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Los Peñasquitos Watershed Management Area Water Quality Improvement Plan Annual Report

Submitted to the San Diego Regional Water Quality Control Board by:

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Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.

With:

Executive Summary

The Water Quality Improvement Plan (WQIP) provides a comprehensive watershed-based program to improve surface water quality in the Los Peñasquitos Watershed Management Area (WMA), in receiving waters in the Los Peñasquitos River, and at nearby beaches. The Responsible Agencies tasked with implementing the WQIP in the Los Peñasquitos WMA are the City of Del Mar, the City of Poway, the City of San Diego, the County of San Diego, and the California Department of Transportation (Caltrans). Caltrans is regulated under a separate permit from the state water resource control board (Order No. 2012-0011-DWQ). However, Caltrans has voluntarily participated in the WQIPs throughout the San Diego Region.

The Los Peñasquitos WMA encompasses almost 94 square miles of urban land and undeveloped open space extending from the Los Peñasquitos Lagoon beyond Highway 67 to the east. The WMA includes Torrey Pines, Del Mar, Carmel Valley, Sorrento Valley, Mira Mesa, Rancho Peñasquitos, Carmel Mountain, Sabre Springs, and Poway. Small finger canyons drain into three main creeks (Carmel Valley Creek, Los Peñasquitos Creek, and Carroll Canyon Creek) that lead into the Los Peñasquitos Lagoon and ultimately the Pacific Ocean.

This Annual Report provides an update on monitoring and assessment completed during the previous reporting period and highlights the strategies implemented and progress toward meeting goals set for the highest priorities. Significant progress has been made in obtaining WQIP goals. The permit term performance based goals have been achieved for dry weather flow reduction by the City of Del Mar and City of San Diego. The City of Poway has surpassed their turf conversion goal and the County of San Diego has made progress in implementing the WQIP. BMPs have been installed and maintained in the City of San Diego, reducing or preventing pollutants from entering receiving waters.

Water Quality Improvement Plan Process

The WQIP identifies goals and strategies to improve the quality of urban runoff waters. These improvements to water quality are achieved through the consistent process of evaluation, goal setting, and monitoring and reporting, according to the following process:

1. Priority and Highest Water Quality Conditions
2. Sources
3. Goals, Strategies, & Schedules
4. Monitoring & Assessment
5. Adaptive Management Process
6. Annual Reporting

With these distinct steps, the WQIP provides a long-term program to measurably improve overall water quality within the Los Peñasquitos WMA. This Annual Report implements Step (6) of the WQIP Process.

Highest Priority Water Quality Conditions

The WQIP identifies the following conditions/pollutants as highest priorities within the Los Peñasquitos WMA:

- Freshwater discharges during dry weather into the Los Peñasquitos Lagoon
- Transport of sediment from upstream sources (current and historical) during rain events into the Los Peñasquitos Lagoon
- Indicator bacteria as measured during both wet and dry weather at Torrey Pines State Beach near the Los Peñasquitos Lagoon mouth

Monitoring and Assessment

The WQIP Monitoring and Assessment Program plays a key role in the Municipal Separate Storm Sewer System (MS4) Permit's new focus on the outcomes of WQIP program implementation to achieve water quality improvement. The long-term receiving water monitoring and MS4 monitoring program provides information on a wide variety of water quality conditions, including the highest priority water quality conditions (HPWQCs) and the other WMA priority water quality conditions (PWQCs).

Receiving waters were last monitored at the long-term monitoring stations during the October 1, 2014, through September 30, 2015, monitoring year. These historical mass loading stations have been monitored since 2001. This data was present in previous monitoring reports. The Responsible Agencies implemented receiving water monitoring in support of the Sediment and Bacteria Total Maximum Daily Loads (TMDLs). Details are provided in Appendix C and highlights are summarized as follows:

- Sediment TMDL:
  - Suspended sediment concentrations (SSCs) were higher at or near peak flow and during the rising limb of the hydrograph for smaller storms such Events 2 and 3 during the 2015–2016 wet season. For the larger storm (Event 1), SSCs in all three WMA creeks remained high throughout the storm and mostly varied with flow, suggesting that the unusually high flows may have mobilized previously deposited sediments that were stored by in-channel vegetation and streambed.
  - The total 2015–2016 sediment load estimate of 23,500 tons per year is above the final Sediment TMDL waste load allocation (WLA) (2,580 tons per year). This TMDL compliance pathway can be achieved by 2034. Monitoring in previous years has recorded annual sediment loads that were below the WLA.

- Bacteria TMDL:
  - During wet weather, the receiving waters at the Los Peñasquitos River Outlet/Beach achieved a 0 percent single-sample maximum exceedance frequency for fecal coliform and a 13 percent (%) single-sample maximum exceedance frequency for total coliform and *Enterococcus*. FM-100 is in compliance with final wet weather single-sample maximum receiving water limitations (RWLs).
  - During the wet season, which evaluates a combination of both wet and dry weather samples, FM-100 achieved a 0% geometric mean exceedance frequency and is in compliance with final dry weather geometric mean RWLs.
  - During the dry season, when recreational activities occur with more regularity, FM-100 achieved a 0% exceedance frequency and is in compliance with the final dry weather geometric mean RWLs.

The MS4 outfall monitoring program provides information on the estimated amount of pollutants coming from monitored MS4 outfalls. Details of this monitoring program are in Appendix C. The results for samples collected during the October 1, 2015, through September 30, 2016, monitoring year were compared with non-storm water action levels and storm water action levels. In dry weather, non-storm water action levels were met over 74% of the time for multiple consituents. In wet weather, only one storm water action level exceedance for turbidity was recorded for wet weather MS4 outfall discharge monitoring locations within the Los Peñasquitos WMA. The Responsbile Agencies plan to continue implementing the WQIP strategies without modification to realize the rewards of these pollutant reduction benefits and will work toward meeting the goals related to the HPWQCs.

The Illicit Discharge Dectection and Elmination (IDDE) Program found non-storm water discharges and worked to eliminate them throughout the WMA. This program helps with dry weather runoff reductions and is one mechanism to achieve some of the fiscal year (FY) 18 performance-based goals. Table ES-1 provides more information about the implementation of the IDDE program throughout the WMA.

Table ES-1
IDDE Program Summary in the Los Peñasquitos WMA

IDDE Program Action	Total Number in WMA
Non-storm water discharges or illicit discharges investigated	589
Sources of non-storm water discharges identified	501
Non-storm water discharges eliminated	465
Sources of illicit discharges or connections identified	488
Illicit discharges or connections eliminated	456
Number of enforcement actions	484[1]

1. The number of enforcement actions issued does not equal the number of identified illicit discharges or connections because some discharge complaints in the last quarter of FY 16 were still under investigation at the end of FY 16.

IDDE = illicit discharge detection and elimination; WMA = Watershed Management Area

In addition to monitoring in the receiving waters and the MS4, the Responsible Agencies conducted special studies. The Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Study found that areas in the upper portion of Los Peñasquitos Creek and in the upper portions of Carmel Valley Creek may have the potential to serve as a sink for sediment within the WMA that can be mobilized during large storms such as the storm in early January 2016. Aerial deposition sampling determined that aerial deposition of sediment was not a significant contributor to the watershed sediment loads compared with the stream loads. The Sediment Load Reduction Quantification Through Outfall Repair and Relocation for the Los Peñasquitos WMA Study estimated the sediment load associated with erosive discharge from 102 City of San Diego outfalls. The load estimation from these 102 outfalls resulted in a load of 85 tons per year that accounts for approximately 1.4% of the total sediment load for the watershed. Of these 102 outfalls, 42 were identified as “high priority” outfalls. Three types of BMPs were investigated to estimate the amount of the loading that could potentially be reduced or eliminated from the high priority outfalls. The San Diego Regional Reference Streams and Beaches Study provided valuable information for the Bacteria TMDL Reopener.

Strategies

Strategies implemented throughout the WMA deliver proven benefits for addressing multiple pollutants by eliminating sources or treating pollutants already found in urban runoff. Responsible Agencies sponsor stream and beach cleanups, provide turf conversion rebates, and work with the public to educate them on the impacts of their actions on the environment. They have also invested in new street sweeping technologies and are refining their catch basin cleaning methodologies. Many of these actions are above and beyond the requirements of the Jurisdictional Runoff Management Program (JRMP) strategies. Figure ES-1 provides a snapshot of the actions that the Responsible Agencies have taken during the previous monitoring year.

Public Outreach and Source Control

- Provide turf conversion rebates
- Engage in enforcement actions for over-irrigation
- Sponsor beach and river cleanup events

Municipal Control Activities

- Sweep streets using new technologies and on a more frequent basis
- Clean debris out of catch basins
- Build and maintain structural best management practices (BMPs)

Figure ES-1
Los Peñasquitos WMA Strategy Overview

The Los Peñasquitos/Sorrento Restoration Program

One of the goals identified for this WMAs is restoration of 84 acres of salt marsh habitat. The Responsible Agencies have made considerable progress towards the implemenantation of the Los Peñasquitos/Sorrento Restoration Program. Phase I of this project includes removal of sediment and construction of sediment management facilities, repairs to storm drain outfalls, and realignment of creeks in the Los Peñasquitos Lagoon to ease water flow, reduce upstream flooding, and improve habitat conditions, as well as pilot restoration activities. Phase II of this project includes the large-scale restoration of salt marsh habitat in the Lagoon. The City of San Diego has been identified as the Lead Agency and is working in collaboration with the Responsible Agencies, State Parks, the Coastal Conservancy, the Los Peñasquitos Lagoon Foundation, and other stakeholders. Modeling was completed in FY 16 to confirm the preferred alternative for the Lagoon restoration. Additionally, some technical studies such as biological efforts and hydraulic and hydrology reports were completed for Phase I of the project. Next steps for FY 17 include additional modeling, completion of the concept design, and commencement of the public outreach process.

Progress Toward Meeting Goals

To measure progress toward achieving their goals and addressing the HPWQCs, the Los Peñasquitos WMA Responsible Agencies developed numeric goals and schedules. Numeric goals may take a variety of forms, but all forms can quantify a benefit to water quality so that progress toward and achievement of the goals are measurable. During this MS4 Permit term, the Responsible Agencies have defined goals based on actions they are taking to improve water quality in the WMA. Many of the goals are on track or have been met. Table ES-2 summarizes the progress of Responsible Agencies toward meeting their goals during the previous monitoring year.

Table ES-2
Los Peñasquitos WMA Progress Toward Performance-Based Goals (FY 16)

Responsible Agency	Weather (Wet/Dry)	FY 18 Goal	FY 16 Progress
City of Del Mar	Dry	10% reduction of anthropogenic surface dry weather flows that originate within the Del Mar's jurisdictional boundaries	Achieved to Date
City of Poway	Wet and Dry	5% increase from the baseline through turf conversion	Achieved
City of San Diego	Wet and Dry	36 acres of drainage area treated through construction of 9 green infrastructure BMPs	Achieved
	Dry	10% reduction in prohibited dry weather flow from baseline measured at persistently flowing outfalls in the WMA	Achieved to Date
County of San Diego	Wet	Progress toward implementing the WQIP.	In Progress

% = percent; BMP = best management practice; FY = fiscal year; WMA = watershed management area

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APPENDIX E	Adaptive Management/Modifications

Acronyms and Abbreviations

Acronym or Abbreviation	Definition
%	percent
AB 411	California Assembly Bill 411, the Beach Safety Act
AEP	California Association of Environmental Professionals
AGR	agricultural supply beneficial use
Bacteria TMDL	*Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001
BIOL	biological habitat beneficial use
BMP	best management practice
Caltrans	California Department of Transportation
CCTV	closed-circuit television
CEQA	California Environmental Quality Act
City	City of San Diego
Copermittee	Operator of a municipal separate storm sewer system in San Diego County that is party to the MS4 Permit
County	County of San Diego
EST	estuarine habitat beneficial use
FY	fiscal year
HMP	Hydromodification Management Plan
HPWQC	highest priority water quality condition
IDDE	illicit discharge detection and elimination
IPM	integrated pest management
JRMP	Jurisdictional Runoff Management Program
LID	low-impact development
MS4	Municipal Separate Storm Sewer System

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
MS4 Permit	San Diego Regional Water Quality Control Board Order No. R9-2013-0001 (amended by Order No. R9-2015-0001 and by Order No. R9-2015-0100), National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems Draining the Watersheds Within the San Diego Region
MWD	Metropolitan Water District
NA	not applicable
NPDES	National Pollutant Discharge Elimination System
PDP	priority development project
PGA	pollutant-generating activity
PWQC	priority water quality condition
REC-1	water contact recreation beneficial use
Regional Board	San Diego Regional Water Quality Control Board
Responsible Agency	Responsible Agencies include parties subject to the Bacteria TMDL and participating in the Water Quality Improvement Plan, specifically the Copermittees in the Los Peñasquitos River WMA
RSC	regenerative storm water conveyance
RWL	receiving water limitation
SANDAG	San Diego Association of Governments
SCCWRP	Southern California Coastal Water Research Project
Sediment TMDL	*Total Maximum Daily Load (TMDL) for Sedimentation in Los Peñasquitos Lagoon*, Resolution No. R9-2012-0033
SHELL	shellfish harvesting beneficial use
SOP	standard operating procedure
SSC	suspended sediment concentrations

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
SUSMP	Standard Urban Storm Water Mitigation Plan
TMDL	Total Maximum Daily Load
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
WARM	warm freshwater habitat beneficial use
WDR	waste discharge requirements
WLA	waste load allocation
WMA	Watershed Management Area
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan
WQO	water quality objective

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1 Introduction

The San Diego Regional Water Quality Control Board (Regional Board) regulates discharges from municipal separate storm sewer systems (MS4s) in the San Diego Region *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region* (MS4 Permit) under Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100 (Regional Board, 2015). The MS4 Permit covers portions of San Diego County, southern Orange County, and southwestern Riverside County and regulates Phase I municipalities that own and operate MS4s (i.e., storm drain systems) that discharge storm water (wet weather) runoff and non-storm water (dry weather) runoff to surface waters throughout the San Diego region.

Under the MS4 Permit, the San Diego region is subdivided into 10 watershed management areas (WMAs), which cover the major, natural drainages in the region. The MS4 Permit requires a Water Quality Improvement Plan (WQIP) (Los Peñasquitos WMA Copermittees, 2015) to be developed for each WMA. The San Diego County Copermittees are listed in Table 1a of the MS4 Permit; the Copermittees with jurisdictional area within the Los Peñasquitos WMA are as follows:

- City of Del Mar
- City of Poway
- City of San Diego
- County of San Diego

Each Copermittee, referred to as a Responsible Agency in the WQIP, must comply with the MS4 discharge prohibitions and receiving water limitations outlined in the MS4 Permit through timely implementation of control measures, other actions specified in the MS4 Permit, and adherence to the WQIP.

The California Department of Transportation (Caltrans) is under a separate storm water permit from the State of California to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters (Order No. 2012-0011-DWQ). The California Department of Transportation (Caltrans) maintains multiple major transportation corridors. Caltrans has partial responsibility for the implementation of the *Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001, referred to as the Bacteria Total Maximum Daily Load, or Bacteria TMDL (Regional Board, 2010) and is therefore included as a Responsible Agency, even though it is not listed in the MS4 Permit as a Copermittee. Caltrans is also a named party in the *Total Maximum Daily Load for Sedimentation in Los Peñasquitos Lagoon*, Resolution No. R9-2012-0033 (Sediment TMDL) expected to be implemented in the next Caltrans NPDES Permit. Caltrans voluntarily participated in WQIPs across the San Diego region.

The goal of the WQIP is to guide the Responsible Agencies' to implement jurisdictional programs, known as Jurisdictional Runoff Management Programs (JRMPs) toward an outcome-based approach and to improve water quality. To accomplish this goal, an adaptive planning and management process will be used to identify the highest priority water quality condition(s) (HPWQC) within a watershed. Responsible Agencies will also implement strategies through the WQIP to achieve improvements in the quality of discharges from storm drain systems and within receiving waters such as creeks, rivers, and beaches. The final WQIP for the Los Peñasquitos WMA can be found on the Project Clean Water website (www.projectcleanwater.org).

The MS4 Permit also requires the Responsible Agencies within each WMA to submit an Annual Report to demonstrate progress toward implementing the WQIPs and corresponding JRMPs. The Annual Report covers two different reporting periods. The first reporting period is from July 1, 2015, through June 30, 2016, for the JRMPs and WQIP strategy implementation. The second reporting period is from October 1, 2015, through September 30, 2016, for monitoring and assessment programs. Progress toward goals may be assessed in either reporting period, depending on the goal metric. This Annual Report addresses the requirements in Provision F.3.b.(3) and other provisions of the MS4 Permit.

Table 1-1 provides an overview of the MS4 Permit requirements that must be addressed and where they are addressed within the Annual Report. The corresponding appendix, provides additional detail regarding the specific MS4 Permit requirements and where they are addressed within the Annual Report.

Table 1-1
MS4 Permit WQIP Annual Reporting Provisions and Corresponding Annual Report Sections[1]

MS4 Permit Provision[2]	WQIP Annual Report Section						WQIP Appendix			
	Section 1: Introduction	Section 2: WMA Priorities & Goals	Section 3: Monitoring	Section 4 : Achieving Goals	Section 5: Adaptive Management	Section 6: Conclusions	Appendix B - Goals	Appendix C - Monitoring	Appendix D – Jurisdictional Specific Information	Appendix E – Adaptive Management
Provision A –- Prohibitions and Limitations										
A.4.a.(2)			X		X			X	X	X
Provision B – Water Quality Improvement Plans										
B.5.a.					X			X		X
B.5.b.			X	X	X		X	X	X	X
B.5.c.					X					X

Table 1-1 (continued)
MS4 Permit WQIP Annual Reporting Provisions and Corresponding Annual Report Sections[1]

MS4 Permit Provision[2]	WQIP Annual Report Section						WQIP Appendix			
	Section 1: Introduction	Section 2: WMA Priorities & Goals	Section 3: Monitoring	Section 4 : Achieving Goals	Section 5: Adaptive Management	Section 6: Conclusions	Appendix B - Goals	Appendix C - Monitoring	Appendix D – Jurisdictional Specific Information	Appendix E – Adaptive Management
Provision D – Monitoring and Assessment Program Requirements										
D.1.e.(2)(c)			X					X		
D.2.b.(iv)			X					X		
D.4.b.(1)(a)(ii)			X					X		
D.4.b.(1)(b)			X		X			X		X
D.4.b.(1)(c)			X		X			X		X
D.4.b.(2)(a)					X			X		X
D.4.b.(2)(b)			X		X			X		X
D.4.b.(2)(c)			X		X			X		X
D.4.c.			X					X		
D.4.d.					X					X
D.4.d.(1)					X					X
D.4.d.(2)					X					X
D.4.d.(3)					X					X
Provision E – Jurisdictional Runoff Management Programs										
E.1.b.									X	
E.2.d.(4)			X					X		
E.8.c.	X								X	
Provision F – Reporting										
F.1.b.(6)					X					X
F.2.a.(2)					X					X
F.2.a.(3)					X					X
F.2.b.(1)					X				X	
F.2.b.(2)					X				X	
F.2.c.(1)(c)					X					X

Table 1-1 (continued)
MS4 Permit WQIP Annual Reporting Provisions and Corresponding Annual Report Sections[1]

MS4 Permit Provision[2]	WQIP Annual Report Section						WQIP Appendix			
	Section 1: Introduction	Section 2: WMA Priorities & Goals	Section 3: Monitoring	Section 4 : Achieving Goals	Section 5: Adaptive Management	Section 6: Conclusions	Appendix B - Goals	Appendix C - Monitoring	Appendix D – Jurisdictional Specific Information	Appendix E – Adaptive Management
F.3.b.(3)(a-f)	X		X	X	X			X	X	X
F.6						X		X		
Attachment E - Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2013-0001										
Attachment E			X	X				X		

1. Appendix A provides additional details regarding the specific MS4 Permit requirements and where they are addressed within the Annual Report.
2. Some Permit provisions are addressed in individual jurisdictional JRMPs.

WQIP = Water Quality Improvement Plan

The Los Peñasquitos WMA WQIP Annual Report for 2015–2016 is structured as follows:

Section 1, Introduction – This section provides an overview of the MS4 Permit, the WQIP, and the Annual Reporting requirements. Includes references to Appendix A:

Appendix A. Crosswalk of Permit Requirements and Annual Report References.

Section 2, Overview of the Los Peñasquitos Watershed Management Area – This section introduces the watershed management area and the priority water quality conditions (PWQCs) of the watershed. The numeric goals and schedules developed to measure progress toward addressing the HPWQCs are presented. Includes references to Appendix B:

Appendix B. Water Quality Improvement Plan Numeric Goals

Section 3, Monitoring and Assessment – This section summarizes the monitoring programs and provides an assessment of the data collected relative to the HPWQCs. Includes references to Appendix C:

Appendix C. Monitoring Results and Assessments

Section 4, Implementation and Progress Toward Achieving Numeric Goals – The section discusses the assessment of the progress toward meeting the numeric goals, with a focus on those numeric goals occurring during the MS4 Permit term. The section also provides an overview of the strategies implemented to meet the numeric goals, the status of implementation, and plans for the coming year. Includes references to Appendix D:

Appendix D. Jurisdictional Runoff Management Program Annual Report Forms, Fiscal Analysis, Updated Best Management Plan (BMP) Manuals, and Jurisdictional Strategies

Section 5, Adaptive Management – This section summarizes the elements of the WQIP's process, which can be changed during the course of MS4 Permit implementation based on monitoring results and new information gathered during the reporting period. Includes references to Appendix E:

Appendix E. Adaptive Management/Modifications

Section 6, Conclusions and Recommendations – This section provides the conclusions and recommendations that are based on the data collected and assessments conducted during implementation of the WQIP in fiscal year (FY) 2015–2016 (FY 16).

Section 7, References – This section lists the sources used to prepare this Annual Report.

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2 Overview of Los Peñasquitos Watershed Management Area

The Los Peñasquitos WMA drains an area of approximately 94 square miles in central San Diego County. The southernmost portion of the watershed is just north of Rose Canyon, the northernmost portion is south of Lake Poway, and the easternmost portion is near State Route 67. Five agencies located in the Los Peñasquitos WMA maintain jurisdiction over the land; the land area for each agency is shown in Figure 2-1. Caltrans, along with other non-Phase 1 MS4s dischargers, is regulated under separate permits, as discussed in Section 1 of the Los Peñasquitos WMA WQIP. They have jurisdiction over 2.4 percent (%) of the land are within the WMA. However, Caltrans has voluntarily participated in development of the WQIP to implement the Bacteria and Sediment TMDLs[1].

The Responsible Agencies are responsible for discharges originating from non-MS4 lands outside of their regulatory control (i.e., industrial, agricultural, Phase II, state, federal, and Indian reservation lands) if those pollutants are ultimately discharged from the MS4 of a Responsible Agency. Therefore, Responsible Agencies look to collaborate and improve communication with non-municipal sources and the appropriate regulatory agencies to ensure that these discharges are regulated before they enter the Responsible Agencies' MS4s.

The Los Peñasquitos WMA was divided into four subwatersheds to focus on the receiving waters when selecting PWQCs and implementing the WQIP. These subwatersheds are the Los Peñasquitos Lagoon, Carroll Canyon Creek, Los Peñasquitos Creek, and Carmel Valley Creek.

The Los Peñasquitos Lagoon subwatershed contains a coastal salt marsh lagoon bearing the same name. The lagoon is located in the Torrey Pines State Reserve and ultimately discharges its waters to the Pacific Ocean. The lagoon is one of the few remaining native salt marsh lagoons within the state of California, and many endangered species inhabit the area.

The three remaining subwatersheds each include a stream that flows into the Los Peñasquitos Lagoon. The Carroll Canyon subwatershed is drained by Carroll Canyon Creek; its headwaters originate near the Miramar Reservoir, and once it crosses Highway 805, the creek is referred to as Soledad Canyon Creek or sometimes Sorrento Valley Creek. The Los Peñasquitos Creek is the largest tributary of the Los Peñasquitos Lagoon. Its headwaters extend to the easternmost portion of the WMA just west of Fernbrook, California. The Los Peñasquitos Creek is joined by the Soledad Canyon Creek of the Carroll Canyon subwatershed in Sorrento Valley near Interstate 5 before flowing into the Los Peñasquitos Lagoon. The Carmel Valley Creek subwatershed is drained by a creek bearing the same name. The creek's headwaters begin near Black Mountain and it drains to the northwestern most portion of the Los Peñasquitos Lagoon.

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[1] Bacteria TMDL: *Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001
Sediment TMDL: *Total Maximum Daily Load (TMDL) for Sedimentation in Los Peñasquitos Lagoon*, Resolution No. R9-2012-0033

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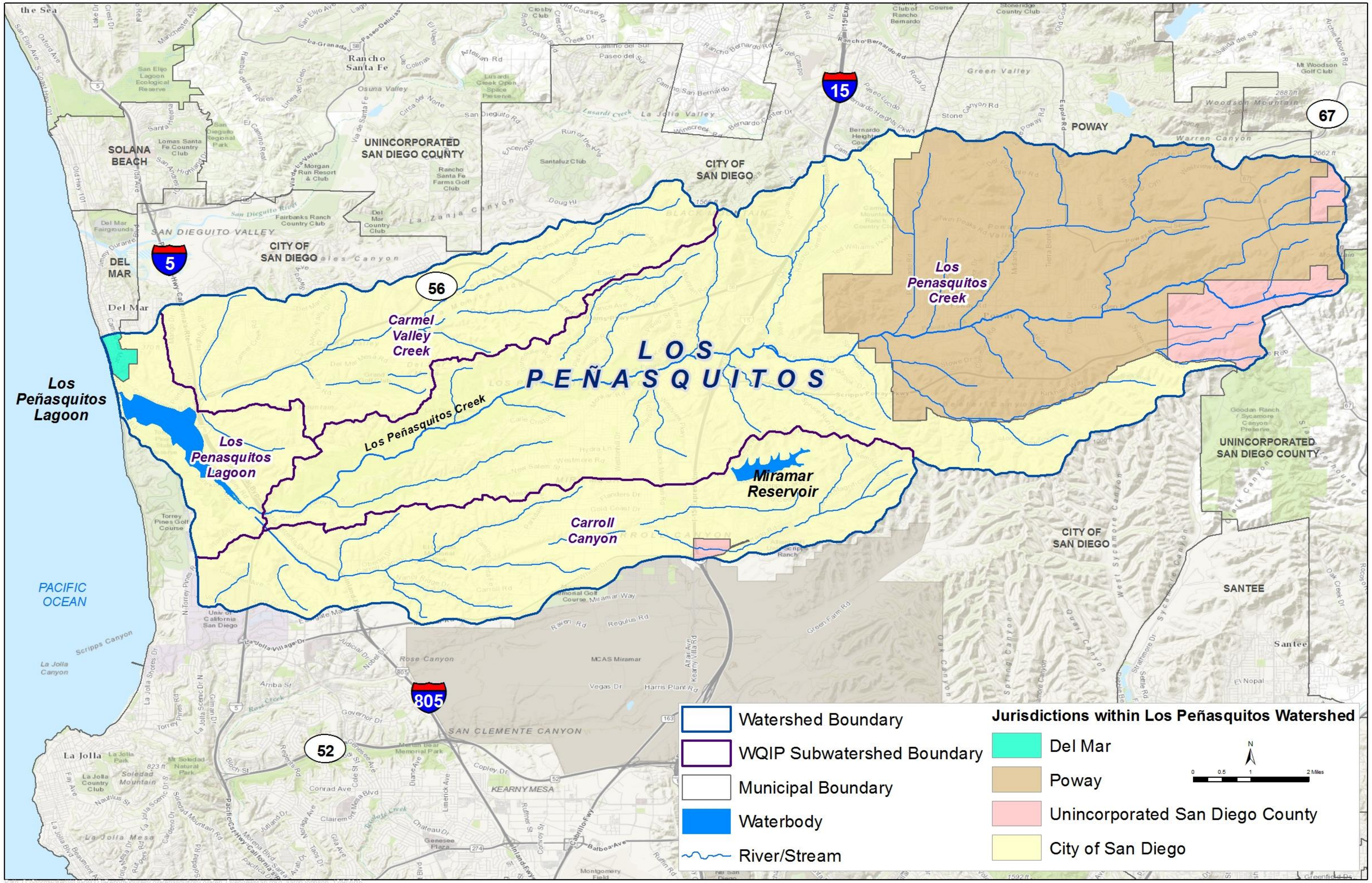

Figure 2-1
Los Peñasquitos WMA Subwatersheds

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2.1 Los Peñasquitos WMA WQIP

The overarching goal of the Los Peñasquitos WMA WQIP is to further the Clean Water Act’s objective to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the state. This goal will be accomplished through a planning and adaptive management process that identifies the PWQCs and HPWQCs. The Los Peñasquitos WMA WQIP identifies strategies (implemented through JRMPs) to address water quality conditions in the WMA with a particular focus on the PWQCs and the HPWQCs to achieve measurable numeric goals and to improve the quality of MS4 discharges and, in turn, the receiving waters. The Los Peñasquitos WMA WQIP outlines how the Responsible Agencies within the WMA are evaluating water quality conditions, prioritizing those water quality conditions, and using these common priorities to guide jurisdictional and watershed-scale programs to address the HPWQCs.

2.2 Priority and Highest Priority Water Quality Conditions

The WQIP identifies the PWQCs on the basis of an assessment of receiving water conditions, MS4 discharges and their potential impacts, and the sources of pollutants in the watershed. The PWQCs for the Los Peñasquitos WMA are summarized by the beneficial use and pollutant category in Figure 2-2. Details about the PWQC selection process and a full list of the PWQCs are in Appendix A and Appendix F, respectively, of the Los Peñasquitos WMA WQIP.

The HPWQCs are the foundation for establishing the WQIP numeric goals and schedules and selecting water quality improvement strategies to achieve the necessary improvements in the quality of MS4 discharges and/or receiving waters. Table 2-1 details the following conditions/pollutants as highest priorities within the Los Peñasquitos WMA. The HPWQCs are highlighted in bold in Figure 2-2.

Table 2-1
Highest Priority Water Quality Conditions in the Los Peñasquitos WMA

<table>
<tr><th rowspan="2">Highest Priority Water Quality Condition</th><th rowspan="2">Potential Stressor</th><th colspan="2">Temporal Extent</th><th rowspan="2">Subwatershed(s)</th></tr>
<tr><th>Dry</th><th>Wet</th></tr>
<tr><td>Impairment of EST and BIOL in Los Peñasquitos Lagoon</td><td>Sedimentation/Siltation, Hydromodification</td><td>—</td><td>✓</td><td rowspan="3">Carroll Canyon, Carmel Valley Creek, Los Peñasquitos Creek, Los Peñasquitos Lagoon</td></tr>
<tr><td>Impairment of EST and BIOL in Los Peñasquitos Lagoon</td><td>Freshwater Discharges</td><td>✓</td><td>—</td></tr>
<tr><td>Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar</td><td>Indicator Bacteria</td><td>✓</td><td>✓</td></tr>
</table>

BIOL = biological habitats beneficial use; EST = estuarine habitat beneficial use; REC-1 = water contact recreation beneficial use

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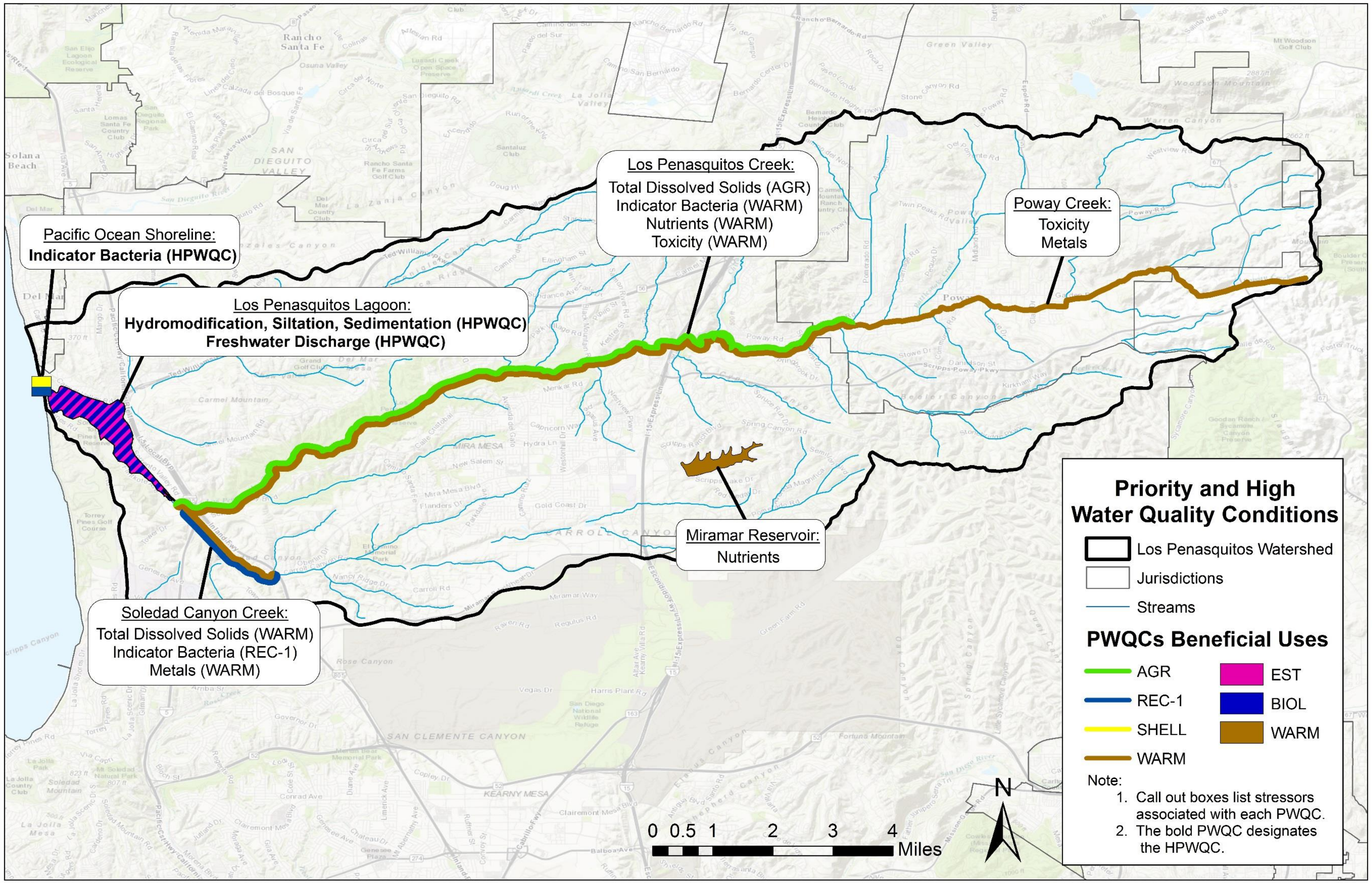

Figure 2-2
Los Peñasquitos WMA Priority and Highest Priority Water Quality Conditions

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2.3 WQIP Numeric Goals

In the WQIP, the Responsible Agencies identified and developed specific water quality improvement numeric goals and strategies to address the HPWQCs identified within the WMA. The numeric goals (interim and final) and corresponding schedules support implementation of the WQIP and measure reasonable progress toward addressing the HPWQCs. In addition, the Responsible Agencies' monitoring and assessment programs measure progress toward attaining these goals.

The numeric goals for the Los Peñasquitos WMA are presented in detail by jurisdiction in Appendix B.

The goals extend beyond the timeframe of the current MS4 Permit. For this reason, the numeric goals within the WQIP are categorized into three distinct time periods:

1. Interim goals within the five-year MS4 Permit term. These goals are typically specific to each Responsible Agency's jurisdiction.
2. Interim goals based on the interim Bacteria TMDL and Sediment TMDL (Regional Board, 2012) compliance pathways.
3. Final goals based on final Bacteria TMDL and Sediment TMDL compliance options.

The timelines for the Los Peñasquitos WMA bacteria and sediment numeric goals are illustrated in Figure 2-3 and Figure 2-4, respectively.

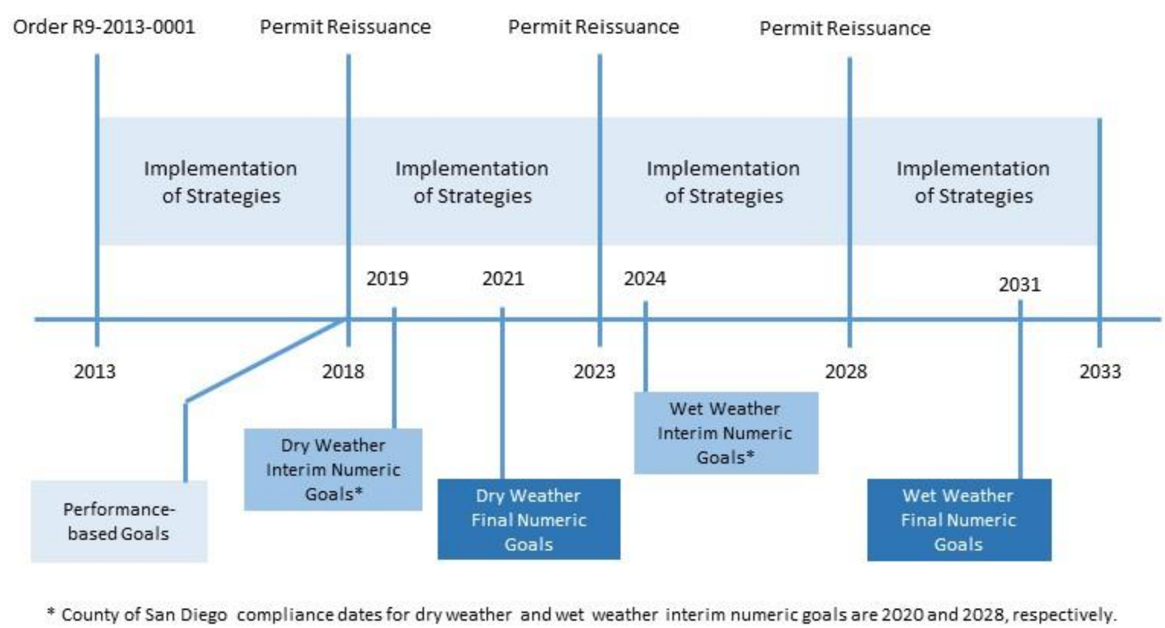

Figure 2-3
Timelines and Relationships for Bacteria TMDL Numeric Goals

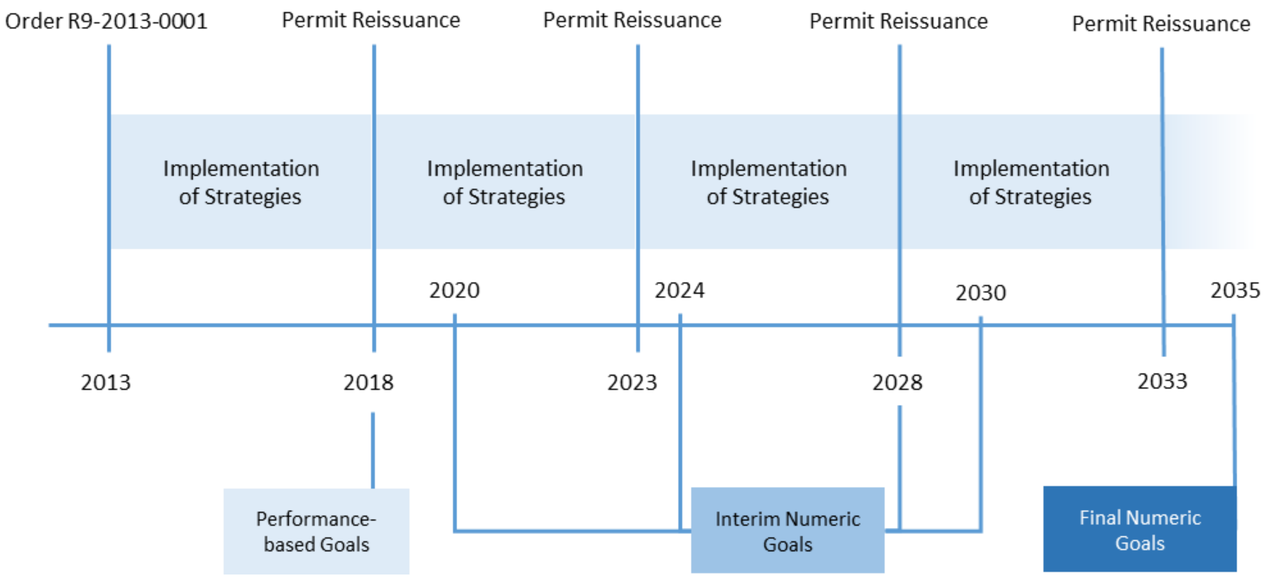

Figure 2-4
Timelines and Relationships for Sediment TMDL Numeric Goals

3 Monitoring and Assessment

The Los Peñasquitos Lagoon is one of the few remaining coastal lagoons in southern California and Torrey Pines State Beach at Del Mar near the Los Peñasquitos Lagoon mouth is a popular state beach. These two important water bodies encompass the HPWQCs in the Los Peñasquitos WMA.

This section discusses the monitoring related to maintaining salt marsh habitat in the Los Peñasquitos Lagoon and water contact recreation uses at the Pacific Ocean Shoreline. Monitoring related to the 2013–2018 MS4 Permit term and interim/final goals is detailed, including tracking of performance-based goals, receiving water monitoring for TMDL compliance, vegetation monitoring in the Los Peñasquitos Lagoon, MS4 monitoring, and special studies.

3.1 Monitoring Related to Performance Based Goals

The Responsible Agencies have established dry and wet weather goals for the 2013–2018 MS4 Permit term. Tables 3-1 and 3-2 summarize the data collected during the 2015–2016 monitoring year to assess progress toward meeting fiscal year (FY) 18 goals.

Table 3-1
Dry Weather Monitoring Related to Performance Based Goals

Jurisdiction	Highest Priority Water Quality Condition	Performance-Based Goal	Monitoring Element
City of Del Mar	Impairment of EST and BIOL in the Los Peñasquitos Lagoon from freshwater discharge Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar from Indicator Bacteria	Reduce anthropogenic surface dry weather flows[1] that originate within Del Mar's jurisdictional boundaries by 10%	Collected flow measurements at selected MS4 outfalls Sampling Days: 2 Field site visits: 15
City of Poway	Impairment of EST and BIOL in the Los Peñasquitos Lagoon due to freshwater discharge Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar due to indicator bacteria	Achieve a 5% increase in turf conversion from the baseline	Tracked the implementation of turf conversion, including turf conversion increase

Jurisdiction	Highest Priority Water Quality Condition	Performance-Based Goal	Monitoring Element
City of San Diego	Impairment of EST and BIOL in the Los Peñasquitos Lagoon due to freshwater discharge Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar due to indicator bacteria	Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality from 36 acres of drainage area	Tracked the acres of drainage area treated by green infrastructure BMPs
		Reduce the prohibited[2] dry weather flow from baseline measured at persistently flowing outfalls during dry weather by 10%	Collected flow measurements at persistently flowing outfalls. Sampling Days: 37
County of San Diego	Impairment of EST and BIOL in the Los Peñasquitos Lagoon due to freshwater discharge Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar due to indicator bacteria	Eliminate anthropogenic dry weather flows[1] from storm drain outfalls either by aggregate flow volume or the number of persistently flowing outfalls during dry weather	Determine baseline for number and aggregate flow in 2016

1. The term “dry weather flows” excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.
2. Does not include allowable discharges as defined in Provision A and Provision E.2.a of the MS4 Permit.

% = percent; BIOL = biological habitat beneficial use; BMP = best management practice; EST = estuarine habitat beneficial use; MS4 = municipal separate storm sewer system; REC-1 = water contact recreation beneficial use

Table 3-2
Wet Weather Monitoring Related to Performance Based Goals

Jurisdiction	High Priority Water Quality Condition	Performance-Based Goal	Monitoring Element
City of Del Mar	Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar due to indicator bacteria	Reduce anthropogenic surface dry weather flows[1] that originate within Del Mar's jurisdictional boundaries by 10% to address bacteria regrowth contributing during wet weather	Collected flow measurements at selected MS4 outfalls during dry weather Sampling Days: 2 Field site visits: 15
City of Poway	Impairment of EST and BIOL in the Los Peñasquitos Lagoon due to sediment Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar due to indicator bacteria	Achieve a 5% increase in turf conversion from the baseline	Tracked the implementation of turf conversion, including turf conversion increase
City of San Diego	Impairment of EST and BIOL in the Los Peñasquitos Lagoon due to Sediment Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar due to indicator bacteria	Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality from 36 acres of drainage area	Tracked the acres of drainage area treated by green infrastructure BMPs
County of San Diego	Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar due to indicator bacteria	Implement program strategies to meet FY 18 goal	See Section 4.1.4 for details

1. The term "dry weather flows" excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.

% = percent; BIOL = biological habitat beneficial use; BMP = best management practice; EST = estuarine habitat beneficial use; MS4 = municipal separate storm sewer system; REC-1 = water contact recreation beneficial use

3.2 Monitoring Related to Interm and Final Goals

The Responsible Agencies have implemented the Monitoring and Assessment Program outlined in Section 5 of the Los Peñasquitos WMA WQIP to track progress toward meeting long-term WQIP goals. The program includes receiving water monitoring, MS4 outfall monitoring, and the designated special studies. This section provides an overview of the monitoring conducted to track this progress through this reporting period. The full details of the monitoring results are in Appendix C.

Los Peñasquitos WMA Sediment TMDL Compliance Monitoring Program

The Sediment TMDL Compliance Monitoring Program has two components including a sediment monitoring component for the upper watershed and vegetation monitoring component at the lagoon. The sediment component monitors suspended sediment concentrations (SSC), conducts volumetric streambed sampling and pebble counts for particle-size distribution, and estimates wet weather sediment loads in each of the WMA's three major tributary creeks during wet weather. Bedload samplers were installed with each wet weather event and each sampling location. Pebble counts were conducted prior to the first monitored wet weather event and after each monitored event to document changes in the streambed composition. The vegetation component includes annual vegetation monitoring in the Los Peñasquitos Lagoon to track vegetation changes over time. The Responsible Agencies are collaborating with the Los Peñasquitos Lagoon Foundation to represent the vegetation data in an appropriate and consistent manner.

Section 2.6 of Appendix C provides more information about the sampling performed in the 2015–2016 monitoring year and Attachment B of Appendix C provides the Sediment TMDL Compliance Monitoring Report. The data collected as part of this program will be used to assess the receiving water and lagoon restoration compliance pathways in future years. A summary of the results from the 2015–2016 monitoring year includes the following:

- SSCs were higher at or near peak flow and during the rising limb of the hydrograph for smaller storms such Events 2 and 3 during the 2015–2016 wet season. For the larger storm (Event 1), SSCs in all three WMA creeks remained high throughout the storm and mostly varied with flow, suggesting that the unusually high flows may have mobilized previously deposited sediments that were stored by in-channel vegetation and streambed.
- The total 2015–2016 sediment load estimate of 23,500 tons per year is above the final Sediment TMDL waste load allocation (WLA) (2,580 tons per year). This is one TMDL compliance pathway that can be achieved by 2034. Monitoring in previous years has recorded annual sediment loads that were below the WLA.

Bacteria TMDL Compliance Monitoring Program

The Bacteria TMDL Compliance Monitoring Program monitors bacteria indicators at the historical California Assembly Bill 411 (AB 411) monitoring location in San Diego County at the mouth of the Los Peñasquitos Lagoon. Monitoring occurred as required during both dry and wet weather.

Wet weather monitoring was conducted at the monitoring location during three storm events during the wet season (October 1 through April 30). During the recreation season (April 1 through October 31), samples are collected at monitoring location five times per month consistent with AB 411 requirements, and during dry periods of the wet season (November 1 through March 31) on a monthly basis per Bacteria TMDL requirements. Samples were collected on dry weather days, after an antecedent dry period of 72 hours with less than 0.1 inch of rainfall. Grab samples were collected in a manner consistent with requirements of the AB 411 program and were analyzed for total coliform, fecal coliform, and *Enterococcus*.

Section 2.7 of Appendix C provides more information on the sampling performed in the 2015–2016 monitoring year and Attachment A of Appendix C provides the Bacteria TMDL Compliance Monitoring Report. The data collected as part ofthis program will be used to assess the receiving water compliance pathway in future years. The results of the 2015–2016 monitoring year are summarized as follows:

- ❖ During wet weather, the receiving waters at the Los Peñasquitos River Outlet/Beach achieved a 0% single-sample maximum exceedance frequency for fecal coliform and a 13% single-sample maximum exceedance frequency for total coliform and *Enterococcus*. FM-100 is in compliance with final wet weather single-sample maximum receiving water limitations (RWLs).
- ❖ During the wet season, which evaluates a combination of both wet and dry weather samples, FM-100 achieved a 0% geometric mean exceedance frequency and is in compliance with final dry weather geometric mean RWLs.
- ❖ During the dry season, when recreational activities occur with more regularity, FM-100 achieved a 0% exceedance frequency and is in compliance with the final dry weather geometric mean RWLs.

Los Peñasquitos WMA MS4 Outfall Monitoring

The Responsible Agencies implemented the dry and wet weather MS4 outfall monitoring program, as detailed in Section 5 of the WQIP. The dry weather MS4 monitoring program is a combination of field screening and collection of samples at persistently flowing major outfalls. Field screening includes visual monitoring of all major MS4 outfalls to identify and eliminate sources of persistently flowing non-storm water discharges. This information is also used to track the progress of some of the 2018 MS4 Permit term goals.

Water quality sample collection provides information on the impact of MS4 outfalls on receiving water quality during dry weather. The goal of the wet weather MS4 monitoring program is to identify pollutants in storm water discharges from the MS4s and to guide pollutant source identification efforts by collecting paired water quality samples and flow data. Annually, the data from the dry weather program are compared with the non-storm water action levels and data from the wet weather program are compared with the storm water action levels. During the current monitoring year, in dry weather non-storm water action levels were met over 74% of the time for multiple consituents and in wet weather only one storm water action level exceedance for turbidity was recorded.The data collected as part of this program will be used to assess the MS4 outfall compliance pathway toward reaching interim and long-term goals in future years. Total suspended solids (TSS) concentrations and bacteria indicator concentrations are measured during both dry and wet weather sampling to assess sediment and bacteria concentrations loads, respectively.

Table 3-3 summarizes the number of major outfalls visited during the 2015–2016 monitoring year for each Responsible Agency, along with the dates of the analytical monitoring. The County of San Diego does not have any major outfalls in the Los Peñasquitos WMA, but did monitor 28 minor outfalls twice during this reporting period. No flows were detected at these sites. Sections 3 and 4 of Appendix C provide more information on dry and wet weather MS4 monitoring programs, respectively. Attachments C and D (Dry and Wet Weather Assessments) of Appendix C provide detailed calculations with regard to the these monitoring programs. The data collected as part of this program will be used to assess MS4 compliance pathways in future years.

Table 3-3
Number of Major MS4 Outfalls Monitored During the 2015–2016 Monitoring Year

Jurisdiction	Number of Major Outfalls Visited Per Year				
	Field Screening[1]	Dry Weather Monitoring		Wet Weather Monitoring	
		Number of Sites[2]	Dates	Number of Sites[2]	Dates
City of Del Mar	3 (1)[3]	1	6/30/2016 8/12/2016	1	1/30/2016
City of Poway	30 (37)[3]	5	7/28/2016 7/29/2016 8/2/2016 8/2/2016	3	3/5/2016
City of San Diego	198 (198)[4]	5	2/4/2016 3/16/2016 4/25/2016	1	1/30/2016
County of San Diego	28[5]	0[5]	NA	0[5]	NA

1. Field screening represents the number of major MS4 outfalls visited in the 2015–2016 monitoring year. Total number of major outfalls within each jurisdiction in the WMA is provided in parentheses.
2. Number of sites represents the number of outfalls with priority persistent flows selected for dry weather water quality sampling.
3. For Copermittees with fewer than 125 major outfalls in the WMA, 80% of major outfalls must be screened twice per year.
4. For Copermittees with portions of their jurisdictions in more than one WMA and more than 500 major MS4 outfalls in their jurisdictions, at least 500 major outfalls must be inspected once per year.
5. There are 28 minor outfalls but no major outfalls have been identified within the County of San Diego for this WMA. Therefore, no water quality data was collected by the County of San Diego at major MS4 locations in the Los Peñasquitos WMA.

NA = not applicable

Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Study

The Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Study characterized potential sediment sources contributing to the lagoon by conducting wet weather stream monitoring and dry weather aerial deposition monitoring. Monitoring was conducted concurrently with the Sediment TMDL Monitoring Program, which monitors total sediment loads into the lagoon from the outlet of each of the three subwatersheds. Section 5.1 of Appendix C provides more information on this special study and Attachment E of Appendix C provides the Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Study Final Report.

This study identified reaches within each subwatershed stream reaches that may warrant further investigation. These areas include two reaches within the Carroll Canyon Creek subwatershed including a reach of Carroll Canyon Creek that runs through the gravel mine operations and the immediate reach downstream of the gravel mine. Other reaches are located in the upper portions of both the Los Peñasquitos Creek subwatershed and the Carmel Valley Creek subwatershed. The study found that these areas have the potential to serve as a sink for sediment within the WMA and the sediment can be mobilized during large storms such as the storm in early January 2016. Carmel Valley Creek loads are consistently much smaller than those of the other two subwatersheds, making it a low priority for management measures. The aerial deposition sampling determined that aerial deposition of sediment was not a significant contributor to the watershed sediment loads compared with the stream loads.

Outfall Repair and Relocation Study

The Sediment Load Reduction Quantification Through Outfall Repair and Relocation for the Los Peñasquitos WMA Study was performed in order to assess the current sediment loading to the Los Peñasquitos Lagoon caused by the erosive scour associated with outfall discharge, as well as possible sediment load reductions associated with various BMPs. The load estimations from 102 City of San Diego outfalls resulted in a load of 85 tons per year that accounts for approximately 1.4% of the total sediment load for the watershed. Of these 102 outfalls, 42 were identified as “high priority” outfalls because of their high annual sediment load production.

Three types of BMPs were investigated to estimate the amount of the loading that could potentially be reduced or eliminated. It was determined that the total sediment load modeled could be reduced by implementing the following BMP practices at the 42 high priority outfalls:

- 50% reduction in sediment through outfall relocation (extending storm water conveyance infrastructure from a location near the top of a canyon to one near the valley floor);
- 79% reduction in sediment by installing energy dissipation structures (placing materials below the outfall that reduce the energy of incoming storm flows); and
- 84% reduction in sediment by implementing regenerative storm water conveyance (RSC) practices (a relatively new BMP intended to treat storm water through a series of energy dissipation structures and small retention ponds).

San Diego Regional Reference Streams and Beaches Study

The San Diego Regional Reference Streams and Beach Study (Southern California Coastal Water Research Project [SCCWRP], 2015 and SCCWRP, 2016) characterizes the natural background concentrations of bacteria from natural streams and beaches in a condition minimally disturbed by anthropogenic activities, referred to as a “reference” condition. These data are being used during the Bacteria TMDL Reopener to revisit the Bacteria TMDL numeric targets based on current data and United States Environmental Protection Agency (USEPA) policy, which may lead to revised terms of compliance. The Bacteria TMDL Reopener is in progress and is expected to be completed in 2017. Section 5.2 of Appendix C provides more information on this special study.

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4 Implementation and Progress Toward Achieving Numeric Goals

The MS4 Permit requires the Responsible Agencies to develop specific water quality improvement numeric goals and strategies to address the HPWQCs identified for the Los Peñasquitos WMA. Each year, the Responsible Agencies assess specific water quality data and programmatic information to gauge progress toward achieving the numeric goals. These assessments provide information to determine whether intended outcomes are being realized or whether adaptations of Responsible Agencies' programs are necessary. This section discusses the strategies that have been implemented during the reporting period and the progress toward achieving specific MS4 Permit term goals for the watershed. Many of the selected strategies necessarily target the WMA HPWQCs, but many address other pollutants as well, providing a multi-benefit approach to implementation.

4.1 Strategies and Schedules

The strategies being implemented by the Responsible Agencies are the activities that enable improvements in water quality to achieve the numeric goals outlined in Section 2.3. Strategy selection considered the following:

- Responsible Agencies emphasized strategies that target HPWQCs and provide multiple benefits.
- Responsible Agencies considered the triple bottom line, evaluating the environmental, economic, and social components of the strategies.
- Strategies that improve and promote cooperation and collaboration between the Responsible Agencies and other governmental agencies (WMA groups, Caltrans, water districts, school districts) and other entities, such as private or non-profit organizations, were also given priority. Responsible Agencies also continually collaborate with internal jurisdictional departments.

The success of the strategies will ultimately be measured against the interim and final numeric goals.

In general, all Responsible Agencies are collectively implementing both JRMP-required[2] and optional nonstructural BMPs throughout the Los Peñasquitos WMA to achieve dry and wet weather load reduction goals. As implementation continues and progress is evaluated, distributed and regional structural BMPs will be implemented as needed to meet interim and final goals as funding becomes available. Figure 4-1 shows the different types of strategies implemented by Responsible Agencies to meet WQIP goals.

[2] Caltrans does not have a JRMP.

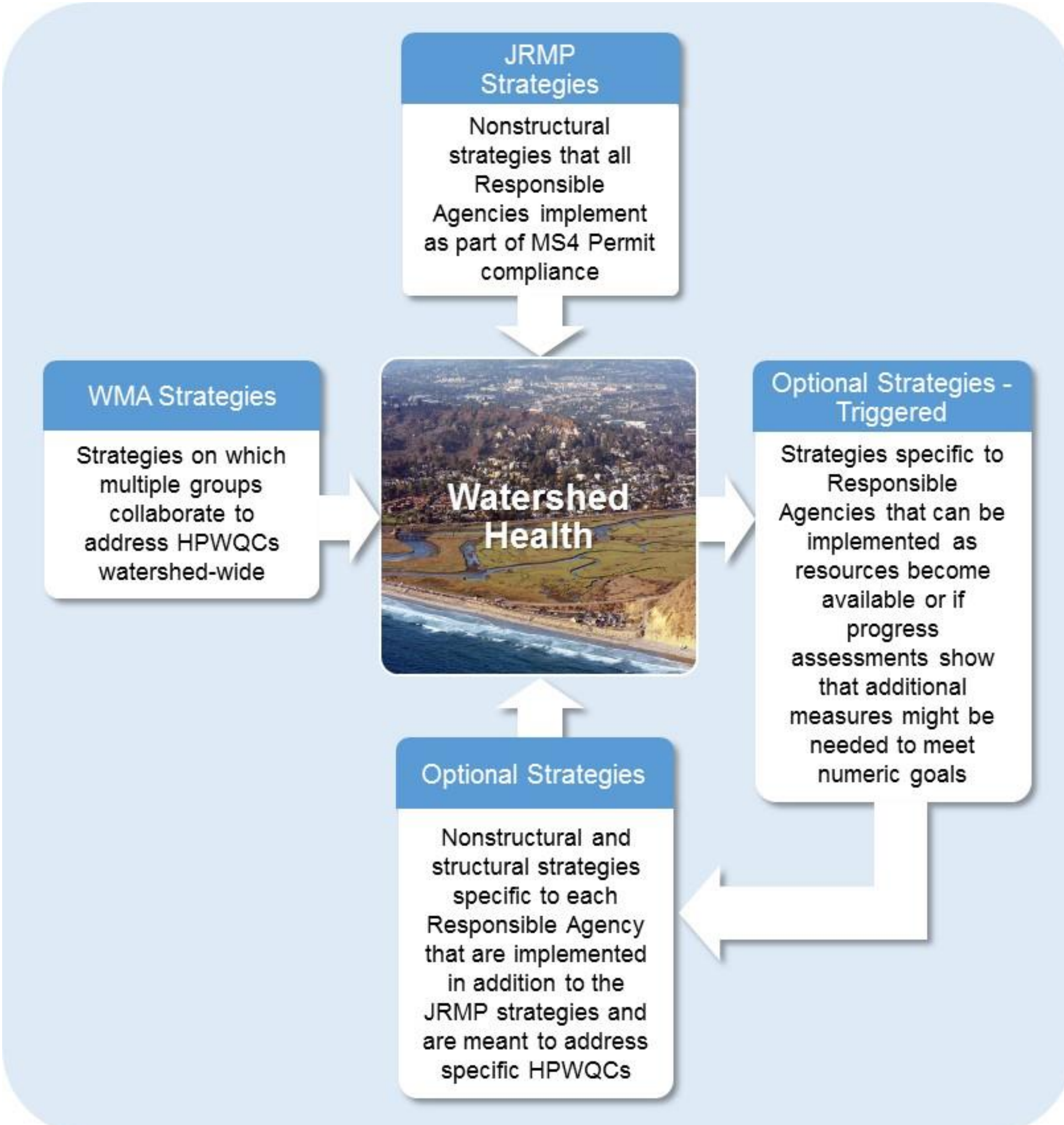

Figure 4-1
Strategies Implemented by Responsible Agencies to Meet WQIP Goals

JRMP strategies implemented by all Responsible Agencies during the reporting period throughout the Los Peñasquitos WMA are summarized by program element in Table 4-1. Detailed jurisdictional strategies are included in Appendix D. Within the detailed strategies tables, information is presented to indicate whether the strategy was implemented during this reporting period, whether it will continue to be implemented during the next reporting period, or whether the strategy will be modified or eliminated for the coming year(s).

Nonstructural strategies reduce pollutant loading to the MS4 by reducing pollutant generation at the source and/or by reducing mobilization of pollutants to the MS4, and either directly or ultimately to receiving waters. Programs designed to attenuate the effects of irrigation runoff, landscaping practices, and pet waste on receiving water quality are primary examples of nonstructural approaches that the Responsible Agencies in the Los Peñasquitos WMA have employed during this MS4 Permit term. The key strategies for each Responsible Agency are described in more detail below in Sections 4.1.1 through 4.1.4, and WMA strategies are presented in Section 4.1.5.

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Table 4-1
Jurisdictional Runoff Management Program Strategies Implemented in 2015–2016 by All Responsible Agencies

Strategy	Pollutants Addressed						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
Jurisdictional Runoff Management Program (JRMP) (E.2-E.7) Strategies							
E.3 Development Planning							
All Development Projects							
Establish guidelines and standards for all development projects and public low-impact development (LID) best management practices (BMPs); provide technical support related to implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area or implement easements to protect water quality, where applicable and feasible. Provide education and outreach to the development community regarding requirements of the Municipal Separate Storm Sewer System (MS4) Permit, Water Quality Improvement Plan (WQIP), and BMP updates.	X	X	X	X	X	X	X
Priority Development Projects (PDPs)							
For PDPs, administer a program and provide technical support to other internal departments to ensure implementation of on-site structural BMPs to control pollutants and manage hydromodification by developing storm water development standards and design guidelines. Includes confirmation of design, construction, and maintenance of PDP structural BMPs. Update the BMP Design Manual to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	X	X	X	X	X	X	X

Table 4-1 (continued)
Jurisdictional Runoff Management Program Strategies Implemented in 2015–2016 by All Responsible Agencies

Strategy	Pollutants Addressed						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
E.4 Construction Management							
Administer a program to oversee implementation of temporary BMPs that control sediment and other pollutants during the construction phase of projects. Includes requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other internal departments.			X	X	X	X	
E.5 Existing Development							
Commercial, Industrial, Municipal, and Residential Facilities and Areas							
Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and pollutant-generating activities (PGAs), as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods. Update minimum BMPs for existing residential, commercial, and industrial development. Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	X	X	X	X	X	X	X
MS4 Infrastructure							
Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels as allowed by resource agencies, detention basins, pump stations, etc.) for water quality improvement and for flood control risk management. Includes inspecting and cleaning catch basins, implementing controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers, and repairing and replacing MS4 components.	X	X	X	X	X		

Table 4-1 (continued)
Jurisdictional Runoff Management Program Strategies Implemented in 2015–2016 by All Responsible Agencies

Strategy	Pollutants Addressed						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
Roads, Streets, and Parking Lots							
Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways. Implement street sweeping.	X	X	X	X	X		
Pesticides, Herbicides, and Fertilizer BMP Program							
Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education.		X					X
Retrofit and Rehabilitation in Areas of Existing Development							
Develop a strategy and identification of candidate areas of existing development necessary for implementing retrofit projects and facilitate the implementation of such projects.	X	X	X	X	X	X	X
Develop a strategy and identify candidate areas necessary to implement stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	X	X	X	X	X	X	X
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program							
Implement the Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	X	X	X	X	X	X	X

Table 4-1 (continued)
Jurisdictional Runoff Management Program Strategies Implemented in 2015–2016 by All Responsible Agencies

Strategy	Pollutants Addressed						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
E.7 Public Education and Participation (B.3.b(1)(a)(iii))							
Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences. Enhanced school and recreation-based education and outreach, of which may include irrigation reduction issues, integrated pest management (IPM) for residents and businesses, and implementation and education of pet waste program. Promote and encourage implementation of designated BMPs in commercial and industrial areas.	X	X	X	X	X	X	X
E.6 Enforcement Response Plan							
Continue to implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Storm Water Code Enforcement Unit's Standard Operating Procedures (SOPs) – Enforcement Response Plan.	X	X	X				

1. Highest priority water quality conditions are highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

4.1.1 City of Del Mar

During FY 16, Del Mar implemented the strategies described in the WQIP. Highlights of strategies implemented by Del Mar to address sediment, bacteria, and freshwater input are described below. The full list of strategies implemented is in Appendix D. Additional strategies being implemented are listed in Table 4-2.

- **Enhanced Dry Weather Patrols and BMP Inspections:** The City of Del Mar implements a proactive patrol of the entire city at least six times per year. City staff patrol municipal, commercial, residential, and construction areas and locations to identify any potential illicit discharges and improper BMP implementation. In addition, treatment control BMPs and all minor and major MS4 outfalls are inspected during patrols. For FY 16 Del Mar conducted 11 city-wide patrols (~monthly) and was able to enforce proper BMP implementation throughout the city.
- **Post-Storm Erosion Monitoring:** The City of Del Mar visually monitored for erosion and completed minor repair and slope stabilization after wet weather events within the City's jurisdiction of the Los Peñasquitos WMA to address sediment.

Table 4-2
Summary of Strategies for the Los Peñasquitos WMA —City of Del Mar

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
Promoted and collaborated with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	X	X	X	X	X	X	X
Continued participating in source reduction initiatives.	X	X	X	X	X	X	X
Proactively monitored for erosion and complete minor repair and slope stabilization as needed.	X	X	X	X	X	X	X
Protected areas that are functioning naturally.	X	X	X	X	X	X	X
Participated in the San Diego Regional Reference Streams and Beaches Study (see Section 3.2 for study details).		X					
Visually inspected all major and minor MS4 outfalls.	X	X	X	X	X	X	X

1. Highest priority water quality conditions are highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

MS4 = municipal separate storm sewer system

4.1.2 City of Poway

During FY 16, Poway implemented the strategies described in the WQIP. Key strategies being implemented are listed in Table 4-3. The full list of strategies implemented is in Appendix D.

Table 4-3
Summary of Strategies for the Los Peñasquitos WMA—City of Poway

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
Required implementation of low-impact development (LID) best management practices (BMPs) with all new construction.	X	X	X	X	X	X	X
Promoted Metropolitan Water District of Southern California (MWD) and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	X	X	X	X	X	X	X
Proactively repaired and replaced corrugated metal pipe municipal separate storm sewer system (MS4) components to provide source control from MS4 infrastructure.	X	X	X		X		
Targeted human behavior in parks and other public areas, including trash reduction or other high-impact behaviors that affect habitat, wildlife, and water quality.	X	X		X			X
Participated in the Los Peñasquitos Watershed Special Study (see Section 3.2 for study details).					X		
Participated in the San Diego Regional Reference Streams and Beaches Study (see Section 3.2 for study details).	X	X			X		
Implemented numerous green infrastructure; multiuse treatment area; stream, channel, and habitat rehabilitation; and other structural projects located throughout the watershed (see Appendix D for a list of specific projects).	X	X	X	X	X	X	X

1. Highest priority water quality conditions are highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

4.1.3 City of San Diego

During FY 16, City of San Diego (City) implemented the strategies described in the WQIP. Highlights of strategies implemented by City of San Diego to address sediment, bacteria, and freshwater input are described below. The full list of strategies implemented is in Appendix D. Additional strategies being implemented are listed in Table 4-4.

- **Special Study (New in FY 16):** The Sediment Load Reduction Quantification through Outfall Repair and Relocation for the Los Peñasquitos WMA Study was completed to assess the current sediment loading to the Los Peñasquitos Lagoon caused by erosive scour associated with outfall discharge, as well as possible sediment load reductions associated with various BMP practices. Potential next steps include completing field verifications of the modeled sediment loads and/or monitoring to validate model results. In addition, a cost benefit analysis and evaluation of challenges associated with implementation of BMP practices will be considered. *HPWQC: sediment*

- **Enhanced Street Sweeping and Catch Basin Cleaning (New in FY 16):** The City began steps toward increasing staff and equipment to fully implement enhanced street sweeping and catch basin cleaning. In addition, enhanced street sweeping routes are being developed and a schedule for increasing the number of annual catch basin inspections has been established. *HPWQCs: bacteria, sediment*

- **Structural Strategies:** 113.15 acres of drainage area were treated by green infrastructure features in the Los Peñasquitos WMA. *HPWQCs: bacteria, sediment, flow*

- **Los Peñasquitos Lagoon Restoration Efforts (New in FY 16):** The Los Peñasquitos/Sorrento Restoration Program has been divided into two phases. Phase I of this project includes removal of sediment and construction of sediment management facilities, repairs to storm drain outfalls, and realignment of creeks in the Lagoon to ease water flow, reduce upstream flooding, and improve habitat conditions, as well as pilot restoration activities. Phase II of this project includes a large-scale restoration of salt marsh habitat in the lagoon to meet TDML requirements. The City has been identify as the Lead Agency and is working in collaboration with the Responsible Agencies, State Parks, the Coastal Conservancy, the Los Peñasquitos Lagoon Foundation, and other stakeholders. Modeling was completed in FY 16 to confirm the preferred alternative for the Lagoon restoration. Additionally, several biological technical studies were completed for Phase I of the project. Next steps for FY 17 include additional modeling, completion of the concept design, and commencement of the public outreach process. *HPWQCs: sediment, flow*

Table 4-4
Summary of Strategies for the Los Peñasquitos WMA—City of San Diego

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
Storm Drain Structure Cleaning: 7,087 storm drain structure inspections were conducted, resulting in the cleaning of 1,045 structures and removal of 386.5 tons of debris in the watershed management area (WMA).	X		X	X	X		
New in fiscal year (FY) 16: Enhanced Catch Basin Cleaning Optimization: Enhanced catch basin cleaning is a strategy to address pollutant removal by inspecting catch basins more than the Jurisdictional Runoff Management Program (JRMP)-required minimum of once per year in the Tijuana River, San Diego Bay, and Los Peñasquitos WMAs to meet specific total maximum daily load (TMDL) pollutant removal requirements. In an effort to further optimize its drain cleaning program, the City of San Diego (City) analyzed eight years of catch basin cleaning data and assigned priorities to individual basins based on historical debris removal. This enhancement will allow the City to target high priority drains to maximize pollutant removal while maintaining cost efficiencies.	X		X	X	X		
Street Sweeping: Approximately 21,030 curb miles of roads, streets, highways, medians, parking lots, and operations yards were swept in the WMA.	X	X	X	X	X		
New in FY 16: Median Sweeping: 4,315 median miles were swept citywide.	X	X	X	X	X		
New in FY 16: Targeted Aggressive Street Sweeping Pilot: The City completed a pilot study that quantified the effectiveness of posting limited-hour "no parking" signs on typically non-posted routes. The study found that posting routes resulted in an approximate 50 percent (%) increase in pollutant removal because the sweeper had more access to curbs and gutters. Based on this finding, the City will consider posting additional routes if supported by the community.	X	X	X	X	X		

Table 4-4 (continued)
Summary of Strategies for the Los Peñasquitos WMA—City of San Diego

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
New in FY 16: MS4 Maintenance: In addition to routine maintenance of the MS4, the City repaired or replaced 12 pump stations and modernized another 14 pump stations, closed-circuit television (CCTV) surveyed 28,000 linear feet of pipe in 62 locations citywide, and began the development of the Waterways Maintenance Plan and Channel **Maintenance Prioritization Plan.** To help minimize the risk of flooding in a flood-prone drainage area, the City also installed a 2,400-volt automatic transfer switch and generator to a 130,000 gallon-per-minute pump station, allowing for sustained function in the event of a power outage.	X		X	X	X		
IDDE Program: 353 discharges were reported by the public, 518 cases were investigated, 429 discharges or illicit connections were eliminated, 436 enforcement actions were issued, and 197 escalated enforcement actions were issued in the WMA. **New in FY 16: Launch of the Get It Done App**: This app allows illicit discharges to be reported quickly via any smartphone. Lastly, the Tiger Team (a proactive escalated monitoring and enforcement team that involves multiple City departments and divisions) was developed to identify, locate, and eliminate sources of human specific bacteria in the MS4. Over several months during the reporting year, one problem area within the City was investigated extensively and a source of human-specific bacteria in the MS4 was identified and abated.	X	X	X	X	X	X	X

Table 4-4 (continued)
Summary of Strategies for the Los Peñasquitos WMA—City of San Diego

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
Commercial and Industrial Business Inspections: 1,673 inspections were completed, 276 follow-up inspections were completed, 425 violations were issued, 538 enforcement actions were issued, and 156 escalated enforcement actions were issued in the WMA. In addition, the City conducted property-based inspections that focus on common areas/activities shared among multiple businesses or tenants that generate pollution. A previously conducted pilot study on inspection practices found property-based inspections to be more effective at identifying and resolving water quality issues (e.g., improper trash disposal practices and irrigation runoff, etc.) associated with commercial and industrial businesses.	X	X	X	X	X	X	X
Trash Cleanups: 5 cleanup events were sponsored through community-based organizations and 5,468 pounds of trash and debris were collected in the WMA (see Appendix D for a list of specific projects).				X			
Rebates to Reduce Irrigation Runoff: Rebates were issued to convert 203,599 square feet of turf in the WMA and rebates for rain barrels were issued to capture 772,740 gallons of rainwater citywide.	X	X	X	X	X	X	X
New in FY 16: Offsite Alternative Compliance Program: The City implemented Phase I of the Alternative Compliance Program to give development projects that would require onsite structural best management practices (BMPs) the ability to propose offsite alternative compliance projects. The development of Phase II was also initiated and will include the establishment of an in-lieu fee structure and credit system.	X	X	X	X	X	X	X

Table 4-4 (continued)
Summary of Strategies for the Los Peñasquitos WMA—City of San Diego

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
New in FY 16: Bacteria Regrowth Study: The City completed a study to characterize the magnitude and extent of potential *Enterococcus* loading due to regrowth within the City's storm drain system. This study quantifies the amount of bacteria in receiving water samples that are harmless to humans and could potentially be used to refine bacteria water quality standards of the Bacteria TMDL as a part of the Reopener process.	X						

1. Highest priority water quality conditions are highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters, including freshwater inputs.

4.1.4 County of San Diego

During FY 16, County of San Diego (County) implemented the strategies described in the WQIP. Highlights of strategies implemented by the County of San Diego to address sediment, bacteria, and freshwater input are shown below. The full list of strategies implemented is in Appendix D.

- **Residential Area BMPs:** The County encourages BMPs in residential areas. All residential management areas were inspected in FY 16.
- **Water Conservation:** The County collaborates with and promotes the efforts of partner agencies for incentive programs such as rain barrels, water smart irrigation controllers, soil sensors, turf replacement programs, and residential landscape evaluation programs.
- **Green Streets:** The County developed green street retrofit design standards and specifications. Green streets are now being used to meet compliance for all retrofit and redeveloped road projects in the Capital Improvement Projects plan.
- **Public Education:** The County collaborates with the Regional Education Workgroup and Think Blue San Diego Region to develop and distribute educational materials.
- **Trash Generation Studies:** The County is collaborating with the Responsible Agencies to develop baseline trash generation rates.
- **Offsite Alternative Compliance:** The County supports applicant-implemented offsite alternative compliance. The Water Quality Equivalency provides the currency for structural BMPs and some natural system management practices.
- **Irrigation Runoff Prevention Study:** The County undertook a community-based social marketing pilot study on the effectiveness of irrigation runoff prevention materials.
- **Sustainable Landscapes:** The County is implementing a program to encourage landscape retrofits that replace water-intensive turf grass with landscaping that provides several environmental benefits.
- **Rain Barrel Incentives:** The County offers incentives for rain barrel installation by offering discounts on rain barrel purchases as well as rebates for rain barrel installation.

Additionally, the County recently undertook efforts to update its 2007 Low-Impact Development (LID) Handbook[3] to better align with the County's Standard Urban Storm Water Mitigation Plan (SUSMP) and Hydromodification Management Plan (HMP), and to reflect the most current data on LID approaches and their efficacy. For its distinguished efforts, the County was named the recipient of the 2015 Outstanding Innovation in Green Planning and Design Award by the San Diego Chapter of the California Association of Environmental Professionals (AEP), a non-profit organization established in 1974 and dedicated to enforcing and supporting the California Environmental Quality Act (CEQA). Additionally, the County received a similar award in October 2016 for work done during the fiscal year on development of its Guidance on Green Infrastructure, a document outlining tools to uniformly design, install, and maintain LID features in the public right-of-way (Figure 4-3). Additional strategies being implemented are listed in Table 4-5.

Figure 4-3
LID Incorporated into a Roadway Median

Table 4-5
Summary of Strategies for the Los Peñasquitos WMA —County of San Diego

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment[1]	Flow[1,2]	Habitat/Wildlife
Began implementing the Sustainable Landscapes Program to encourage landscape retrofits	X	X	X		X	X	X
Began implementing an incentive program for best management practice (BMP) retrofits (Public-Private Partnerships – a County-sponsored program to offer incentives for rain barrel installation, downspout disconnects from the storm water system, etc.).	X	X	X	X	X	X	

1. Highest priority water quality conditions are highlighted in orange
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

[3] http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

4.1.5 Optional WMA Strategies

In addition to implementing strategies on a jurisdictional basis, Responsible Agencies may collaboratively implement projects within the WMA that improve water quality, as described in Table 4-6.

Table 4-6
Optional WMA Strategies that Address Sediment, Bacteria, and Freshwater Input

WMA Strategy	Implementation Status Update
WMA-1: Watershed Collaboration for Los Peñasquitos Lagoon Restoration	The Los Peñasquitos/Sorrento Restoration Program has been divided into two phases. Phase I of this project includes removal of sediment and construction of sediment management facilities, repairs to storm drain outfalls, and realignment of creeks in the Lagoon to ease water flow, reduce upstream flooding, and improve habitat conditions, as well as pilot restoration activities. Phase II of this project includes a large-scale restoration of salt marsh habitat in the lagoon to meet total maximum daily load (TDML) requirements. The City has been identified as the Lead Agency and is working in collaboration with the Responsible Agencies, State Parks, the Coastal Conservancy, the Los Peñasquitos Lagoon Foundation, and other stakeholders. Modeling was completed in fiscal year (FY) 16 to confirm the preferred alternative for the Lagoon restoration. Additionally, several biological technical studies were completed for Phase I of the project. Please refer to Figure 4-4.
WMA-2: Los Peñasquitos Wetland Restoration Project	In coordination with Copermittees, Caltrans, and the San Diego Association of Governments (SANDAG) completed environmental and construction phases for various rail and transit, highway, and environmental protection projects.
WMA-3: Collaborative Approach to Irrigation Reduction	Responsible Agencies collaborated with water agencies to continue to implement turf replacement and rain barrel rebate programs. Additionally, various Responsible Agencies implemented irrigation reduction programs to help achieve the State-mandated reduction in water consumption.

Table 4-6 (continued)
Optional WMA Strategies that Address Sediment, Bacteria, and Freshwater Input

WMA Strategy	Implementation Status Update
WMA-4: Offsite Alternative Compliance Option (Watershed Management Area Analysis [WMAA])	Responsible Agencies implemented Phase I of the Alternative Compliance Program to give development projects that would require onsite structural BMPs the ability to propose offsite alternative compliance projects.
WMA-5: Collaboration with the Regional Board	Responsible Agencies continued to collaborate with the Regional Board to include non-Phase I MS4s in general permits, waivers, and waste discharge requirements (WDRs).
WMA-6: Refinement of Water Quality Regulations	Responsible Agencies coordinated with the Regional Board to discuss modifications to the Bacteria TMDL as part of the Reopener process.

Los Peñasquitos/Sorrento Restoration Program

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Phase I- targeted for completion by 2023

1 Creek Restoration

Improved flood management within the Sorrento Valley corridor through flood creek enhancement in the upstream portion of the project. Creek enhancements may include improving capacity of existing creeks through removal of accumulated sediment and debris and increasing creek width in combination with sediment management efforts upstream of the Lagoon.

2 Sediment Management Facilities (Sorrento Valley - Phase I) (Conceptual)

Sediment management facilities are being proposed to reduce sediment loading during storm flows and to protect sensitive downstream habitats in the upper Lagoon. The new facilities are intended to address the historic and ongoing sediment deposition that degrades important riparian habitat at the confluence of the canyon creeks and the Lagoon. That deposition also contributes to the unwanted conversion of historic salt marsh in the upper Lagoon. Removal of accumulated sediment and the continued maintenance of the new facilities proposed would protect areas restored downstream.

3 Storm Drain Outfall Connections for Freshwater and Vector Management

Additional connections to the existing storm drain outfalls would reduce ponding of freshwater helping to diminish mosquito breeding habitat.

4 New Creek Alignment and Side Drainage Creek Alignment for Freshwater Management (Sorrento 5 Valley - Phase I) (Conceptual)

Upstream tributaries and existing braided tidal creeks would be reconnected to reduce freshwater ponding and inundation, reduce mosquito breeding habitat and to increase downstream creek capacity. Improving freshwater management would aid in the reduction of invasive vegetation (e.g. Festuca perennis) and other organisms that favor more freshwater and brackish environments. The improvements will also support the re-establishment salt marsh habitat and increase the flood-level flow capacity of the lagoon.

6 Preliminary Salt Marsh Restoration Boundary

Restoration of up to 23 acres of historic salt marsh that has transitioned to brackish and fresh water marsh is being considered as the initial step in the Lagoon restoration effort. As currently envisioned, freshwater management techniques would be implemented to expand current tidal influence through extension of existing tidal braided creeks and creation of tidally influenced overbanks. In addition, improved freshwater conveyance would be established between the extended tidal braided creeks and a new branching creek system. Restoration techniques could include removal of invasive plants and select removal and possible amendment of sediment prior to revegetation to reestablish historical salt marsh habitat. This would be a "pilot" area from which these techniques will be assessed for adaptive management in the restoration areas to the northeast of the railroad. This restoration will also be counted toward the salt marsh restoration goals of the Sediment Total Maximum Daily Load requirement (TMDL) and Water Quality Improvement Plan (WQIP).

Phase II- targeted for completion 2030

7 Salt Marsh Restoration and New Creek Alignment 8 (Carmel Valley- Phase II) (Conceptual)

Freshwater management and salt marsh restoration improvements that may extend tidal braided creeks to reduce ponding and freshwater inundation of the marsh are currently under evaluation. As being considered this effort may also include diversion and beneficial reuse of dry weather flows and existing groundwater seeps into the Lagoon. Freshwater management along with the removal of invasive vegetation would also support the restoration of historic salt marsh and the reduction of mosquito breeding habitat. This effort is being considered in response to salt marsh restoration requirements associated with current TMDL and WQIP goals. The area being evaluated will be subject to sea level rise and potential impacts from that condition is being considered in the current evaluation and modeling.

9 Sediment Management Facilities (Carmel Valley- Phase II) (Conceptual)

Sediment management facilities are proposed to reduce sediment loading during storm flows and to protect sensitive downstream habitats in the upper Lagoon. The new facilities would be necessary to address the historic and ongoing sediment deposition that degrades important riparian habitat at the confluence of the canyon creeks and the Lagoon.

The City of SAN DIEGO

For more information please contact:

Phase I
Chris Gascon, P.E.
Senior Civil Engineer
Transportation & Storm Water Department, Storm Water Division
cgascon@sandiego.gov | (619) 527-7411

Phase II
Karina Danek
Senior Planner
Transportation & Storm Water Department, Storm Water Division
kdanek@sandiego.gov | (858) 541-4349

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LOS PEÑASQUITOS/SORRENTO RESTORATION PROGRAM

The City of San Diego is leading a long-term restoration plan for the Los Peñasquitos Lagoon. The plan is being developed in partnership with other cities, community leaders, businesses, regulatory agencies and environmental organizations interested in the health of the lagoon and its nearby waterways. The plan envisions improvements to the lagoon that include restoration of salt marsh areas, the removal of sediment and the construction of sediment management facilities, repairs to storm drain outfalls, and realignment of creeks in the lagoon to ease water flow, reduce upstream flooding and to improve habitat conditions.

This guidebook includes a map and description of the work being considered for the restoration effort. Contact information for City staff working to develop the final restoration plan is listed on the back page.

Figure 4-4
Fact Sheet Describing the Los Peñasquitos/Sorrento Restoration Program

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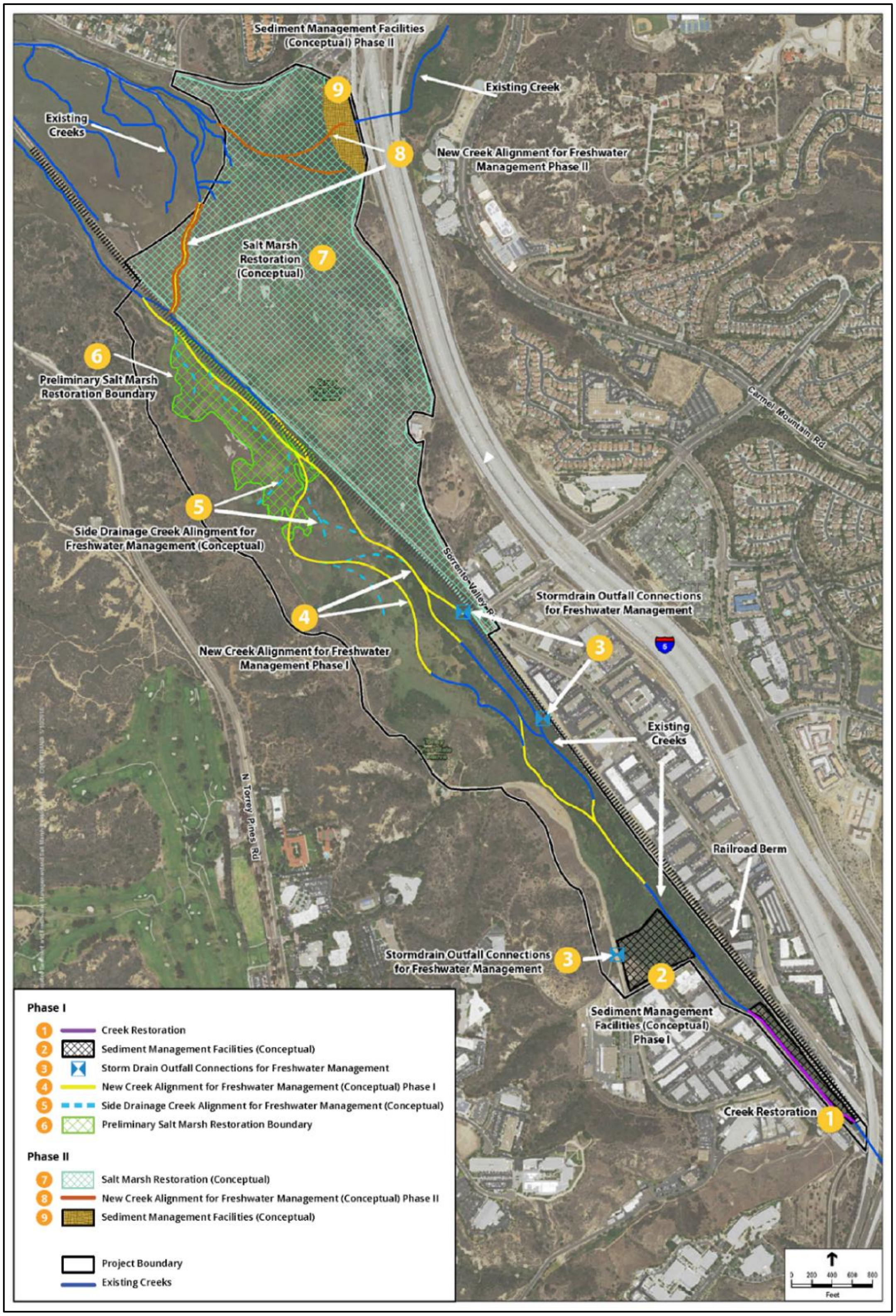

Figure 4-4 (continued)
Fact Sheet Describing the Los Peñasquitos/Sorrento Restoration Program

4.2 Calculating Baseline Values for Assessment of Progress Toward Achieving Numeric Goals

Section 4 of the Los Peñasquitos WMA WQIP included several placeholders for baseline values against which Responsible Agencies can gauge progress in achieving numeric goals. The baseline values were calculated for these placeholders in this Annual Report and are summarized in Table 4-7 for Los Peñasquitos Lagoon Health (sediment and freshwater discharge) and in Table 4-8 Pacific Ocean Shoreline Recreation (bacteria).

Table 4-7
Baseline Values for Numeric Goals for Los Peñasquitos Lagoon Health (Sediment and Freshwater Input)

Compliance Pathway	Metric	Agency	Baseline
Wet Weather Sediment			
MS4 Discharges Number of Direct or Indirect Discharges[1] to Receiving Water	Discharges[1]	City of Del Mar	1 discharge[1]
		City of Poway	37 discharges[1]
		City of San Diego	198 discharges[1]
		County of San Diego	0 discharges[1]
Turf Conversion	Area converted	City of Poway	0 square feet of turf converted
Dry Weather Freshwater Discharge			
MS4 Discharges % Irrigation or Other Dry Weather Flow Reduction	Flow	City of Del Mar	Average Annual Flow: 4 gallons per minute Maximum Flow: 7 gallons per minute
		City of Poway	Average Dry Weather Flow[2]: 7.1 gallons per minute Maximum Dry Weather Flow[2]: 11.7 gallons per minute
		City of San Diego	Average Dry Weather Flow[2]: 27.6 gallons per minute Maximum Dry Weather Flow[2]: 305.2 gallons per minute
		County of San Diego	0 discharges based on no dry weather flow observed.

Table 4-7 (continued)
Baseline Values for Numeric Goals for Los Peñasquitos Lagoon Health (Sediment and Freshwater Input)

Compliance Pathway	Metric	Agency	Baseline
Reduce anthropogenic dry weather water flows	Flow	City of Del Mar	Average Annual Flow: 4 gallons per minute Maximum Flow: 7 gallons per minute
Implement runoff reduction programs, including targeted education and outreach, enhanced inspections, rebates, and increased enforcement	Flow	City of San Diego	Average Dry Weather Flow[2]: 27.6 gallons per minute Maximum Dry Weather Flow[2]: 305.2 gallons per minute
Eliminate anthropogenic dry weather flows from storm drain outfalls either by aggregate flow volume or the number of persistently flowing outfalls during dry weather	Flow	County of San Diego	There are no County major outfalls in Los Peñasquitos WMA; however, 28 minor outfalls were observed and no flow was detected during this reporting period

1. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
2. Calculated using historical dry weather MS4 outfall data from 2009-2012. Calculations are described in Appendix D.
% = percent; MS4 = municipal separate storm sewer system; WMA = Watershed Management Are

Table 4-8
Baseline Values for Numeric Goals for Pacific Ocean Shoreline Recreation (Bacteria)

Compliance Pathway	Metric	Agency	Baseline
Wet Weather Bacteria			
MS4 Discharges % Days Exceeding WQO	Fecal coliform	All Responsible Agencies	99%[1]
	Enterococcus		100%[1]
	Total coliform		100%[1]
Number of Direct or Indirect MS4 Discharges[2] to Receiving Water	Discharges[2]	City of Del Mar	1 discharge[2]
		City of Poway	37 discharges[2]
		City of San Diego	198 discharges[2]
		County of San Diego	0 discharges[2]
Reduce anthropogenic surface dry weather flows to address bacteria regrowth contributing during wet weather		City of Del Mar	Average Annual Flow: 4 gallons per minute Maximum Flow: 7 gallons per minute
Turf conversion		City of Poway	0 square feet of turf converted
Dry Weather Bacteria			
MS4 Discharges % Days Exceeding WQO	Fecal coliform	All Responsible Agencies	100%[3]
	Enterococcus		100%[3]
	Total coliform		100%[3]
Number of Direct or Indirect MS4 Discharges[4] to Receiving Water	Discharges[4]	City of Del Mar	1 discharge[4]
		City of Poway	37 discharges[4]
		City of San Diego	198 discharges[4]
		County of San Diego	0 discharges[4]
Reduce anthropogenic surface dry weather flows	Flow	City of Del Mar	Average Annual Flow: 4 gallons per minute Maximum Flow: 7 gallons per minute

Table 4-8 (continued)
Baseline Values for Numeric Goals for Pacific Ocean Shoreline Recreation (Bacteria)

Compliance Pathway	Metric	Agency	Baseline
Turf conversion	Area converted	City of Poway	0 square feet of turf converted
Implement runoff reduction programs such as education and outreach, enhanced inspections, rebates, and increased enforcement	Flow	City of San Diego	Average Dry Weather Flow[5]: 27.6 gallons per minute Maximum Dry Weather Flow[5]: 305.2 gallons per minute

1. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008, through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period.
2. Wet weather discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008, through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the fifth sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Dry weather discharges are defined as observed dry weather flows from persistently flowing major MS4 outfalls.
5. Calculated using historical dry weather MS4 outfall data from 2009-2012. Calculations are described in Appendix D.

% = percent; MS4 = municipal separate storm sewer system; WMA = Watershed Management Area;
WQO = water quality objective

4.3 Progress Toward Achieving Numeric Goals

As discussed in Section 2, interim and final numeric goals were established for the watershed as a means of measuring reasonable progress toward addressing the HPWQCs; the goals are included in Appendix B. Performance-based goals are included to measure short-term jurisdictional progress toward achieving these goals, given that sustained water quality improvement is typically demonstrated over a longer timeframe. Performance-based goals are intended to measure an outcome from a strategy or suite of strategies and to provide an interim link to demonstrate reasonable incremental progress in the quality of MS4 discharges and receiving waters by FY 18. The strategies presented have been selected as goals because they are measurable and provide a direct water quality benefit in the near term. Table 4-9 and Table 4-10 summarize progress in FY 16 toward meeting these performance-based goals for Los Peñasquitos Lagoon Health (sediment and freshwater input) and Pacific Ocean Shoreline Recreation (bacteria), respectively.

Table 4-9
Progress Toward FY 18 MS4 Permit Term Goals to Address Los Peñasquitos Lagoon Health (Sediment and Freshwater Input) in FY 16

Responsible Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY 18 Goal	Progress
Caltrans	Cooperative Implementation Agreement: Achieve compliance units by contributing funds to a cooperative implementation	Wet	N/A	Ongoing[1]	In progress.
Caltrans	Implement Nonstructural BMPs: Continue to implement wet weather nonstructural BMP activities within the watershed	Wet	N/A	Ongoing[1]	In progress.
Caltrans	Implement Structural BMPs: Continue to implement wet weather structural BMP activities for proposed projects within the watershed	Wet	N/A	Ongoing[1]	In progress.
City of Del Mar	Reduce anthropogenic surface dry weather water flows	Dry	Average Annual Flow: 4 gallons per minute Maximum Flow: 7 gallons per minute	Reduce anthropogenic surface dry weather flows that originate within Del Mar's jurisdictional boundaries by 10%	Achieved to date. Average annual flow in FY 16 was 0.75 gallons per minute, representing an approximately 81% reduction from the baseline average flow.

Table 4-9 (continued)
Progress Toward FY 18 MS4 Permit Term Goals to Address Los Peñasquitos Lagoon Health (Sediment and Freshwater Input) in FY 16

Responsible Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY 18 Goal	Progress
City of Poway	Implement turf conversion	Wet and Dry	0 square feet of turf converted	Achieve a 5% increase from the baseline through turf conversion	Achieved. 214,105 square feet of turf converted.
City of San Diego	Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	Wet and Dry	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	Treat 36 acres of drainage area through construction of 9 green infrastructure BMPs	In progress. The City has begun the process for developing a green infrastructure policy. The City has treated 113.15[3] acres of drainage area.
	Implement runoff reduction programs, including targeted education and outreach, enhanced inspections, rebates, and increased enforcement	Dry	Average Dry Weather Flow[2]: 27.6 gallons per minute Maximum Dry Weather Flow[2]: 305.2 gallons per minute	Reduce prohibited dry weather flow by 10% from the baseline measured at persistently flowing outfalls in the WMA	Achieved to date. Average dry weather flow in FY 16 was 11.5 gallons per minute, representing a 58.4% reduction from the baseline average flow.

Table 4-9 (continued)
Progress Toward FY 18 MS4 Permit Term Goals to Address Los Peñasquitos Lagoon Health (Sediment and Freshwater Input) in FY 16

Responsible Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY 18 Goal	Progress
County of San Diego	Fully implement an accepted WQIP.	Wet	Acceptance of the WQIP by the Regional Board.	Make progress toward implementing the WQIP.	In progress. The County has begun implementation of the WQIP.

1. Caltrans goals, strategies, and schedules vary from those of other responsible agencies to best address typical freeway characterization discharge from Caltrans rights-of-way.
2. Calculated using historical dry weather MS4 outfall data from 2009–2012.
3. 113.15 acres of drainage area are currently being treated by the following projects: Los Peñasquitos Sediment Basin, Del Mar Mesa Neighborhood Park (catchment basins and impervious areas), Miramar Treatment Plant (vegetated swales), Carrol Canyon Road Extension (vegetated swale), Camino Ruiz Neighborhood park (vegetated swale), Breen Park (vegetated swales), Rancho Peñasquitos Skate Park (basins/trenches), Fire Station #47 (vegetated swale), Torrey Del Mar Neighborhood Park (2 vegetated filter strips and 2 vegetated swales), and Hilltop Community Park (2 bioretention facilities).

% = percent; BMP = best management practice; FY = fiscal year; MS4 = municipal separate storm sewer system; TMDL = total maximum daily load;
WMA = Watershed Management Area; WQIP = Water Quality Improvement Plan

Table 4-10
Progress Toward 2018 MS4 Permit Term Goals to Address Pacific Ocean Shoreline Recreation (Bacteria)

Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY 18 Goal	FY 16 Progress
Caltrans	Reduce dry weather flow: eliminate dry weather flows by implementing control measures to ensure effective prohibition	Dry	N/A	Ongoing	In progress.
Caltrans	Implement dry weather BMPs: implement drought-tolerant landscaping and conversion to smart irrigation controllers within the watershed	Dry	N/A	Ongoing	In progress.
City of Del Mar	Reduce anthropogenic surface dry weather water flows	Dry	Average Annual Flow: 4 gallons per minute Maximum Flow: 7 gallons per minute	Reduce anthropogenic surface dry weather flows that originate within the City's jurisdictional boundaries by 10%	Achieved to date. Average annual flow in FY 16 was 0.75 gallons per minute, representing an approximately 81% reduction from the baseline average flow.
City of Poway	Implement turf conversion	Wet and Dry	0 square feet of turf converted	Achieve a 5% increase from the baseline through turf conversion	Achieved. 214,105 square feet of turf converted.

Table 4-10 (continued)
Baseline Values for Numeric Goals for Pacific Ocean Shoreline Recreation (Bacteria)

Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY 18 Goal	FY 16 Progress
City of San Diego	Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	Wet and Dry	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	Treat 36 acres of drainage area through construction of 9 green infrastructure BMPs	In progress. The City has begun the process for developing a green infrastructure policy. The City has treated 113.15[1] acres of drainage area.
	Implement runoff reduction programs, including targeted education and outreach, enhanced inspections, rebates, and increased enforcement	Dry	Average Dry Weather Flow[1]: 27.6 gallons per minute Maximum Dry Weather Flow[2]: 305.2 gallons per minute	Reduce prohibited dry weather flow from baseline measured at persistently flowing outfalls in the WMA by 10%	Achieved to date. Average dry weather flow in FY 16 was 11.5 gallons per minute, representing a 58.4% reduction from the baseline average flow.

Table 4-10 (continued)
Baseline Values for Numeric Goals for Pacific Ocean Shoreline Recreation (Bacteria)

Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY 18 Goal	FY 16 Progress
County of San Diego	Fully implement an accepted WQIP	Wet	Acceptance of the WQIP by the Regional Board	Achieve progress toward implementing the WQIP.	In progress. The County has begun implementation of the WQIP.
	Eliminate anthropogenic dry weather flows from storm drain outfalls either by aggregate flow volume or the number of persistently flowing outfalls during dry weather	Dry	County of San Diego has no major outfalls in the Los Peñasquitos WMA; however 28 minor outfalls were observed and no flow was detected during this reporting period	The County of San Diego has no major outfalls in the Los Peñasquitos WMA; however, 28 minor outfalls were observed and no flow was detected during this reporting period	In progress. Baseline established in FY 16.
	MS4 discharges: # of direct or indirect discharges[2] to receiving water	Wet	0 discharges[3]	0 discharges[3]	There are no major outfalls in the County in this WMA.

1. 113.15 acres of drainage area are currently being treated by the following projects: Los Peñasquitos Sediment Basin, Del Mar Mesa Neighborhood Park (catchment basins and impervious areas), Miramar Treatment Plant (vegetated swales), Carrol Canyon Road Extension (vegetated swale), Camino Ruiz Neighborhood park (vegetated swale), Breen Park (vegetated swales), Rancho Peñasquitos Skate Park (basins/trenches), Fire Station #47 (vegetated swale), Torrey Del Mar Neighborhood Park (2 vegetated filter strips and 2 vegetated swales), and Hilltop Community Park (2 bioretention facilities).
2. Calculated using historical dry weather MS4 outfall data from 2009–2012.
3. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring. The County of San Diego does not have any major outfalls in the Los Peñasquitos WMA.

% = percent; BMP = best management practice; FY = fiscal year; MS4 = municipal separate storm sewer system; TMDL = total maximum daily load;
WMA = Watershed Management Area; WQIP = Water Quality Improvement Plan

5 Adaptive Management

This section summarizes the potential triggers for adaptation of the WQIP and the results of the MS4 Permit adaptive management process for the Los Peñasquitos WMA during the first year of implementation. The adaptive management approach uses an iterative approach to re-evaluate major components of the WQIP based on the requirements of the MS4 Permit. It details how the Responsible Agencies use new data and information to improve the WQIP through updates to priorities, assessments of and adjustments to goals, updates to strategies to meet the latest goals, and updates to the monitoring and assessment program to provide the necessary data to support the process. Responsible Agencies are continually evaluating and assessing the implementation of the WQIP and making minimal modifications to streamline and optimize execution outside the MS4 Permit adaptive management process.

The MS4 Permit describes various triggers that may warrant program adaptation, including exceedances of water quality standards in receiving waters, new information, Regional Board recommendations, and input from the public. Effectiveness assessments of JRMP programs and strategies may also trigger adaptations to the WQIP.

The adaptive management process is used in conjunction with water quality and program data to evaluate whether modifications to numeric goals, schedules, and/or strategies are necessary to achieve compliance with the interim and final compliance numeric goals. MS4 Permit adaptive management triggers are typically implemented either annually or at the end of the MS4 Permit term.

5.1 Potential Triggers for Adaptation

The adaptive management process may be triggered when new information becomes available. New information to be considered includes results of routine monitoring and special studies, new regulatory drivers, results of program effectiveness assessments and progress toward numeric goals, and recommendations from the public and/or Regional Board. Modifications may be made to the PWQCs, goals, strategies, schedules, and/or the Monitoring and Assessment Program (Appendix E). The potential triggers for adaptation to be considered annually in the Annual Report are summarized in Table 5-1.

Table 5-1
Triggers for Adaptive Management Within the WQIP

Trigger[1]	Frequency for Assessment	Potential Area(s) for Adaptation			
		Priority Water Quality Conditions	Goals and Schedules	Strategies and Schedules	Monitoring and Assessment
Exceedances of Non-Storm Water Action Levels or Storm Water Action Levels	Annual			X	X
Special Studies Results	Annual, as results are available		X	X	X
New Regulatory Actions	Annual, as applicable	X	X	X	X
Regional Board Recommendations	Annual, as applicable	X	X	X	X
Program Effectiveness Assessments/ Progress Toward Goals	Annual			X	X

1. The trigger related to the review of receiving water limitations exceedances will now be assessed on a permit term basis in the Regional Monitoring and Assessment Report. Section 5.2 and Appendix E provide more detail.

5.2 WQIP Elements for Adaptation

The Los Peñasquitos WMA WQIP was approved by the Regional Board in February 2016. The Responsible Agencies have just begun to implement the WQIP strategies. Therefore, there have been no adaptations made to the PWQCs, goals, strategies, or schedules, as summarized in Table 5-2. There have been changes to timing of the receiving water limitation exceedance assessment put forth by Provision A.4 and administrative changes to the City of San Diego's strategies. These changes are summarized in Table 5-2 and additional detail is provided in Appendix E.

Table 5-2
2015–2016 WQIP Annual Report Adaptations

Element for Adaptation	2015–2016 Annual Report Adaptation
Priority Water Quality Conditions	There are no adaptations at to the priority water quality conditions at this time. No new regulations, policies, or recommendations from the Regional Board have triggered adaption of this WQIP Element.
Goals and Schedules	The Responsible Agencies are on track to meet their 2018 WQIP goals and do not plan any adaptations to their goals or the related schedules at this time.
Strategies and Schedules	The Responsible Agencies have just begun implementation of their WQIP strategies that have pollutant reduction benefits. They plan to continue implementing the strategies without modification to realize the rewards of these pollutant reduction benefits. The City of Del Mar identified some administrative changes to their strategies that are reflected in Appendix D. The City of San Diego has identified some administrative changes that are reflected in Appendix D and some operational adaptive management efforts in its JRMP included in Appendix D.
Monitoring and Assessment	The adaptive management process was changed to review receiving water limitation exceedances once per permit term, as allowed by the MS4 Permit, and not annually, as outlined in the WQIP.

JRMP = Jurisdictional Runoff Management Program; WQIP = Water Quality Improvement Plan

5.3 Summary of Previous Adaptation and Implementation

The 2015–2016 Los Peñasquitos WMA WQIP Annual Report is the first annual report submitted by the Responsible Agencies. No prior adaptations or updates have been made to either the WQIP or each Responsible Agency's JRMP.

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6 Conclusions and Recommendations

The Responsbile Agencies have successfully implemented the 2015–2016 program set forth in the WQIP. Progress toward performance-based goals has been achieved. Wet and dry weather water quality monitoring provided an initial data set for assessing and adapting goals and strategies. The conclusions described below highlight the success of the WQIP.

Monitoring and Assessment: The Responsible Agencies successfully completed wet and dry weather MS4 outfall monitoring in 2015–2016 in accordance with Provision D of the MS4 Permit. Monitoring was also conducted for the HPWQCs. The monitoring program and results for 2015–2016 are described in Section 3 and Appendix C. Monitoring and Assessment highlights include:

- Monitoring for the HPWQC – Los Peñasquitos Lagoon: Three storm events were monitored at the subwatershed compliance monitoring locations. Results are as follows:
  - SSCs were higher at or near peak flow and during the rising limb of the hydrograph for smaller storms such Events 2 and 3 during the 2015–2016 wet season. For the larger storm (Event 1), SSCs in all three WMA creeks remained high throughout the storm and mostly varied with flow, suggesting that the unusually high flows may have mobilized previously deposited sediments that were stored by in-channel vegetation and streambed.
  - The total 2015–2016 sediment load estimate of 23,500 tons per year is above the final Sediment TMDL waste load allocation (WLA) (2,580 tons per year). This TMDL compliance pathway can be achieved by 2034. Monitoring in previous years has recorded annual sediment loads that were below the WLA.
- Monitoring for the HPWQC – Pacific Ocean Shoreline: The first year of Bacteria TMDL monitoring at the at the historical San Diego County AB 411 monitoring location at the mouth of the Los Peñasquitos Lagoon (FM-100) was completed for wet and dry weather. Results are as follows:
  - During wet weather, the receiving waters at the Los Peñasquitos River Outlet/Beach achieved a 0% single-sample maximum exceedance frequency for fecal coliform and a 13% single-sample maximum exceedance frequency for total coliform and *Enterococcus*. FM-100 is in compliance with final wet weather single-sample maximum RWLs.
  - During the wet season, which evaluates a combination of both wet and dry weather samples, FM-100 achieved a 0% geometric mean exceedance frequency and is in compliance with final dry weather geometric mean RWLs.
- During the dry season, when recreational activities occur with more regularity, FM-100 achieved a 0% exceedance frequency and is in compliance with the final dry weather geometric mean RWLs.

- MS4 Monitoring: Data collected as part of the MS4 monitoring program were compared to the permit action levels as detailed below:
  - In dry weather, non-storm water action levels were met over 74% of the time for multiple consituents.
  - In wet weather, only one storm water action level exceedance for turbidity was recorded.
- Special Studies: The Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Study found that areas in the upper portion of Los Peñasquitos Creek and in the upper portions of Carmel Valley Creek may have the potential to serve as a sink for sediment within the WMA that can be mobilized during large storms such as the storm in early January 2016. Aerial deposition sampling determined that aerial deposition of sediment was not a significant contributor to the watershed sediment loads compared with the stream loads. The San Diego Regional Reference Streams and Beaches Study provided valuable information for the Bacteria TMDL Reopener. The Sediment Load Reduction Quantification Through Outfall Repair and Relocation for the Los Peñasquitos WMA Study was performed in order to assess the current sediment loading to the Los Peñasquitos Lagoon caused by the erosive scour associated with outfall discharge. Also, the study provided estimates in sediment location reduction provided by three BMP options.

Strategy Implementation: Strategies have been implemented as planned in the WQIP during 2015–2016. Strategies for the HPWQCs are described in Section 4. The following examples highlight efforts by the Responsbile Agencies to improve water quality:

- City of Del Mar: The City of Del Mar proactively implemented its city-wide patrol approach to identify issues or potential issues and ensure proper BMP implementation. Del Mar also conducted visual monitoring after wet weather events to identify areas with erosion. Minor and major repairs and slope stabilization were completed based on the visual monitoring results.
- City of Poway: The City of Poway has implemented a turf replacement program and has successfully converted 214,105 square feet of turf.
- City of San Diego: The City volunteered to be the Lead Agency for the Los Peñasquitos/Sorrento Restoration Program (to help meet restoration of 84 acres of saltwater marsh) and is working in collaboration with the Responsible Agencies, State Parks, the Coastal Conservancy, the Los Peñasquitos Lagoon Foundation, and other stakeholders. Modeling was completed in FY 16 to confirm the preferred alternative for the lagoon restoration. Additionally, several biological technical studies were completed the first phase of the project. Next steps for FY 17 may include additional modeling, completion of the concept design, and commencement of the public outreach process.

- County of San Diego: The County collaborates with and promotes the efforts of partner agencies for incentive programs such as rain barrels, water smart irrigation controllers, soil sensors, turf replacement programs, and residential landscape evaluation programs. The County undertook a community-based social marketing pilot study on the effectiveness of irrigation runoff prevention materials.

Progress Toward Goals: The Responsible Agencies have demonstrated achievement of the performance-based goals planned for 2015–2016, and have either met, surpassed, or demonstrated progress toward achieving the interim numeric goals set for the term of the current MS4 Permit. Goals and performance-based goals achieved include the following:

- BMPs have been installed and maintained in the City of San Diego, reducing or preventing pollutants from entering receiving waters.
- Dry weather flow reduction goals have been surpassed in the City of San Diego.
- Flow reduction goals have been surpassed in the City of Del Mar**.**
- The County has begun implementation of the WQIP.

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7 References

Los Peñasquitos WMA Copermittees. 2015. Los Peñasquitos WMA Water Quality Improvement Plan and Comprehensive Load Reduction Plan. Develop by Amec Foster Wheeler Environment and Infrastructure, Inc.

San Diego Regional Water Quality Control Board (Regional Board). 2010. *Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001.

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Southern California Coastal Water Research Project (SCCWRP), 2015. *Wet and Dry Weather Natural Background Concentrations of Fecal Indicator Bacteria in San Diego, Orange, and Ventura County, California Streams.* SCCWRP Technical Report 862. June 2015.

Southern California Coastal Water Research Project (SCCWRP), 2016. *Microbiological Water Quality at Reference Beaches and an Adjoining Estuary in Southern California during a Prolonged Drought.* SCCWRP Technical Report 936. July 2016.

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Appendix A: Crosswalk of MS4 Permit Requirements and Annual Report References

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Table A1-1
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix B Numeric Goals	Appendix C Monitoring	Appendix D Jurisdictional Information	Appendix E Adaptive Management
Provision A						
A.4.a.(2)	If ***exceedance(s) of water quality standards persist in receiving waters*** notwithstanding implementation of this Order, the Copermittees must comply with the following procedures: (2) Upon a **determination** by either the Copermittees or the San Diego Water Board that discharges from the MS4 are **causing or contributing to a new exceedance** of an applicable water quality standard **not addressed** by the Water Quality Improvement Plan, the Copermittees must submit the following updates to the Water Quality Improvement Plan pursuant to Provision F.2.c ***or as part of the Water Quality Improvement Plan Annual Report*** required under Provision F.3.b, unless the San Diego Water Board directs an earlier submittal:	Section 5		X		X
	(a) The water quality improvement ***strategies being implemented that are effective and will continue to be implemented***,	Section 5.2			X	
	(b) ***Water quality improvement strategies (i.e. BMPs, retrofitting projects, stream and/or habitat rehabilitation projects, adjustments to jurisdictional runoff management programs, etc.) that will be implemented*** to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards,	Section 5.2				X
	(c) ***Updates to the schedule for implementation*** of the existing and additional water quality improvement strategies, and	Section 5.2				X
	(d) ***Updates to the monitoring and assessment program*** to track progress toward achieving compliance with Provisions A.1.a, A.1.c and A.2.a of this Order;	Section 5.2				X
Provision B						
B.5.a.	a. The **priority water quality conditions** and potential **water quality improvement strategie**s included in the Water Quality Improvement Plan pursuant to Provisions B.2.c and B.2.e ***may be re-evaluated by the Copermittees as needed during the term of this Order as part of the Water Quality Improvement Plan Annual Report***. Re-evaluation and recommendations for modifications to the priority water quality conditions and potential water quality improvement strategies **must be provided in the Report of Waste Discharge**, and must consider the following: (1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan; (2) New information developed when the requirements of Provisions B.2.a-c have been re-evaluated; (3) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality conditions and implementation strategies to address the highest priority water quality conditions; (4) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees; (5) San Diego Water Board recommendations; and (6) Recommendations for modifications solicited through a public participation process.	Section 5		X		X
B.5.b.	b. The water quality improvement goals, strategies and schedules, included in the Water Quality Improvement Plan pursuant to Provisions B.3, ***must be reevaluated and adapted as new information becomes available*** to result in more effective and efficient measures to address the highest priority water quality conditions identified pursuant to Provision B.2.c. ***Re-evaluation of and modifications to the water quality improvement goals, strategies and schedules must be provided in the Water Quality Improvement Plan Annual Report***, and must consider the following:	Section 5	X			X
	(1) Modifications to the **priority water quality conditions** based on Provision B.5.a;	Section 5				X
	(2) Progress toward **achieving interim and final numeric goals** in receiving waters and MS4 discharges for the highest priority water quality conditions in the Watershed Management Area,	Section 4.3				
	(3) Progress toward achieving outcomes according to established schedules;	Section 4.3			X	X
	(4) New policies or regulations that may affect identified numeric goals;					X
	(5) Measurable or demonstrable reductions of non-storm water discharges to and from each Copermittee's MS4;			X		
	(6) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;			X		

Table A1-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix: Appendix B Numeric Goals	WQIP Appendix: Appendix C Monitoring	WQIP Appendix: Appendix D Jurisdictional Information	WQIP Appendix: Appendix E Adaptive Management
B.5.b. (continued)	(7) New information developed when the requirements of Provisions B.2.b and B.2.d have been re-evaluated;	Section 5		X		X
	(8) Efficiency in implementing the Water Quality Improvement Plan;	Section 5			X	X
	(9) San Diego Water Board recommendations; and	Section 5				X
	(10) Recommendations for modifications solicited through a public participation process.	Section 5				X
B.5.c.	c. The water quality improvement monitoring and assessment program, included in the Water Quality Improvement Plan pursuant to Provision B.4, ***must be reevaluated and adapted when new information becomes available***. Re-evaluation and recommendations for modifications to the monitoring and assessment program, pursuant to the requirements of Provision D, ***may be provided in the Water Quality Improvement Plan Annual Report***, but must be provided in the Report of Waste Discharge.	Section 5		X		X
Provision D						
D.1.e.(2)(c)	**Sediment Quality Monitoring** (c) The Copermittees must incorporate a ***Sediment Monitoring Report as part of the Water Quality Improvement Plan Annual Report*** in accordance with the schedule contained in the Sediment Monitoring Plan, unless otherwise directed in writing by the San Diego Water Board Executive Officer. The Sediment Monitoring Report must contain the following information: (i) Analysis: An evaluation, interpretation and tabulation of the water and sediment monitoring data, including interpretations and conclusions as to whether applicable Receiving Water Limitations in this Order have been attained at each sample station; (ii) Sample Location Map: The locations, type, and number of samples must be identified and shown on a site map; and (iii) California Environmental Data Exchange Network: A statement certifying that the monitoring data and results have been uploaded into the California Environmental Data Exchange Network (CEDEN).			X		
D.2.b.(iv)	**Dry Weather MS4 Outfall Discharge Monitoring** (iv) Each Copermittee must document ***removal or re-prioritization of the highest priority persistent flow MS4 outfall monitoring stations identified under Provision D.2.b.(2)(a) in the Water Quality Improvement Plan Annual Report***. Persistent flow MS4 outfall monitoring stations that have been removed must be replaced with the next highest prioritized major MS4 outfall in the Watershed Management Area within its jurisdiction, unless there are no remaining qualifying major MS4 outfalls within the Copermittee's jurisdiction in the Watershed Management Area.			X		
D.4.b.(1)(a)(ii)	**Non-Storm Water Dischargers Reduction Assessments** (a) Each Copermittee must assess and report the ***progress of its illicit discharge detection and elimination program***, required to be implemented pursuant to Provision E.2, toward effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction as follows: (ii) Based on the data collected pursuant to Provisions D.2.b, the ***assessments required under <u>Provision D.4.b.(1)(c)</u> must be included in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3).***			X		
D.4.b.(1)(b)	(b) Based on the transitional dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.a.(2), each Copermittee must assess and report the following: (i) Identify the known and suspected controllable sources (e.g. facilities, areas, land uses, pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area; (ii) Identify sources of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area that have been reduced or eliminated; and (iii) Identify modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.			X		X

Table A1-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix: Appendix B Numeric Goals	WQIP Appendix: Appendix C Monitoring	WQIP Appendix: Appendix D Jurisdictional Information	WQIP Appendix: Appendix E Adaptive Management
D.4.b.(1)(c)	(c) Based on the **dry weather MS4 outfall discharge field screening monitoring** required pursuant to Provision D.2.b.(1), each Copermittee must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(1)(b); (ii) Based on the data collected and applicable NALs in the Water Quality Improvement Plan, rank the MS4 outfalls in the Copermittee's jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan, with the goal of eliminating persistent flow non-storm water discharges and/or pollutant loads in order of the ranked priority list through targeted programmatic actions and source investigations; (iii) For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identify the known and suspected sources within the Copermittee's jurisdiction in the Watershed Management Area that may cause or contribute to the NAL exceedances; (iv) Each Copermittee must analyze the data collected pursuant to Provision D.2.b, and utilize a model or other method, to calculate or estimate the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually. [a] Each Copermittee must calculate or estimate the annual non-storm water volumes and pollutant loads collectively discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall; [b] Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters.			X		
	(v) Each Copermittee must review the data collected pursuant to Provision D.2.b and findings from the assessments required pursuant to Provision D.4.b.(1)(c)(i)-(iv) at least once during the term of this Order to: [a] Identify reductions and progress in achieving reductions in non-storm water and illicit discharges to the Copermittee's MS4 in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction, with an estimate, if possible, of the non-storm water volume and/or pollutant load reductions attributable to specific water quality strategies implemented by the Copermittee; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittee in the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction. (vi) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(1)(c)(i)-(v).			X		
D.4.b.(2)(a)	**Storm Water Pollutant Discharge Reduction Assessments** (a) The Copermittees must assess and report the ***progress of the water quality improvement strategies, required to be implemented pursuant to Provisions B and E, toward reducing pollutants in storm water discharges*** from the MS4s within the Watershed Management Area as follows: (ii) Based on the data collected pursuant to Provisions D.2.c, the ***assessments required under <u>Provision D.4.b.(2)(c)</u> must be included in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).			X		

Table A1-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix: Appendix B Numeric Goals	WQIP Appendix: Appendix C Monitoring	WQIP Appendix: Appendix D Jurisdictional Information	WQIP Appendix: Appendix E Adaptive Management
D.4.b.(2)(b)	(b) Based on the transitional wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.a.(3) the Copermittees must assess and report the following: (i) The Copermittees must analyze the monitoring data collected pursuant to Provision D.2.a.(3), and utilize a watershed model or other method, to calculate or estimate the following for each monitoring year: [a] The average storm water runoff coefficient for each land use type within the Watershed Management Area; [b] The volume of storm water and pollutant loads discharged from each of the Copermittee's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch; [c] The total flow volume and pollutant loadings discharged from the Copermittee's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and [d] The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch.(ii) Identify modifications to the wet weather MS4 outfall discharge monitoring locations and frequencies necessary to identify pollutants in storm water discharges from the MS4s in the Watershed Management Area pursuant to Provision D.2.c.(1).			X		
D.4.b.(2)(c)	(c) Based on the wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.c the Copermittees must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(2)(b); (ii) Based on the data collected and applicable SALs in the Water Quality Improvement Plan, analyze and compare the monitoring data to the analyses and assumptions used to develop the Water Quality Improvement Plans, including strategies developed pursuant to Provision B.3, and evaluate whether those analyses and assumptions should be updated as a component of the adaptive management efforts pursuant to Provision B.5 for follow-up action to update the Water Quality Improvement Plan; (iii) The Copermittees must review the data collected pursuant to Provision D.2.c and findings from the assessments required pursuant to Provisions D.4.b.(2)(c)(i)-(ii) at least once during the term of this Order to: [a] Identify reductions or progress in achieving reductions in pollutant concentrations and/or pollutant loads from different land uses and/or drainage areas discharging from the Copermittees' MS4s in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters within the Watershed Management Area to the MEP, with an estimate, if possible, of the pollutant load reductions attributable to specific water quality strategies implemented by the Copermittees; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittees in the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters in the Watershed Management Area to the MEP. (iv) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(2)(c)(i)-(iii).			X		
D.4.c.	**Special Studies Assessments** c. The Copermittees must ***annually evaluate the results and findings from the special studies developed and implemented pursuant to Provision D.3***, and assess their relevance to the Copermittees' efforts to characterize receiving water conditions, understand sources of pollutants and/or stressors, and control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters in the Watershed Management Area. The Copermittees must ***report the results of the special studies assessments applicable to the Watershed Management Area, and identify any necessary modifications or updates to the Water Quality Improvement Plan based on the results in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).	Section 2		X		X
D.4.d.	Integrated Assessment of Water Quality Improvement Plan d. As part of the ***iterative approach and adaptive management process*** required for the Water Quality Improvement Plan pursuant to Provision B.5, the Copermittees in each Watershed Management Area must integrate the data collected pursuant to Provisions D.1-D.3, the findings from the assessments required pursuant to Provisions D.4.a-c, and information collected during the implementation of the jurisdictional runoff management programs required pursuant to Provision E to assess the effectiveness of, and identify necessary modifications to, the Water Quality Improvement Plan as follows:	Section 5		X		X

Table A1-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix: Appendix B Numeric Goals	WQIP Appendix: Appendix C Monitoring	WQIP Appendix: Appendix D Jurisdictional Information	WQIP Appendix: Appendix E Adaptive Management
D.4.d.(1)	(1) The Copermittees ***must re-evaluate the priority water quality conditions and numeric goals for the Watershed Management Area, as needed, during the term of this Order pursuant to Provision B.5.a.*** The re-evaluation and recommendations for modifications to the priority water quality conditions, and/or numeric goals and corresponding schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The priority water quality conditions and numeric goals for the Watershed Management Area must be reevaluated as follows: (a) Re-evaluate the receiving water conditions in the Watershed Management Area in accordance with Provision B.2.a; (b) Re-evaluate the impacts on receiving waters in the Watershed Management Area from MS4 discharges in accordance with Provision B.2.b; (c) Re-evaluate the identification of MS4 sources of pollutants and/or stressors in accordance with Provision B.2.d; (d) Identify beneficial uses of the receiving waters that are protected in accordance with Provision D.4.a; (e) Evaluate the progress toward achieving the interim and final numeric goals for protecting impacted beneficial uses in the receiving waters.	Section 5.2		X		X
D.4.d.(2)	(2) The Copermittees ***must re-evaluate the water quality improvement strategies for the Watershed Management Area during the term of this Order pursuant to Provision B.5.b.*** The re-evaluation and recommendations for modifications to the water quality improvement strategies and schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The water quality improvement strategies for the Watershed Management Area must be re-evaluated as follows: (a) Identify the non-storm water and storm water pollutant loads from the Copermittees' MS4 outfalls in the Watershed Management Area, calculated or estimated pursuant to Provisions D.4.b; (b) Identify the non-storm water and storm water pollutant load reductions, or other improvements to receiving water or water quality conditions, that are necessary to attain the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters; (c) Identify the non-storm water and storm water pollutant load reductions, or other improvements to the quality of MS4 discharges, that are necessary for the Copermittees to demonstrate that non-storm water and storm water discharges from their MS4s are not causing or contributing to exceedances of receiving water limitations; (d) Evaluate the progress of the water quality improvement strategies toward achieving the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters.	Section 5.2			X	X
D.4.d.(3)	(3) The Copermittees ***must re-evaluate and adapt the water quality monitoring and assessment program for the Watershed Management Area when new information becomes available to improve the monitoring and assessment program pursuant to Provision B.5.c.*** The re-evaluation and recommendations for modifications to the monitoring and assessment program ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. Modifications to the water quality monitoring and assessment program must be consistent with the requirements of Provision D.1-D.3. The re-evaluation of the water quality monitoring and assessment program for the Watershed Management Area must consider the data gaps identified by the assessments required pursuant to Provisions D.4.a-b, and results of the special studies implemented pursuant to Provision D.4.c	Section 5.2		X		X
Provision E						
E.1.b.	**b.** With the first ***Water Quality Improvement Plan Annual Report*** *required pursuant to Provision F.3.b.(3),* ***each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority*** within its jurisdiction to implement and enforce each of the requirements contained in this Order.	Cert Statement			X	
E.2.d.(4)	(4) Each Copermittee must submit a ***summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its jurisdiction with each Water Quality Improvement Plan Annual Report required under Provision F.3.b.(3)*** of this Order.			X		
E.8.c.	**c.** Each Copermittee must submit a ***summary of the annual fiscal analysis with each Water Quality Improvement Plan Annual Report required pursuant to Provision F.3.b.(3)***.				X	

Table A1-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix B Numeric Goals	Appendix C Monitoring	Appendix D Jurisdictional Information	Appendix E Adaptive Management
Provision F						
F.1.b.(6)	(6) During implementation of the Water Quality Improvement Plan the Copermittees must ***correct any deficiencies in the Plan identified by the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report*** following a request by the Board to do so.	Section 5.2				X
F.2.a.(2)	(2) Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the jurisdictional runoff management program document based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;***				X	X
F.2.a.(3)	(3) Each Copermittee must submit ***updates to its jurisdictional runoff management program, with the supporting rationale for the modifications, either in the Water Quality Improvement Plan Annual Report*** required pursuant to Provision F.3.b.(3), or as part of the Report of Waste Discharge required pursuant to Provision F.5.b	Section 5			X	X
F.2.b.(1)	(1) Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provisions E.3.a-d concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the BMP Design Manual based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report***;	Section 5.2			X	
F.2.b.(2)	(2) Any ***future updates to the BMP Design Manual*** made after it update pursuant to Provision F.2.b.(1) is completed must be consistent with the requirements of Provisions E.3.a-d and ***must be submitted as part of the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b; and				X	
F.2.c.(1)(c)	(c) The Copermittees for each Watershed Management Area ***must submit 1) proposed updates to the Water Quality Improvement Plan and supporting rationale, and 2) recommendations received from the public and the Water Quality Improvement Consultation Panel and the rationale for the requested updates, either in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b.	Section 5.2				X
F.3.b.(3)(a-f)	(3) Water Quality Improvement Plan Annual Reports - The Copermittees for each Watershed Management Area must ***submit a Water Quality Improvement Plan Annual Report for each reporting period no later than January 31*** of the following year. The annual reporting period consists of two different periods: 1) July 1 to June 30 of the following year for the jurisdictional runoff management programs, 2) October 1 to September 30 of the following year for the monitoring and assessment programs. The Water Quality Improvement Plan Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each ***Annual Report must include the following***:	See below				
	(a) The receiving water and MS4 outfall discharge monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;	Section 3.2		X		
	(b) The progress of the special studies required pursuant to Provision D.3, and the findings, interpretations and conclusions of a special study, or each phase of a special study, upon its completion;	Section 3.2		X		
	(c) The findings, interpretations and conclusions from the assessments required pursuant to Provision D.4;			X		
	(d) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following: (i) The **progress toward achieving the interim and final numeric goals** for the highest water quality priorities for the Watershed Management Area;	Section 4.3				
	(ii) The water quality improvement **strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods**;				X	X
	(iii) The water quality improvement strategies planned for implementation during the next reporting period;				X	X

Table A1-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix: Appendix B Numeric Goals	WQIP Appendix: Appendix C Monitoring	WQIP Appendix: Appendix D Jurisdictional Information	WQIP Appendix: Appendix E Adaptive Management
F.3.b.(3)(a-f) (continued)	(iv) Proposed modifications to the water quality improvement strategies, the public comments received and the supporting rationale for the proposed modifications;	Section 5			X	X
	(v) Previous modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area; and	Section 5.3			X	X
	(vi) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;	Section 5.3			X	X
	(e) A completed Jurisdictional Runoff Management Program Annual Report Form (contained in Attachment D to this Order or a revised form accepted by the San Diego Water Board) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative; and				X	
	(f) Each Copermittee must provide any data or documentation utilized in developing the Water Quality Improvement Plan Annual Report upon request by the San Diego Water Board. Any Copermittee monitoring data utilized in developing the Water Quality Improvement Plan Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN). Any Copermittee monitoring and assessment data utilized in developing the Water Quality Improvement Plan Annual Report must be available for access on the Regional Clearinghouse required pursuant to Provision F.4.			X		
F.6	Each Copermittee must comply with all the reporting and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.	Section 6		X		
Attachment E						
Attachment E	Specific Monitoring and Assessment Requirements for each TMDL.TMDL monitoring and assessment results must be submitted as part of Water Quality Improvement Plan Annual Reports required under Provision F.3.b	Section 3.2		X		

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Appendix B: Water Quality Improvement Plan Goals

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The following sections present final and interim numeric goals by jurisdiction.

B.1 City of Del Mar Goals

Del Mar's Water Quality Improvement Plan interim and final goals for wet weather sediment are presented in Tables B-1 and B-2, respectively. Del Mar's Water Quality Improvement Plan numeric goals for wet weather bacteria and dry weather are presented in Tables B-3 and B-4, respectively.

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Table B-1
Wet Weather Sediment Interim Numeric Goals for the City of Del Mar

Compliance Pathways		**Baseline**	**Goals by Assessment Period and Fiscal Year**				
			Current Permit Term (FY14 – FY18)	**FY 16–20**	**FY 21–25**	**FY 26–30**	
Sediment							
			FY18	**FY20[1]**	**FY24[1]**	**FY28[1]**	**FY30[1]**
Lagoon Restoration Restoration of Salt Marsh Habitat	Acres of Salt Marsh Habitat	262 acres in 2010 (Sediment TMDL)	346 acres[2]				
Or							
MS4 Discharges % Load Reduction		0% Load Reduction Year 2000 (Sediment TMDL Model)	3.0%[3]	7.0%[3]	13.9%[3]	20.9%[3]	27.8%[3]
Or							
MS4 Discharges Sediment Load Within Allowable Limits as Determined by Sediment Loading Model (tons/wet period)		1.6 tons/wet period 2010 (Sediment Water Quality Improvement Plan Model)	–	1.5	1.4	1.2	1.1
Or							

Table B-1 (continued)
Wet Weather Sediment Interim Numeric Goals for the City of Del Mar

<table>
<tr><th rowspan="2">Compliance Pathways</th><th rowspan="2">Baseline</th><th colspan="5">Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term (FY14 – FY18)</th><th>FY 16–20</th><th>FY 21–25</th><th colspan="2">FY 26–30</th></tr>
<tr><td rowspan="6">MS4 Discharges and Receiving Water
Implement Accepted Water Quality Improvement Plan</td><td colspan="6">Submitting and fully implementing a Water Quality Improvement Plan, accepted by the Regional Board, which provides reasonable assurance[4] that the City's portion of the interim TMDL compliance requirements, described in Attachment A of Resolution No. R9-2010-0033 will be achieved.
The compliance schedule in Attachment A provides two pathways to meet interim goals: (1) attain the specified percent load reduction, or (2) show progress in improving Lagoon conditions; see metrics below.</td></tr>
<tr><td>0% Load Reduction Year 2000 (Sediment TMDL Model)</td><td>3.0%[3]</td><td>7.0%[3]</td><td>13.9%[3]</td><td>20.9%[3]</td><td>27.8%[3]</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td>1.6 tons/wet period 2010 (Sediment Water Quality Improvement Plan Model)</td><td>–</td><td>1.5</td><td>1.4</td><td>1.2</td><td>1.1</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td>262 acres in 2010 (Sediment TMDL)</td><td colspan="5">Increasing trend in the total area of salt marsh habitat</td></tr>
<tr><td colspan="7">Or</td></tr>
</table>

Table B-1 (continued)
Wet Weather Sediment Interim Numeric Goals for the City of Del Mar

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	
MS4 Discharges # of Direct or Indirect Discharges to Receiving Water	Discharges	Average Annual Flow: 4 gallons per minute Maximum Flow: 7 gallons per minute	0	0	0	0	0

1. Denotes TMDL interim and final target.
2. As defined by the Sediment TMDL and Attachment A to Resolution No. R9-2010-0033, this can mean either:
   - Successful restoration of 80% of the 1973 acreage of Lagoon salt marsh habitat (346 acres); or
   - Demonstration that implementation actions are active on and/or affecting 346 acres with continued monitoring to ensure 80% target achievement.
3. The load reduction is based on Sediment TMDL model updates completed during development of the Water Quality Improvement Plan. The interim goals were calculated on the basis of the required percent reductions in the compliance schedule (Attachment A to Resolution No. R9-2010-0033). Calculation of the load reduction includes loading from Phase II MS4s, general construction, and general industrial permittees within the City of San Diego's jurisdiction. Further analysis of loads specific to the City of San Diego may be completed in the future.
4. Reasonable assurance is provided by the compliance analysis described in Section 4.3.2 and Appendix K. The metric used in the compliance analysis is load reduction.

% = percent; FY = fiscal year; WQO = Water Quality Objective
All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-2
Wet Weather Sediment Final Numeric Goals for the City of Del Mar

<table>
<tr><th colspan="2" rowspan="2">Compliance Pathways</th><th rowspan="2">Baseline</th><th>Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>FY31-36</th></tr>
<tr><td colspan="4">Sediment</td></tr>
<tr><td colspan="2"></td><td></td><td>FY35[1]</td></tr>
<tr><td>Lagoon Restoration
Restoration of Salt Marsh Habitat</td><td>Acres of Salt Marsh Habitat</td><td>262 acres in 2010 (Sediment TMDL)</td><td>346 acres[2]</td></tr>
<tr><td colspan="4">Or</td></tr>
<tr><td colspan="2" rowspan="3">MS4 Discharges and Receiving Water
Implement Accepted Water Quality Improvement Plan</td><td>Strategies presented in Appendix I</td><td>The Water Quality Improvement Plan must incorporate and the City must implement the BMPs or other implementation actions required to achieve the Lagoon restoration goal</td></tr>
<tr><td colspan="2">And</td></tr>
<tr><td>Reasonable assurance is provided by the compliance analysis described in Section 4.3.2 and Appendix K</td><td>Include a compliance analysis[3], accepted by the Regional Board, to demonstrate that implementation of the BMPs or other implementation actions will achieve the Lagoon restoration goal</td></tr>
</table>

Table B-2 (continued)
Wet Weather Sediment Final Numeric Goals for the City of Del Mar

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		FY31-36
Sediment		
		FY35[1]
MS4 Discharges and Receiving Water Implement Accepted Water Quality Improvement Plan	And	
	262 acres in 2010 (Sediment TMDL)	Perform monitoring and assessments to demonstrated compliance with the Lagoon restoration goal of 346 acres[2]

1. Denotes TMDL interim and final target.
2. As defined by the Sediment TMDL and Attachment A to Resolution No. R9-2010-0033, this can mean either:
   - Successful restoration of 80% of the 1973 acreage of Lagoon salt marsh habitat (346 acres); or
   - Demonstration that implementation actions are active on and/or affecting 346 acres with continued monitoring to ensure 80% target achievement.
3. The load reduction is based on Sediment TMDL model updates completed during the development of the Water Quality Improvement Plan. The interim goals were calculated on the basis of the required percent reductions in the compliance schedule (Attachment A to Resolution No. R9-2010-0033). Calculation of the load reduction includes loading from Phase II MS4s, general construction, and general industrial permittees within the City of Del Mar's jurisdiction. Further analysis of loads specific to the City of Del Mar may be completed in the future.

FY = fiscal year
All numeric goals are cumulative from the baseline assessment for each fiscal year.

Table B-3
Wet Weather Bacteria Numeric Goals for the City of Del Mar

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31-35
Indicator Bacteria							
Compliance Pathways		**Baseline**	**FY18**	**FY19**	**FY24[1]**	**FY29**	**FY31[1]**
Receiving Water % Days Exceeding WQO	Fecal coliform	30% Days Exceeding WQO (2002 TMDL Model)	See performance measures	30%[2]	26%	25%	22%
	Enterococcus	30% Days Exceeding WQO (2002 TMDL Model)		30%[2]	26%	25%	22%
	Total coliform	30% Days Exceeding WQO (2002 TMDL Model)		30%[2]	26%	25%	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures	0.3%	1.0%	1.4%	2.0%
	Enterococcus			0.3%	1.0%	1.3%	1.9%
	Total coliform			0.2%	0.8%	1.1%	1.6%
Or							

Table B-3 (continued)
Wet Weather Numeric Goals for the City of Del Mar

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year: Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31-35
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 99%[3]	See performance measures	22%	22%	22%	22%
	Enterococcus	**New:** 100%[3]		22%	22%	22%	22%
	Total coliform	**New:** 100%[3]		22%	22%	22%	22%
Or							
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 1 discharge[4]	0	0	0	0	0
Or							
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
	Total coliform		100%	100%	100%	100%	100%
Or							
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge percent load reduction (above). Interim compliance is implementation of strategies and schedule on the basis of analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See Section 4.3.2 and Appendix K for modeling results.					

Table B-3 (continued)
Wet Weather Numeric Goals for the City of Del Mar

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		Current Permit Term (FY14-FY18)
Performance Measures		
Suite of Strategies to Measure Performance During First Permit Term	**Baseline**	**FY18**
Reduce anthropogenic surface dry weather flows[6] to address bacteria regrowth contributing during wet weather	**New:** Average Annual Flow: 4 gallons per minute Maximum Flow: 7 gallons per minute	10% reduction in anthropogenic surface dry weather flows[6] that originate within the City's jurisdictional boundaries

1. Denotes TMDL interim and final target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceeding frequency.
3. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period.
4. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The term "dry weather flows" excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.

% = percent; FY = fiscal year; WQO = Water Quality Objective
All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-4
Dry Weather Numeric Goals for the City of Del Mar

Compliance Pathways		**Baseline**	**Goals by Assessment Period and Fiscal Year**		
			Current Permit Term (FY14 – FY18)	**FY 16–20**	**FY 21–25**
Indicator Bacteria					
			FY18	**FY19[1]**	**FY21[1]**
Receiving Water % Days Exceeding WQO	Fecal coliform	4% Days Exceeding WQO (2002[2])	See performance measures	2.0%[2]	0%
	Enterococcus	19% Days Exceeding WQO (2002[2])		9.5%[2]	0%
	Total coliform	1% Days Exceeding WQO (2002[2])		0.5%[2]	0%
Or					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 100%[3]	See performance measures	0%	0%
	Enterococcus	**New:** 100%[3]		0%	0%
	Total coliform	**New:** 100%[3]		0%	0%
Or					
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures	48.3%	96.6%
	Enterococcus			49.7%	99.4%
	Total coliform			48.3%	96.5%
Or					
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 1 discharge[4]	0		0

Table B-3 (continued)
Wet Weather Numeric Goals for the City of Del Mar

<table>
<tr><th colspan="2" rowspan="2">Compliance Pathways</th><th rowspan="2">Baseline</th><th colspan="3">Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term (FY14 – FY18)</th><th>FY 16–20</th><th>FY 21–25</th></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td rowspan="3">% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]</td><td>Fecal coliform</td><td rowspan="3">Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.</td><td colspan="2">100%</td><td>100%</td></tr>
<tr><td>Enterococcus</td><td colspan="2">100%</td><td>100%</td></tr>
<tr><td>Total coliform</td><td colspan="2">100%</td><td>100%</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td colspan="2">MS4 Discharges
Implement Accepted Water Quality Improvement Plan</td><td colspan="4">Metric for compliance analysis is MS4 discharge percent load reduction (above). Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.
See Section 4.3.2 and Appendix K for modeling results.</td></tr>
</table>

Table B-3 (continued)
Wet Weather Numeric Goals for the City of Del Mar

<table>
<tr><th colspan="2" rowspan="2">Compliance Pathways</th><th rowspan="2">Baseline</th><th colspan="3">Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term (FY14 – FY18)</th><th>FY 16–20</th><th>FY 21–25</th></tr>
<tr><td colspan="6">Freshwater Discharge</td></tr>
<tr><td></td><td></td><td></td><td>FY18</td><td>FY19[1]</td><td>FY21[1]</td></tr>
<tr><td>MS4 Discharges
% Irrigation or Other Dry Weather Flow Reduction</td><td>Flow</td><td>New:
Average Annual Flow:
4 gallons per minute
Maximum Flow:
7 gallons per minute</td><td>See performance measures</td><td>18%</td><td>25%</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td colspan="2">MS4 Discharges
Implement Accepted Water Quality Improvement Plan</td><td colspan="4">Metric for compliance analysis is MS4 discharge percent load reduction (above). Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.
See Section 4.3.2 and Appendix K for modeling results.</td></tr>
</table>

Table B-3 (continued)
Wet Weather Numeric Goals for the City of Del Mar

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		Current Permit Term (FY14-FY18)
Performance Measures		
Suite of Strategies to Measure Performance During First Permit Term	**Baseline**	**FY18**
Reduce anthropogenic surface dry weather water flows[6]	**New:** Average Annual Flow: 4 gallons per minute Maximum Flow: 7 gallons per minute	Reduce anthropogenic surface dry weather flows[6] that originate within the City's jurisdictional boundaries by 10%

1. Denotes TMDL interim and final target.
2. Calculated as a 50% reduction in the existing exceedance frequency presented in Appendix H.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Discharges are defined as observed dry weather flows from persistently flowing MS4 outfalls.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The term "dry weather flow" excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.

% = percent; FY = fiscal year; WQO = Water Quality Objective
All numeric goals are cumulative from the baseline assessment for each fiscal year.

B.2 City of Poway Goals

Poway's Water Quality Improvement Plan interim and final goals for wet weather sediment are presented in Tables B-5 and B-6, respectively. Poway's Water Quality Improvement Plan numeric goals for wet weather bacteria and dry weather are presented in Tables B-7 and B-8, respectively.

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Table B-5
Wet Weather Sediment Interim Numeric Goals for the City of Poway

Compliance Pathway		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	
Sediment							
			FY18	**FY20[1]**	**FY24[1]**	**FY28[1]**	**FY30[1]**
Lagoon Restoration Restoration of Salt Marsh Habitat	Acres of Salt Marsh Habitat	262 acres in 2010 (Sediment TMDL)	346 acres[2]				
Or							
MS4 Discharges % Load Reductions		0% Load Reduction Year 2000 (Sediment TMDL Model)	See performance measures	9.4%[3]	18.9%[3]	28.3%[3]	37.8%[3]
Or							
MS4 Discharges and Receiving Water Implement Accepted Water Quality Improvement Plan		Submitting and fully implementing a Water Quality Improvement Plan, accepted by the Regional Board, which provides reasonable assurance[4] that the City's portion of the interim TMDL compliance requirements, described in Attachment A of Resolution No. R9-2010-0033, will be achieved. The compliance schedule in Attachment A provides two pathways to meet interim goals: (1) attain the specified percent load reduction, or (2) show progress in improving Lagoon conditions; see metrics below.					

Table B-5 (continued)
Wet Weather Sediment Interim Numeric Goals for the City of Poway

<table>
<tr><th colspan="2" rowspan="2">Compliance Pathway</th><th rowspan="2">Baseline</th><th colspan="5">Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term (FY14 – FY18)</th><th>FY 16–20</th><th>FY 21–25</th><th colspan="2">FY 26–30</th></tr>
<tr><td colspan="2" rowspan="3">MS4 Discharges and Receiving Water
Implement Accepted Water Quality Improvement Plan
(continued)</td><td>0% Load Reduction
Year 2000
(Sediment TMDL Model)</td><td>See performance measures</td><td>9.4%[3]</td><td>18.9%[3]</td><td>28.3%[3]</td><td>37.8%[3]</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td>262 acres in 2010
(Sediment TMDL)</td><td>See performance measures</td><td colspan="4">Increasing trend in the total area of salt marsh habitat</td></tr>
<tr><td colspan="8">Or</td></tr>
<tr><td>MS4 Discharges
# of Direct or Indirect Discharges to Receiving Water</td><td>Discharges</td><td>New: 3 discharges[5]</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Table B-5 (continued)
Wet Weather Sediment Interim Numeric Goals for the City of Poway

Compliance Pathway	Baseline	Goals by Assessment Period and Fiscal Year
		Current Permit Term (FY14 – FY18)
Performance Measures		
Suite of Strategies to Measure Performance During First Permit Term	**Baseline**	**FY18**
Turf conversion	**New:** 0 square feet of turf converted	5% increase from the baseline through turf conversion

1. Denotes TMDL interim and final target.
2. As defined by the Sediment TMDL and Attachment A to Resolution No. R9-2010-0033, this can either mean:
   - Successful restoration of 80% of the 1973 acreage of Lagoon salt marsh habitat (346 acres); or
   - Demonstration that implementation actions are active on and/or affecting 346 acres with continued monitoring to ensure 80% target achievement.
3. The percent load reduction is based on Sediment TMDL model updates completed during the development of the Water Quality Improvement Plan. The interim goals were calculated on the basis of the required percent reductions in the compliance schedule (Attachment A to Resolution No. R9-2010-0033). Percent load reduction, rather than the mass (or tonnage) of load reduction, was selected as the Water Quality Improvement Plan numeric goal because the mass of sediment reduction is, in part, related to rainfall, which varies year by year. Percent load reduction provides a relative metric that is unaffected by wet or dry water years. Calculation of the percent load reduction includes loading from Phase II MS4s, general construction, and general industrial permittees within the City of Poway's jurisdiction. Further analysis of loads specific to the City of Poway may be completed in the future.
4. Reasonable assurance is provided by the compliance analysis described in Section 4.3.2 and Appendix K. The metric used in the compliance analysis is percent load reduction.
5. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.

% = percent; FY = fiscal year
All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-6
Wet Weather Sediment Final Numeric Goals for the City of Poway

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year
			FY 31–36
Sediment			
			FY35[1]
Lagoon Restoration Restoration of Salt Marsh Habitat	Acres of Salt Marsh Habitat	262 acres in 2010 (Sediment TMDL)	346 acres[2]
Or			
MS4 Discharges and Receiving Water Implement Accepted Water Quality Improvement Plan		Strategies presented in Appendix I	The Water Quality Improvement Plan must incorporate and the City must implement the BMPs or other implementation actions required to achieve the Lagoon restoration goal
		And	
		Reasonable assurance is provided by the compliance analysis described in Section 4.3.2 and Appendix K	Include a compliance analysis[3], accepted by the Regional Board, to demonstrate that implementation of the BMPs or other implementation actions will achieve the Lagoon restoration goal

Table B-6 (continued)
Wet Weather Sediment Final Numeric Goals for the City of Poway

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		FY 31–36
Sediment		
		FY35[1]
MS4 Discharges and Receiving Water Implement Accepted Water Quality Improvement Plan	**And**	
	262 acres in 2010 (Sediment TMDL)	Perform monitoring and assessments to demonstrated compliance with the Lagoon restoration goal of 346 acres[2]

1. Denotes TMDL interim and final target.
2. As defined by the Sediment TMDL and Attachment A to Resolution No. R9-2010-0033, this can mean either:
   - Successful restoration of 80% of the 1973 acreage of Lagoon salt marsh habitat (346 acres); or
   - Demonstration that implementation actions are active on and/or affecting 346 acres with continued monitoring to ensure 80% target achievement.
3. The percent load reduction is based on Sediment TMDL model updates completed during the development of the Water Quality Improvement Plan. The interim goals were calculated on the basis of the required percent reductions in the compliance schedule (Attachment A to Resolution No. R9-2010-0033). Percent load reduction, as opposed to the mass (or tonnage) of load reduction, was selected as the Water Quality Improvement Plan numeric goal because the mass of sediment reduction is, in part, related to rainfall, which varies year by year. Percent load reduction provides a relative metric that is unaffected by wet or dry water years. Calculation of the percent load reduction includes loading from Phase II MS4s, general construction, and general industrial permittees within the City of San Diego's jurisdiction. Further analysis of loads specific to the City of San Diego may be completed in the future.

FY = fiscal year
All numeric goals are cumulative from the baseline assessment for each fiscal year.

Table B-7
Wet Weather Bacteria Goals for the City of Poway

Compliance Pathway		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–35
Indicator Bacteria							
			FY18	**FY19**	**FY24[1]**	**FY29**	**FY31[1]**
Receiving Water % Days Exceeding WQO	Fecal coliform	30% Days Exceeding WQO (2002 TMDL Model)	See performance measures	30%[2]	26%	25%	22%
	Enterococcus	30% Days Exceeding WQO (2002 TMDL Model)		30%[2]	26%	25%	22%
	Total coliform	30% Days Exceeding WQO (2002 TMDL Model)		30%[2]	26%	25%	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures	0.3%	1.0%	1.4%	2.0%
	Enterococcus			0.3%	1.0%	1.3%	1.9%
	Total coliform			0.2%	0.8%	1.1%	1.6%

Table B-7 (continued)
Wet Weather Bacteria Goals for the City of Poway

Compliance Pathway		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–35
Or							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 99%[3]	See performance measures	22%	22%	22%	22%
	Enterococcus	**New:** 100%[3]		22%	22%	22%	22%
	Total coliform	**New:** 100%[3]		22%	22%	22%	22%
Or							
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 3 discharges[4]	See performance measures	0	0	0	0
Or							
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
	Total coliform		100%	100%	100%	100%	100%
Or							
MS4 Discharges Implemented Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge percent load reduction (above). Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See Section 4.3.2 and Appendix K for modeling results.					

Table B-7 (continued)
Wet Weather Bacteria Goals for the City of Poway

Compliance Pathway	Baseline	Goals by Assessment Period and Fiscal Year
		Current Permit Term (FY14 – FY18)
Performance Measures		
Suite of Strategies to Measure Performance During First Permit Term	**Baseline**	**FY18**
Turf conversion	**New:** 0 square feet of turf converted	5% increase from the baseline through turf conversion

1. Denotes TMDL interim and final target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceeding frequency.
3. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period.
4. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WQO = Water Quality Objective
All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-8
Dry Weather Numeric Goals for the City of Poway

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25
Indicator Bacteria					
			FY18	**FY19[1]**	**FY21[1]**
Receiving Water % Days Exceeding WQO	Fecal coliform	4% Days Exceeding WQO (2002[2])	See performance measures	2.0%[2]	0%
	Enterococcus	19% Days Exceeding WQO (2002[2])		9.5%[2]	0%
	Total coliform	1% Days Exceeding WQO (2002[2])		0.5%[2]	0%
Or					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 100%[3]	See performance measures	0%	0%
	Enterococcus	**New:** 100%[3]		0%	0%
	Total coliform	**New:** 100%[3]		0%	0%
Or					
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures	48.3%	96.6%
	Enterococcus			49.7%	99.4%
	Total coliform			48.3%	96.5%
Or					
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 5 discharges[4]	0	0	0

Table B-8 (continued)
Dry Weather Numeric Goals for the City of Poway

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year: Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25
Or					
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%
	Enterococcus		100%	100%	100%
	Total coliform		100%	100%	100%
Freshwater Discharge					
			FY18	**FY19[1]**	**FY21[1]**
MS4 Discharges % Irrigation or other Dry Weather Flow Reduction	Flow	**New:** Average Dry Weather Flow[6]: 7.1 gallons per minute; Maximum Dry Weather Flow[6]: 11.7 gallons per minute	See performance measures	18%	25%

Table B-8 (continued)
Dry Weather Numeric Goals for the City of Poway

Compliance Pathway	Baseline	Goals by Assessment Period and Fiscal Year
		Current Permit Term (FY14 – FY18)
Performance Measures		
Suite of Strategies to Measure Performance During First Permit Term	**Baseline**	**FY18**
Turf conversion	**New:** 0 square feet of turf converted	5% increase from the baseline through turf conversion

1. Denotes TMDL interim and final target.
2. Calculated as a 50% reduction in the existing exceedance frequency presented in Appendix H.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Discharges are defined as observed dry weather flows from persistently flowing MS4 outfalls.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. Dry weather flow baseline calculations were based on Targeted Dry Weather Flow Outfall Monitoring data from 2009 to 2012. Data are only from outfalls with "persistent flow," defined as: “the presence of flowing, pooled, or ponded water more than 72 hours after a measureable rainfall event of 0.1 inch or greater during three consecutive monitoring and/or inspection events. All other flowing, pooled, or ponded water is considered transient.” Persistently flowing annual averages were computed, and an overall average was computed using all data points in this time period and used for comparison. Note, reported flow values of 0 were present and included in the calculations.

% = percent; FY = fiscal year; WQO = Water Quality Objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

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B.3 City of San Diego Goals

The City of San Diego's Water Quality Improvement Plan interim and final goals for wet weather sediment are presented in Tables B-9 and B-10, respectively. The City of San Diego's Water Quality Improvement Plan numeric goals for wet weather bacteria and dry weather are presented in Tables B-11 and B-12, respectively.

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Table B-9
Wet Weather Sediment Interim Numeric Goals for the City of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	
Sediment							
			FY18	FY20[1]	FY24[1]	FY28[1]	FY30[1]
Lagoon Restoration Restoration of Salt Marsh Habitat	Acres of Salt Marsh Habitat	262 acres in 2010 (Sediment TMDL)	346 acres[2]				
Or							
MS4 Discharges % Load Reductions		0% Load Reduction Year 2000 (Sediment TMDL Model)	See performance measures	10.6%[3]	21.2%[3]	31.9%[3]	42.5%[3]
Or							

Table B-9 (continued)
Wet Weather Sediment Interim Numeric Goals for the City of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year: Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	
MS4 Discharges and Receiving Water Implement Accepted Water Quality Improvement Plan		Submitting and fully implementing a Water Quality Improvement Plan, accepted by the Regional Board, which provides reasonable assurance[4] that the City's portion of the interim TMDL compliance requirements, described in Attachment A of Resolution No. R9-2010-0033, will be achieved. The compliance schedule in Attachment A provides two pathways to meet interim goals: (1) attain the specified percent load reduction, or (2) show progress in improving Lagoon conditions; see metrics below.					
		0% Load Reduction Year 2000 (Sediment TMDL Model)	See performance measures	10.6%[3]	21.2%[3]	31.9%[3]	42.5%[3]
		Or					
		262 acres in 2010 (Sediment TMDL)	See performance measures	Increasing trend in the total area of salt marsh habitat			
Or							
MS4 Discharges # of Direct or Indirect Discharges to Receiving Water	Discharges	**New:** 1 discharge[5]	0	0	0	0	0

Table B-9 (continued)
Wet Weather Sediment Interim Numeric Goals for the City of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year			
		Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30
Performance Measures					
Suite of Strategies to Measure Performance During First Permit Term	**Baseline**	**FY18**			
Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	36 acres of drainage area treated through construction of 9 green infrastructure BMPs[6]			

1. Denotes TMDL interim and final target.
2. As defined by the Sediment TMDL and Attachment A to Resolution No. R9-2010-0033, this can mean either:
   - Successful restoration of 80% of the 1973 acreage of Lagoon salt marsh habitat (346 acres); or
   - Demonstration that implementation actions are active on and/or affecting 346 acres with continued monitoring to ensure 80% target achievement.
3. The percent load reduction is based on Sediment TMDL model updates completed during the development of the Water Quality Improvement Plan. The interim goals were calculated on the basis of the required percent reductions in the compliance schedule (Attachment A to Resolution No. R9-2010-0033). Percent load reduction, rather than the mass (or tonnage) of load reduction, was selected as the Water Quality Improvement Plan numeric goal because the mass of sediment reduction is, in part, related to rainfall, which varies year by year. Percent load reduction provides a relative metric that is unaffected by wet or dry water years. Calculation of the percent load reduction includes loading from Phase II MS4s, general construction, and general industrial permittees within the City of San Diego's jurisdiction. Further analysis of loads specific to the City of San Diego may be completed in the future.
4. Reasonable assurance is provided by the compliance analysis described in Section 4.3.2 and Appendix K. The metric used in compliance analysis is percent load reduction.
5. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
6. The 36 acres of drainage area treated are associated with 9 green infrastructure projects that will be completed by FY18.

% = percent; FY = fiscal year
All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-10
Wet Weather Sediment Final Numeric Goals for the City of San Diego

Compliance Pathways	Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year FY31–36
Sediment			
			FY35[1]
Lagoon Restoration Restoration of Salt Marsh Habitat	Acres of Salt Marsh Habitat	262 acres in 2010 (Sediment TMDL)	346 acres[2]
Or			
MS4 Discharges and Receiving Water Implement Accepted Water Quality Improvement Plan		Strategies presented in Appendix I	The Water Quality Improvement Plan must incorporate and the City must implement the BMPs or other implementation actions required to achieve the Lagoon restoration goal
		And	
		Reasonable assurance is provided by the compliance analysis described in Section 4.3.2 and Appendix K	Include a compliance analysis[3], accepted by the Regional Board, to demonstrate that implementation of the BMPs or other implementation actions will achieve the Lagoon restoration goal

Table B-10 (continued)
Wet Weather Sediment Final Numeric Goals for the City of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		FY31–36
Sediment		
		FY35[1]
MS4 Discharges and Receiving Water Implement Accepted Water Quality Improvement Plan	**And**	
	262 acres in 2010 (Sediment TMDL)	Perform monitoring and assessments to demonstrated compliance with the Lagoon restoration goal of 346 acres[2]

1. Denotes TMDL interim and final target.
2. As defined by the Sediment TMDL and Attachment A to Resolution No. R9-2010-0033, this can mean either:
   - Successful restoration of 80% of the 1973 acreage of Lagoon salt marsh habitat (346 acres); or
   - Demonstration that implementation actions are active on and/or affecting 346 acres with continued monitoring to ensure 80% target achievement.
3. The percent load reduction is based on Sediment TMDL model updates completed during the development of the Water Quality Improvement Plan. The interim goals were calculated on the basis of the required percent reductions in the compliance schedule (Attachment A to Resolution No. R9-2010-0033). Percent load reduction, rather than the mass (or tonnage) of load reduction, was selected as the Water Quality Improvement Plan numeric goal because the mass of sediment reduction is, in part, related to rainfall, which varies year by year. Percent load reduction provides a relative metric that is unaffected by wet or dry water years. Calculation of the percent load reduction includes loading from Phase II MS4s, general construction, and general industrial permittees within the City of San Diego's jurisdiction. Further analysis of loads specific to the City of San Diego may be completed in the future.

FY = fiscal year
All numeric goals are cumulative from the baseline assessment for each fiscal year.

Table B-11
Wet Weather Bacteria Numeric Goals for the City of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–35
Indicator Bacteria							
			FY18	**FY19**	**FY24**[1]	**FY29**	**FY31**[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	30% Days Exceeding WQO (2002 TMDL Model)	See performance measures	30%[2]	26%	25%	22%
	Enterococcus	30% Days Exceeding WQO (2002 TMDL Model)		30%[2]	26%	25%	22%
	Total coliform	30% Days Exceeding WQO (2002 TMDL Model)		30%[2]	26%	25%	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures	0.3%	1.0%	1.4%	2.0%
	Enterococcus			0.3%	1.0%	1.3%	1.9%
	Total coliform			0.2%	0.8%	1.1%	1.6%
Or							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 99%[3]	See performance measures	22%	22%	22%	22%
	Enterococcus	**New:** 100%[3]		22%	22%	22%	22%
	Total coliform	**New:** 100%[3]		22%	22%	22%	22%
Or							

Table B-11 (continued)
Wet Weather Sediment Final Numeric Goals for the City of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16-20	FY 21-25	FY 26-30	FY 31-35
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 2 discharges[4]	See performance measures	0	0	0	0
Or							
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
	Total coliform		100%	100%	100%	100%	100%
Or							
MS4 Discharges Implemented Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge percent load reduction (above). Interim compliance is implementation of strategies and schedule (presented in Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See Section 4.3.2 and Appendix K for compliance analysis results.					

Table B-11 (continued)
Wet Weather Sediment Final Numeric Goals for the City of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year				
		Current Permit Term (FY14 – FY18)	FY 16-20	FY 21-25	FY 26-30	FY 31-35
Performance Measures						
Suite of Strategies to Measure Performance During First Permit Term	**Baseline**	**FY18**				
Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	36 acres of drainage area treated through construction of 9 green infrastructure BMPs[6]				

1. Denotes TMDL interim and final target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceeding frequency.
3. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period.
4. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The 36 acres of drainage area treated are associated with 9 green infrastructure projects that will be completed by FY18.

% = percent; FY = fiscal year; WQO = Water Quality Objective
All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-12
Dry Weather Numeric Goals for the City of San Diego

Compliance Pathways		**Baseline**	**Goals by Assessment Period and Fiscal Year**		
			Current Permit Term (FY14 – FY18)	**FY 16–20**	**FY 21–25**
Indicator Bacteria					
			FY18	**FY19[1]**	**FY21[1]**
Receiving Water % Days Exceeding WQO	Fecal coliform	4% Days Exceeding WQO (2002[2])	See performance measures	2.0%	0%
	Enterococcus	19% Days Exceeding WQO (2002[2])		9.5%	0%
	Total coliform	1% Days Exceeding WQO (2002[2])		0.5%	0%
Or					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 100%[3]	See performance measures	0%	0%
	Enterococcus	**New:** 100%[3]		0%	0%
	Total coliform	**New:** 100%[3]		0%	0%
Or					
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures	48.3%	96.6%
	Enterococcus			49.7%	99.4%
	Total coliform			48.3%	96.5%
Or					
# Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 28 discharges[4]	0	0	0

Table B-12 (continued)
Dry Weather Numeric Goals for the City of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25
Or					
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%
	Enterococcus		100%	100%	100%
	Total coliform		100%	100%	100%
Or					
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge percent load reduction (above). Interim compliance is implementation of strategies and schedule (presented in Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See Section 4.3.2 and Appendix K for compliance analysis results.			
Freshwater Discharge					
			FY18	**FY19[1]**	**FY21[1]**
MS4 Discharges % Irrigation or other Wet and Dry Weather Flow Reduction	Flow	**New:** Average Dry Weather Flow[6]: 27.6 gallons per minute; Maximum Dry Weather Flow[6]: 305.2 gallons per minute	See performance measures	18%	25%

Table B-12 (continued)
Dry Weather Numeric Goals for the City of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year		
		Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25
Or				
MS4 Discharges Implement Accepted Water Quality Improvement Plan	Metric for compliance analysis is MS4 discharge % load reduction (above). Interim compliance is implementation of strategies and schedule (presented in Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See Section 4.3.2 and Appendix K for compliance analysis results.			
Performance Measures				
Suite of Strategies to Measure Performance During First Permit Term	**Baseline**	**FY18**		
Implement runoff reduction programs, including targeted education and outreach, enhanced inspections, rebates[7], and increased enforcement	Historical dry weather monitoring data will be used to establish a baseline in the first Water Quality Improvement Plan Annual Report	10% reduction in prohibited[8] dry weather flow from baseline measured at persistently flowing outfalls in the WMA		

Table B-12 (continued)
Dry Weather Numeric Goals for the City of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year		
		Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25
Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry[9] weather	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	36 acres of drainage area treated through construction of 9 green infrastructure BMPs[10]		

1. Denotes TMDL interim and final target.
2. Calculated as a 50% reduction in the existing exceedance frequency presented in Appendix H.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Discharges are defined as observed dry weather flows from persistently flowing MS4 outfalls.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. Dry weather flow baseline calculations were based on Targeted Dry Weather Flow Outfall Monitoring data from 2009 to 2012. Data are only from outfalls with "persistent flow," defined as: "the presence of flowing, pooled, or ponded water more than 72 hours after a measureable rainfall event of 0.1 inch or greater during three consecutive monitoring and/or inspection events. All other flowing, pooled, or ponded water is considered transient." Persistently flowing annual averages were computed, and an overall average was computed using all data points in this time period and used for comparison. Note, reported flow values of 0 were present and included in the calculations.
7. City of San Diego rebates include grass replacement, rainwater harvesting, downspout disconnect, and micro-irrigation.
8. Does not include allowable discharges as defined in Provision A and Provision E.2.a of the MS4 Permit.
9. Irrigation runoff reduction programs are the primary strategies for addressing dry weather, freshwater flows, and bacteria loading. However, green infrastructure will treat small storm events, in addition to unabated urban runoff in the short term. Green infrastructure also provides other benefits related to providing natural areas throughout urban development. See Section 4.2.3.1 for additional discussion.
10. The 36 acres of drainage area treated are associated with 9 green infrastructure projects that will be completed by FY18.

% = percent; FY = fiscal year; WQO = Water Quality Objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

B.4 County of San Diego Goals

The County of San Diego's Water Quality Improvement Plan interim and final goals for wet weather sediment are presented in Tables B-13 and B-14, respectively. The County of San Diego's Water Quality Improvement Plan numeric goals for wet weather bacteria and dry weather are presented in Tables B-15 and B-16, respectively.

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Table B-13
Wet Weather Sediment Interim Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	
Sediment							
			FY18	FY20[1]	FY24[1]	FY28[1]	FY30[1]
Lagoon Restoration Restoration of Salt Marsh Habitat	Acres of Salt Marsh Habitat	262 acres in 2010 (Sediment TMDL)	346 acres[2]				
Or							
MS4 Discharges % Load Reductions		0% Load Reduction Year 2000 (Sediment TMDL Model)	4%[3]	9.5%[3]	19.0%[3]	28.6%[3]	38.1%[3]
Or							
MS4 Discharges Load Reduction (Tons/Wet Period) Determined by Sediment Loading Model		0 tons/wet period Year 2000 (Sediment TMDL Model)	4[3]	9[3]	18[3]	26[3]	35[3]
Or							

Table B-13 (continued)
Wet Weather Sediment Interim Numeric Goals for the County of San Diego

<table>
<tr><th rowspan="2">Compliance Pathways</th><th rowspan="2">Baseline</th><th colspan="5">Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term (FY14 – FY18)</th><th>FY 16–20</th><th>FY 21–25</th><th colspan="2">FY 26–30</th></tr>
<tr><td rowspan="6">MS4 Discharges and Receiving Water
Implement Accepted Water Quality Improvement Plan</td><td colspan="6">Submitting and fully implementing a Water Quality Improvement Plan, accepted by the Regional Board, which provides reasonable assurance[4] that the County's portion of the interim TMDL compliance requirements, described in Attachment A of Resolution No. R9-2010-0033, will be achieved.
The compliance schedule in Attachment A provides two pathways to meet interim goals: (1) attain the specified percent load reduction or (2) show progress in improving Lagoon conditions; see metrics below.</td></tr>
<tr><td>0% Load Reduction
Year 2000
(Sediment TMDL Model)</td><td>4%[3]</td><td>9.5%[3]</td><td>19.0%[3]</td><td>28.6%[3]</td><td>38.1%[3]</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td>0 tons/wet period
Year 2000
(Sediment TMDL Model)</td><td>4[3]</td><td>9[3]</td><td>18[3]</td><td>26[3]</td><td>35[3]</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td>262 acres in 2010
(Sediment TMDL)</td><td colspan="5">Increasing trend in the total area of salt marsh habitat</td></tr>
<tr><td colspan="7">~~Or~~</td></tr>
</table>

Table B-13 (continued)
Wet Weather Sediment Interim Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	
~~**MS4 Discharges**~~ ~~# of Direct or Indirect Discharges to Receiving Water~~	~~Discharges~~	~~**New:** 0 discharges~~[5]	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~

1. Denotes TMDL interim and final target.
2. As defined by the Sediment TMDL and Attachment A to Resolution No. R9-2010-0033, this can mean either:
   - Successful restoration of 80% of the 1973 acreage of Lagoon salt marsh habitat (346 acres); or
   - Demonstration that implementation actions are active on and/or affecting 346 acres with continued monitoring to ensure 80% target achievement.
3. The load reduction is based on Sediment TMDL model updates completed during the development of the Water Quality Improvement Plan. The interim goals were calculated on the basis of the required percent reductions in the compliance schedule (Attachment A to Resolution No. R9-2010-0033). Calculation of the load reduction includes loading from Phase II MS4s, general construction, and general industrial permittees within the County of San Diego's jurisdiction. Further analysis of loads specific to the County of San Diego may be completed in the future.
4. Reasonable assurance is provided by the compliance analysis described in Section 4.3.2 and Appendix K. The metric used in compliance analysis is percent load reduction.

% = percent; FY = fiscal year

All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-14
Wet Weather Sediment Final Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year
			FY31–36
Sediment			
			FY35[1]
Lagoon Restoration Restoration of Salt Marsh Habitat	Acres of Salt Marsh Habitat	262 acres in 2010 (Sediment TMDL)	346 acres[2]
Or			
MS4 Discharges and Receiving Water Implement Accepted Water Quality Improvement Plan		Strategies presented in Appendix I	The Water Quality Improvement Plan must incorporate and the County must implement the BMPs or other implementation actions required to achieve the Lagoon restoration goal
		And	
		Reasonable assurance is provided by the compliance analysis described in Section 4.3.2 and Appendix K	Include a compliance analysis[3], accepted by the Regional Board, to demonstrate that implementation of the BMPs or other implementation actions will achieve the Lagoon restoration goal

Table B-14 (continued)
Wet Weather Sediment Final Numeric Goals for the County of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		FY31–36
Sediment		
		FY35[1]
MS4 Discharges and Receiving Water Implement Accepted Water Quality Improvement Plan	And	
	262 acres in 2010 (Sediment TMDL)	Perform monitoring and assessments to demonstrated compliance with the Lagoon restoration goal of 346 acres[2]

1. Denotes TMDL interim and final target.
2. As defined by the Sediment TMDL and Attachment A to Resolution No. R9-2010-0033, this can mean either:
   - Successful restoration of 80% of the 1973 acreage of Lagoon salt marsh habitat (346 acres); or
   - Demonstration that implementation actions are active on and/or affecting 346 acres with continued monitoring to ensure 80% target achievement.
3. The load reduction is based on Sediment TMDL model updates completed during the development of the Water Quality Improvement Plan. The interim goals were calculated on the basis of the required reductions in the compliance schedule (Attachment A to Resolution No. R9-2010-0033). Calculation of the load reduction includes loading from Phase II MS4s, general construction, and general industrial permittees within the County of San Diego's jurisdiction. Further analysis of loads specific to the County of San Diego may be completed in the future.

FY = fiscal year
All numeric goals are cumulative from the baseline assessment for each fiscal year.

Table B-15
Wet Weather Bacteria Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–35
Indicator Bacteria							
			FY18	**FY19**	**FY24**	**FY28[1,2]**	**FY31[1,2]**
Receiving Water % Days Exceeding WQO	Fecal coliform	30% Days Exceeding WQO (2002 TMDL Model)	30%[3]	30%[3]	29%	26%	22%
	Enterococcus	30% Days Exceeding WQO (2002 TMDL Model)	30%[3]	30%[3]	29%	26%	22%
	Total coliform	30% Days Exceeding WQO (2002 TMDL Model)	30%[3]	30%[3]	29%	26%	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	0.2%	0.3%	0.5%	1.0%	2.0%
	Enterococcus		0.2%	0.3%	0.4%	1.0%	1.9%
	Total coliform		0.1%	0.2%	0.4%	0.8%	1.6%
Or							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 99%[4]	22%	22%	22%	22%	22%
	Enterococcus	**New:** 100%[4]	22%	22%	22%	22%	22%
	Total coliform	**New:** 100%[4]	22%	22%	22%	22%	22%
Or							
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 0 discharges[5]	0	0	0	0	0

Table B-15 (continued)
Wet Weather Bacteria Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–35
Or							
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[6]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
	Total coliform		100%	100%	100%	100%	100%
Or							
MS4 Discharges Implemented Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge percent load reduction (above). Interim compliance is implementation of strategies and schedule (presented in Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See Section 4.3.2 and Appendix K for compliance analysis results.					

1. Denotes TMDL interim and final target. Request moving Interim TMDL Compliance Date from April 4, 2021, (per MS4 Permit Attachment E, 6.c(1)) to April 4, 2028, to allow adequate time to monitor progress through the adaptive management process of the Water Quality Improvement Plan.
2. Progress toward final goals will be monitored and, if implemented programmatic BMPs are not enough to meet compliance, then through the adaptive management process of the Water Quality Improvement Plan, more effective and or additional BMPs, including structural controls, will be considered for implementation. The County of San Diego is concerned that a funding source to construct, operate, and maintain structural controls is not identified, if structural controls are needed to meet compliance.
3. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceeding frequency.
4. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period.
5. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
6. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WQO = Water Quality Objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

Table B-16
Dry Weather Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25
Indicator Bacteria					
			FY18	**FY20[1]**	**FY21[1]**
Receiving Water % Days Exceeding WQO	Fecal coliform	4% Days Exceeding WQO (2002[2])	See performance measures	2.0%	0%
	Enterococcus	19% Days Exceeding WQO (2002[2])		9.5%	0%
	Total coliform	1% Days Exceeding WQO (2002[2])		0.5%	0%
Or					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 100%[3]	See performance measures	0%	0%
	Enterococcus	**New:** 100%[3]		0%	0%
	Total coliform	**New:** 100%[3]		0%	0%
Or					
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures	48.3%	96.6%
	Enterococcus			49.7%	99.4%
	Total coliform			48.3%	96.5%
Or					
# Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 0 discharges[4]	0	0	0
Or					

Table B-16 (continued)
Dry Weather Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14 – FY18)	FY 16–20	FY 21–25
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%
	Enterococcus		100%	100%	100%
	Total coliform		100%	100%	100%
Or					
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge percent load reduction (above). Interim compliance is implementation of strategies and schedule (presented in Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See Section 4.3.2 and Appendix K for compliance analysis results.			
Freshwater Discharge					
			FY18	**FY19[1]**	**FY21[1]**
MS4 Discharges % Irrigation or other Wet and Dry Weather Flow Reduction	Flow	**New:** 0 discharges	See performance measures	18%	25%
Or					
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge % load reduction (above). Interim compliance is implementation of strategies and schedule (presented in Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See Section 4.3.2 and Appendix K for compliance analysis results.			

Table B-16 (continued)
Dry Weather Numeric Goals for the County of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year		
		Current Permit Term (FY14 – FY18)	FY16 – FY20	FY21 – F25
Performance Measures				
Suite of Strategies to Measure Performance During First Permit Term	**Baseline**	**FY18**	**FY20**	**FY21**
Eliminate anthropogenic dry weather flows[6] from storm drain outfalls either by aggregate flow volume or the number of persistently flowing outfalls during dry weather	To be established during FY15–16 using dry weather flow measurements		Reduce by 75%	Reduce by 100% anthropogenic dry weather discharges from storm drain outfalls to the receiving water or meet the WQOs in the storm drain discharges.

1. Denotes TMDL interim and final target. Request moving Interim TMDL Compliance Date from April 4, 2016 (per MS4 Permit Attachment E, 6.c(1)) to April 4, 2020, to allow adequate time to investigate and mitigate dry weather flows through the adaptive management process of the Water Quality Improvement Plan.
2. Calculated as a 50% reduction in the existing exceedance frequency presented in Appendix H.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Discharges are defined as observed dry weather flows from persistently flowing MS4 outfalls.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. Here and throughout this table, the term “dry weather flows” excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.

% = percent; FY = fiscal year; WQO = Water Quality Objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Appendix C: Monitoring Results and Assessment

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Attachment G	Sediment Special Study Report
Attachment H	CEDEN Certification Statements

Acronyms and Abbreviations

Acronym or Abbreviation	Definition
≥	greater than or equal to
<	less than
≤	less than or equal to
µg/L	micrograms per liter
%	percent
303(d) List	Clean Water Act Section 303(d) List of Water Quality Limited Segments
AB 411	California Assembly Bill 411, the Beach Safety Act
ADCP	Acoustic Doppler Current Profiler
Bacteria TMDL	Los Peñasquitos WMA Bacteria Total Maximum Daily Load
Bight ’13	Southern California Bight 2013 Regional Monitoring Survey
BMI	benthic macroinvertebrates
BMP	best management practice
BSTEM	Bank Stability and Toe Erosion Model
CEDEN	California Environmental Data Exchange Network
cf	cubic feet
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeters
Copermittee	Operator of a municipal separate storm sewer system in San Diego County that is party to the MS4 Permit
CTR	California Toxics Rule
CWA	Clean Water Act
DEH	San Diego County Department of Environmental Health
E. coli	*Escherichia coli*
EMC	event mean concentration
FIB	fecal indicator bacteria
FRM	Federal Reference Method
FY	fiscal year

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
GIS	geographic information system
HA	hydrologic area
HMP	Hydromodification Monitoring Program
HPWQC	highest priority water quality condition
HSA	hydrologic subarea
IC/ID	illicit connection and/or illicit discharge
ID	identification
IDDE	illicit discharge detection and elimination
in	inches
J	Analytical flag for ‘Analyte detected above the method detection limit but below the reporting limit’
JRMP	Jurisdictional Runoff Management Program
Lagoon	Los Peñasquitos Lagoon
lb	pounds
LTMS	long-term monitoring station
MAP	Monitoring and Assessment Program
MDL	method detection limit
mg/L	milligrams per liter
mL	milliliters
MPN	most probable number
MPN/100mL	most probable number per 100 milliliters
MS4	Municipal Separate Storm Sewer System
MS4 Permit	San Diego Regional Water Quality Control Board Order No. R9-2013-0001 (amended by Order No. R9-2015-0001 and R9-2015-0100), National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems Draining the Watersheds Within the San Diego Region
N	nitrogen
NA	not analyzed

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
NA	not applicable
NAL	non-storm water action level
ND	not detected
NSWD	non-storm water discharge
NTU	nephelometric turbidity unit
NWS	National Weather Service
P	phosphorus
PM_{10}	particulate matter less than or equal to 10 microns in diameter
QA	quality assurance
QC	quality control
R^2	coefficient of determination
Regional Board	San Diego Regional Water Quality Control Board
Responsible Agency	Responsible Agencies include parties subject to the Bacteria TMDL and Sediment TMDL and participating in this Water Quality Improvement Plan, specifically the Copermittees in the Los Peñasquitos WMA
RL	reporting limit
RSC	regenerative storm water conveyance
RWL	receiving water limitation
SAL	Storm water action level
SCCWRP	Southern California Coastal Water Research Project
Sediment TMDL	Los Peñasquitos WMA Sediment Total Maximum Daily Load
SMC	Southern California Storm water Monitoring Coalition
SSC	suspended sediment concentration
Storm Water Assessments	Storm Water Pollutant Discharge Reduction Assessments
sub-AV	sub area-velocity probe
SWAMP	Surface Water Ambient Monitoring Program

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
SWMP	Storm Water Management Plan
TBD	to be determined
TDS	total dissolved solids
TIE	toxicity identification evaluation
TKN	total Kjeldahl nitrogen
TMAR	Transitional Monitoring and Assessment Report
TMDL	Total Maximum Daily Load
TRE	toxicity reduction evaluation
TSS	total suspended solids
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
WLA	waste load allocation
WMA	Watershed Management Area
WQBEL	water quality-based effluent limitation
WQIP	Water Quality Improvement Plan
WQO	water quality objective

1 Monitoring and Assessment Program

The Monitoring and Assessment Program (MAP) for the Los Peñasquitos Watershed Management Area (WMA) is Section 5 of the Water Quality Improvement Plan (WQIP). The MAP incorporates requirements of Provision B and Provision D of the Municipal Separate Storm Sewer System (MS4) Permit, along with the specific monitoring and assessment requirements for the Bacteria and Sediment Total Maximum Daily Loads (TMDLs) listed in Attachment E of the MS4 Permit.

The Monitoring Program includes three major components: (1) the receiving water monitoring program that measures the long-term health of the watershed; (2) the MS4 outfall monitoring program that documents non-storm water flows and measures outfall water quality at select sites during dry and wet conditions; and (3) special studies that investigate the highest priority water quality conditions (HPWQCs). Table 1-1 provides an overview of the monitoring that is planned as part of the Los Peñasquitos WMA MAP and Figure 1-1 shows the locations for the 2015–2016 monitoring year.

This appendix summarizes monitoring data collected during the 2015–2016 monitoring year (October 1, 2015, and September 30, 2016), and data that were not summarized in the 2013–2014 and 2014–2015 Transitional Monitoring and Assessment Program Reports for the Los Peñasquitos WMA. Data include both receiving water and MS4 outfall monitoring data. Monitoring methodologies were summarized in Section 5 of the Los Peñasquitos WMA WQIP and were specified in the associated component Monitoring Plans (Project Clean Water, 2016). These documents provide detailed information regarding monitoring locations, monitoring techniques, constituents sampled, and quality assurance and quality control (QA/QC) requirements.

The Assessment Program for the 2015–2016 monitoring year includes only an annual analysis of the monitoring data collected for the 2015–2016 monitoring year. This appendix describes the MS4 Outfall Discharge Assessments (Provision D.4.b), which evaluate both the dry weather data associated with the illicit discharge detection and elimination (IDDE) program that were collected as part of the Jurisdictional Runoff Management Program (JRMP) program, along with the dry and wet weather MS4 monitoring data collected by the Responsible Agencies. The results of the special studies are also assessed in this appendix. The Receiving Water Assessment (Provision D.4.a) and the Integrated Assessments (D.4.b), as well as assessments of wet weather MS4 outfall discharge temporal trends, will be summarized in the Regional Monitoring and Assessment Report to be submitted with the Report of Waste Discharge in December 2017.

Table 1-1
Water Quality Improvement Plan Monitoring Overview

Monitoring Program			Monitoring Element	Program Schedule[1]				
				2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
Monitoring to Assess Goals and Schedules		Dry and Wet	Varies by goal and jurisdiction	–	–	●	●	●
Receiving Water Monitoring	Long-term Receiving Water	Dry	Conventionals[2], FIB, nutrients, metals, pesticides, toxicity (chronic), possible TIE/TREs, visual observations, field measurements	–	●[3]	–	–	–
		Dry	Hydromodification (channel conditions, discharge points, habitat integrity, evidence and estimate of erosion and habitat impacts)	–	●[3]	–	–	–
		Dry	Bioassessment (BMI taxonomy, algae taxonomy, physical habitat characteristics)	–	●[3]	–	–	–
		Wet	Conventionals[2], FIB nutrients, metals, pesticides, toxicity (chronic), field measurements	–	●[3]	–	–	–

Table 1-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Program				Monitoring Element	Program Schedule[1]				
					2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
Receiving Water Monitoring (continued)	Regional Monitoring Participation	Bight	Dry	Chemistry, toxicity, benthic infauna	●	–	–	–	●[4]
		SMC	Dry	Bioassessment	●	●	●	●	●
		AB 411[5]	Dry	FIB	●	●	●	●	●
		2011 HMP	Wet	Channel assessments; flow monitoring; sediment transport monitoring	●	●	●	–	–
	Sediment Quality Monitoring	Sediment Quality Monitoring	Dry	Chemistry, toxicity, benthic infauna	●[6]	●[3]	–	–	–
	TMDL Monitoring	Sediment Monitoring for Los Peñasquitos Lagoon	Dry	Particle size distribution, suspended sediment concentration[2], pebble count, extended flow monitoring; vegetation mapping	●	●	●	●	●
		Bacteria Monitoring for Pacific Ocean Shoreline at Torrey Pines State Beach, Del Mar	Dry	FIB, visual observations, optional field measurements	●[7]	●[7]	●	●	●
			Wet	FIB, visual observations, optional field measurements	●[7]	●[7]	●	●	●

Table 1-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Program			Monitoring Element	Program Schedule[1] 2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
MS4 Monitoring	MS4 Field Screening	Dry	Visual: flow condition, presence and assessment of trash in and around the station, IC/IDs, descriptions	●[3]	●[3]	●	●	●
MS4 Monitoring	MS4 Outfall	Dry	Field parameters, conventionals[2], nutrients, metals, FIB,	–	–	●	●	●
MS4 Monitoring	MS4 Outfall	Wet	Field parameters, conventionals[2], nutrients, metals, FIB,	●[7]	●[7]	●	●	●
Special Studies	San Diego Regional Reference Streams and Beaches	Dry	Field parameters, conventionals[2], FIB, instantaneous flow	2012 – 2014	●[8]	–	–	–
Special Studies	San Diego Regional Reference Streams and Beaches	Dry	Streams only: nutrients, metals, bioassessment (including physical habitat and chlorophyll a)	2012 – 2014	–	–	–	–
Special Studies	San Diego Regional Reference Streams and Beaches	Wet	Field parameters, conventionals[1], FIB	2012 – 2014	●	–	–	–
Special Studies	San Diego Regional Reference Streams and Beaches	Wet	Streams only: nutrients, metals, toxicity, flow, and precipitation (duration of storm)	2012 – 2014	●	–	–	–

Table 1-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Program			Monitoring Element	Program Schedule[1]				
				2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
Special Studies (continued)	Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Monitoring Plan	Dry/Wet	Particle size distribution, suspended sediment concentration, streambed and bedload sampling, pebble count, extended flow monitoring	–	•	•	–	–
		Dry	Air particle monitoring	–	•	•	–	–
	Outfall Repair and Relocation Study	Dry/Wet	Priority locations for outfall repair and relocation	–	–	•	–	–

The highlighted cells represent the monitoring that occurred during the October 2015 to September 2016 monitoring year.

1. The MS4 Permit was adopted on May 8, 2013; the MS4 Permit became effective on June 27, 2013. Note that implementation of the programs began when the WQIP was approved in September 2015.
2. Definition of conventionals (conventional parameters) is based on Storm Water Management Program (SWMP) guidelines.
3. Completed under the Transitional Monitoring Program in accordance with MS4 Permit Provisions D.1.a and D.2.a.
4. The 2018 Southern California Bight Regional Monitoring will occur during the summer of 2018 or 2019.
5. The AB 411 program is not required by the MS4 Permit. Responsible Agencies are using the data to track beach water quality conditions related to the highest priority water quality condition for the WMA.
6. Sediment quality monitoring was completed under the 2013 Southern California Bight Regional Monitoring Program.
7. Completed under the Transitional Monitoring Program in accordance with MS4 Permit Provisions D.1.a and D.2.a.
8. Dry weather monitoring at reference streams was completed in spring 2014. Dry weather monitoring at reference beaches began in fall 2014.

AB 411 = California Assembly Bill 411; BMI = benthic macroinvertebrates; FIB = fecal indicator bacteria;
HMP = Hydromodification Monitoring Program; IC/ID = illicit connection and/or illicit discharge;
MS4 = Municipal Separate Storm Sewer System; NA = not applicable; SMC = Southern California Storm water Monitoring Coalition;
TBD = to be determined; TIE = toxicity identification evaluation; TMDL = Total Maximum Daily Load; TRE = toxicity reduction evaluation;
WMA = Watershed Management Area

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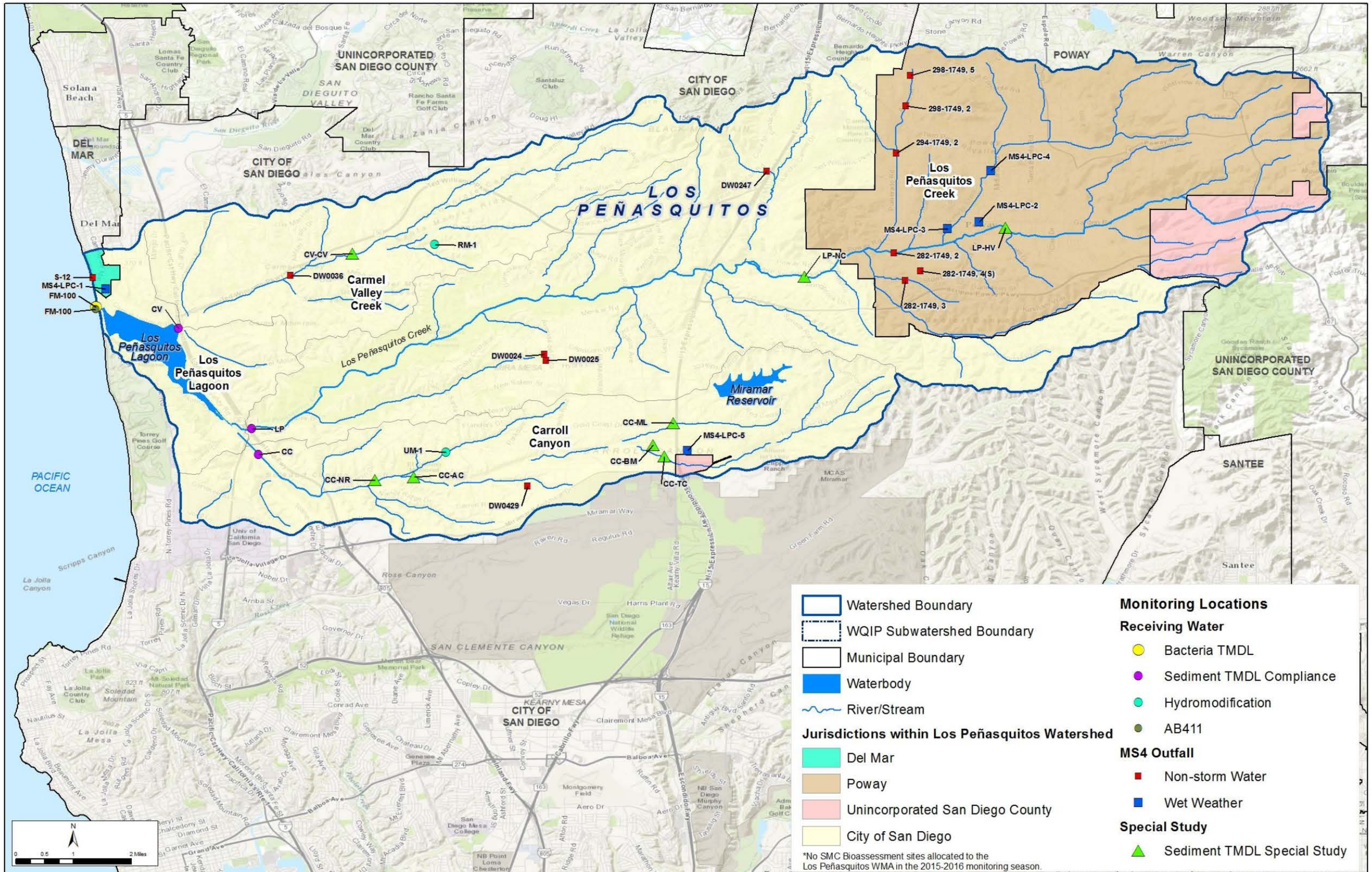

Figure 1-1
2015-2016 MAP Monitoring Locations for the Los Peñasquitos WMA

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1.1 2015–2016 Regional Rainfall Summary

Precipitation during the 2015–2016 monitoring year measured at the National Weather Service Lindbergh Field station (GHCND:USW00023188) was compared with average precipitation totals from 1939–2015. The 2015–2016 observed total of 8.18 inches was slightly less than the average annual total of 9.90 inches. Greater than average rainfall amounts were observed in November 2015, January 2016, May 2016, and September 2016. All other months saw less than average rainfall amounts, including February 2016, which saw much less than the historical average for February (0.05 inch vs. 1.8 inches). Figure 1-2 shows the October 2015 through September 2016 monthly rainfall measured at Lindbergh Field, compared with the average monthly and annual rainfall.

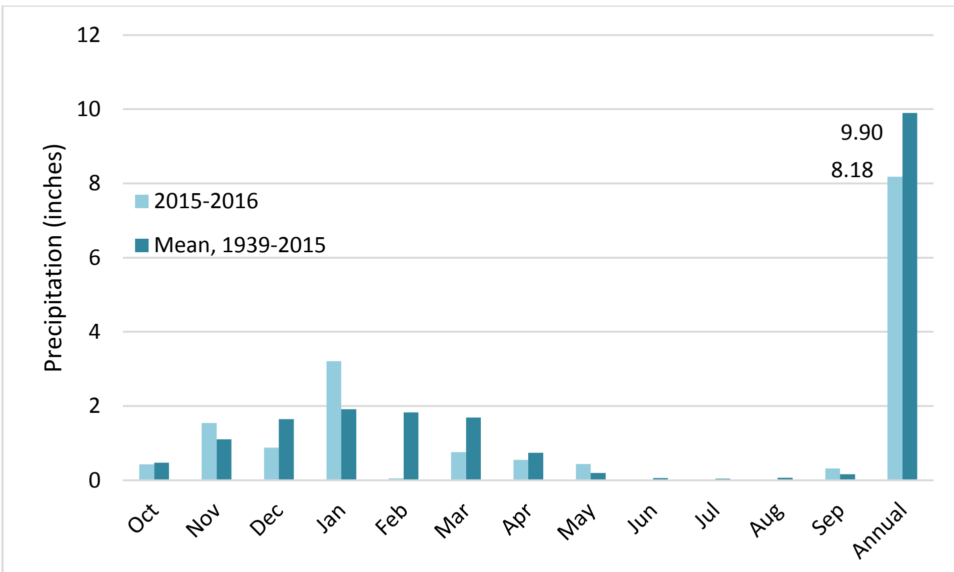

Figure 1-2
2015–2016 Monthly Rainfall vs. Average Monthly Rainfall (Lindbergh Field)

Eighty-four County of San Diego (County) ALERT rain gauges were used to measure rainfall throughout the region during the monitoring year (October 2015 through September 2016). Because the Transitional Monitoring Annual Reports presented rainfall data based on a July through June monitoring year, the July 2015 through September 2015 measured rainfall total is also presented to fill the gap between the end of reporting under the transitional program and the beginning of reporting under the WQIP. Going forward, WQIP Annual Reports will present data based on the October through September monitoring year.

July 2015 through September 2015 regional rainfall totals ranged from less than 0.25 inch in the inland deserts to over 5 inches in the mountains. Totals at the coast ranged from approximately 1 inch near the international border with Mexico to over 3 inches in the Mission Bay area. Rainfall in the Los Peñasquitos WMA was measured at 2.2 inches at the Miramar Lake ALERT station. Figure 1-3 presents regional rainfall totals from July 2015 through September 2015.

October 2015 through September 2016 regional rainfall totals ranged from less than 1 inch in the inland deserts to over 30 inches in the mountains. Totals at the coast ranged from approximately 7 inches near the international border with Mexico to approximately 12 inches in the northern section of the County. Rainfall in the Los Peñasquitos WMA ranged from 12.97 inches at the Miramar Lake ALERT station to 13.89 inches at the Poway ALERT station. Figure 1-4 presents regional rainfall totals from October 2015 through September 2016.

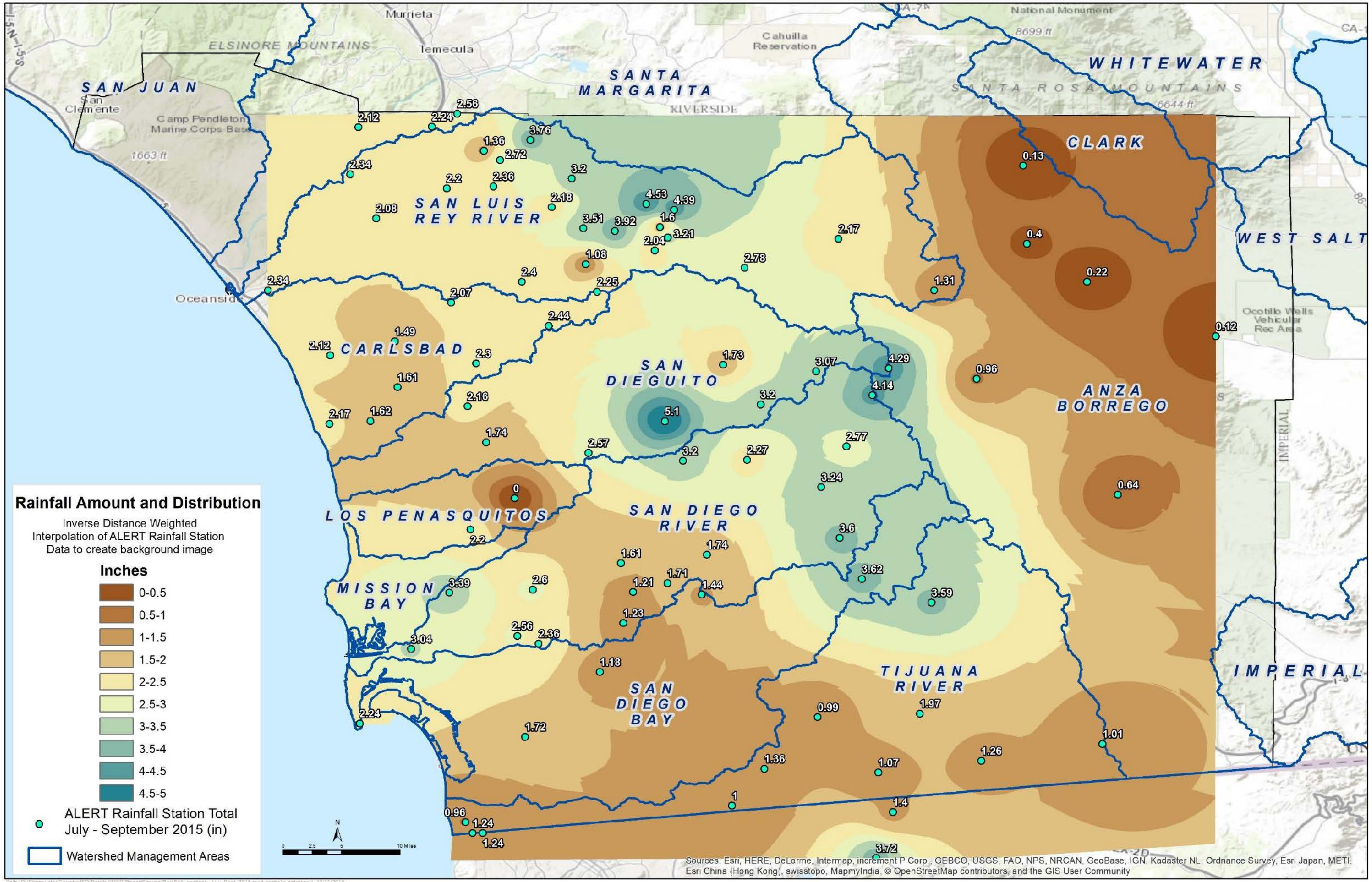

Figure 1-3
July 2015 through September 2015 ALERT Station Rainfall Totals

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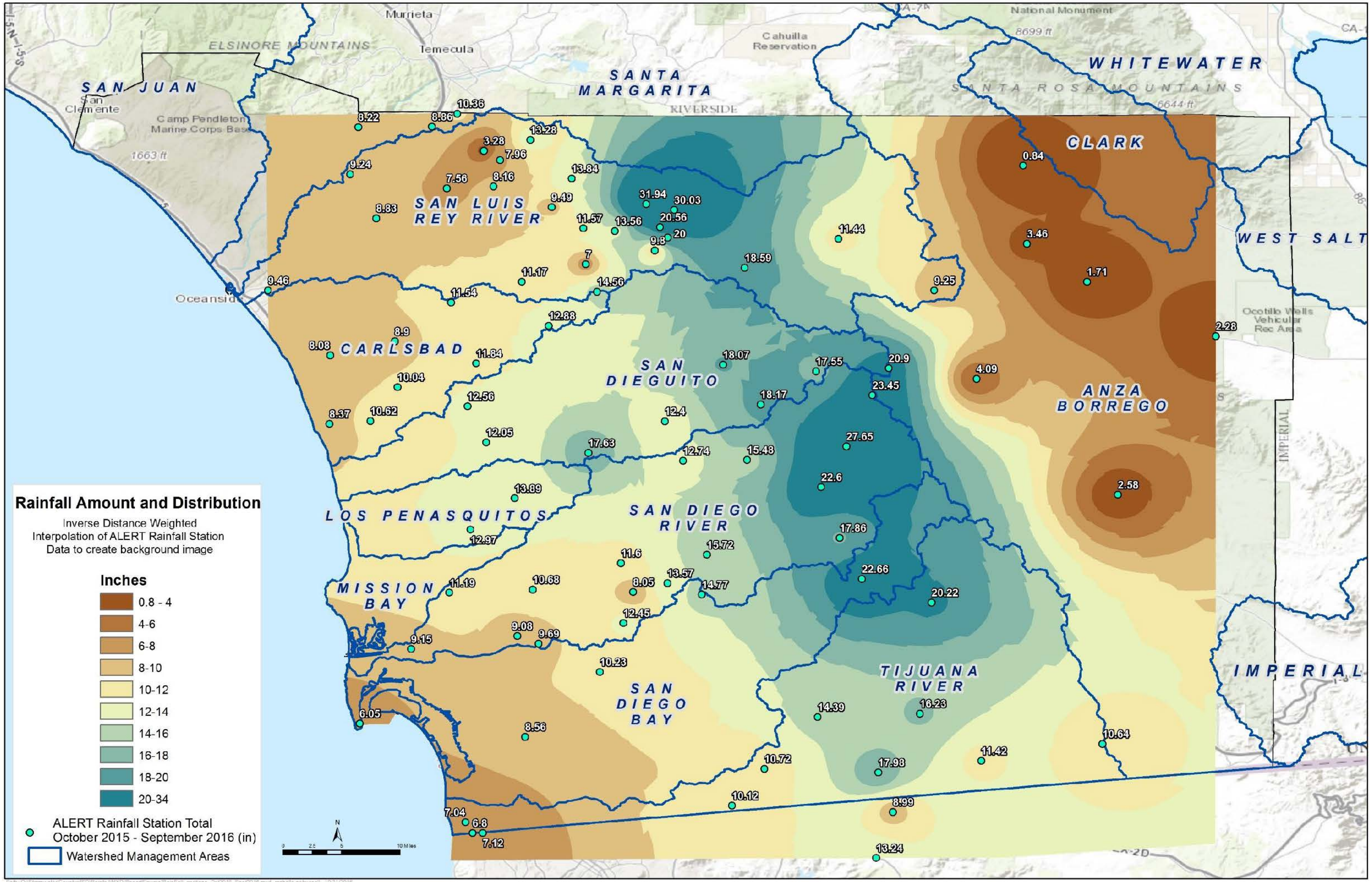

Figure 1-4
October 2015 through September 2016
ALERT Station Rainfall Totals

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1.2 Monitoring Results and Assessments Appendix Organization

This appendix includes the Monitoring Results and Assessments for the Los Peñasquitos WMA Water Quality Improvement Plan Annual Report and is organized as follows:

Section 1, Monitoring and Assessment Program—This section provides an overview of the MAP, the monitoring performed during the October 2015 through September 2016 monitoring year, annual rainfall summary, and the assessments included in this appendix.

Section 2, Receiving Water Data Summary—This section describes the monitoring data collected as part of the Receiving Water Monitoring program. Data from various sources were compiled and summarized. Some data were collected during the October 2015 through September 2016 monitoring year, while other data were collected previously but not included in the Los Peñasquitos WMA Transitional Monitoring Assessment Report submitted in January 2016.

Section 3, Dry Weather Outfall Assessments and Illicit Discharges—This section summarizes the dry-weather MS4 Outfall Discharge Assessments (MS4 Permit Provision B.4.b). It includes a comparison with non-storm water action levels (NALs) and assessments required by the MS4 Permit.

Section 4, Wet Weather Outfall Assessments—This section summarizes the wet-weather MS4 Outfall Discharge Assessments (MS4 Permit Provision B.4.b). It includes a comparison with storm water action levels (SALs) and assessments required by the MS4 Permit.

Section 5, Special Study Assessments- This section provides an overview of the two special studies completed or in progress in the Los Peñasquitos WMA, including the San Diego Regional Reference Streams and Beaches Studies and the Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Compliance Monitoring Program.

Section 6, California Environmental Data Exchange Network (CEDEN) Certification Statement Summary—This section summarizes the CEDEN data submittal certifications for the October 2015–September 2016 monitoring year.

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2 Receiving Water Monitoring Data Summary

Section 2 of the Monitoring Results and Assessments Appendix highlights receiving water data collected as part of the Los Peñasquitos WMA MAP. Because this is the first Annual Report to be submitted under the Los Peñasquitos WMA WQIP, data collected since the acceptance of the MS4 Permit in 2013 will be (1) referenced if they have been previously submitted to the San Diego Regional Water Quality Control Board (Regional Board), (2) summarized if sampling was conducted prior to the October 2015 through September 2016 monitoring year and the data have not been previously submitted to the Regional Board, or (3) summarized in graphical and tabular form as part of this Monitoring Results and Assessments Appendix. As discussed in Section 1, MS4 Permit Provision D.4.a.(b) requires Receiving Water Assessments to be completed as part of the Report of Waste Discharge in December 2017. The data presented in this appendix will be used to complete those assessments as well as the Integrated Assessment detailed in the MAP.

2.1 Long-Term Receiving Water and Sediment Quality Monitoring Data

The Transitional Receiving Water Monitoring Program completed during the October 2014 through September 2015 monitoring year fulfilled a number of the requirements for the long-term monitoring outlined in the MAP. The results of this monitoring were presented in the Transitional Monitoring and Assessment Program Report for the Los Peñasquitos WMA (2014–2015) (San Diego County Municipal Copermittees, 2016). Results presented included water quality monitoring during dry and wet weather, trash assessments, hydromodification monitoring, and bioassessment at the long-term monitoring station (LTMS).

As stated in the Los Peñasquitos WMA WQIP, the Southern California Bight 2013 Regional Monitoring Survey (Bight ’13) Monitoring Program satisfied the initial monitoring requirements of the state's Sediment Control Plan. As many as two sites were monitored in the Los Peñasquitos Lagoon in 2013 for the initial screening of sediment quality. Because both sites were found to be likely unimpacted during the initial screening, no follow-up monitoring was conducted. Based on the monitoring and assessment completed, sediment conditions in the Los Peñasquitos Lagoon are generally protective of the beneficial uses (San Diego County Municipal Copermittees, 2014). The Sediment Monitoring Report was provided in the 2015 Transitional Monitoring and Assessment Report in accordance with the MS4 Permit reporting requirements.

2.2 Bight ’13 Regional Monitoring Data

Sediment quality monitoring was conducted during summer 2013 at 22 sites in 9 estuaries and lagoons in the San Diego region under the Bight ’13 (Los Peñasquitos Responsible Agencies, 2015). The sediment quality monitoring included sediment chemistry and toxicity. Bight ’13 was used to fulfill the initial monitoring requirements for the Sediment Quality Monitoring requirement of the MS4 Permit that is summarized in Section 2.1.

2.3 Southern California Storm Water Monitoring Coalition (SMC) Monitoring Data

The SMC bioassessment program has a probabilistic random sampling design, meaning that sites are selected at random within each designated stratum of the County. Four strata are within the County: Northern San Diego (Santa Margarita and San Luis Rey WMAs), Central San Diego (Carlsbad, San Dieguito, and Los Peñasquitos WMAs), Mission Bay/San Diego River (Mission Bay and San Diego River WMAs), and Southern San Diego (San Diego Bay and Tijuana River WMAs). For the 2015–2019 cycle, there are also two different classes of sites: Trend and Condition. Trend sites will be fixed for all five years of the cycle (unless the site goes dry or access is denied) and will be resampled in each of those five years. Condition sites will be different for each year of the five-year term. In the County as a whole, 16 sites are sampled annually: 4 Trend sites and 12 Condition sites.

At the beginning of the 2015–2019 cycle, the Southern California Coastal Water Research Project (SCCWRP) generated two randomized site lists that will be used to select sites for the entire five-year period, one for Trend sites and one for Condition sites. Trend sites are further categorized as “Open” sites (i.e., not urban or agriculture influenced) and “Developed” sites (i.e., with urban or agriculture influence). Of the four Trend sites in the County, two have been allocated as “Open” and 2 as “Developed” sites. Trend sites were selected on a County-wide basis, and were not allocated to a certain number of sites per County stratum. The two “Open” Trend sites are in the San Dieguito and San Diego Bay WMAs, while the two “Developed” Trend sites are in the Carlsbad and Santa Margarita WMAs. These sites will remain fixed and will be resampled each year, unless the sites go dry or are no longer accessible because of lack of landowner permission or other reasons. The Condition sites will change every year, and these sites are allocated as three Condition sites per County stratum. In 2015, the Condition sites were selected by starting at the top of the randomized Condition list for each County stratum and choosing the first three sites able to be sampled, after reconnaissance confirmation. Then, for each subsequent year (i.e., 2016–2019), site selection would start on the list from where the previous year left off and continue down the list to select three new sites. Within each County stratum for each year of the program, the three Condition sites have the potential to fall into any of the WMAs within that stratum. During the spring 2016 reconnaissance efforts, no Condition sites were allocated to the Los Peñasquitos WMA; the three Condition sites were split between the Carlsbad WMA (1) and San Dieguito River WMA (2).

2.4 California Assembly Bill 411 (AB 411) Data

San Diego County Department of Environmental Health (DEH) implements the Beach and Bay Water Quality Monitoring Program to support the statewide program funded by the Beach Safety Act (AB 411). This program is commonly referred to as AB 411 monitoring. There is one AB 411 beach monitoring station in the Los Peñasquitos WMA. The AB 411 monitoring program is not required by the MS4 Permit. Responsible Agencies are using the AB 411 data to track dry weather beach water quality conditions related to the HPWQCs for the watershed (Los Peñasquitos Responsible Agencies, 2015).

The number of samples collected for each fecal indicator bacteria (FIB) indicator (*Enterococcus*, fecal coliform, and total coliform) for the period between October 1, 2015, and July 31, 2015, is presented in Table 2-1.

Table 2-1
Los Peñasquitos WMA AB 411 Data Summary

Site ID	Location[1]	Total Number of Samples		
		Enterococcus	Fecal Coliform	Total Coliform
FM-100	Los Peñasquitos Lagoon	106	105	105

1. Figure 1-1 shows the AB 411 Monitoring Locations.
ID = identification

The concentrations for the FIB indicators are shown in Figures 2-1 through 2-3. These data will be reviewed during the Receiving Water Assessment completed in the Regional Monitoring and Assessment Report.

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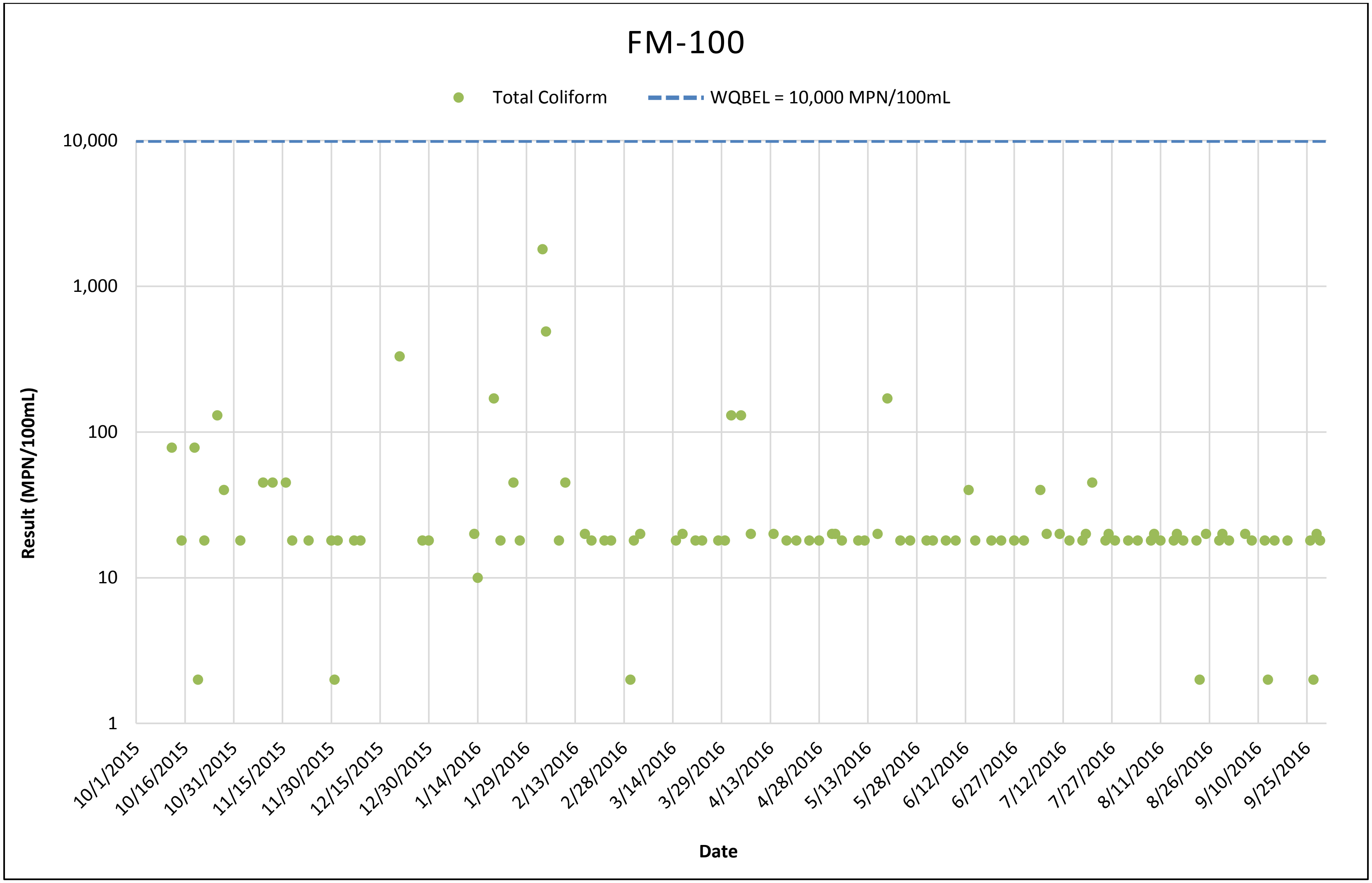

Figure 2-1
Total Coliform Concentrations at AB 411 Site FM-100

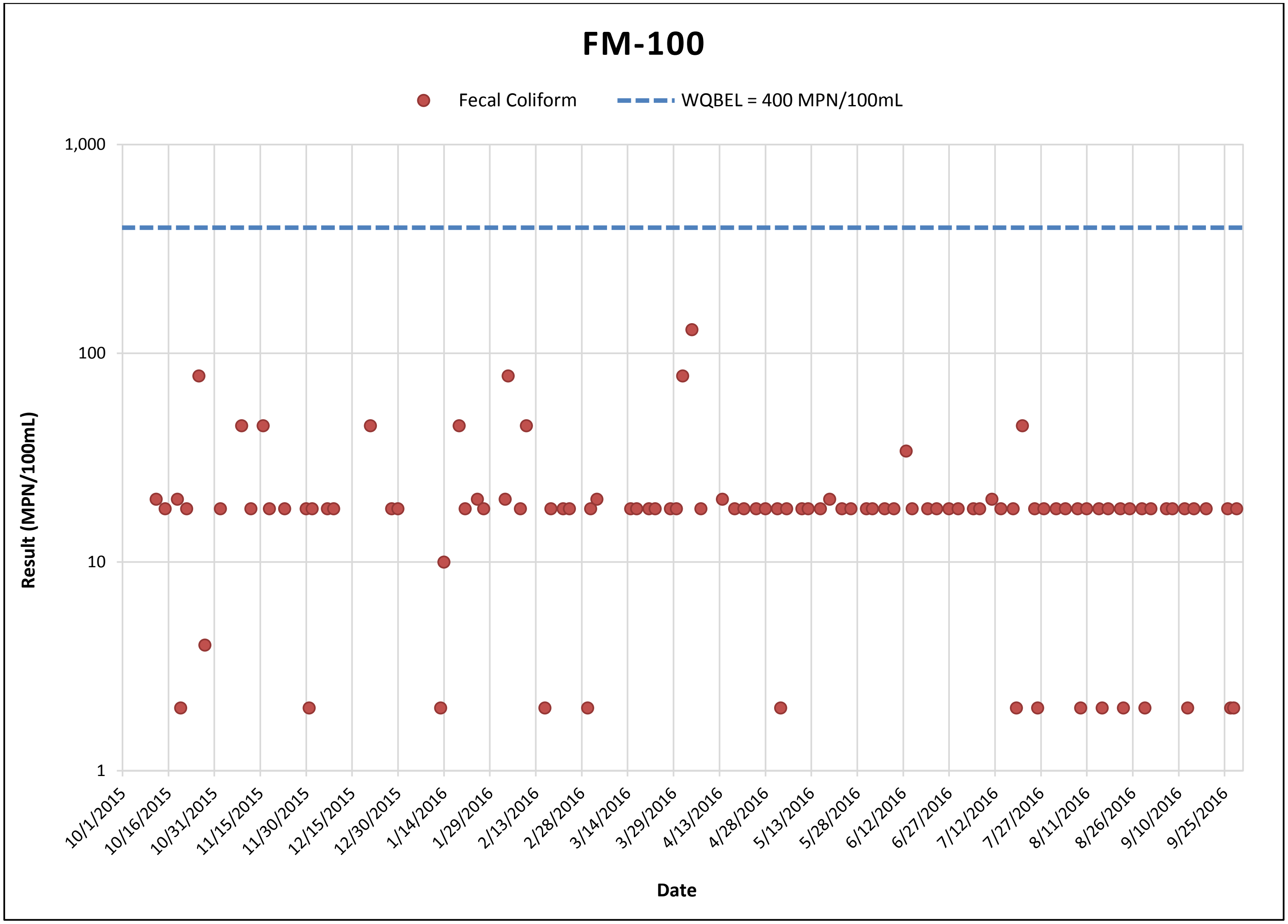

Figure 2-2
Fecal Coliform Concentrations at AB 411 Site FM-100

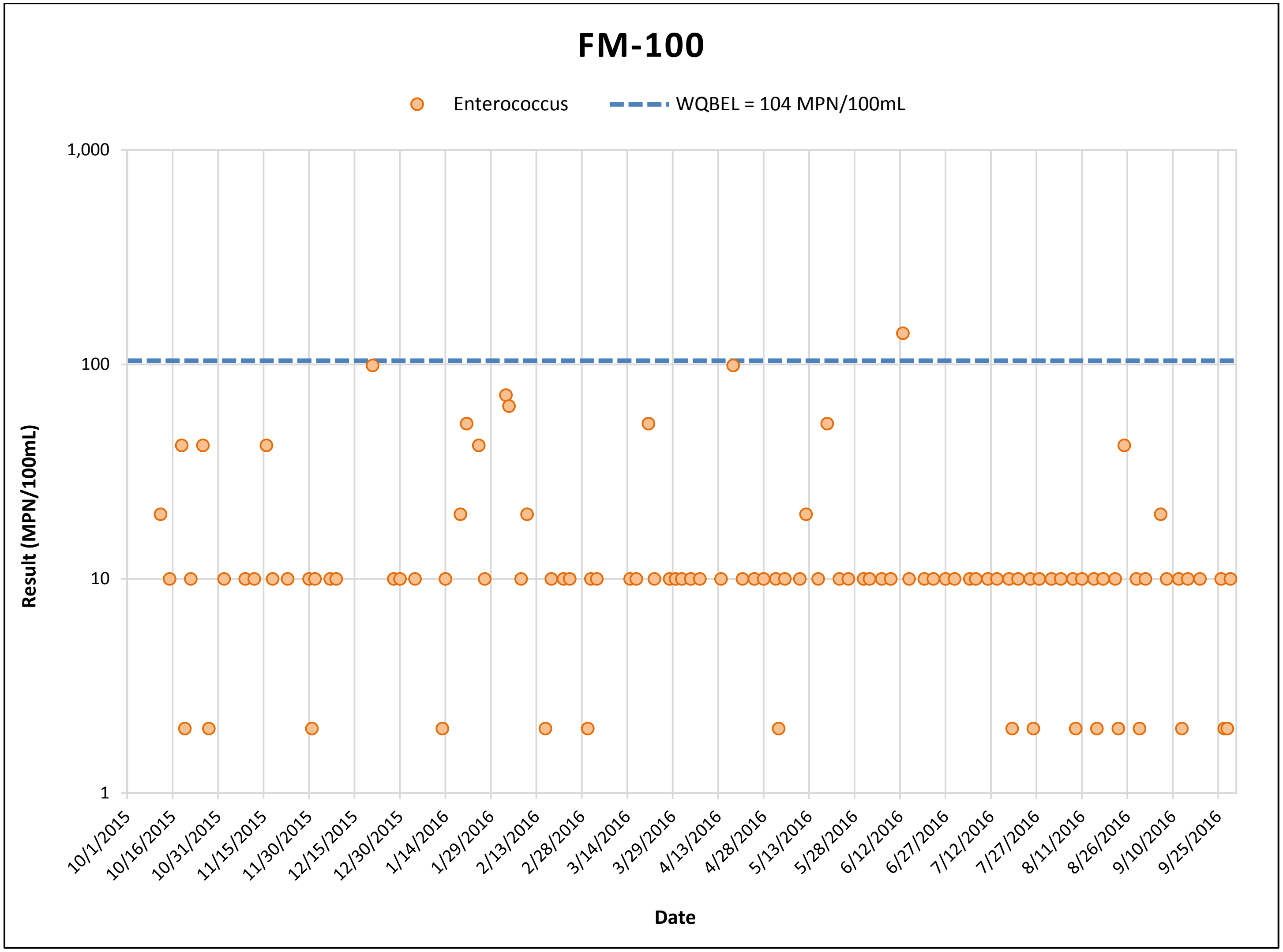

Figure 2-3
***Enterococcus* Concentrations at AB 411 Site FM-100**

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2.5 Hydromodification Monitoring Program

The Hydromodification Monitoring Program (HMP) was initially developed in response to the requirements of the 2007 MS4 Permit. The Monitoring Plan is defined in Chapter 8 of the HMP, and was updated by the San Diego County Regional Copermittees and accepted by the Regional Board in February 2014. The Effectiveness Assessment of the San Diego HMP Report will be submitted to the Regional Board in December 2016.

The Effectiveness Assessment of the San Diego HMP is intended to determine whether the requirements in the checklist for the Chapter 8 of the HMP were fully met. Monitoring results and program evaluations indicate that the HMP elements are protecting stream physical integrity (Regional Board, 2016). Additionally, the report provides answers regionally to three questions:

1. Do field observations confirm that the HMP appropriately defines the flow rate (expressed as a function of the 2-year runoff event) that initiates the movement of channel bed and bank material? The Effectiveness Assessment determined that the HMP does appropriately define the flow rate that initiates movement of channel bed and bank materials (Regional Board, 2016).

2. Are hydromodification mitigation facilities adequately meeting flow duration design criteria outlined in the HMP? The initial plan for this phase of the assessment was to couple best management practice (BMP) monitoring and channel monitoring. The slow pace of development during the economic recession in the first few years of the project did not allow this to happen. The study plan was changed and one BMP location was monitored during the 2015–2016 wet season for flow. Analysis for this one location over the year showed that significant peak flow attenuation occurred and during the monitored events the BMP performed as designed to prevent hydromodification (Regional Board, 2016).

3. What is the effect of development on receiving water channel cross-section stability downstream of urban development? The Effectiveness Assessment found that there were no major changes in channel stability within the nine monitored sites during the monitoring period, which included a relatively dry period due to drought conditions (Regional Board, 2016).

The report provided details of the small changes in channel geomorphology for the two sites located in the Los Peñasquitos WMA, as summarized in Table 2-2.

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Table 2-2
Los Peñasquitos WMA HMP Monitoring Site Summary

Site Name and Number	HMP Monitoring Type	Evidence of Erosion/ Deposition?	Repeat Assessment?	Susceptibility Class Changed?	Notes and interpretation. Is change (if observed) indicative of instability in channel or watershed?
Deer Valley RM-1	Reference	Small patches of up to 6 inches of fine sediment depositing in channel	Yes	Yes (Medium to High)	Fine sediment from watershed has formed a thin layer on the channel bed (originally gravel). Appears to be cyclical deposition; fines likely to be washed out in subsequent years. Fine sediment has caused changed classification. Site appears stable.
Flanders UM-2	Urban	~12 inches of upstream erosion and downstream deposition	Yes	No	Gravel pulse passing through site. Cyclical deposition of intermediate size bed–lining material, likely to be washed out in subsequent years. Site appears stable.

HMP = Hydromodification Monitoring Program; Source: (Regional Board, 2016)

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2.6 Sediment TMDL Monitoring

The Los Peñasquitos Lagoon (Lagoon) has been historically impacted by anthropogenic disturbances that caused excessive sedimentation and degradation of estuarine habitat. As a result, the Lagoon was placed on the Clean Water Act (CWA) Section 303(d) List of Water Quality Limited Segments (303(d) List) for sedimentation and siltation. In response, on June 13, 2012, the Regional Board adopted Resolution Number R9-2012-0033: *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate the Total Maximum Daily Load (TMDL) for Sedimentation in Los Peñasquitos Lagoon* (referred to as the Sediment TMDL) (Regional Board, 2012). This section summarizes the results of the 2015–2016 monitoring year. The Sediment TMDL Monitoring Compliance Report is provided in Attachment A.

2.6.1 Sediment TMDL Monitoring Methodology

The Los Peñasquitos Lagoon WMA Sediment TMDL Compliance Monitoring Program was designed to assess sediment transport within the three major tributaries that flow through the WMA into the Lagoon: Carroll Canyon Creek, Carmel Valley Creek, and Los Peñasquitos Creek (WMA creeks). The Monitoring Program provides data on (1) streambed conditions (particle sizes), (2) suspended sediment concentrations (SSC) during wet weather, (3) sediment delivery potential from the three WMA creeks discharging into the Lagoon, and (4) estimated total sediment loads to the Lagoon.

For vegetation monitoring, the seven vegetation types consistent with the categories historically used in the 2011 California State Parks analysis (California State Parks, 2011) of Lagoon vegetation from 2010 will be evaluated. These seven vegetation categories will be mapped using the methodology described below as part of the Sediment TMDL compliance monitoring to identify where and how changes in habitat are occurring in Los Peñasquitos Lagoon.

This Monitoring and Assessment Appendix summarizes the results of the Monitoring Program during fiscal year (FY) 2016 (July 1 2015, through June 30, 2016), provides a comparison with historical data, and summarizes the results of the monitoring program to determine compliance with the established TMDL.

Monitoring conducted by Amec Foster Wheeler Environment & Infrastructure, Inc. prior to and during the wet season included the following:

- Pre-wet-season (prior to October 1, 2015):
  - Volumetric streambed sampling for particle-size distribution
  - Pre-storm Wolman pebble counts
  - Photo documentation
  - Channel cross-section surveys

- Wet season (October 1, 2015, through April 30, 2016):
  - Storm bedload sampling for particle-size distribution
  - Post-storm Wolman pebble counts
  - Photo documentation
  - Instantaneous water discharge measurements
  - Continuous water discharge monitoring
  - Pollutograph sampling for SSC

During the 2015–2016 wet season, cross-sectional areas of streambeds at the monitoring locations were updated and used to revise the head-versus-flow tables. Multiple field flow measurements using wading rods and StreamPro Acoustic Doppler Current Profilers (ADCPs) were used to verify and calibrate the head-versus-flow tables. The primary change to the head-versus-flow tables was extending the Los Peñasquitos Creek table to higher stages, because the stages measured during the large storms in early January 2016 exceeded the tables previously developed.

2.6.2 Sediment TMDL Monitoring Results

Hydrology and Analysis

Three storm events (storms) were monitored during the 2015–2016 wet season (Table 2-3). Total rainfall during monitored storms was 2.94 inches, representing 31 percent (%) of the 9.48 inches of total wet season rainfall. A total of 21 "wet weather days" (days with more than 0.1 inch of rainfall) were observed, compared with 11 wet weather days in 2013–2014 and 14 wet weather days in 2014–2015.

Table 2-3
Rainfall Amounts for 2015–2016 Monitored Wet Weather Events

Event	Dates	Rainfall Total[1] (inches)
1	January 5–6, 2016	1.55
2	January 31, 2016	0.49
3	March 6–8, 2016	0.90

1. Rainfall was measured at the Los Peñasquitos Creek monitoring location rain gauge, except during the event on January 5-6, 2016, when it was replaced by Carmel Valley Creek monitoring location rain gauge because of equipment malfunction. Rainfall totals reported are only during the monitoring period. Rainfall continued later on the January 6, 2016, after sampling concluded for Event 1.

SSC Results

Data collected during the three storms showed that changes in SSC were strongly controlled by flow. In general, data collected over three wet seasons (2013–2016) indicated that SSCs were higher at or near peak flow and during the rising limb of the hydrograph for smaller storms, suggesting supply-limited sediment transport. This finding is particularly evident in results of the smaller storms (Events 2 and 3) during the 2015–2016 wet season. For the larger storm (Event 1), SSCs in all three WMA creeks remained high throughout the storm and mostly varied with flow, suggesting that the unusually high flows may have mobilized previously deposited sediments that were stored by in-channel vegetation and streambed.

Bedload and Pebble Count Results

Collection of bedload samples was attempted during each monitored event at the three monitoring locations using both trap samplers (installed in streambed) and manual bedload samplers. Bedload sampling proved challenging and samplers were frequently displaced or buried, making it impossible to determine sampled volume. One manual sample was successfully collected during low flow conditions, but may not be representative of the bedload throughout the storm, particularly at peak flow conditions. Visual observations and photos taken pre- and post-storm documented large amounts of cobble and streambed sediment deposited in the concrete-lined portion of Carroll Canyon Creek, but it is not known whether, or how much of, this material was transported into the Lagoon.

Post-storm pebble counts were conducted on six occasions during the 2015–2016 wet season. Results showed that there was a shift toward a higher proportion of sands (i.e., larger particle size) after the series of large rain events in early January 2016 at Carroll Canyon Creek, which typically has higher velocity flows compared with the other two creeks. Pebble count data after Events 2 and 3 show a return to a lower proportion of sands and more fines, likely due to lower intensity storms. This trend is less apparent or not detected in the other two creeks. The lack of a clear shift after the large January 2016 storms is most likely due to the lower velocities observed in these two creeks, but may also be attributable to sediment supply within the creeks (i.e., higher proportion of fines compared to sands upstream).

Sediment Loads from Watersheds During Measured Storms

Flow-weighted event mean concentrations (EMCs) and total sediment load estimates were calculated using SSC and flow data for three storms during the 2015–2016 wet season and the two previous years. In the two previous wet seasons and a previous estimate (Weston Solutions Inc., 2009), Carroll Canyon Creek typically accounted for 80% to 90% of the sediment loads to the Lagoon, with the remaining 10% to 20% supplied mostly by Los Peñasquitos Creek, and a small percentage (1%) by Carmel Valley Creek. Data collected during the 2015–2016 wet season indicated that relative contributions measured this season differ greatly from previous sediment load measurements and estimates, primarily because of unusually intense storms and resulting high flow rates and large flow volumes in Los Peñasquitos Creek. Because of these unusually high flows, Los Peñasquitos Creek accounted for the majority (~60%) of the total sediment load during the 2015–2016 wet season. Carroll Canyon Creek supplied approximately 39%, and Carmel Valley Creek supplied approximately 1%.

These estimated annual sediment loads are preliminary values, based on the limited data set collected during the 2013–2014, 2014–2015, and 2015–2016 wet seasons (nine total events). Data collection during future storm events are required to further refine these sediment load estimates, particularly for non-monitored events.

Estimated Annual Sediment Loads

The annual sediment load (23,500 tons per year) was estimated by multiplying the average of the three daily load estimates at each site (per storm) by the number of wet days per year (21 in 2015–2016) ("average estimation method"). This approach can yield skewed results by averaging a single large event over several smaller events, raising the total estimated load. In an effort to better represent load estimations for non-monitored storms, annual sediment load was also estimated using a regression between maximum one-hour rainfall-intensity and estimated loads during monitored events. The regression relationship between one-hour rainfall intensity and sediment loads was strong in previous wet seasons, but the approach was unreliable with the data from the 2015–2016 wet season, likely because of the unusually high rainfall intensities. The annual sediment load estimates from the rainfall intensity method yielded significantly different results than the average estimation method, leading to uncertainty in the annual sediment load estimates. Using the rainfall intensity method, sediment load for the 2015–2016 wet season was estimated to be 688 tons per year compared with the estimated total of 23,500 tons per year calculated using the average estimation method. Relationships between flow and SSC were investigated, but the relationships were not strong at all monitoring locations, and the approach was not extended further. All three methods present different challenges, and future work will be performed to develop an improved method for estimating annual total sediment loading, primarily focusing on regression relationships between maximum event flow rate and total event sediment load.

Total Sediment Load and Waste Load Allocation (WLA)

Based on monitoring during the 2015–2016 wet season, the total sediment load estimate of 23,500 tons per year is significantly above the WLA allowed by the Sediment TMDL (2,580 tons per year). Continued compliance monitoring at the sediment TMDL locations is planned for FY 17.

2.6.3 Vegetation Monitoring Methodology

The vegetation types in Los Peñasquitos Lagoon are monitored annually, in the fall, to measure changes in the spatial extent of the vegetation types. The monitoring is conducted via aerial photography and/or land-based survey methods that are consistent with the methodology used to calculate the numeric target. Ground truthing (i.e., land-based survey methods) of aerial mapping may be performed to distinguish among vegetation types.

The vegetation mapping uses the preferred vegetation classification that is necessary to document attainment of the Sediment TMDL goals. At the minimum, mapping distinguishes with high confidence between the two major vegetation types called out in the Sediment TMDL, tidal saltmarsh and native-dominated non-tidal saltmarsh.

The Sediment TMDL Staff Report and its attachments (Regional Board, 2012) describe the methods that were used for mapping Los Peñasquitos Lagoon pursuant to the development of the numeric target for Lagoon restoration. Aerial photos were digitized onscreen at a 1:2,500 scale and were mapped into generalized classifications that could be reliably interpreted without field verification. Vegetation monitoring currently utilizes the same methodology. Aerial photographs are taken at the height of the growing season (late summer to early fall) for the monitoring year. Vegetation types are mapped as described, with the polygons for each type totaled to indicate the number of acres of each type that were identified. Changes in vegetation types from the previous mapping efforts are quantified to determine whether progress is being made toward the Sediment TMDL numeric target.

2.6.4 Vegetation Monitoring Results

Vegetation was mapped in the Peñasquitos Lagoon using aerial imagery collected in October 2016 to determine whether progress is being toward the standards set in the TMDL documents.

For the purposes of Sediment TMDL compliance, 33 Western San Diego County Vegetation Classifications were consolidated into the seven Sediment TMDL classifications to develop a provisional crosswalk. These classifications are tidal saltmarsh, non-tidal saltmarsh, non-tidal saltmarsh infested with *Lolium*, freshwater marsh, southern willow scrub/mulefat scrub, herbaceous wetland, and upland. Newly designated acreage for the seven TMDL categories is provided in Table 2-4. The full crosswalk and acreage for the 33 Western San Diego County Vegetation Classifications are provided in Attachment C. An updated map of TMDL vegetation types from the October 2016 aerial survey is in Figure 2-4.

Table 2-4
Los Peñasquitos Lagoon TMDL Vegetation Acreage

TMDL Vegetation and Baseline Vegetation	Baseline Area (Acres)	October 2016 Area (Acres)	Difference from Baseline to 2016 (acres)
Developed Total	429.66	429.66	0
Freshwater Marsh Total	64.42	63.27	-1.15
Herbaceous Wetland Total	7.95	7.99	+0.04
Non-Tidal Saltmarsh Total	106.53	106.82	+0.29
Non-Tidal Saltmarsh with Lolium Total	60.46	60.35	-0.11
Southern Willow Scrub Total	140.82	140.87	+0.05
Tidal Saltmarsh Total	186.61	187.36	+0.75
Upland Total	203.70	204.04	+0.34
Water Total	3.53	3.53	0
Grand Total	**1,203.68**	**1,203.89**	**+0.21**

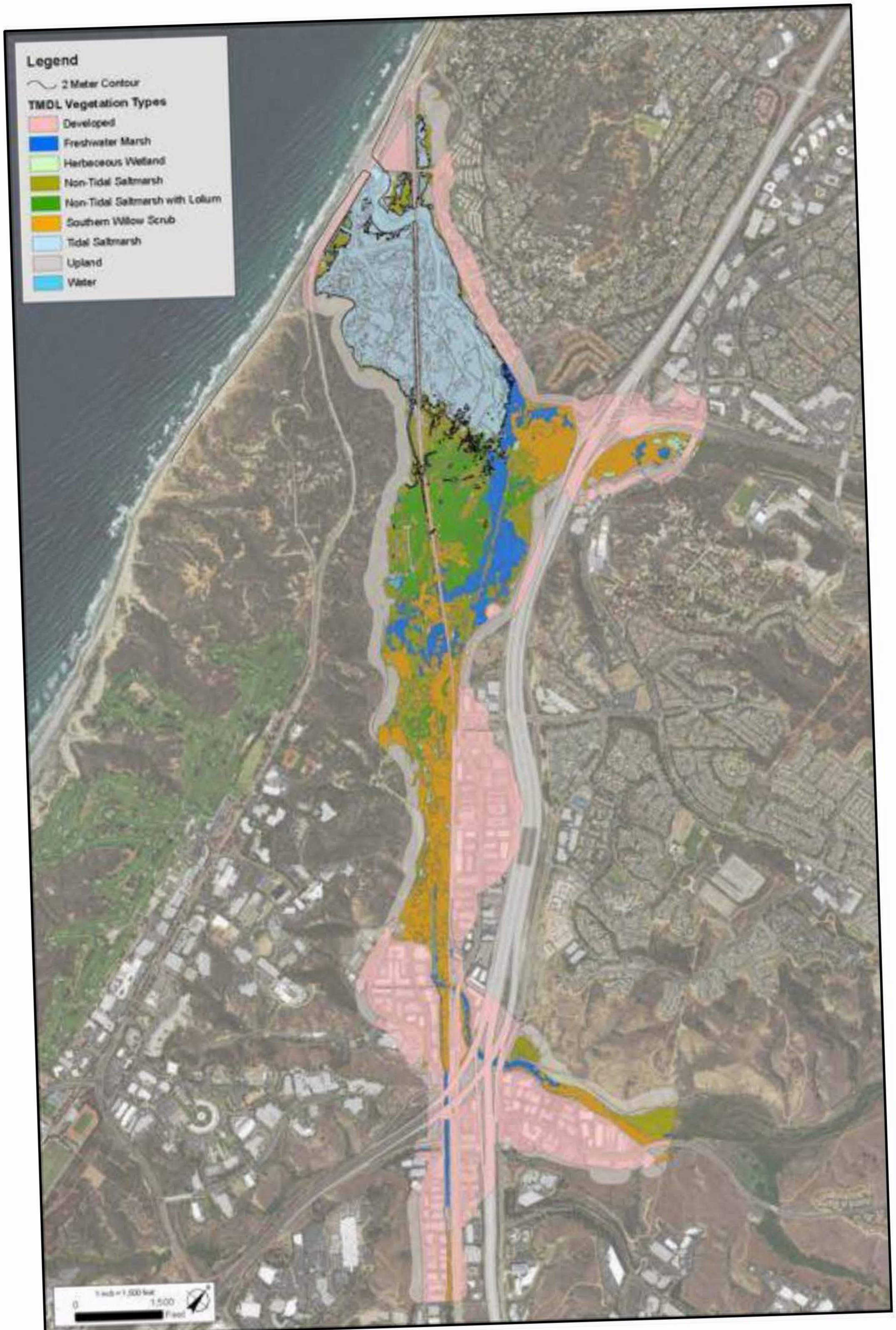

Figure 2-4
October 2016 Vegetation Type Classification

2.7 Bacteria TMDL Monitoring

The 2015–2016 Los Peñasquitos WMA Bacteria Total Maximum Daily Load (Bacteria TMDL) compliance monitoring program was designed to meet the requirements of the MS4 Permit. The Bacteria TMDL monitoring program assesses the conditions of the receiving waters and has the following objectives:

- Characterize levels of bacteria concentrations at compliance monitoring locations.
- Track progress toward meeting the Bacteria TMDL numeric targets.

FIB sampling was completed for the compliance monitoring season (October 2015 through September 2016). Dry weather samples were collected at least monthly on dry weather days from November 1, 2015, through March 31, 2016. Dry weather samples were collected at least weekly in October 2015 and from April 1, 2016, through September 30, 2016. Compliance monitoring location information is presented in Table 2-5. The Bacteria TMDL Compliance Report is provided in Attachment B.

Annual Compliance Reports summarize FIB concentrations and key hydrologic data by season. Compliance is assessed by comparing analytical results for *Enterococcus*, fecal coliform, and total coliform with applicable receiving water limitations (RWLs), in accordance with the Bacteria TMDL requirements in Attachment E of the MS4 Permit. The RWLs are a combination of numeric targets for bacteria density and allowable exceedance frequencies. The single-sample maximum numeric targets are required to be achieved only during wet weather with a 22% final allowable exceedance frequency. For dry weather days, the 30-day geometric mean numeric targets must be achieved with a 0% exceedance frequency. The compliance schedule includes interim milestones that must be achieved to demonstrate progress prior to attaining full compliance with the TMDL. Wet weather samples were collected for three wet weather events, including an extreme wet weather event in January 2016 that produced over 5 inches of rainfall as measured at the Miramar Naval Air Station rain gauge.

Table 2-5
TMDL Monitoring Station

Monitoring Location	Monitoring Identification	Latitude	Longitude
Los Peñasquitos River Outlet/Beach	FM-100	32.935074626	–117.261955166

Summary of Results for 2015–2016

Analytical results for total coliform, fecal coliform, and *Enterococcus* at the Los Peñasquitos River Outlet were compared with numeric targets established in the Bacteria TMDL and MS4 Permit. Results are as follows:

- During wet weather, the receiving waters at the Los Peñasquitos River Outlet/Beach achieved a 0% single-sample maximum exceedance frequency for fecal coliform and a 13% single-sample maximum exceedance frequency for total coliform and *Enterococcus*. FM-100 is in compliance with final wet weather single-sample maximum RWLs.
- During the wet season, which evaluates a combination of both wet and dry weather samples, FM-100 achieved a 0% geometric mean exceedance frequency and is in compliance with final dry weather geometric mean RWLs.
- During the dry season, when recreational activities occur with more regularity, FM-100 achieved a 0% exceedance frequency and is in compliance with the final dry weather geometric mean RWLs.

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3 Dry Weather Outfall Assessments and Illicit Discharges

The purpose of this program is to identify non-storm water and illicit discharges within each Responsible Agency's jurisdiction, determine which discharges are transient flows and which are persistent flows, and prioritize the dry weather MS4 discharges that will be investigated and eliminated. The dry weather MS4 outfall monitoring component involves the following types of data collection activities for the Los Peñasquitos WMA:

- Dry Weather MS4 Outfall Field Screening: inspecting major outfalls during dry weather conditions to identify and prioritize persistently flowing outfalls.
- Dry Weather Persistent MS4 Outfall Discharge Monitoring: testing the discharge for various pollutants and comparing the results with the NALs.

3.1 Non-Storm Water MS4 Outfall Monitoring Data

During the 2015–2016 monitoring season (October 2015 through September 2016), the Responsible Agencies implemented the first year of dry weather outfall discharge monitoring in accordance with Provision D.2.b of the MS4 Permit. The goals of dry weather outfall monitoring are to:

- Identify non-storm water and illicit discharges within each Responsible Agency's jurisdiction.
- Prioritize dry weather MS4 discharges that will be investigated and eliminated.
- Assess effectiveness of JRMP programs toward effectively prohibiting non-storm water discharges into the MS4.

Dry weather data collected at major MS4 outfalls are provided in Attachment D.1. Non-storm water MS4 outfall observations data are provided in Attachment D.2. Attachment E includes a QA/QC summary of the dry weather outfall data collected. Details of the monitoring methodology are provided in the Los Peñasquitos WMA MS4 Outfall Monitoring Plan, available on the Project Clean Water website (Project Clean Water, 2016). The following sections present the results of dry weather discharge monitoring in the Los Peñasquitos WMA.

3.2 Non-Storm Water Action Level Comparisons

Data collected as part of the dry weather MS4 outfall discharge monitoring were compared with NALs per the MS4 Permit. The results are summarized in Tables 3-1 through 3-3.

The MS4 Permit NALs vary according to the receiving water of the MS4 discharge (i.e., there are separate NALs for discharges to ocean surf zone, lagoons/harbors/bays/estuaries, and inland surface waters). In the Ocean Surf Zone (Table 3-1), none of the samples collected had total coliform and fecal coliform concentrations that exceeded their respective NALs. Both samples collected had concentrations of *Enterococcus* that exceeded the NAL.

Table 3-1
NAL Comparison for MS4 Outfalls to Ocean Surf Zone

Parameter	NAL	Monitoring Location	
		City of Del Mar	
		S-12	
		6/30/2016	8/12/2016
Total Coliform	10000/1000 MPN/100 mL*	1600	**30000**
Fecal Coliform	400 MPN/100 mL	50	ND
Enterococcus	104 MPN/100 mL	**1600**	**500**

Bold = exceedance of NAL
MPN/100 mL = most probable number per 100 milliliters; ND = not detected; NAL = non-storm water action level
*The NAL is 1,000 MPN/100mL when the fecal/total coliform ratio exceeds 0.1.

A total of 11 major MS4 outfalls were monitored that flow into inland surface waters. Monitoring results by jurisdiction are shown in Tables 3-2 and 3-3. The City of Poway and City of San Diego monitor six and five major MS4 outfalls, respectively, that flow to inland surface waters in the Los Peñasquitos WMA. The majority of results were below the NALs. A total of 276 of the 366 separate results were below appropriate NALs (including 107 non-detects). NALs were exceeded for concentrations of *Enterococcus*, fecal coliform, iron, manganese, pH, total nitrogen, and total phosphorous, collectively, within these outfalls. Some of these analytes are found in groundwater and may be from unidentified groundwater intrusion. Other analytes will be addressed by the strategies developed by the Responsible Agencies. The Los Peñasquitos WMA Responsible Agencies have just begun implementation of the WQIP. They plan to continue implementing the strategies without modification, and to work toward eliminating dry weather flows. Additionally, they have implemented their IDDE programs, as summarized in Section 3.3.1, to identify sources of illicit dry weather discharges.

Table 3-2
NAL Comparison for MS4 Outfalls to Inland Surface Waters – City of Poway

Parameter	NAL	Monitoring Locations									
		City of Poway									
		282-1749, 2[1]		282-1749, 3[2]		282-1749, 4(S)[1]	294-1749, 2[3]	298-1749, 2[3]		298-1749, 5[4]	
		7/28/2016	8/1/2016	7/28/2016	8/1/2016	7/28/2016	8/1/2016	8/1/2016	8/2/2016	7/28/2016	8/2/2016
Dissolved Cadmium	** µg/L	ND (10.52)	ND (10.52)	0.4 (5.59)	ND (6.25)	0.9 (10.52)	ND (14.45)	ND (14.45)	ND (14.45)	ND (5.91)	ND (5.91)
Dissolved Chromium III	** µg/L	0.2 (994.36)	ND (994.36)	0.4 (491.97)	ND (556.28)	0.6 (994.36)	ND (1417.87)	ND (1417.87)	ND (1417.87)	0.2 (523.19)	ND (523.19)
Dissolved Chromium VI	16 µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dissolved Copper	** µg/L	3 (53.9)	4 (53.9)	13 (25.87)	7 (29.4)	5 (53.9)	5 (78.05)	2 (78.05)	1 (78.05)	8 (27.58)	9 (27.58)
DO	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	16	8.4	19.4	10.1	16.9	9	9.1	8.4	11.4	8.4
Enterococcus	61 MPN/100 mL	**900**	**3000**	**17000**	**5000**	**900**	**3000**	**1700**	**1700**	**1300**	**22000**
Fecal Coliform	400 MPN/100 mL	**1700**	**5000**	**13000**	**23000**	**3000**	**23000**	**13000**	**13000**	**8000**	**300000**
Total Iron	0.3 mg/L	0.108	0.128	**0.479**	0.116	0.150	**0.358**	0.095	0.048	**0.925**	**1.07**
Dissolved Lead	** µg/L	3 (22.37)	0.4 (22.37)	2 (9.43)	0.1 (11)	0.1 (22.37)	ND (33.77)	0.1 (33.77)	0.6 (33.77)	ND (10.19)	ND (10.19)
Total Manganese	0.05 mg/L	0.003	0.003	0.031	0.004 J	0.006	**0.061**	**0.053**	0.028	0.019	0.038
MBAS	0.5 mg/L	ND	ND	0.4 J	0.1 J	0.1	ND	ND	ND	0.1	ND
Dissolved Nickel	** µg/L	2 (307.47)	ND (307.47)	4 (148.63)	0.2 (168.75)	2 (307.47)	ND (443.58)	ND (443.58)	0.8 (443.58)	3 (158.39)	3 (158.39)
pH	Not in the range of 6.5-8.5	6.6	6.5	6.5	6.8	6.5	7.2	6.8	7.5	6.5	7.3
Dissolved Silver	** µg/L	ND (127.89)	ND (127.89)	ND (29.18)	ND (37.76)	ND (127.89)	ND (269.44)	ND (269.44)	ND (269.44)	ND (33.2)	ND (33.2)
Total Nitrogen	1.0 mg/L	**5.8**	**11.3**	**7.7**	**7.00**	**53.1**	**2.3**	**12.5**	**7.9**	**15.3**	**9.1**
Total Phosphorus	0.1 mg/L	0.09	0.23	**0.5**	**0.63**	**0.98**	**0.62**	**0.24**	**0.84**	**0.86**	**0.66**
Turbidity	20 NTU	1.66	1.28	13.11	0.31	8.1	1.97	0.88	1.21	13.17	18.11
Dissolved Zinc	** µg/L	6 (700.36)	7 (700.36)	329 (338.18)	19 (384.02)	20 (700.36)	1 (1010.97)	3 (1010.97)	2 (1010.97)	3 (360.41)	4 (360.41)

Bold = exceedance of NAL
** = California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent non-storm water action level
µg/L = micrograms per liter; mg/L = milligrams per liter; MPN/100 mL = most probable number per 100 milliliters; NA = not analyzed; NAL = non-storm water action level; ND = not detected; NTU = nephelometric turbidity unit; - = missing data; ( ) = Numbers in parentheses adjacent to analytical results are CTR Freshwater Continuous Concentration Hardness dependent values from 40 Code of Federal Regulations (CFR) 131.38(b)(1) calculated using the hardness result of the receiving water for each designated monitoring location:
[1]282-1749, 2 - RW; [2]282-1749, 3; [3]298-1749, 2 - RW; and [4]298-1749, 5 - RW

Table 3-3
NAL Comparison for MS4 Outfalls to Inland Surface Waters – City of San Diego

Parameter	NAL	Monitoring Locations									
		City of San Diego									
		DW0025[1]		DW0247[1]		DW0036[2]		DW0024[1]		DW0429[1]	
		2/4/2016	4/25/2016	3/16/2016	4/25/2016	2/4/2016	4/25/2016	2/4/2016	4/25/2016	3/16/2016	4/25/2016
Dissolved Cadmium	** µg/L	ND (7.87)	0.18 (9.78)	ND (7.76)	0.22 (9.78)	ND (14.79)	0.16 (18)	ND (7.87)	ND (9.78)	ND (7.76)	ND (9.78)
Dissolved Chromium III	** µg/L	ND (719.1)	1.4 (916.92)	ND (708.37)	0.84 (916.92)	ND (1454.63)	1.2 (1812.05)	ND (719.1)	1.3 (916.92)	ND (708.37)	2.6 (916.92)
Dissolved Chromium VI	16 µg/L	ND	ND	ND	ND	0.29	ND	ND	ND	ND	ND
Dissolved Copper	** µg/L	6.6 (38.44)	6.4 (49.53)	ND (37.84)	ND (49.53)	ND (80.16)	13 (100.81)	22 (38.44)	8.8 (49.53)	5.5 (37.84)	3.7 (49.53)
DO	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	9.65	8.87	9.53	9.12	10.78	7.38	10	9.31	9.37	9.03
Enterococcus	61 MPN/100 mL	**11000**	**340**	20	**200**	**1000**	**2800**	**100**	**1300**	**100**	**580**
Fecal Coliform	400 MPN/100 mL	**1100**	310	20	18	80	**7900**	20	**460**	20	18
Total Iron	0.3 mg/L	**0.99**	**1.2**	0.051	ND	**0.35**	0.14	**0.46**	**1.5**	**0.89**	**0.97**
Dissolved Lead	** µg/L	ND (15.12)	ND (20.3)	ND (14.85)	ND (20.3)	ND (34.76)	ND (44.33)	ND (15.12)	ND (20.3)	ND (14.85)	ND (20.3)
Total Manganese	0.05 mg/L	**0.052**	0.047	ND	0.00083	**0.096**	**0.079**	0.039	**0.16**	ND	0.041
MBAS	0.5 mg/L	0.2	0.29	ND	ND	0.14	0.15	0.19	0.15	0.069	0.19
Dissolved Nickel	** µg/L	ND (219.99)	3.3 (282.77)	ND (216.6)	ND (282.77)	ND (455.46)	2.3 (571.5)	ND (219.99)	2.9 (282.77)	ND (216.6)	1.7 (282.77)
pH	Not in the range of 6.5-8.5	8.5	**8.7**	8.4	**8.9**	8.0	7.9	**8.8**	**8.6**	**8.6**	**8.6**
Dissolved Silver	** µg/L	ND (64.75)	ND (107.87)	ND (62.74)	ND (107.87)	ND (284.32)	ND (451.02)	ND (64.75)	ND (107.87)	ND (62.74)	ND (107.87)
Total Nitrogen	1.0 mg/L	**6.6**	**3.3**	**1.4**	0.16	0.87	**1.7**	**6.6**	**4.0**	**1.4**	0.99
Total Phosphorus	0.1 mg/L	**0.13**	**0.22**	0.027	ND	**0.14**	**0.22**	**0.17**	**0.27**	**0.12**	0.073
Turbidity	20 NTU	5.83	17.92	0.04	1.23	6.89	2.55	1.64	5.9	2.96	8.64
Dissolved Zinc	** µg/L	13 (500.84)	9.8 (644.01)	ND (493.12)	ND (644.01)	ND (1038.1)	19 (1303.02)	11 (500.84)	ND (644.01)	23 (493.12)	12 (644.01)

Bold = exceedance of NAL
** = California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent non-storm water action level
µg/L = micrograms per liter; J = estimate; mg/L = milligrams per liter; MPN/100 mL = most probable number per 100 milliliters; ND = not detected; NA = not analyzed; NAL = non-storm water action level; NTU = nephelometric turbidity unit; - = missing data; ( ) = Numbers in parentheses adjacent to analytical results are CTR Freshwater Continuous Concentration Hardness dependent values from 40 Code of Federal Regulations (CFR) 131.38(b)(1) calculated using the hardness result of the receiving water for each designated monitoring location: [1]LPCMLS and [2]LPCTWAS3

3.3 Non-Storm Water MS4 Outfall Monitoring Data Assessments

Assessments of jurisdictional MS4 monitoring programs were conducted individually by the jurisdictions, watershed-wide. Per Provision D.4. of the MS4 Permit, assessments include:

- Progress of IDDE programs toward effectively prohibiting non-storm water and illicit discharges into the MS4 within Copermittees' jurisdictions.
- Identification of known and suspected controllable sources (e.g., facilities, areas, land uses, pollutant-generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the WMA, sources of transient and persistent flows within the Copermittee's jurisdiction in the WMA that have been reduced or eliminated, and modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in Copermittee inventories.
- Based on the dry weather MS4 outfall discharge field screening monitoring, assessment and reporting of the following:
  - For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identification of the known and suspected sources within the Copermittee's jurisdiction in the WMA that may cause or contribute to the NAL exceedances.
  - Calculations or estimates of the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in the Copermittee's jurisdiction identified as having persistent dry weather flows during the monitoring year.

Each Copermittee is required to conduct field screening to determine which non-storm water MS4 outfall discharges are transient or persistent non-storm water flows. Data collected during dry weather MS4 outfall monitoring are used to prioritize the non-storm water MS4 discharges to be investigated and eliminated.

3.3.1 Illicit Discharge Detection and Elimination Program Data and Assessment

Los Peñasquitos WMA Responsible Agencies implemented IDDE program activities to detect and eliminate illicit discharges and improper disposal of wastes into the MS4. A total of 501 non-storm water discharges were detected during the course of the monitoring year. Illicit discharge investigations included visual observations, additional site visits, field sampling, photo documentation, and follow-up/enforcement activities, as appropriate.

In the course of investigating these non-storm water discharges, 465 non-storm water discharges were eliminated, as shown in Table 3-4. The most common source of non-storm water and illicit discharges is generally irrigation runoff. Other significant sources include groundwater seepages, commercial washing activities, chlorinated pool discharges, and illicit discharges/connections.

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Table 3-4
Dry Weather Discharge Investigations and Discharges Eliminated in the 2015–2016 Monitoring Year

Copermittee	Number of IDDE Investigations Initiated	Number of Sources of Non-Storm Water Discharges Identified	Number of Non-Storm Water Discharges Eliminated	Number of Sources of Illicit Discharges or Connections Identified	Number of Illicit Discharges or Connections Eliminated
City of San Diego	518	442	434	437	429
City of Del Mar	5	5	5	2	2
City of Poway	63	53	25	49	25
County of San Diego	3	1	1	0	0
Total	**589**	**501**	**465**	**488**	**456**

IDDE = illicit discharge detection and elimination

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3.3.2 Classification of Major MS4 Outfalls Within each Copermittee's Jurisdiction

To address the MS4 Permit requirements, Responsible Agencies determined the number of major MS4 outfalls within their jurisdictions within the WMA. Table 3-5 provides the number of major outfalls for each Responsible Agency. Each major outfall was classified as follows:

- Persistent – having flowing, pooled, or ponded water more than 72 hours after a measureable rainfall event of 0.1 inch or greater during the three consecutive most recent monitoring and/or inspection events;
- Transient – having flowing, pooled, or ponded water during at least one but not on all three most recent consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation ≥0.1 inch;
- Tidal – having persistent or transient flow with ocean tides as the source;
- Dry – having no flowing, pooled, or ponded water during the previous three consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation ≥0.1 inch; and
- Unknown – site cannot be evaluated, or has not been visited enough times to determine flow status.

In the Los Peñasquitos WMA, 39% of the major outfalls were classified as persistently flowing outfalls. Table 3-6 and Figure 3-1 presents percentages of all classifications of major outfalls in the 2015–2016 monitoring year. No outfalls were classified as tidal during the monitoring period.

Table 3-5
Number of Major Outfalls in Los Peñasquitos WMA

Copermittee	Total Number of Major Outfalls	Number of Major Outfall Stations Visited	Number of Major Outfall Visual Observations	HA Name	HA Number	Number of Major Outfalls per HA
City of San Diego[1]	200	200[3]	205[4]	Miramar Reservoir	906.1	162
				Poway	906.2	38
City of Del Mar[2]	1	1	15	Miramar Reservoir	906.1	1
City of Poway[2]	32	32	53	Poway	906.2	32
County of San Diego[5]	0	NA	NA	NA	NA	NA
Total	**233**	**233**	**273**			

1. The City of San Diego has 502 outfalls within the City jurisdiction. The City of San Diego, in accordance with Provision D.2.a(2).(a).(iv) of the MS4 Permit, is required to screen 500 sites city wide once per year. The City is not required to screen 500 sites within each watershed.
2. For Responsible Agencies with fewer than 125 major outfalls in the WMA, 80% of total major outfalls presented in the table must be screened twice per year.
3. Proxy sites were visited for 109 major outfalls. Proxy sites were visited when field crews were unable to access the outfall.
4. Observations of multiple upstream proxy sites for the same outfall counted as a single observation if they occurred on the same day.
5. County of San Diego has no major MS4 outfalls in the Los Peñasquitos WMA.

HA = hydrologic area; NA = not applicable

Table 3-6
2015–2016 Flow Classification of Major Outfalls in the Los Peñasquitos WMA

Copermittee	HA Number	Persistent	Transient	Dry	Unknown
City of San Diego	906.1	66	51	43	2
	906.2	15	11	10	2
	Jurisdictional Total	81	62	53	4
City of Del Mar	906.1	1	0	0	0
City of Poway	906.2	9	8	15	0
County of San Diego	Not Applicable. No major MS4 outfalls.				
WMA Total		**91**	**70**	**68**	**4**

HA = hydrologic area; MS4 = municipal separate storm sewer system; WMA = Watershed Management Area

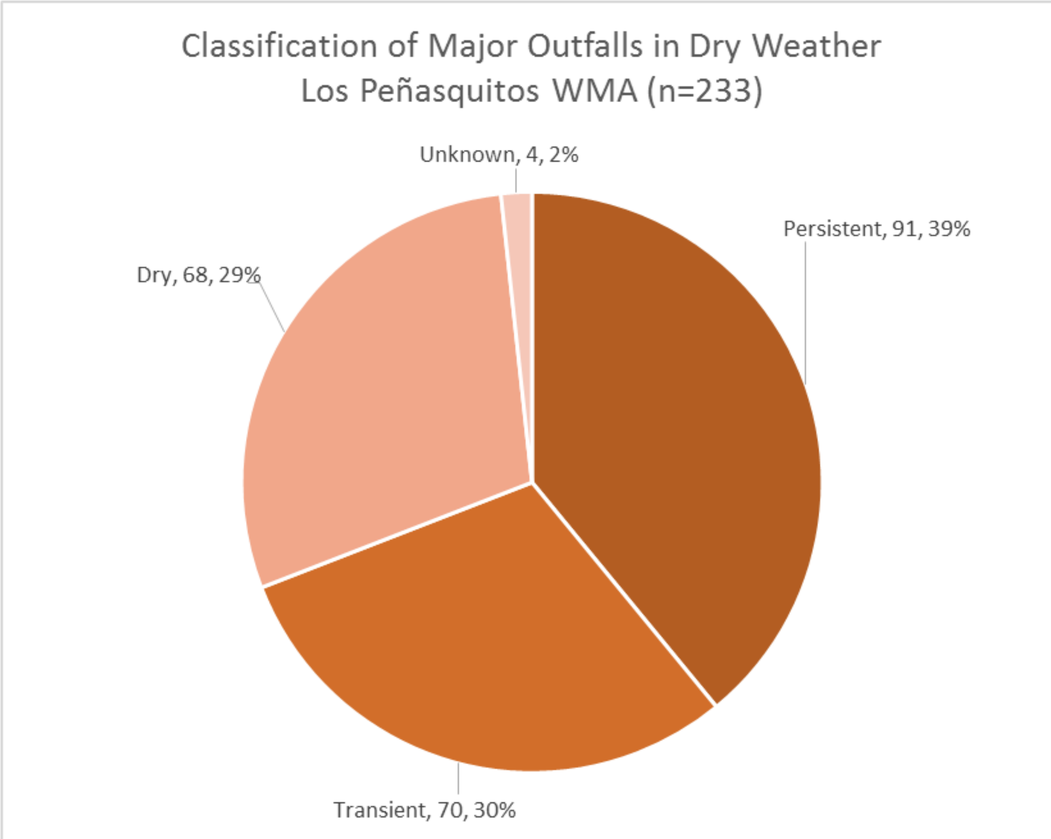

Figure 3-1
Classification of Major Outfalls in Los Peñasquitos WMA

3.3.3 Visual Observations at Major MS4 Outfalls

MS4 outfall visual assessments were performed as required by Table D-5 of the MS4 Permit. Table 3-7 presents the results of visual assessments with regard to trash, including whether trash was observed during each visual observation event, and, if so, the approximate number of pieces of trash. During the 2015–2016 monitoring year, greater than 99% of visual observations indicated no or low (<50 pieces) presence of trash. Additional visual observations are provided in Attachment D.2.

Table 3-7
Trash Assessment Visual Observations in the 2015–2016 Monitoring Year

Copermittee	HA	Number of Major Outfall Visual Observations with Trash Assessments[1]	Number of Observations with No Trash Present	Number of Observations with Trash Present		
				Low (<50 pieces)	Medium (50 to 400 pieces)	High (>400 pieces)
City of San Diego[2]	906.1	180	93	86	1	0
	906.2	41	29	12	0	0
Subtotal		**221**	**122**	**98**	**1**	**0**
City of Del Mar	906.1	15	10	5	0	0
Subtotal		**15**	**10**	**5**	**0**	**0**
City of Poway	906.2	53	30	23	0	0
Subtotal		**53**	**30**	**23**	**0**	**0**
Total		**289**	**162**	**126**	**1**	**0**

1. Trash assessments not conducted for all visual observations. Values in this column may not match total numbers of visual observations in Table 3-5.
2. Trash assessments include observations at multiple upstream proxy sites representing a single outfall. The number of trash assessments is greater than the number of visual observations listed in Table 3-5.

HA = hydrologic area

3.3.4 Controllable and Non-Controllable Sources of Flow

The MS4 Permit requires classification of sources of observed flowing or ponded water in dry weather. Known, controllable sources, such as irrigation runoff and commercial washing activities, were identified by observation. Other suspected sources of flow were noted and may have included pool/spa leaks or overflows. Non-controllable sources were also identified during dry weather visual observations and included mostly groundwater seepage. Unidentified sources of flow were also noted during dry weather visual observations. Tables 3-8 and 3-9 present results of visual observation identifications of controllable and non-controllable sources, respectively, made in the 2015–2016 monitoring year.

Table 3-8
Controllable Sources of Flow Observed in the 2015–2016 Monitoring Year

Copermittee	Number of Flowing or Ponded Observations at Major Outfall[1]	Known Controllable Sources		Suspected Controllable Sources	
		Irrigation Runoff	Other Discharges	Irrigation Runoff	Other Discharges
City of San Diego	123	9	4[2]	42	1[3]
City of Del Mar	13	Source information collected in IDDE program.			
City of Poway	19	11	0	0	0
Total	**156**	**20**	**4**	**44**	**1**

1. Note that the number of flowing or ponded observations may not be the same as the number of Persistent or Transient outfalls in Table 3-8. Some outfall stations were visited more than once.
2. Two commercial washing activities discharges, one curb cut discharge, and one weephole discharge.
3. Suspected pool/spa chlorinated source

Table 3-9
Non-Controllable Sources of Flow Observed in the 2015–2016 Monitoring Year

Copermittee	Known Uncontrollable Sources	Suspected Uncontrollable Sources
	Groundwater Seepage	Groundwater Seepage
City of San Diego	0	0
City of Del Mar	Source information collected in IDDE program.	
City of Poway	0	9
Total	**0**	**9**

Non-storm water discharges (NSWDs) that have been reduced or eliminated during the 2015–2016 monitoring year have also been identified during the visual observations that were conducted by each Copermittee. Table 3-10 presents the number of discharges eliminated through visual outfall monitoring, including the identified sources of eliminated discharges. Additional runoff sources were eliminated through inspection and enforcement action under the Copermittees' IDDE program, as noted in Section 3.3.1.

Table 3-10
Dry Weather Discharges Eliminated in the 2015–2016 Monitoring Year

Copermittee	Number of Eliminated Discharges	Types of Eliminated Discharges
City of San Diego	2	Commercial Washing Activities and Over-irrigation
City of Del Mar	5	Residential and Commercial
City of Poway	0	-
Total	**2**	-

Per MS4 Permit requirements, Responsible Agencies must identify modifications to the field screening monitoring locations and frequencies for the major MS4 outfalls in their inventories. Table 3-11 summarizes these modifications, based on the findings of visual observations during the 2015–2016 monitoring year.

Table 3-11
Modifications to Dry Weather Field Screening Locations and Frequencies

Copermittee	Number of Outfalls Added to Priority Persistent Flow Outfall List	Number of Outfalls Removed from Priority Persistent Flow Outfall List	Number of Outfalls Added to MS4 Inventory	Number of Outfalls Removed from MS4 Inventory
City of San Diego	5	0	0	0
City of Del Mar	0	0	0	0
City of Poway	0	0	0	4[1]
Total	**5**	**0**	**0**	**4**

1. Four outfalls removed from inventory because additional outfalls were discovered to be located downstream.

3.4 Non-Storm Water Volume and Pollutant Load Assessment

Copermittees must assess the non-storm water volumes and pollutant loads collectively discharged from their jurisdictions in the Los Peñasquitos WMA, per MS4 Permit Provision D.4.b(1)(c). The methodology used to calculate the non-storm water volumes and loads is provided in Attachment D.3.

3.4.1 Identification of Dry Weather Days

The first step in calculating annual non-storm water volumes and pollutant loads is to determine the number of dry weather days in the monitoring year. The number of dry weather days was determined using County of San Diego ALERT station data (https://sandiego.onerain.com). The Poway ALERT station was selected to represent rainfall conditions in the Los Peñasquitos WMA. This representative ALERT station was also utilized in Wet Weather MS4 Outfall Discharge Monitoring Assessments, and is the station closest to a majority of wet weather MS4 outfall discharge monitoring stations.

A wet weather day was defined as any day with at least 0.1 inch of measurable rainfall within a 24-hour period, and the subsequent 72 hours. Dry weather days were defined as all other days during the monitoring year (October 1 through September 30). Table 3-12 presents the number of dry weather days identified in the Los Peñasquitos WMA during the 2015–2016 monitoring season.

Table 3-12
Los Peñasquitos WMA Dry Weather Days by Month

Month	Number of Days	Storm Dates	Number of Storm Days	Number of Storm Days +72 Hours	Number of Dry Days
October 2015	31	October 4-5, 2015	2	5	26
November 2015	30	November 3, 2015	3	12	18
		November 15, 2015			
		November 27, 2015			
December 2015	31	December 11, 2015	6	18	13
		December 13, 2015			
		December 19, 2015			
		December 22-23, 2015			
		December 28, 2015			
January 2016	31	January 5-8, 2016	5	8	23
		January 31, 2016			
February 2016	29	February 17, 2016	1	7	22
March 2016	31	March 5-7, 2016	4	10	21
		March 11, 2016			
April 2016	30	April 7, 2016	2	6	24
		April 9, 2016			
May 2016	31	May 5-6, 2016	2	5	26
June 2016	30	NA	0	0	30
July 2016	31	NA	0	0	31
August 2016	31	NA	0	0	31
September 2016	30	September 20-21, 2016	2	5	25

NA = not applicable, no storms recorded

3.4.2 Non-Storm Water Volume Assessment

An annual non-storm water volume was calculated for each persistently flowing major MS4 outfall in each Copermittee's jurisdiction. The calculation method differed, depending on the availability of flow data for each site. Details of each calculation method are presented in the Dry Weather Assessment Methodology in Attachment D.3.

The methods are summarized as follows:

- Scenario A: If a major MS4 outfall station was visited once during the monitoring year, and a single discrete flow rate was measured, this flow rate was applied across all dry weather days within the year.
- Scenario B: If a major MS4 outfall station was visited more than once during the monitoring year, and more than one discrete flow rate was measured, monthly dry weather flow volumes were calculated. The monthly flow volume calculation method varied on the basis of whether a flow measurement was logged at the outfall during that month. For calendar months in which the outfall was visited one or more times, the mean of the measured flow rates was applied to all dry weather days within the month. For calendar months in which the outfall was not visited, the mean of all flow rates observed at that site during the calendar year was applied.
- Scenario C: If a major MS4 outfall station was monitored continuously for a period of time longer than a day, a measured daily flow volume was calculated for each monitored day. The mean of these daily flow volumes was applied to all non-monitored dry days. This scenario was not encountered during the 2015–2016 monitoring season.
- Scenario D: If a major MS4 outfall station was not visited during the monitoring year, the mean of annual outfall flow volumes for all monitored stations in the jurisdiction in the WMA was applied. This scenario was not encountered during the 2015–2016 monitoring season.

Within all these scenarios, observations of ponding (i.e., evidence of non-storm water in the MS4, with no connectivity to the receiving water) were assigned a flow rate of zero. If a station was observed to be flowing, but no flow rate was recorded, the average non-zero flow rate for that station was applied to that observation. If a station was observed to be flowing, but the flow rate was estimated (e.g., <1 gallon per minute), a value of half the estimated flow rate was applied.

The methodology above assumes that a persistently flowing major MS4 outfall is flowing on 100% of dry weather days. This assumption is highly conservative. Additional limitations to the methodology are listed in Section 3.4.6. Major limitations include assuming that rates of dry weather discharge equal the measured values throughout the entire month or year (depending on the calculation scenario used), as well as assuming that pollutant concentrations can be represented by samples collected just twice per year at five or fewer outfalls per jurisdiction.

Tables 3-13 through 3-15 present the outfalls that were identified as persistently flowing by each Copermittee. The number of visual observations made at these locations during the 2015–2016 monitoring year are also presented, and the numbers of flowing, ponded, and dry observations from these site visits are summarized. Finally, the annual dry weather flow volume modeled from each site is presented, as well as the total dry weather flow volume collectively discharged from persistently flowing sites within each Copermittee's jurisdiction in the WMA.

Note that the County of San Diego has no major MS4 outfalls within the Los Peñasquitos WMA.

Table 3-13
City of Del Mar 2015–2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
S-12	15	11	2	2	48,421
Total					**48,421**

cf = cubic feet; ID = identification

Highest priority persistently flowing outfalls indicated in **bold**.

Table 3-14
City of Poway 2015–2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
278-1749, 2	2	2	0	0	27,913
282-1749, 2	2	2	0	0	262,378
282-1749, 3 (DW Site 2)	2	2	0	0	117,233
282-1749, 4(S)[1]	1	1	0	0	27,913
286-1749, 1[2]	1	1	0	0	245,631
290-1749, 2	1	0	1	0	0
290-1755, 1	1	1	0	0	223,301
294-1749, 2	2	2	0	0	251,213
298-1749, 2	4	4	0	0	34,891
298-1749, 3	2	2	0	0	27,913
298-1749, 5	2	0	2	0	0
Total					**1,218,386**

1. Site removed from outfall inventory. Outfall 282-1749, 3 (DW Site 15) is located downstream.
2. Site removed from outfall inventory. Outfall 282-1749, 6 is located downstream.

cf = cubic feet; ID = identification

Highest priority persistently flowing outfalls indicated in **bold**.

Table 3-15
City of San Diego 2015–2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
DW0017	1	1	0	0	125,048
DW0024	2	2	0	0	1,227,234
DW0025	2	2	0	0	1,388,057
DW0027	1	1	0	0	139,563
DW0034	1	0	1	0	0
DW0036	2	0	2	0	0
DW0037	1	0	1	0	0
DW0247	3	3	0	0	369,710
DW0266	0	1	0	0	51,988
DW0281	0	1	0	0	200,412
DW0308	1	1	0	0	247,864
DW0375	1	1	0	0	350,610
DW0422	1	1	0	0	41,590
DW0426	1	0	1	0	0
DW0428	1	1	0	0	31,318
DW0429	2	2	0	0	54,023
DW0435	1	0	1	0	0
DW0478	1	1	0	0	250,543
DW0481	1	0	1	0	0
DW0554	1	1	0	0	3,342,254
DW0638	1	0	1	0	0
DW0643[1]	0	1	0	0	0
DW0839	1	1	0	0	3,908
DW0884	0	1	0	0	166,917
DW0887	0	1	0	0	501,310
DW0903	0	1	0	0	167,476
DW0910	1	1	0	0	44,102
DW0911	1	0	1	0	0
DW0915	0	0	1	0	0

Table 3-15 (continued)
City of San Diego 2015-2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
DW0923	1	1	0	0	40,194
DW0924[1]	0	1	0	0	0
DW0928	0	1	0	0	125,048
DW0931	1	1	0	0	751,407
DW0932	1	1	0	0	375,703
DW0944	0	1	0	0	4,019,413
DW0945	0	1	0	0	292,524
DW0950	1	1	0	0	332,718
DW0958	0	1	0	0	62,636
DW0959	0	1	0	0	20,097
DW0968	0	1	0	0	125,272
DW0969[1]	0	1	0	0	0
DW0971	1	0	1	0	0
DW0976	0	0	1	0	0
DW0978	0	1	0	0	82,621
DW0981	0	1	0	0	2,079,488
DW0987	0	1	0	0	2,255,337
DW0988[1]	0	1	0	0	0
DW0990	0	1	0	0	751,407
DW1003	1	0	1	0	0
DW1004	1	1	0	0	32,044
DW1005	1	0	1	0	0
DW1006	1	0	1	0	0
DW1007	0	1	0	0	464,801
DW1009	0	1	0	0	2,254,779
DW1011[1]	0	1	0	0	0
DW1016	0	1	0	0	501,310
DW1026	1	1	0	0	375,815
DW1049	1	1	0	0	62,524

Table 3-15 (continued)
City of San Diego 2015-2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
DW1051	0	1	0	0	1,002,062
DW1079	0	1	0	0	753,640
DW1083	0	1	0	0	61,408
DW1084	1	1	0	0	1,507,280
DW1085	1	1	0	0	122,815
DW1086	1	1	0	0	189,806
DW1087	1	1	0	0	61,408
DW1088	1	1	0	0	189,806
DW1091	0	0	1	0	0
DW1092	1	1	0	0	831,795
DW1093	1	1	0	0	1,503,372
DW1094	0	1	0	0	10,607
DW1103	1	1	0	0	83,180
DW1105	1	0	1	0	0
DW1106	0	1	0	0	189,806
DW1107	0	1	0	0	626,359
DW1108	0	1	0	0	1,002,062
DW1114	0	1	0	0	1,879,076
DW1122	0	0	1	0	0
DW1124	0	1	0	0	3,758,151
DW1126	0	1	0	0	2,061,624
DW1128	0	1	0	0	80,388
DW1174	1	0	1	0	0
Total					**39,623,712**

1. Site observed to be flowing, but flow rate too low to calculate.

cf = cubic feet; ID = identification

Highest priority persistently flowing outfalls indicated in **bold**.

3.4.3 Non-Storm Water Load Assessment

The Copermittees estimated the annual non-storm water pollutant loads collectively discharged from their persistently flowing major MS4 outfalls to receiving waters in the MS4.

A load was calculated for each pollutant required to be analyzed at each high priority outfall, based on the arithmetic mean of the analytical results from the two dry weather outfall monitoring events at that outfall during the monitoring year. For each non-high priority persistently flowing outfall in a Copermittee's jurisdiction in the WMA, the mean of that Copermittee's monitored outfall results for each pollutant was applied. For any pollutants not detected at the method detection limit (MDL), a concentration of MDL/2 was applied in calculating the loads. The annual non-storm water pollutant loads collectively discharged from each jurisdiction are presented in Table 3-16. The non-storm water pollutant loads for each persistently flowing major MS4 outfall are presented in Attachment D.4.

Table 3-16
City of San Diego 2015–2016 Dry Weather Persistent Flow Volume

Analyte	**Units**	**Jurisdiction**		
Site ID	-	City of Del Mar	City of Poway	City of San Diego
Annual Flow Volume	cf	48,421	1,218,385	39,623,712
Conventional Parameters				
Hardness (Total)	lb	3,506	59,345	999,747
MBAS	lb	0.1511	6.9919	361.6408
Indicator Bacteria				
Enterococcus	MPN	1.44E+12	1.59E+14	2.05E+15
Fecal Coliform	MPN	4.11E+10	8.62E+14	1.18E+15
Total Coliform	MPN	2.17E+13	2.08E+15	2.09E+17
Total Metals				
Cadmium	lb	0.0003	0.0295	1.4664
Chromium	lb	NR[1]	0.0491	3.3470
Chromium (III)	lb	NR[1]	0.0484	See Dissolved Load[2]
Chromium (VI)	lb	NR[1]	0.0761	See Dissolved Load[2]
Copper	lb	0.0060	0.6053	27.8707
Iron	lb	0.7089	21.5322	1,671.4499
Lead	lb	0.0005	0.0415	2.7210
Manganese	lb	0.1436	2.0384	131.9244
Nickel	lb	NR[1]	0.2089	6.3897
Selenium	lb	0.0242	0.1483	9.9160
Silver	lb	NR[1]	0.0079	3.6610
Zinc	lb	0.0227	3.2945	65.4980

Table 3-16 (continued)
City of San Diego 2015–2016 Dry Weather Persistent Flow Volume

Analyte	Units	Jurisdiction		
Site ID	-	City of Del Mar	City of Poway	City of San Diego
Annual Flow Volume	cf	48,421	1,218,385	39,623,712
Dissolved Metals				
Cadmium	lb	0.0001	0.0137	1.4098
Chromium	lb	NR[1]	0.0133	3.2189
Chromium (III)	lb	NR[1]	0.0102	2.1101
Chromium (VI)	lb	NR[1]	0.0761	0.3469
Copper	lb	0.0017	0.4076	18.2313
Iron	lb	0.0106	1.4431	153.0765
Lead	lb	0.0002	0.0579	2.7210
Manganese	lb	0.0453	1.1696	123.7423
Nickel	lb	NR[1]	0.0887	5.7698
Selenium	lb	0.0212	0.1339	8.6329
Silver	lb	NR[1]	0.0038	3.6610
Zinc	lb	0.0151	2.7266	26.2945
Nutrients				
Ammonia N	lb	0.5441	19.8712	381.6332
Nitrite as N[3]	lb	0.0423	NR	94.5712
Nitrate as N[3]	lb	4.4133	NR	5,006.8413
Nitrate/Nitrite N[3]	lb	4.4436	306.0245	NR
Total Nitrogen	lb	11.7891	777.0844	7,028.1823
TKN	lb	7.4060	471.3990	2,014.2944
Phosphorus, Total	lb	0.2872	37.8723	348.5531
Orthophosphate as P	lb	0.1564	34.9312	191.3866
Solid Parameters				
TDS	lb	10,988	144,613	2,829,040
TSS	lb	97	368	21,347

1. NAL analyte not required for Ocean Receiving Waters.
2. Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
3. Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = not required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; TSS = total suspended solids

3.4.4 Percent Contribution from Known Sources

Table 3-17 summarizes the percentage of non-storm water volume and load contributions from known sources. This value was calculated by dividing the observed flow rate for each known source by the estimated annual outfall flow volume presented in Section 3.4.2. It was assumed that the known source was flowing for the entire day on which the source was observed. Additionally, it was assumed that the percent load contribution is equal to the percent flow contribution for each known source.

Table 3-17
Percent Contribution from Known Sources

Copermittee	Station ID	Observation Date	Known Source	Known Source Flow Rate (cfs)	Known Source Daily Flow Volume (cf)	Annual Outfall Non-Storm Water Flow Volume (cf)	Percent Contribution from Known Source (%)
City of San Diego	DW0024	2/4/2016	Irrigation Runoff	0.09	7,776	1,227,234	0.63%
	DW0025	4/25/2016	Commercial Washing Activities	0.03	2,592	1,388,057	0.19%
	DW0036	8/2/2016	Curb Cut Discharge	0.005	432	0	NA
	DW0375	2/25/2016	Irrigation Runoff	0.014	1,210	350,610	0.35%
	DW0638	12/28/2015	Irrigation Runoff	0	0	0	0%
	DW0887	5/5/2016	Weephole Discharge	0.02	1,728	501,310	0.34%
	DW0928	12/3/2015	Irrigation Runoff	0.005	432	125,048	0.35%
	DW0944	6/14/2016	Irrigation Runoff	0.16	13,824	4,019,413	0.34%
	DW0958	2/25/2016	Irrigation Runoff	0.002	173	62,636	0.28%
	DW0988	3/28/2016	Commercial Washing Activities	0	0	0	0%

Table 3-17 (continued)
Percent Contribution from Known Sources

Copermittee	Station ID	Observation Date	Known Source	Known Source Flow Rate (cfs)	Known Source Daily Flow Volume (cf)	Annual Outfall Non-Storm Water Flow Volume (cf)	Percent Contribution from Known Source (%)
City of San Diego (continued)	DW1003	2/25/2016	Irrigation Runoff	0	0	0	0%
	DW1011	3/28/2016	Irrigation Runoff	0	0	0	0%
	DW1103	1/11/2016	Irrigation Runoff	0.003	259	83,180	0.31%
City of Del Mar	-	-	-	-	-	48,421	-
City of Poway	278-1749, 2	7/22/2016	Irrigation Runoff	< 0.002	86[1]	27,913	0.31%
		8/3/2016	Irrigation Runoff	< 0.002	86[1]		0.31%
	282-1749, 3	7/28/2016	Irrigation Runoff	0.007	605	262,378	0.23%
		8/1/2016	Irrigation Runoff	0.002	172		0.07%
	282-1749, 4(S)	7/25/2016	Irrigation Runoff	< 0.002	86[1]	27,913	0.31%
	290-1755, 1	7/22/2016	Irrigation Runoff	0.009	778	223,301	0.35%
	294-1749, 2	7/21/2016	Irrigation Runoff	0.01	864	251,213	0.34%
		8/1/2016	Irrigation Runoff	0.01	864		0.34%
	298-1749, 2	7/21/2016	Irrigation Runoff	0.002	173	34,891	0.50%
		7/27/2016	Irrigation Runoff	< 0.002	86[1]		0.25%

1. Daily Flow Volume was calculated using a flowrate of 0.001 cfs, half of the reporting limit for the City of Poway.

% = percent; cf = cubic feet; cfs = cubic feet per second; ID = identification; NA = not applicable. Modeled annual flow volume for outfall was 0 cfs.

3.4.5 Percent Contribution from Sources Not Subject to Copermittee Legal Authority

Copermittees did not identify sources not subject to their legal authority within the Los Peñasquitos WMA during dry weather monitoring.

3.4.6 Dry Weather Assessment Methodology Assumptions and Limitations

The calculation of the MS4 Permit-required assessments necessitates a number of assumptions to translate the monitoring data into conclusions regarding flow volume and load for the entire WMA. These assumptions may introduce potential sources of error, while propagating potential errors inherent to the monitoring data. These assumptions and sources of error are as follows:

- Monitoring Error—Annual non-storm water volumes and pollutants loads are based on the results of dry weather visual observations and dry weather outfall monitoring events. Error in the monitoring data could have the effect of propagating error in all subsequent calculations. Potential sources of error in the monitoring data include the following:
  - Monitored Flow Selection—The pollutant loading estimations rely on monitoring data from one or more non-storm water visual observations per major MS4 outfall per year. The 2015–2016 monitoring year is the first year of dry weather flow volume and load calculation, and this period generally has represented a drought condition, which can affect the type and volume of non-storm water sources such as irrigation and ground water. The potential for inter-annual variability is a source of error in both the flow and chemistry data.
  - Flow Measurement Method—The MS4 Outfall Monitoring Plan provides different options to determine the non-storm water volume: (1) field-based estimation methods (e.g., “float method” or “bucket and stopwatch method”), and (2) equipment-based flow measurements. The method chosen varies among outfalls and Copermittees, introducing inter-site variability in volume estimations. The field-based estimation methods introduce potential human error in using stopwatches and error in determining volume amounts in non-graduated buckets. The consistent equipment-based flow monitoring approach is more accurate and precise compared with the field-based estimation methods. However, this approach introduces variability through the flow measurement device and sensor type used to account for site-specific conditions, and can also be cost and time prohibitive across the number of outfalls monitored. Each measurement device and sensor type has an inherent accuracy range (e.g., ±2% accuracy for sub area-velocity [sub-AV] probes). Additionally, each flow measurement device and sensor type can produce slightly different values for the same event, adding inter-site variability.
  - Rainfall Measurement—Accuracy in determining the number of dry days relies on the accuracy of the rainfall measurements representing that outfall. Rainfall measurements were based on the County of San Diego ALERT rain gauge

closest to the majority of wet weather outfalls in each WMA, and not site-specific rainfall data. Rainfall totals across the San Diego area can vary widely within a given storm.

- Chemistry Results—An attempt was made to maintain regional consistency in reporting limits (RLs) and MDLs. However, differences in lab capabilities can sometimes lead to different RLs and MDLs. This variability can introduce error if constituent concentrations are near or below the MDL for one monitoring event or Copermittee, and the MDL differs for another monitoring event or Copermittee. For the assessment calculations, an attempt was made to account for this type of error by assigning a value of MDL/2 to constituents that were not detected.

- Assessment Methodology Error—The assessments require a series of assumptions and extrapolations regarding the determination of annual volumes and pollutant loadings. Each assumption carries the possibility of error, including the following:

  - Annual Volume Estimation Representativeness—Regardless of the flow measurement method utilized, error is introduced when utilizing the median of more than one field measurement to determine an annual volume estimation. It is assumed that these field measurements are representative of “typical” non-storm water conditions because persistently flowing non-storm water flows are relatively consistent through the year. However, this may not be the case, and error could be introduced into these estimations. For example, groundwater base flows can increase during the wet season, increasing dry weather flow rates. Or, alternatively, irrigation and irrigation runoff may increase during the dry season, increasing dry weather flow rates. Unless flow observations are made throughout the year under a variety of conditions, this seasonal variation may not be captured.

  - Annual Volume Estimation Confidence—Based on availability of data, multiple calculation methods are used to estimate annual flow volume. The confidence associated with each estimate varies because different sample sizes are used for each estimate. That is to say, volumes calculated based on continuous flow data are associated with a higher confidence than volumes based on one or two instantaneous flow measurements.

  - Annual Pollutant Load Estimations—The annual volume estimation error introduced previously disseminates into the annual pollutant load estimations through calculations discussed in Section 3.4.2. Although persistent non-storm water flows are relatively consistent throughout the year, collecting two grab samples in one year provides a very brief snapshot in time of the pollutant concentration at an outfall, which may not be indicative of typical conditions or pollutant loadings. Additionally, using an arithmetic mean as a “typical” value of pollutant concentrations to estimate pollutant loads can introduce error if the sample size of the mean is too small, as means are sensitive to sample size.

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4 Wet Weather Outfall Data and Assessments

During the 2015–2016 monitoring season, the first year of wet weather outfall discharge monitoring was conducted in accordance with Provision D.2.c of the MS4 Permit. The goals of wet weather outfall monitoring are the following:

- Identify pollutants in storm water discharges from the MS4;
- Guide pollutant source identification efforts; and
- Determine compliance with the water quality-based effluent limitations (WQBELs) associated with the applicable TMDLs presented in Attachment E of the MS4 Permit.

Wet weather outfall monitoring was initiated following completion and acceptance of the Los Peñasquitos WMA WQIP. This program built upon the transitional wet weather outfall discharge monitoring completed during the 2013–2014 and 2014–2015 monitoring seasons. Details of the monitoring methodology are provided in the Los Peñasquitos WMA MS4 Outfall Monitoring Plan, available on the Project Clean Water website (Project Clean Water, 2016).

This section presents the results of wet weather discharge monitoring in the Los Peñasquitos WMA, as well as the results of the required Storm Water Pollutant Discharges Reduction Assessments (Storm Water Assessments).

4.1 Storm Water Action Level Comparisons

The data collected as part of the wet weather MS4 outfall discharge monitoring were compared with the SALs and HPWQC WQBELs per MS4 Permit Provision D.4.b.(2)(c)(ii). These comparisons are shown in Table 4-1 and Table 4-2, respectively.

One SAL exceedance was recorded for all wet weather MS4 outfall discharge monitoring locations within the Los Peñasquitos WMA. This exceedance was for turbidity at MS4-LPC-1 in the City of Del Mar, with a recorded concentration that was more than four times the SAL value. The City of Del Mar has just begun to implement its WQIP strategies during the 2015–2016 monitoring year and plans to continue implementing the strategies without modification to realize the rewards of these pollutant reduction benefits.

At all 2015–2016 Los Peñasquitos WMA monitoring locations, bacteria concentrations exceeded bacteria WQBELs for wet weather. The WQIP (Los Peñasquitos Responsible Agencies, 2015) outlining the Responsible Agencies' strategies was accepted in fall 2015. The Responsible Agencies have just begun to implement their planned strategies in the 2015–2016 monitoring year and plan to continue to implement them as originally designed.

Table 4-1
MS4 Outfall Storm Water Action Level Comparison

Parameter	SAL	Monitoring Location				
		MS4-LPC-1	MS4-LPC-2	MS4-LPC-3	MS4-LPC-4	MS4-LPC-5
		City of Del Mar	City of Poway	City of Poway	City of Poway	City of San Diego
Total Cadmium	3 µg/L	0.097 J	0.092 J	0.13	0.10	0.53
Total Copper	127 µg/L	89	20	35	22	28
Total Lead	250 µg/L	6.4	2.4	1.7	4.5	1.1
Nitrate + Nitrite as N	2600 µg/L	1800	1700	1700	980	2500
Total Phosphorous	1.46 mg/L	0.54	0.27	0.58	0.42	0.64
Total Zinc	976 µg/L	110	140	130	72	130
Turbidity	126 NTU	**546**	9.7	9.25	10.6	42

µg/L = micrograms per liter; J = estimate; mg/L = milligrams per liter; N = nitrogen; NTU = nephelometric turbidity unit; SAL = storm water action level

Bold value = exceedance of SAL

Table 4-2
MS4 Outfall Water Quality-Based Effluent Limitations Comparison

Parameter	WQBEL	Monitoring Location				
		MS4-LPC-1	MS4-LPC-2	MS4-LPC-3	MS4-LPC-4	MS4-LPC-5
		City of Del Mar	City of Poway	City of Poway	City of Poway	City of San Diego
Enterococcus	61(104*) MPN/100mL	**42,000**	**8,164**	**3,873**	**26,030**	**34,000**
Total Coliforms	10,000 MPN/100mL	**60,000**	**17,000**	**33,000**	**1,600,000**	**280,000**
Fecal Coliforms	400 MPN/100mL	**2,000**	**11,000**	**11,000**	**1,600,000**	**7,200**

MPN/100mL = most probable number per 100 milliliters; WQBEL = water quality-based effluent limitation

Bold value = exceedance of WQBEL; *= A single-sample maximum of 104 MPN/100mL may be applied as a receiving water limitation for creeks designated as “moderately or slightly used” or less frequent usage in the Basin Plan.

4.2 Wet Weather Outfall Monitoring

4.2.1 Wet Weather Outfall Monitoring Locations

Responsible Agencies selected wet weather MS4 outfall discharge monitoring locations from their inventories developed pursuant to Provision D.2.a.(3)(a)(i) of the MS4 Permit for the Los Peñasquitos WMA. These locations were compliant with the MS4 Permit requirements for wet weather outfall site selection, namely:

- ❖ At least five wet weather MS4 outfall discharge monitoring locations that are representative of storm water discharges from areas consisting primarily of residential, commercial, industrial, and typical mixed-use land uses present within the Los Peñasquitos WMA; and
- ❖ At least one wet weather MS4 outfall discharge monitoring location for each Responsible Agency within the Los Peñasquitos WMA.

The five stations monitored during the 2015–2016 monitoring season are presented in Table 4-3. Each wet weather MS4 outfall discharge monitoring location in the Los Peñasquitos WMA was sampled once during the 2015–2016 monitoring season. All five stations were also monitored during the 2014–2015 monitoring season (second transitional monitoring season). Two of the five stations were also monitored during the 2013–2014 monitoring season (first transitional monitoring season). The MS4 outfall stations that changed during the second transitional year were MS4-LPC-3 and MS4-LPC-4 in the City of Poway, and MS4-LPC-5 in the City of San Diego. The outfall monitoring locations and their associated drainage areas are shown in Figure 4-1. Land use types within the drainage area for each location are described in Table 4-5. The representativeness of the outfall drainage areas, relative to the WMA as a whole, is discussed in Section 4.4.

Table 4-3
2015–2016 Los Peñasquitos WMA Wet Weather Outfall Monitoring Locations

Monitoring Location	Responsible Agency	Jurisdictional Identifier	Latitude	Longitude	HA Name	HA Number
MS4-LPC-1	City of Del Mar	S-01	32.93964	-117.25947	Miramar Reservoir	906.1
MS4-LPC-2	City of Poway	286-1755, 1	32.95403	-117.04097	Poway	906.2
MS4-LPC-3[1]	City of Poway	286-1755, 3	32.95467	-117.04841	Poway	906.2
MS4-LPC-4[1]	City of Poway	290-1755, 2	32.96929	-117.03764	Poway	906.2
MS4-LPC-5[2]	City of San Diego	DW839	32.89915	-117.11371	Miramar Reservoir	906.1

1. City of Poway monitoring locations MS4-LPC-3 and MS4-LPC-4 were relocated between the 2013–2014 and 2014–2015 monitoring years. The Jurisdictional Identifiers of the previous monitoring locations are 298-1761, 1 and 286-1767, 1, respectively.
2. City of San Diego monitoring location MS4-LPC-5 was relocated between the 2013-2014 and 2014-2015 monitoring years. The Jurisdictional Identifier of the previous monitoring location is DW289.

HA = hydrologic area

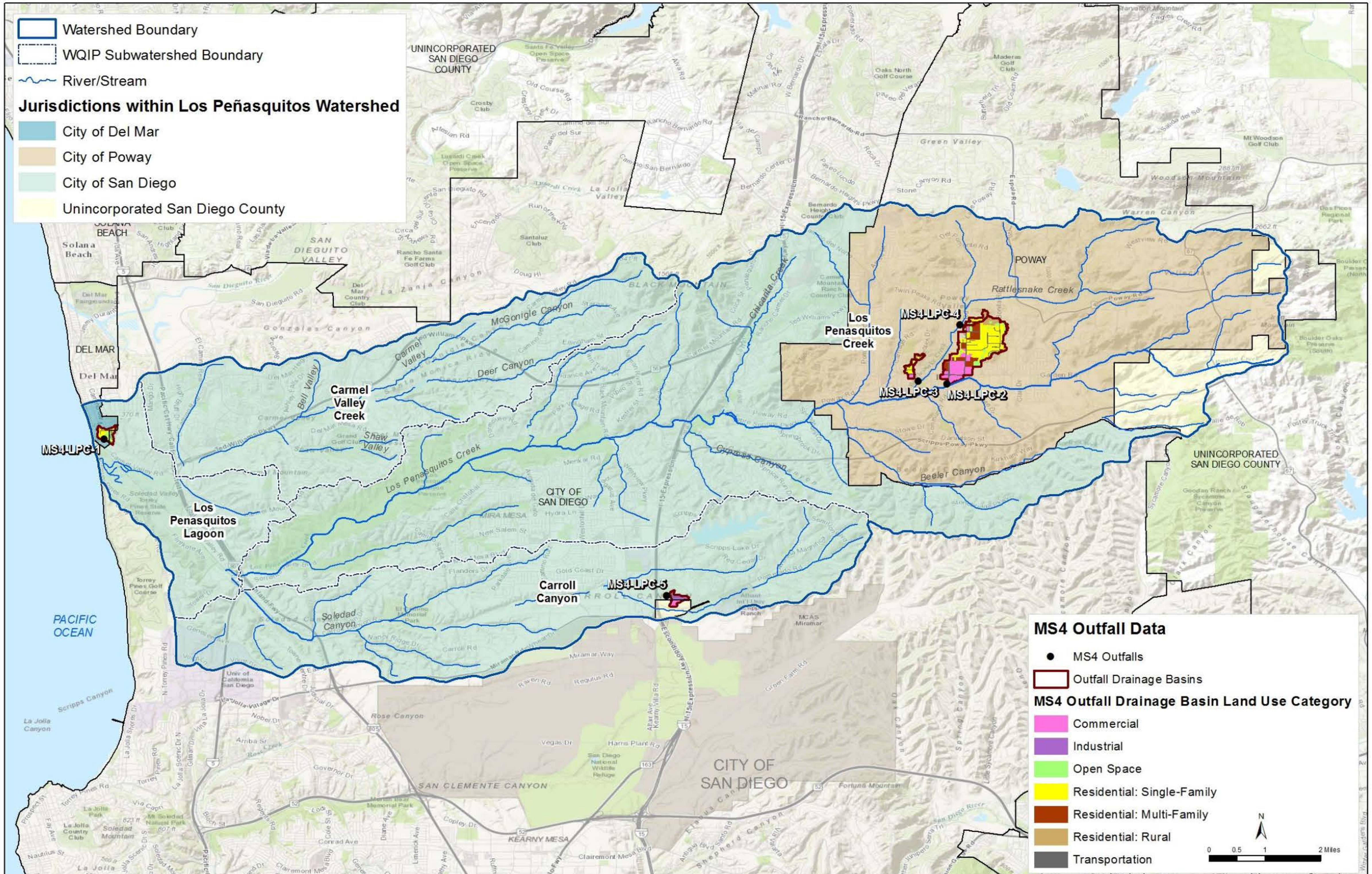

Figure 4-1
Los Peñasquitos WMA Outfall Monitoring Locations

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4.2.2 Wet Weather Outfall Monitoring Event Field Observations

The Los Peñasquitos WMA wet weather outfall locations were monitored during the wet season (i.e., October 1, 2015, through April 30, 2016), across two storm events on January 31, 2016, and March 6, 2016. Each location was monitored once.

During the wet weather monitoring event, narrative descriptions and field observations were recorded at each MS4 outfall discharge monitoring location. Flow was measured using a Hach Sigma 950 flow meter with a sub-AV probe in accordance with the United States Environmental Protection Agency (USEPA) Storm Water Sampling Guidance Document (EPA-833-B-92-001), as described in the Los Peñasquitos WMA MS4 Outfall Monitoring Plan. Rainfall statistics for each monitored event were based on a nearby San Diego County Flood Control District ALERT station. The closest ALERT station to each monitoring location was selected.

Details, including date and duration of the storm events sampled, rainfall estimates of the storm event, and duration between the storm event sampled and the end of the previous measurable storm event with over 0.1 inch of rainfall, are presented in Table 4-4. Hydrographs for each monitored event, displaying event flows and rainfall amounts, are presented in Attachment F.1.

Table 4-4
2015–2016 Los Peñasquitos WMA Wet Weather Outfall Monitoring Event Field Observations

Monitoring Location	Storm Event Date	ALERT Station	Storm Duration (hours)	Rainfall Depth (inches)	Rainfall Intensity (inches/ hour)	Antecedent Dry Days	Flow Volume (cf)
MS4-LPC-1	1/30/2016	Encinitas	19.3	0.54	0.02803	22	12,137
MS4-LPC-2	3/5/2016	Poway	3.3	0.24	0.07347	15	83,929
MS4-LPC-3	3/5/2016	Poway	3.3	0.24	0.07347	15	24,985
MS4-LPC-4	3/5/2016	Poway	3.3	0.24	0.07347	15	30,458
MS4-LPC-5	1/30/2016	Miramar Lake	24.5	0.75	0.03055	21	50,407

cf=cubic feet

4.2.3 Wet Weather Outfall Monitoring Event Analytical Results

During each wet weather event, samples were collected according to the procedures described in the Los Peñasquitos WMA MS4 Outfall Monitoring Plan.

Grab samples were collected for bacterial indicators and receiving water hardness. The grab samples were collected after the second hour of storm water runoff and before the sixth hour of storm water runoff. If the storm duration was less than two hours, the grab samples were collected as close to the peak flow as possible. A time-weighted composite sample was collected for all other analytes. All samples were collected in accordance with Surface Water Ambient Monitoring Program (SWAMP) protocols and following the quality assurance and quality control procedures outlined in the Los Peñasquitos WMA MS4 Outfall Monitoring Plan.

In situ turbidity measurements were collected using a LaMotte 2020 Portable Turbidity Meter. All other field measurements were collected using YSI Pro Plus Quatro field meter.

The required analyses were based upon the following four groupings of constituents, per Provision D.2.c(5)(f) of the MS4 Permit:

- ❖ Constituents contributing to the HPWQCs identified in the Los Peñasquitos WMA WQIP;
- ❖ Constituents listed as a cause for impairment of receiving waters in the Los Peñasquitos WMA, as listed on the 2010 CWA 303(d) List;
- ❖ Constituents for implementation plans or load reduction plans (e.g., Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for the Los Peñasquitos WMA where the Responsible Agencies are listed as responsible parties under the TMDLs in Attachment E of the MS4 Permit; and
- ❖ Applicable SAL constituents listed in Provision C.2 of the MS4 Permit.

Receiving water hardness samples were collected for each wet weather outfall station discharging to a fresh water receiving water. The receiving water hardness results were used to evaluate compliance with the USEPA one-hour maximum concentration criteria for metals, in the case of any SAL exceedances. Receiving water hardness samples were not collected for wet weather outfalls discharging to an ocean receiving water, or to a bay or estuary.

The 2015–2016 monitoring year wet weather outfall analytical results for the Los Peñasquitos WMA are presented in tabular form in Attachment F.2. Attachment E includes a QA/QC summary of the wet weather outfall data collected.

4.3 Volumes and Loads of Storm Water Discharges

Per Provision D.4.b.(2)(b)(i) of the MS4 Permit, the Responsible Agencies are required to use a watershed model or other method to calculate the following:

1. The average storm water runoff coefficient for each land use type within the WMA;
2. The volumes of storm water and pollutant loads discharged from the monitored MS4 outfalls in the jurisdiction of each Responsible Agency to receiving waters within the WMA for each storm event with measurable rainfall greater than 0.1 inch;

3. The total flow volumes and pollutant loadings discharged from the jurisdiction of each Responsible Agency within the WMA over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and
4. The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea to receiving waters or within each jurisdiction of within the WMA for each storm event with measurable rainfall greater than 0.1 inch.

The following sections present the results of these assessments. The methodology used follows the methodology presented in the Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan (San Diego County Regional Copermittees, 2015). Changes from the transitional methodology are noted below. The methodology is presented in Attachment F.3. Complete tables of storm water volumes and pollutant loads are in Attachment F.4.

Calculation of the MS4 Permit-required assessments necessitates a number of assumptions to extrapolate the available monitoring data into watershed-wide estimates of discharge volumes and pollutant loads. These extrapolations introduce potential sources of error in addition to error sources inherent to the monitoring data. A summary of these assumptions and sources of error follows:

- Potential Sources of Error Inherent to Monitoring—Runoff coefficients and pollutant loads are based on the results of wet weather outfall monitoring events. Error in the monitoring data could have the effect of propagating error in all subsequent calculations. Potential sources of error in the monitoring data include the following:
  - *Monitored Storm Selection*—The calculation relies on monitoring data from one storm event per year. Although a range of storm conditions have been targeted over the period of monitoring (2013–2016), this period generally has represented drought conditions. Inter-annual variability in storm duration, intensity, and rainfall depth can be a source of error in both the flow and chemistry data.
  - *Drainage Area Delineation*—The accuracy of the observed outfall runoff coefficient calculation relies on the accuracy of the drainage area delineation for that outfall. Drainage area delineations were based on the most recent jurisdictional delineation. Delineations were based on desktop analysis, and accuracy of the delineations is dependent on the geographic information system (GIS) data layers used.
  - *Flow Measurement Method*—A consistent flow monitoring approach is described in the Monitoring Plan. However, this approach allows for variability in the flow measurement device and sensor type used to account for site-specific conditions. Each measurement device and sensor type has an inherent accuracy range (e.g., ±2% accuracy for sub-AV probes). Additionally, each flow

measurement device and sensor type can produce slightly different values for the same event, adding a layer of inter-site variability.

- *Rainfall Measurement*—The accuracy of the observed outfall runoff coefficient calculation relies on the accuracy of the rainfall measurement for that event at that outfall. Rainfall measurements were based on the nearest County of San Diego ALERT rain gauge to each outfall and not site-specific rainfall data. Rainfall totals across the San Diego area can vary widely within a given storm.

- *Chemistry Results*—An attempt was made to maintain consistent RLs and MDLs across the monitoring seasons. However, differences in lab capabilities can sometimes lead to different RLs and MDLs. This variability can introduce error if constituent concentrations are near or below the MDL one monitoring year, and the MDL changes. For the assessment calculations, an attempt was made to account for this type of error by assigning a value of MDL/2 to constituents that were not detected.

- Potential Sources of Error Inherent to the Assessment Methodology—The assessments require a series of assumptions and extrapolations regarding land-use-based runoff coefficients and pollutant concentrations. Each assumption carries the possibility of error, including the following:

  - *Observed Outfall Runoff Coefficient Calculation*—Total rainfall of a monitored storm event, not accounting for rainfall intensity or duration, is considered in these calculations. Storms of higher intensity generally produce more runoff for a given rainfall amount than storms of lower intensity. Therefore, a storm with an equal total rainfall but a higher intensity than another storm would be expected to exhibit a higher runoff volume or flow rate.

  - *Outfall Drainage Area Land Use Representativeness*—While an attempt has been made to select monitoring locations with drainage areas of one primary land use type, the reality of storm water drainage systems in urban and suburban areas means that most monitoring locations are a mixture of multiple land use categories. To calculate the runoff coefficient from each land use category, the observed runoff coefficient is compared with standard values calculated using the San Diego County Hydrology Manual (County of San Diego, 2003). A correction factor based on the ratio of the observed runoff coefficient to the calculated runoff coefficient is then applied to each land use category to derive land use runoff coefficients.

  - *WMA Land Use Representativeness*—Not all land use categories within the WMA are represented by the monitored outfall drainage areas. Therefore, the pollutant EMCs and runoff coefficient for one land use are sometimes substituted for another land use. For example, open space pollutant concentrations and runoff coefficients may be used as a proxy for agriculture land use values, in the absence of monitoring data from agricultural land uses. These proxies are summarized in Table 4-5.

- *Land Use EMC Assumptions*—Apportioning pollutant loads to each land use type requires an assumption of pollutant concentrations that are "typical" of each land use category. To calculate a pollutant concentration from each land use category, the observed pollutant concentrations are compared with typical (arithmetic mean) values calculated on the basis of land use studies in the Los Angeles and San Diego areas (see Attachment F.3). A correction factor based on the ratio of the observed pollutant concentration to the calculated typical pollutant concentration is then applied to each land use category to derive land use concentrations. Using an arithmetic mean as a "typical" value can introduce error if the sample size of the mean is too small, because means are sensitive to sample size. However, literature values did not exist for all pollutants analyzed, and therefore an additional assumption is made that similar pollutants have similar land-use-based concentrations For example, it is assumed that ratios of other dissolved metals concentrations from the analyzed land use categories follow the ratios of dissolved copper concentrations from those land use categories. This assumes that all dissolved metals behave similarly to dissolved copper, which is not necessarily the case. The full list of assumptions is provided in Attachment F.3.
- *Variability of Standard Runoff Coefficient and Pollutant Concentration Values*—The mean standard runoff coefficients and pollutant concentrations are used in the assessments. In reality, there is a range associated with the real-world land use runoff conditions for both runoff coefficients and pollutant concentrations. For example, land use runoff pollutant concentrations can vary on the basis of socioeconomic factors across a single land use category. The 2015 City of San Diego trash study found that median income of people living in a given drainage area affected trash assessment results at the corresponding outfall. It is possible a similar pattern could be seen for other pollutants (City of San Diego, 2015).

4.3.1 Land Use Storm Water Runoff Coefficient (D.4.b.(2)(b)(i)[a])

The average storm water runoff coefficient ("C") was calculated for each land use type in the WMA, based on data collected through three seasons of wet weather MS4 outfall monitoring (2013–2014, 2014–2015, and 2015–2016). This calculation is based on the measured flow and rainfall values for each monitored outfall (Table 4-2), along with the outfall drainage area characteristics. The quantity (area and percentage) of each land use type by outfall drainage area is presented in Table 4-5. Agriculture and Open Space land uses are subdivided by hydrologic soil group (A, B, C, or D).

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Table 4-5
2015–2016 Los Peñasquitos WMA Wet Weather Outfall Monitoring Stations – Drainage Area Land Use

Land Use Category	Los Peñasquitos WMA									
	MS4-LPC-1		MS4-LPC-2		MS4-LPC-3		MS4-LPC-4		MS4-LPC-5	
	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%
Agriculture-A	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture-B	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture-C	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture-D	0	0%	0	0%	0	0%	0	0%	0	0%
Commercial	0.30	1%	80.40	20%	4.13	14%	0.40	2%	10.70	41%
Educational	0	0%	8.73	2%	0	0%	0	0%	0	0%
Industrial	0	0%	0.25	0%	0	0%	0	0%	12.46	47%
Mixed Use	0	0%	0	0%	0	0%	0	0%	0	0%
Open Space-A	0.58	2%	0	0%	0	0%	0	0%	0	0%
Open Space-B	0.17	0%	2.70	1%	0	0%	0	0%	0	0%
Open Space-C	0	0%	3.53	1%	0	0%	0.01	0%	0	0%
Open Space-D	7.14	19%	21.45	5%	1.95	7%	2.96	13%	0	0%
Residential: Multi Family	0	0%	55.75	14%	0	0%	2.02	9%	0	0%
Residential: Rural	0	0%	19.65	5%	0	0%	7.12	31%	0	0%
Residential: Single Family	21.28	58%	164.38	41%	17.22	59%	7.77	33%	0	0%
Transportation	7.29	20%	43.30	11%	5.80	20%	2.96	13%	3.23	12%
Water[1]	0	0%	0	0%	0	0%	0	0%	0	0%
TOTAL	36.76	100%	400.12	100%	29.10	100%	23.23	100%	26.38	100%

1. Water land use excluded from MS4 outfall assessments. Water land use assumed to be a sink for runoff storage.

% = percent; WMA = Watershed Management Area

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The observed "C" was calculated for each outfall, based on the monitored event characteristics (event flow, event rainfall, and outfall drainage area). For outfalls that were monitored for more than one monitoring season, the Runoff "C" is averaged across all years of monitoring at that outfall. This value was compared with the expected "C" for each outfall, based on runoff coefficients listed in the San Diego County Hydrology Manual (County of San Diego, 2003) The current observed "C" value for each outfall, as well as the expected "C" for each outfall, is presented in Table 4-6.

Table 4-6
2015–2016 Los Peñasquitos WMA Observed vs. Expected Outfall Runoff Coefficients

Monitoring Location	Observed "C"	Hydrology Manual "C"
MS4-LPC-1	0.14	0.50
MS4-LPC-2	0.20	0.58
MS4-LPC-3	0.63	0.57
MS4-LPC-4	0.92	0.49
MS4-LPC-5	0.48	0.83

The WMA "C" for each land use was calculated using an area-weighted average of all monitored event "C" values for the monitored wet weather outfalls. To improve the accuracy of the calculation over time, historical (2013–2015) and current (2015–2016) WMA land use "C" values were included in the calculation. The historical and 2015–2016 WMA "C" values for each land use are presented in Table 4-7.

Table 4-7
Current and Historical Los Peñasquitos WMA Calculated Land Use Runoff Coefficients

Land Use Category	2013-2014 "C"	2014-2015 "C"	2015–2016 "C"
Agriculture-A[1,2]	0.058	0.051	0.053
Agriculture-B[1,2]	0.053	0.053	0.056
Agriculture-C[1,2]	0.052	0.053	0.060
Agriculture-D[1,2]	0.064	0.070	0.090
Commercial	0.263	0.226	0.263
Educational	0.347	0.283	0.265
Industrial	0.068	0.250	0.359
Mixed Use[3]	--	--	--
Open Space-A[2,4]	0.058	0.051	0.053
Open Space-B[2]	0.053	0.053	0.056
Open Space-C[2]	0.052	0.053	0.060
Open Space-D[2]	0.064	0.070	0.090
Residential: Multi Family	0.193	0.162	0.188
Residential: Rural	0.039	0.050	0.077
Residential: Single Family	0.142	0.135	0.157
Transportation	0.266	0.235	0.266

1. Because of limited WMA monitoring data for agriculture land use, "C" and event mean concentration (EMC) values are based on Los Peñasquitos WMA monitored outfalls data for Open Space with corresponding soil type land use type.
2. Agriculture and Open Space land use types were divided into subgroups based on hydrologic soil type. See http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ny/soils/?cid=nrcs144p2_027279 for more information on hydrologic soil types.
3. "C" and EMC values not calculated. Mixed Use land use represents less than 1 acre of area within the Los Peñasquitos WMA.
4. Open Space-A land use, "C," and EMC values are based on Los Peñasquitos WMA monitored outfalls data for Open Space-B land use type.

4.3.2 Monitored MS4 Outfall Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[b])

The volume of storm water and pollutant loads discharged from the MS4 outfalls to receiving waters in the jurisdictions within the WMA was calculated for each storm event with measurable rainfall greater than 0.1 inch. The wet season rainfall data for the ALERT rain gauge closest to each monitoring location were used to calculate the qualifying measured rainfall for each site. Table 4-8 presents the annual wet season storm water volume and pollutant load discharged from each outfall.

Table 4-8
Los Peñasquitos WMA Wet Season Flow Volume and Pollutant Loads by Drainage Area 2015–2016

Analyte	Units	MS4-LPC-1	MS4-LPC-2	MS4-LPC-3	MS4-LPC-4	MS4-LPC-5
Qualifying Measured Rainfall	in	6.92	12.49	12.49	12.49	11.39
Wet Season Flow Volume	cf	132,182	3,650,981	832,507	966,854	527,298
Indicator Bacteria						
Enterococcus	MPN	1.57E+14	8.44E+14	9.13E+13	7.13E+14	5.08E+14
Fecal Coliform	MPN	7.49E+12	1.14E+15	2.59E+14	4.38E+16	1.08E+14
Total Coliform	MPN	2.25E+14	1.76E+15	7.78E+14	4.38E+16	4.18E+15
Total Metals						
Total Cadmium	lb	0.0008	0.0210	0.0068	0.0060	0.0174
Total Copper	lb	0.7344	4.5585	1.8190	1.3279	0.9217
Total Lead	lb	0.0528	0.5470	0.0884	0.2716	0.0362
Total Selenium	lb	0.0021	0.0707	0.0192	0.0115	0.0494
Total Zinc	lb	0.9077	31.9095	6.7564	4.3459	4.2794
Dissolved Metals						
Dissolved Selenium	lb	0.0014	0.0023	0.0025	0.0006	0.0116
Nutrients						
Ammonia	lb	2.8882	59.2604	40.5382	22.3329	2.6005
Nitrate as N	lb	14.0282	364.6795	77.9580	53.1160	75.7122
Nitrite as N	lb	0.2723	11.6242	9.8747	6.0359	5.5961
TKN	lb	18.1542	455.8494	291.0432	126.7541	954.6316
Total Nitrogen	lb	32.1824	820.5289	379.3957	187.1132	1,020.4682
Total Phosphorus as P	lb	4.4560	61.5397	30.1438	25.3508	21.0677
Solid Parameters						
TSS	lb	908	5,470	1,143	7,847	1,876
TDS	lb	1,898	50,143	18,190	4,225	30,943

cf = cubic feet; in = inches; lb = pounds; MPN = most probable number; N = nitrogen; P = phosphorus;
TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; TSS = total suspended solids

4.3.3 Jurisdictional Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[c])

The volume of storm water and pollutant loads discharged from the jurisdictions of Responsible Agencies within the WMA over the course of the wet season was calculated for each storm event with measurable rainfall greater than 0.1 inch. The wet season rainfall data for the ALERT rain gauge closest that most represented the WMA were used. Because the Los Peñasquitos WMA contains more than one ALERT rain gauge, data from the Poway rain gauge were used, because this station was closest to a majority of the wet season MS4 outfall monitoring stations. Table 4-9 presents the annual wet season storm water volume and pollutant load discharged from the jurisdictions of Responsible Agencies in the Los Peñasquitos WMA.

Table 4-9
Los Peñasquitos WMA Wet Season Flow Volume and Pollutant Loads by Jurisdictional Area 2015–2016

Analyte	Units	City of Del Mar	City of Poway	City of San Diego	County of San Diego
Qualifying Measured Rainfall	in	12.49[1]	12.49	12.49[1]	12.49
Wet Season Flow Volume	cf	217,496	93,713,770	299,584,222	7,344,905
Indicator Bacteria					
Enterococcus	MPN	2.94E+14	7.35E+16	2.35E+17	2.68E+15
Fecal Coliform	MPN	8.04E+14	1.82E+17	4.68E+17	8.26E+15
Total Coliform	MPN	1.12E+15	2.75E+17	7.96E+17	9.99E+15
Total Metals					
Total Cadmium	lb	0.0015	0.8710	3.0370	0.0332
Total Copper	lb	0.4333	138.9753	496.3421	7.3010
Total Lead	lb	0.0334	12.3255	33.9337	0.8745
Total Selenium	lb	0.0104	3.6652	12.3496	0.1865
Total Zinc	lb	1.8433	642.1788	2,437.1346	28.4612
Dissolved Metals					
Dissolved Selenium	lb	0.0101	2.9586	11.6546	0.0763
Nutrients					
Ammonia	lb	8.2695	2,747.0384	9,681.1478	148.0456
Nitrate as N	lb	26.1929	10,341.6817	30,665.6871	790.6406
Nitrite as N	lb	1.3089	536.3859	1,638.9260	37.9328
TKN	lb	45.0288	24,245.4220	85,039.2918	1,090.2261
Total Nitrogen	lb	76.7843	55,336.5705	208,833.9152	1,850.4057
Total Phosphorus as P	lb	6.0673	2,767.2634	7,576.0924	198.5862
Solid Parameters					
TSS	lb	373	447,256	620,050	61,722
TDS	lb	5,084	2,181,985	7,119,814	145,820

1. The qualifying measured rainfall amount used to calculate monitored outfall flow volumes and pollutant loads for the City of Del Mar and City of San Diego outfall monitoring stations (MS4-LPC-1 and MS4-LPC-5, respectively) was less than the rainfall amount used to calculate jurisdictional flow volumes and pollutant loads for these jurisdictions. The rainfall gauge that most represented the WMA as whole was used for WMA and jurisdictional calculations, while the rainfall gauge that most represented each outfall was used for outfall calculations.

cf = cubic feet; in = inches; lb = pounds; MPN = most probable number; N = nitrogen; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; TSS = total suspended solids

4.3.4 Land Use Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[d])

The MS4 Permit requires the percent contribution of storm water and pollutant loads discharged from each land use type within each hydrologic subarea (HSA) with a major MS4 outfall in the jurisdiction of each Responsible Agency in the Los Peñasquitos WMA be calculated. Because there are no HSAs within the Los Peñasquitos WMA, storm water volumes and pollutant loads were calculated on a hydrologic area (HA) level. The wet season rainfall data for the closest ALERT rain gauge that most represented the WMA were used. As in the jurisdictional load calculations described in Section 4.3.3, the Poway ALERT station data were used to calculate the qualifying measured rainfall for the WMA. Tables 4-10 through 4-13 present, by Responsible Agency jurisdiction, the percentage of the wet season storm water volume discharged from each HA with a major outfall in the Los Peñasquitos WMA. The numerator for this calculation is the wet season flow volume from each HA; the denominator is the total jurisdictional wet season flow volume. The percentages of the wet season storm water volume and pollutant loads discharged from each land use type within each HA with a major outfall in the Los Peñasquitos WMA, by Responsible Agency, are presented in Attachment F.4.

Table 4-10
City of Del Mar Percent Contribution of Storm Water Volume, by HA

HA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HA 906.1 – Miramar Reservoir	217,496	100%
Jurisdictional HAs with No Major Outfall	NA	0%
Jurisdictional WMA	**217,496**	**100%**

% = percent; cf = cubic feet; HA = hydrologic area; NA = not applicable; WMA = Watershed Management Area

Table 4-11
City of Poway Percent Contribution of Storm Water Volume, by HA

HA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HA 906.2 - Poway	93,713,770	100%
Jurisdictional HAs with No Major Outfall	NA	0%
Jurisdictional WMA	**93,713,770**	**100%**

% = percent; cf = cubic feet; HA = hydrologic area; NA = not applicable; WMA = Watershed Management Area

Table 4-12
City of San Diego Percent Contribution of Storm Water Volume, by HA

HA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HA 906.1 – Miramar Reservoir	239,254,791	79%
Jurisdictional HA 906.2 - Poway	60,329,430	21%
Jurisdictional HAs with No Major Outfall	NA	0%
Jurisdictional WMA	**299,584,221**	**100%**

% = percent; cf = cubic feet; HA = hydrologic area; NA = not applicable; WMA = Watershed Management Area

Table 4-13
County of San Diego Percent Contribution of Storm Water Volume, by HA

HA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HAs with No Major Outfall[1]	7,344,905	100%
Jurisdictional WMA	**7,344,905**	**100%**

1. The County of San Diego has jurisdictional land area in HAs 906.1, 906.2, and 906.4, but has no major outfalls in those HAs.

% = percent; cf = cubic feet; HA = hydrologic area; NA = not applicable; WMA = Watershed Management Area

4.4 Evaluation of Monitoring Locations and Frequencies

Provision D.4.b.(2)(b)(ii) of the MS4 Permit allows the Responsible Agencies to modify the wet weather MS4 outfall discharge monitoring locations and frequencies to better identify pollutants in storm water discharges from the MS4s in the WMA.

An analysis of wet weather MS4 outfall monitoring locations was performed in the 2014–2015 Transitional Monitoring and Assessment Report for the Los Peñasquitos WMA (TMAR) (San Diego County Municipal Copermittees, 2016). The purpose of the recommendations provided was to accurately quantify the storm water volume and loads from the various land uses in the WMA to improve the effectiveness of MS4 monitoring in meeting the intended MS4 Permit goal. As part of the evaluation of monitoring locations in the TMAR, the WMA land use was compared with the monitored outfall drainage area land uses. The results of this comparison are provided in Table 4-14.

Table 4-14
Land Use Comparison, WMA and Monitored Drainage Areas

Land Use	WMA Area (acres)[1]	WMA Area (%)[1]	Outfalls Area (acres)	Outfalls Area (%)	% Difference
Agricultural (Combined)	940	1.7%	0	0%	-1.7%
Commercial	2,928	5.2%	96	17.3%	12.1%
Educational	1,323	2.4%	9	1.6%	-0.8%
Industrial	4,625	8.3%	13	2.3%	-6.0%
Mixed Use	4	0%	0	0%	0.0%
Open Space (Combined)	23,277	41.7%	40	7.3%	-34.4%
Residential: Multi-Family	1,829	3.3%	58	10.4%	7.1%
Residential: Rural	2,995	5.4%	27	4.8%	-0.6%
Residential: Single-Family	12,057	21.6%	211	37.9%	16.3%
Transportation	5,797	10.4%	63	11.3%	0.9%
Total	**55,775**	**100%**	**517**	**100%**	**-**

1. Acreage excludes state, federal, and tribal lands; Source: San Diego County MS4 Copermittees, 2015

% = percent

Because the wet weather outfall monitoring locations did not change between the 2014–2015 and 2015–2016 monitoring seasons, the conclusions reached in the TMAR remain valid:

- ❖ The wet weather MS4 outfall monitoring locations are, overall, representative of land uses in the WMA.
- ❖ Open space land uses are under-represented in the monitored outfall drainage areas; however, the intention of monitoring is to characterize drainage from the MS4 (i.e., developed land uses).
- ❖ Single-family residential, multi-family residential, and commercial land uses are well represented in the monitored outfall drainage areas.

The evaluation of monitoring frequency includes a comparison of monitored event rainfall conditions with annual rainfall conditions. During the 2015–2016 wet season (October through April), rainfall totals at ALERT station gauges within the Los Peñasquitos WMA ranged from 11.85 inches at the Miramar Lake rain gauge to 12.87 inches at the Poway rain gauge. Both ALERT station gauges within the WMA registered more rainfall during the wet season than the official National Weather Service (NWS) rain gauge at San Diego International Airport – Lindbergh Field (7.42 inches). The storms that occurred generally had totals of less than 1 inch of rainfall, although one very large storm beginning January 4, 2016, produced more than 4 inches of rainfall throughout the WMA. The average wet season storm event rainfall total at the Poway ALERT station rain gauge is 0.83 inch. The rainfall totals for the monitored storm events were less than this average.

It was recommended in the TMAR to target more monitoring events during average (greater than 0.5 inch) and large (greater than 1 inch) storms. The 2015–2016 sampling targeted one smaller (less than 0.5 inch) and one average storm. It is recommended to continue targeting larger storm events during future wet seasons where feasible, to capture a range of data for “C” calculations.

5 Special Study Assessments

Special studies have been selected to further investigate the HPWQCs in the Los Peñasquitos WMA. The special studies have been conducted and are summarized and assessed in this section. Studies included the Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Compliance Monitoring Program and the San Diego Regional Reference Streams and Beaches Studies. The Outfall Repair and Relocation Study is currently being implemented by the City of San Diego.

5.1 Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Study

Prior to adoption of the Sediment TMDL into the MS4 Permit, the City of San Diego developed a special study to assess sediment sources in the subwatersheds of the Los Peñasquitos WMA (referred to as the Watershed Special Study) (Attachment G). Phase I of the Watershed Special Study focused on monitoring sediment discharge in Carroll Canyon Creek and aerial deposition in the subwatershed. Phase I was conducted during FY 15 (July 1, 2014, through June 30, 2015) and is summarized in this report. In the following year (Phase II), the Watershed Special Study was enhanced by including the Carmel Valley Creek and Los Peñasquitos Creek subwatersheds and was designated as the special study for the Los Peñasquitos WMA during FY 16 (July 1, 2015, through June 30, 2016).

The goal of the Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Study was to characterize potential sediment sources contributing to the Lagoon. It was conducted concurrently with the Los Peñasquitos WMA Sediment TMDL Compliance Monitoring Program (Sediment TMDL Monitoring Program), which monitors total sediment loads into the Lagoon from the outlet of each of the three subwatersheds. Both monitoring programs were designed to provide data on SSC during wet weather conditions, estimated sediment loads, and delivery potential within storm flows. The key questions posed by the Special Study include:

- Wet Season Riverine Monitoring
  - What is the sediment concentration at discrete times throughout a wet weather event hydrograph at points throughout the subwatersheds?
  - What are current sediment load estimates at points throughout the subwatersheds? Is there a greater load from a potential source area?
  - What are the relative wet-weather sediment delivery potentials of each creek?
- Dry Weather Aerial Deposition Monitoring
  - What are the aerial contributions of sediment to the subwatersheds within the WMA?
  - Can airborne sediment particles be associated with specific sources or land uses?

- What is the contribution of aerial sediment deposition relative to wet weather suspended sediment loads observed from the subwatersheds?

5.1.1 Monitoring Overview

Monitoring for Phase II of the special study took place prior to and during the October 1, 2015, through April 30, 2016, wet weather monitoring season. Pre-wet-season (prior to October 1, 2015) monitoring consisted of:

- Volumetric streambed sampling and pebble counts for particle-size distribution
- Cross-section surveys
- Photo documentation

Wet season (October 1, 2015, through April 30, 2016) monitoring consisted of:

- Pollutograph sampling for SSC: continuous flow and precipitation, and discrete SSC samples
- Bedload sampling for particle-size distribution
- Post-storm pebble counts and photo documentation
- Instantaneous flow measurements

FY 16 aerial deposition during dry weather (September 1, 2015, through April 30, 2016) monitoring included:

- Aerial deposition sampling for particulate matter less than or equal to 10 microns in diameter (PM_{10})
- Comparison of two monitoring methods using optical sensors and Federal Reference Method (FRM)

Aerial deposition:

- Three sampling events
  - 2015–2016 monitoring events took place in fall and mid-winter because of planned (February 2016) destruction of Del Mar City Hall, where the reference station was located
- Sampling events consist of three 24-hour sample collection periods at each site: two during weekdays and one during the weekend
- Sampling with both USEPA FRM sampling equipment and optical sensor sampling equipment
  - Comparison of the results between both equipment types for future aerial deposition monitoring consideration

- Three additional aerial deposition monitoring locations were added by the City of San Diego in the Carroll Canyon Creek subwatershed that were monitored in conjunction with the planned locations. Resources for these locations were provided by the City of San Diego, and not through funding approved by the Responsible Agencies.

5.1.2 Monitoring Results

Storm Events

Rainfall data recorded at the Carmel Valley monitoring location (CV-CV) were used as the Watershed Special Study project rainfall data. Wet weather monitoring was conducted for three storm events during Phase II of the Watershed Special Study (2015–2016 wet season) (Table 5-1). Monitored storms in 2015–2016 resulted in 2.93 inches of rainfall, or 28% of the total wet season rainfall (10.33 inches).

Table 5-1
Summary of Monitored Wet Weather Events

Event	Date	Rainfall Total[1] (inches)
1	January 4–6, 2016	1.58
2	January 31, 2016	0.65
3	March 6–8, 2016	0.70

1. Rainfall for the upper WMA areas monitored for the Watershed Special Study was measured at the CV-CV monitoring location.

The storms monitored during the two phases were vastly different in size and intensity, making comparison challenging. Phase I (2014–2015) occurred during drought conditions, and light to moderate, consistent rainfall was observed during storms. Phase II (2015–2016) occurred during an El Niño year and although annual rainfall was below average, storms were generally intense and brief. A series of three particularly intense storms occurred over three days in early January 2016 (the first of which was monitored), as shown in Table 5-1.

For the estimation of annual sediment loads assessed in this project, a count of “wet days” was needed (see Annual Load Estimation below). A wet day is defined as a 24-hour period with at least 0.1 inch of rainfall. During the 2015–2016 wet season, 22 wet days were recorded using the Special Study rainfall data (at CV-CV), compared with 21 wet days recorded using the TMDL Compliance Program rainfall data (at LP), primarily due to orographic factors. For load estimates and comparability with the TMDL Compliance Program monitoring locations, a total of 21 wet days (number of wet days in the lower WMA) was used in the annual load estimation.

Bedload Sampling

Collection of bedload samples was attempted during each monitored event at five of the eight monitoring locations. CC-ML, LP-HV, and CV-CV did not have suitable locations at which to install samplers. Bedload sampling was attempted using both the trap samplers (installed in the streambed), which have been used in previous wet seasons, and manual bedload samplers (where safe access allowed). No samples were successfully collected during the first event. Most samplers were lost or damaged because of the high flows. One sample from CC-TC was collected during the second event and one sample was collected from CC-NR during the third event. However, in each case, samplers were either displaced or partially buried/overfilled upon retrieval, preventing assessment of the amount of material collected and the associated time frame.

Manual bedload sample collection attempts occurred during low flows, when it was safe to enter the stream, and yielded results from CC-AC and CV-CV during the second wet event only. Samples collected and measured from these two sites resulted in load estimates of 0.21 ton per day and 0.015 ton per day, respectively (not significant relative to washload estimated with SSC results). These samples were collected at one point during one storm and may not be representative of a consistent bed movement condition throughout the storm or day, nor of bedload during other non-sampled. This sample collection was an improvement over that of previous monitoring efforts, but further bedload results are required to accurately quantify this factor.

Pebble Count

Six post-storm pebble counts were conducted during the 2015–2016 wet season, showing a general increase in fine material at monitoring locations CC-TC and CC-BM. Results for CC-AC, CC-NR, and LP-NC varied throughout the year, with no apparent trend. No pebble counts were conducted at CC-ML, LP-HV, and CV-CV, because no suitable sampling locations were present.

5.1.3 Suspended Sediment Load Calculations

Annual Load Estimates

The annual suspended sediment load was estimated by multiplying the average of the three daily load estimates at each monitoring location by the number of wet days from the 2014–2015 (14 days) and the 2015–2016 (21 days) monitoring years. Load estimation options are often limited to this type of approach (referred to herein as the “average estimation method”) based on the amount of data. This approach can potentially skew overall estimates in either direction. Alternative approaches were explored in FY 15 by assessing the relationships among rainfall intensity, EMC, and sediment load to determine whether EMC and/or sediment load values can be reasonably estimated on the basis of rainfall intensity. When data from the 2015–2016 wet season were incorporated, the rainfall intensity/sediment load relationships became too weak for use in estimating loads, so the load estimates reported here are calculated using only the average estimation method described above. Although the results may be skewed high, these values are comparable to the TMDL Monitoring Program estimates and facilitate comparisons and assessments of sediment loads within the subwatersheds and into the Lagoon. Considering these differences in rainfall characteristics between wet seasons, comparability between years is limited but the collected data do provide some useful findings.

Sediment Loads from Subwatersheds

In previous monitoring periods (2013–2015), Carroll Canyon Creek contributed most of the sediment to the Lagoon, but during this monitoring period, Los Peñasquitos Creek delivered the highest overall load because of unusually high flows. Sediment concentrations (SSC and EMC) in Los Peñasquitos Creek were relatively low compared with those of the other two subwatersheds, but the large flow volumes from Los Peñasquitos Creek caused a shift in the relative sediment contribution. As usual, overall contribution from Carmel Valley Creek remained small to insignificant (approximately 1% of the annual load estimate) during the monitoring season, thus making this subwatershed the lowest priority for assessing management measures.

Sediment Loads at Areas of Interest

Stream reaches that may warrant further investigation include the reach of Carroll Canyon Creek running through the gravel mine operations and the immediate reach downstream, the upper portion of Los Peñasquitos Creek, and the upper portions of Carmel Valley Creek. The following provides greater detail regarding each of these stream reaches.

During Phase I, the highest suspended sediment loads were calculated at the Arizona Crossing location (CC-AC), at the downstream end of a highly erodible stream reach. However, during Phase II, the highest sediment loads were measured at the North City location (LC-NC) in the upper Los Peñasquitos Creek subwatershed, due to unusually high flows rather than unusually high EMCs.

Based on the Watershed Special Study (Phases I and II), the central portion of Carroll Canyon Creek between the three upper subwatershed monitoring locations and CC-NR appears to be the primary area contributing sediment to the Lagoon via Carroll Canyon Creek. During Phase I, relatively high loads were measured at the CC-AC location, which were then deposited in the channel, as lower loads were estimated downstream at the CC-NR location. During Phase II, relative sediment load contributions shifted, and higher loads were observed at CC-NR compared to CC-AC. These results suggest the large sediment contribution from the reach between the upper monitoring locations and CC-AC is deposited downstream during typical storm events observed in Phase I, and can be mobilized during larger, more intense storms like those observed during Phase II.

Los Peñasquitos Creek

Another area of interest is the upper subwatershed reaches near the LP-HV and LP-NC sites and downstream through the Los Peñasquitos Creek subwatershed. This result may indicate another source reach followed by a large sink, as the load estimates are slightly higher at LP-NC compared to those at the base of the creek. However, data for only one year are available for this subwatershed; therefore, these results and assessments are preliminary.

Carmel Valley Creek

Similar to Los Peñasquitos Creek, load estimates from the upper portion of Carmel Valley Creek were similar (slightly less) than the estimated load at the base of the creek. However, overall load estimates from Carmel Valley Creek are significantly less than those at Los Peñasquitos and Carroll Canyon Creeks. Similar to findings at Los Peñasquitos Creek, this result is based on a limited data set from one year of monitoring. Furthermore, the relatively small loads from this subwatershed make it a low priority for management measures.

SSC Versus Flow Relationships

An alternative approach to assessing sediment sources and loads focused on relationships between SSC and flow rates. A preliminary analysis compared SSC measured during two wet seasons (2014–2016) and the corresponding flow rates for those samples. CC-NR and CC-AC had the strongest SSC versus flow relationships, with coefficient of determination (R^2) values of 0.78 and 0.74, respectively. These sites were also shown to have ample sediment supply upstream, as found in a geomorphic assessment conducted during the 2014 monitoring program (AMEC Environment & Infrastructure, Inc. [now Amec Foster Wheeler], 2014). The reaches upstream of these monitoring locations were characterized by highly erodible banks, with limited armoring within the channel. Hidden Valley also had a relatively strong SSC versus flow relationship (R^2=0.62) over the study period. The other five sites showed poor relationships between SSC and flow. CC-BM (R^2=0.39) and CC-ML (R^2= -0.13) are similar in that samples are taken as flow enters a storm drain.

5.1.4 Aerial Deposition Monitoring

Aerial deposition monitoring results from both FY 15 and FY 16 indicated that airborne particulate matter equal to or less than 10 microns in diameter (PM_{10}) are not a significant source of sediment within the WMA. PM_{10} analytical results from three monitoring events were generally low, either at or near the reporting limits and monitoring results from the two types of monitoring equipment (FRM and optical sensors) indicated similar results. There were marginal increases in concentrations around anthropogenic activities, particularly in the Carroll Canyon Creek subwatershed relative to other monitored locations; however, these slight increases were not consistent or significant, in that results from both types of equipment were low or negligible.

Visual observations at the Carroll Canyon Creek downwind monitoring location, near the Black Mountain SSC monitoring location, discovered significant, visible particle matter deposition on the surfaces of vehicles, roads, and buildings and other surrounding structures. The observed deposition may be due to the high volume of truck traffic at the mining operations adjacent to the monitoring location. Despite these observations, monitoring equipment placed on the roof of a nearby fire department did not show elevated concentrations of PM_{10}. This result indicates that the observed deposition remained localized to the area just outside the gravel mine driveway.

5.1.5 Conclusions and Recommendations

Per the MS4 Permit (Provision D.4.c) data resulting of special studies should be used (1) assess their relevance to the Responsible Agencies' characterization of receiving water conditions, (2) understand sources of pollutants and/or stressors, and (3) control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters. The Sediment TMDL provides more information on sediment sources in the watershed and an initial framework for assessing management measures and focus areas.

Of the three subwatersheds, Carroll Canyon Creek is the primary subwatershed on which to focus resources and management measures. In typical years, Carroll Canyon Creek delivers the highest percentage of sediment load to the Lagoon (80 to 90%), and despite not contributing the highest percentage this year, its estimated SSC EMCs were the highest of the three subwatersheds. The data also show that sediment is deposited in the lower portions of the subwatershed and can be mobilized during large storm events. Management measures that address controlling sources of sediment where possible can drive down SSC concentrations, and ultimately loads.

The aerial deposition sampling shows that aerial sources are not a significant source of sediment within the WMA. The results were all at or below the reporting limits and were negligible in areas near active gravel mines. Resources do not need to be focused on controlling aerial sources of particulate matter.

5.2 San Diego Regional Reference Streams and Beaches Studies

The San Diego Regional Reference Stream and Beach Studies (SCCWRP, 2015 and SCCWRP, 2016) were designed to measure FIB concentrations and loads at streams and beaches that are minimally disturbed by anthropogenic activities; representing "reference" conditions. Nutrients, metals, and toxicity data were also collected. The resulting data may be used by the Regional Board in the Bacteria TMDL Reopener to derive reasonable and accurate numeric targets for bacteria on the basis of a reference system approach.

5.2.1 San Diego Regional Reference Streams Study

The goal of the San Diego Regional Reference Stream Study was to characterize the natural background concentrations of bacteria, nutrients, heavy metals, and conventional constituents in undeveloped watershed catchments during wet and dry weather. To meet the goal, the study was designed to categorize the exceedance frequencies of FIB water quality objectives (WQOs) by geomorphologic, hydrologic, biotic, and abiotic factors. The human-associated microbial source marker was used to exclude sites and samples with potential human fecal contamination, ensuring that the documented exceedance rates are attributable to nonhuman sources. This summary focuses on presenting the findings for FIB, specifically *Escherichia coli (E. coli)*, *Enterococcus*, and total and fecal coliforms.

The San Diego Reference Stream Study had seven major findings:

1. FIB levels in natural streams likely result from a combination of natural inputs, such as wildlife, birds, and soil erosion and instream bacterial growth facilitated by high summer temperatures, availability of nutrients, and presence of decaying organic matter.

2. Storm event mean concentration exceedances were low except for *Enterococcus*. Based on seven storms, exceedances of single-sample WQOs were 0% for *E. coli*, fecal coliform, and total coliform. The exceedance frequency for *Enterococcus* on the day of the storm was 87%, compared with 37% for the following three days after the end of the storm. The exceedance frequency increased for both *E. coli* and total coliform to 29% if the pollutograph maximum was used. The number of storm events captured was not sufficient to investigate the effect of geology or watershed size on storm event mean concentrations.

3. FIB exceedances occurred in natural sites and were highest in summer dry weather (April through August). No exceedances of fecal coliform single sample WQOs were observed; however, single-sample WQO exceedances of *Enterococcus* were as high as 30%. Annual 30-day geomean exceedance frequencies were 0% for both *E. coli* and fecal coliform, but were 48% and 30% for *Enterococcus* and total coliform, respectively. Exceedance frequencies were highest in the summer, particularly for *Enterococcus*, spiking up to 40% and 68% for single-sample and 30-day geometric mean WQOs, respectively. Using a rolling 30-day geometric mean rather than a monthly mean to calculate exceedance frequencies increased the exceedance frequencies for *Enterococcus* and total coliform as much as 20%.

4. Temperature, and to a lesser extent nutrients and organic carbon, was the major factor associated with elevated summer dry weather FIB concentrations and exceedance frequencies.

5. No significant relationships were found between FIB concentrations and watershed size or geology during dry weather.

6. Water column FIB concentrations could not be attributed directly to instream benthic algal biomass as a measure of stream trophic status, which was low and showed no distinct seasonal variation. In contrast, FIB, temperature, organic carbon, and nitrogen measurements spiked at the end of the season, coinciding with the end of stream flow. This cycle occurs naturally; organic carbon and nutrients are increasingly recycled from organic matter as flow diminishes and temperature increases, conditions that coincide with increased FIB concentrations.

7. Event mean concentration fluctuations during wet weather were found to be 2 to 3 times greater than dry weather FIB fluctuations. Wet and dry weather fluctuations were comparable to those documented in previous southern California regional studies.

5.2.2 San Diego Regional Reference Beaches Study

The goal of the San Diego Regional Reference Beach Study was to characterize natural background concentrations of FIB and determine WQO exceedance frequencies at two "reference" recreational beaches and their adjoining estuary or mixing zones. Two beaches in southern California, San Onofre Creek in San Diego County and Deer Creek in Ventura County, were selected for the Reference Beach Study for dry and wet weather assessments of *Enterococcus*, fecal and total coliforms, and *E. coli*. These locations were selected because watersheds discharging to the beaches were more than 93% undeveloped and had not been subject to fires within the previous three years. Additionally, both beaches are openly exposed with breaking waves and contain freshwater inputs. Analysis of human genetic markers was used to eliminate sites or samples with potential human contamination and therefore not representative of reference conditions.

The San Diego Regional Reference Beach Study was initiated in October 2014 and continued through April 2016. Sampling was conducted in the ocean immediately in front of the inlet or estuary, in the inlet mouth just upstream of the mixing zone, and in the freshwater flowing creek, for a total of three locations at each reference site. Dry weather monitoring was conducted during both wet and dry seasons to characterize baseline conditions throughout the year. Bacteria samples were collected weekly, such that five samples were collected in each 30-day period, to calculate a 30-day dry weather geometric mean. In creeks, dry weather sampling occurred when there was measureable flow at a site. During wet weather, samples were collected during and after the storm. A special study was also conducted to quantify FIB concentrations in the San Onofre estuary. When the estuary was open to tidal exchange, monitoring was extended to collect samples at high and low tides at all sites.

The San Diego Regional Reference Beach Study began during an extended period of drought in the southern California region, which limited the number of samples collected from creeks and during storms, as well as the overall volume of freshwater input to beaches. Dry weather beach sampling achieved the prescribed frequency, but samples from freshwater input sources were limited by extreme drought. From the onset of sampling, San Onofre Creek did not flow during the study period because of the extended drought. Deer Creek began flowing at the end of December 2014 and ceased in early May 2015; Deer Creek did not flow during the 2015–2016 winter dry weather period. In a similar effect, wet weather sampling was limited to only one storm during this study period because of the drought conditions. However human genetic markers were detected and so the results were excluded from the exceedance frequency analysis. The estuary special study was not completed because the San Onofre estuary berm remained closed throughout the study period for all but one storm event, which coincided with a tide in excess of 7 feet. The sampling locations were deemed inaccessible during that event, and so the estuary data collected only characterize concentrations during conditions with a closed estuary mouth.

Although drought conditions limited the conditions in which data were collected, the Reference Beach Study had several key findings:

1. The ranges of annual dry weather FIB concentrations at both beaches were considered low. The ranges are comparable to results from previous FIB beach bacteria reference studies that had estuaries closed to tidal exchange (i.e., San Onofre Creek) or flow to the beach without an estuary (i.e., Deer Creek), with WQO exceedance frequencies in the range of 0% to 3.5%. Prolonged drought conditions resulted in intermittent dry weather flow at Deer Creek and no dry weather flow at San Onofre Creek, which provides important context to interpret data on exceedance frequencies.

2. Concentrations of FIB in the estuary or freshwater mixing zone of both San Onofre and Deer Creeks were typically one to three orders of magnitude higher than their respective beaches, with the highest WQO exceedance frequencies found in San Onofre Creek.

3. In the San Onofre Creek estuary, the dry weather geometric mean exceedance frequency during summer was 72% for fecal coliform; the dry weather geometric exceedance frequency during summer was 100% for both *Enterococcus* and *E. coli*. Dry weather geometric mean exceedances during wet season months ranged from roughly 55% (for total coliform) to 100% (for *Enterococcus*). The higher WQO exceedance frequencies of San Onofre Creek estuary relative to the mixing zone of Deer Creek could be expected, given the abundance of labile organic matter to support microbial growth as well as the presence of water birds typically found in estuaries.

4. At both beaches, no significant relationship was found with water temperature, salinity, or antecedent dry days. In contrast to San Onofre Beach, where FIB concentrations declined with the increasing duration of dry weather, the range and mean FIB concentrations in San Onofre Creek estuary increased with increasing antecedent dry days and salinity, suggesting that freshwater input from the ephemeral channel tended to dilute concentrations, rather than be a source of bacteria to the beach. The slight increase of FIB concentrations as a function of temperature and the lack of surface freshwater input in San Onofre Creek estuary suggests that regrowth may be a factor, which is credible given the organic rich environment of the San Onofre Creek estuary.

5.2.3 Conclusions and Recommendations

Per the MS4 Permit (Provision D.4.c) data resulting from special studies should be used to (1) assess their relevance to the Responsible Agencies' characterization of receiving water conditions, (2) understand sources of pollutants and/or stressors, and (3) control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters. The San Diego Regional Stream and Beach Reference Studies characterized FIB levels in reference waterbodies and contributed to the understanding of non-anthropogenic sources of FIB. The data generated by the study are intended to be used by the Regional

Board in the Bacteria TMDL Reopener to derive reasonable and accurate numeric targets for bacteria that account for contributions from natural sources as characterized by the study.

The San Diego Regional Stream Study is directly related to the highest priority water quality condition. The adaptive management process may use the following key findings to inform the Bacteria TMDL Reopener:

- During dry weather conditions (streams):
  - There are exceedances of FIB WQOs at natural sites for *Enterococcu*s and total coliform (single sample and annual 30-day geomean).
  - These are highest during summer months (April to August).
  - There were no exceedances of the fecal coliform single sample WQOs along with a 0% exceedance frequency of the annual 30-day geomean.
  - *E. coli* also had a 0% exceedance frequency of the annual 30-day geomean.
- During wet weather conditions (streams):
  - Storm event mean concentration exceedances of single sample WQOs were 0% for *E. coli*, fecal coliform, and total coliform, but if the storm maximum pollutograph was included, there were exceedances for *E.coli* and total coliform.
  - For the storm event mean concentration exceedances of single sample WQOs for *Enterococcus,* the exceedance frequency on the day of the storm was 87%, compared with 37% for the following three days after the end of the storm.
- In summary for reference streams:
  - *Enterococcus* concentrations can often exceed the WQO in both dry and wet weather conditions in streams with no anthropogenic impacts.
  - Total coliform concentrations exceeded the WQO only during wet weather conditions in the reference watershed streams when the storm peak was incorporated into the event mean concentration.
  - *E. coli* concentrations exceeded the WQO only during wet weather conditions in the reference watershed streams when the storm peak was incorporated into the event mean concentration.
  - Fecal coliform concentrations did not exceed WQO in dry and wet weather conditions in any reference watershed streams.
- During dry weather conditions (beaches):
  - The *Enterococcus* dry weather annual 30-day geomean exceedance frequency was 100% for the whole year in the San Onofre Creek estuary.

  - The total coliform dry weather annual 30-day geomean exceedance frequency was 55% during winter months (October to March) in the San Onofre Creek estuary.
  - The *E. coli* dry weather annual 30-day geomean exceedance frequency was 100% during summer months (April to August) in the San Onofre Creek estuary.
  - The fecal coliform dry weather annual 30-day geomean exceedance frequency was 72% during the summer months in the San Onofre Creek estuary.
- During wet weather conditions (beaches):
  - No wet weather reference samples were analyzed for the beach study because human genetic markers were found in the samples during the one wet weather sampling event.
- In summary for reference beaches:
  - *Enterococcus* dry weather 30-day geomeans were exceeded during the whole year.
  - Total coliform dry weather 30-day geomeans were exceeded during the winter months (October to March).
  - *E. coli* and fecal coliform dry weather 30-day geomeans were exceeded during the summer months.

Concentrations of FIB were one to three times higher in estuary or freshwater mixings zones than at the beaches. For reference beaches with both streams and estuaries closed from tidal exchange, *Enterococcus* exceeded WQOs. Total coliform, *E. coli*, and fecal coliform concentrations exceeding WQOs varied for seasons and waterbody types. Additionally, the variability in dry weather FIB concentrations is less than the variability in wet weather FIB event mean concentrations, confirming the findings of previous studies.

5.3 Outfall Repair and Relocation Study

The Sediment Load Reduction Quantification Through Outfall Repair and Relocation for the Los Peñasquitos WMA Study was performed to assess the current sediment loading to the Los Peñasquitos Lagoon caused by the erosive scour associated with outfall discharge, as well as possible sediment load reductions associated with various BMPs.

The sediment loading analysis method used in this study utilizes the United States Department of Agriculture (USDA) Bank Stability and Toe Erosion Model (BSTEM) to estimate scour potential. The BSTEM simulation of 102 outfalls in the City of San Diego resulted in a total of 1,400 cubic feet (approximately 85 tons) per year of sediment related to erosive discharge in the Los Peñasquitos WMA. The resulting 85 tons per year from the BSTEM analysis for all 102 modeled outfalls account for approximately 1.4% of the total sediment load for the watershed. Of these 102 outfalls, 42 were identified as “high priority” outfalls because of their high annual sediment load production.

Three types of BMPs were investigated to estimate the amount of the loading that could potentially be reduced or eliminated. It was determined that the total sediment load modeled could be reduced by implementing the following BMP practices at the 42 high priority outfalls:

- 50% reduction in sediment through outfall relocation (extending storm water conveyance infrastructure from a location near the top of a canyon to one near the valley floor);
- 79% reduction in sediment by installing energy dissipation structures (placing materials below the outfall that reduce the energy of incoming storm flows); and
- 84% reduction in sediment by implementing regenerative storm water conveyance (RSC) practices (a relatively new BMP intended to treat storm water through a series of energy dissipation structures and small retention ponds).

Potential next steps include completing field verifications of the BSTEM loads and/or monitoring to validate model results. In addition, a cost benefit analysis and evaluation of challenges associated with implementation of BMP practices will be considered.

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6 Publicly Available Data

The MS4 Permit requires the Responsible Agencies to provide monitoring data and assessment results to the public. The following sections provide the locations where the public may obtain this information.

6.1 California Environmental Data Exchange Network Upload and Retrieval

Provision F.4.a.(6) of the MS4 Permit requires monitoring data collected as part of the Los Peñasquitos MAP to be uploaded to CEDEN. Certifications from CEDEN confirming data upload as required will be included in Attachment H.

CEDEN is a central location for finding and sharing information about California's waterbodies and aggregates water quality, aquatic habitat, and wildlife health data. The data are accessible in downloadable forms at www.ceden.org.

Data collected under the Los Peñasquitos WMA MAP for the October 2015–September 2016 monitoring year will be available in 2017. Data in the CEDEN are searchable by date and by location, project, station, or parameter. Data collected as part of the programs described in this Monitoring Results and Assessment Appendix of the Los Peñasquitos WMA WQIP Annual Report can be retrieved using the project names listed in Table 6-1.

Table 6-1
Project Names for CEDEN Data Retrieval

Monitoring Program	CEDEN Project Name Field Name "ProjectCode"
MS4 Outfall (Wet and Dry Weather)	MS4_WW_OFM MS4_DW_OFSM
Bacteria TMDL	LosPen_BacteriaTMDL
Sediment TMDL	LP_Sediment_TMDL
Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Monitoring Plan	LP_Special_Study

CEDEN = California Environmental Data Exchange Network; MS4 = Municipal Separate Storm Sewer System;
TBD = to be determined; TMDL = Total Maximum Daily Load

6.2 Regional Clearing House

For the 2015–2016 monitoring year, the Responsible Agencies are providing the following data and documentation on the Project Clean Water website (Project Clean Water, 2016), which can be accessed by the general public:

- 2015–2016 Annual Report, including all appendices and associated attachments, including:
  - JRMP Annual Report for each Responsible Agency within the WMA
  - Monitoring Results and Assessment Appendix
  - SMC Bioassessment Summary
  - Bacteria TMDL Compliance Report
  - Reports from special studies conducted in the WMA not previously submitted (Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Monitoring Plan)
- BMP Design Manual for each Responsible Agency within the WMA and all updated versions with date of update
- Monitoring data uploaded to the CEDEN with links to the uploaded data
- Available GIS data, layers, and/or shapefiles used to develop the maps to support the WQIP, Annual Reports, and JRMPs

7 References

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Attachment A – Sediment TMDL Compliance Report

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LOS PEÑASQUITOS LAGOON WATERSHED MANAGEMENT AREA
SEDIMENT TMDL COMPLIANCE MONITORING
FINAL REPORT

Submitted to:
City of San Diego
Transportation & Storm Water Department
9370 Chesapeake Drive, Suite 100
San Diego, California 92123

Submitted by:
Amec Foster Wheeler
San Diego, California

November 2016

IMPORTANT NOTICE

EXECUTIVE SUMMARY

Los Peñasquitos Lagoon (Lagoon) has been historically impacted by anthropogenic disturbances. These have caused excessive sedimentation leading to the gradual degradation and loss of estuarine habitat. As a result, the Lagoon was placed on the Clean Water Act Section 303(d) List of Water Quality Limited Segments for sedimentation and siltation. To address these water quality impairments, on June 13, 2012, the San Diego Regional Water Quality Control Board (Regional Board) adopted Resolution Number R9-2012-0033: *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate the Total Maximum Daily Load (TMDL) for Sedimentation in Los Peñasquitos Lagoon* (referred to as the Sediment TMDL) (Regional Board, 2012).

Project Objectives. The Los Peñasquitos Lagoon Watershed Management Area (WMA) Sediment TMDL Compliance Monitoring Program (Monitoring Program) was designed for the Responsible Agencies (RAs) to assess sediment transport within the three major tributaries that flow through the WMA into the Lagoon: Carroll Canyon Creek, Carmel Valley Creek, and Los Peñasquitos Creek. The Monitoring Program provides data on (a) suspended sediment concentration (SSC) during wet weather conditions, (b) estimated sediment loads to the Lagoon for comparison with the Waste Load Allocation (WLA) stated in the Sediment TMDL, and (c) sediment delivery potential within storm flows in the creeks just before they empty into the Lagoon. This report presents the results of monitoring during Fiscal Year 2016 (FY16) (July 1 2015 – June 30, 2016), along with a comparison to historical data collected to date.

Monitoring Elements. Monitoring took place prior to and during the wet season

Pre-wet-season (prior to October 1, 2015) monitoring consisted of:

- Volumetric streambed sampling for particle-size distribution;
- Pebble counts;
- Cross-section surveys; and
- Photodocumentation.

Wet season (October 1, 2015 – April 30, 2016) monitoring consisted of:

- Pollutograph sampling for SSC;
- Bedload sampling for particle-size distribution;
- Post-storm pebble counts and photodocumentation;
- Instantaneous flow measurements; and
- Long-term flow monitoring.

SSC Results. Data collected during the three wet weather events monitored during the 2015–2016 wet season showed fluctuations of SSC that generally correlated with changes in flow. However, when compared to previous seasons, concentrations tended to be higher and to remain higher throughout the storm because of the unusually intense rainfall experienced during this season. In general, data collected from the 2013–2016 monitoring events (three seasons) indicated that SSC concentrations were higher at or just after the times that higher flows were recorded and during the rising limb of the hydrograph, as expected for sediment transport influenced by supply limits. Observations of peak SSC coinciding with peak flow or slightly before peak flow indicates sediment was mainly supplied from surface washoff, driven by precipitation.

These sediment sources were either quickly exhausted during rainfall, or ceased to be mobilized and supplied to the stream when rainfall stopped. This contrasts streams where SSC rises after peak flow, indicating sediment deposits on the bed and banks are mobilized by the increased flow, or eroded on the falling limb of the hydrograph. Data collected during the 2013–2014 and 2014–2015 wet seasons at Los Peñasquitos Creek indicated that SSC concentrations were higher during the earlier portions of the hydrographs, and were lower or not detected at the peak of the hydrograph. However, data collected during the 2015–2016 wet season showed higher sustained sediment concentrations in Los Peñasquitos Creek throughout the storm, particularly for a large storm in early January 2016. This pattern may indicate this large, energetic storm event scoured and transported sediment that was stored in vegetation and on the streambed in the lower portion of Los Peñasquitos Creek.

Estimated Loads. Flow-weighted event mean concentrations (EMCs) and SSC load estimates were calculated using analytical SSC data and flow data. The total estimated load for the three monitored creeks for the 2015–2016 wet season was 23,500 tons per year, which is significantly greater than the WMA's Sediment TMDL WLA of 2,580 tons per year. The unusually high load estimates were driven primarily by a series of large, intense storm events in early January 2016.

Data collected during the 2015–2016 wet season indicated a shift in the dynamics of load inputs to the Lagoon. This is primarily due to the unusually intense storms that occurred this season that produced high flows, particularly in Los Peñasquitos Creek. Carroll Canyon Creek typically accounts for the majority (80 to 90 percent) of the sediment loads to the Lagoon. However, because of these unusually high flows, Los Peñasquitos Creek accounted for approximately 60 percent of the total load this season, despite not showing a similar relative shift in EMCs. Carroll Canyon Creek accounted for approximately 39 percent and Carmel Valley Creek accounted for approximately 1 percent. The relative contributions measured this season differ greatly from data collected over the past two seasons and a previous estimate (Weston Solutions Inc., 2009a) that Carroll Canyon Creek can supply up to 92 percent of the total sediment contribution to the Lagoon.

The estimated annual sediment loads are preliminary values, based on the limited data set collected during the 2013–2014, 2014–2015, and 2015–2016 wet seasons (nine total events). Data collection during future storm events are required to further refine these sediment load estimates, particularly for non-monitored events.

Total Sediment Load and WLA. Based on monitoring data collected during the 2015–2016 wet season, the total sediment load estimate of 23,500 tons per year is above the WLA allowed by the Sediment TMDL. The unusually high load estimates were driven primarily by a series of large, intense storm events in early January 2016. Continued compliance monitoring at the sediment TMDL locations is planned for Fiscal Year 2017 (FY 17).

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ACRONYMS AND ABBREVIATIONS

303(d) List	Clean Water Act Section 303(d), List of Water Quality Limited Segments
ADCP	acoustic Doppler current profiler
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
BMP	best management practice
Caltrans	California Department of Transportation
cfs	cubic foot (feet) per second
City	City of San Diego
EMC	event mean concentration
FY	fiscal year
hr	hour
in	inch(es)
Lagoon	Los Peñasquitos Lagoon
LID	low-impact development
mg/L	milligrams per liter
MS4	municipal separate storm sewer system
MS4 Permit	Order Number R9-2013-0001, as Amended by Order No. R9-2015-0001, NPDES No. CAS010266, *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region*
NPDES	National Pollutant Discharge Elimination System
OAL	California Office of Administrative Law
RAs	Responsible Agencies (these are: Cities of San Diego, Poway, and Del Mar, and the County of San Diego)[1]
Regional Board	San Diego Regional Water Quality Control Board
Sediment TMDL	Resolution Number R9-2012-0033: *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Total Maximum Daily Load for Sedimentation in Los Peñasquitos Lagoon*
SSC	suspended sediment concentration
TMDL	total maximum daily load
USEPA	United States Environmental Protection Agency
Weston	Weston Solutions, Inc.
WLA	waste load allocation
WMA	Watershed Management Area
WQIP	Water Quality Improvement Plan

[1] Responsible Agencies (RAs) listed are those included in the WQIP implementation. Caltrans is included in the TMDL; however, Caltrans is not part of the WQIP implementation due to their own statewide permit.

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1.0 INTRODUCTION

This report summarizes results from the Los Peñasquitos Lagoon Watershed Management Area (WMA) Sediment Total Maximum Daily Load (TMDL) Compliance Monitoring Program (Monitoring Program) that took place during Fiscal Year 2016 (FY16) (July 1, 2015 – June 30, 2016). The Monitoring Program provides data on (a) suspended sediment concentration (SSC) during wet weather conditions, (b) estimated sediment loads to the Lagoon for comparison with the Waste Load Allocation (WLA) stated in the Sediment TMDL, and (c) sediment delivery potential within storm flows in the creeks just before they empty into the Lagoon.

1.1 BACKGROUND AND REGULATORY FRAMEWORK

The Lagoon is a coastal salt marsh lagoon in west-central San Diego County, in southern California. The WMA is approximately 60,500 acres and contains portions of the cities of Poway and Del Mar, unincorporated areas of San Diego County, and the communities of Mira Mesa, Scripps Ranch, Carmel Valley, and Sorrento Valley within the City of San Diego (City). The WMA is drained by three major creeks, Carroll Canyon Creek, Carmel Valley Creek, and Los Peñasquitos Creek, which ultimately discharge into the Lagoon.

Los Peñasquitos Lagoon (Lagoon) has been historically impacted by anthropogenic disturbances. These have caused excessive sedimentation leading to the gradual degradation and loss of estuarine habitat. As a result, the Lagoon was placed on the Clean Water Act Section 303(d) List of Water Quality Limited Segments (303(d) List) for sedimentation and siltation. To address these water quality impairments, in 2012 the San Diego Regional Water Quality Control Board (Regional Board) adopted Resolution Number R9-2012-0033: *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate the Total Maximum Daily Load (TMDL) for Sedimentation in Los Peñasquitos Lagoon* (referred to as the “Sediment TMDL”) (Regional Board, 2012).[2]

The Sediment TMDL has been designed to restore the Lagoon to its mid-1970s condition by assigning the responsible parties a WLA for sediment contributions from the WMA. The responsible parties are (a) the Phase I Municipal Separate Storm Sewer System (MS4) copermittees, (b) the Phase II MS4 permittees, (c) the California Department of Transportation (Caltrans), and (d) the General Construction and General Industrial Storm Water National Pollutant Discharge Elimination System (NPDES) permittees.

The Sediment TMDL designates a single WLA of 2,580 tons per year for the entire WMA contribution, which is assigned collectively to the responsible parties.

The Sediment TMDL has been incorporated into the Order Number R9-2013-0001, as Amended by Order No. R9-2015-0001*, NPDES No. CAS010266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal*

[2] The Sediment TMDL was approved by the State Water Resources Control Board on January 21, 2014; by the California Office of Administrative Law (OAL) on July 14, 2014; and by the United States Environmental Protection Agency (USEPA) on October 30, 2014.

Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region (Regional Board, 2015) (referred to as the MS4 Permit) and included in the Water Quality Improvement Plan (WQIP) for the Los Peñasquitos WMA (Amec Foster Wheeler, 2015). The requirements of the Sediment TMDL and the MS4 Permit are to be executed under the WQIP. The WQIP is being implemented by the Cities of San Diego, Poway, and Del Mar, and the County of San Diego, collectively referred to as the Responsible Agencies (RAs).

1.2 CURRENT STUDY

Understanding the mechanics of sediment transport and relative contributions from the WMA's three major creeks will enable the RAs to effectively address the WLAs required under the Sediment TMDL. Amec Foster Wheeler conducted sediment transport sampling and characterization before and throughout the 2015–2016 wet season (October 1, 2015–April 30, 2016). Data collected at these sites provide an estimate of the current loads from the WMA into the Lagoon.

1.3 PROJECT OBJECTIVES

This Monitoring Program was designed to measure flows at each of the three major WMA creeks, monitor suspended sediment concentration (SSC) during three storm events, assess changes in streambed composition throughout FY16 monitoring, and estimate wet weather sediment loads from each of the creeks. The Monitoring Program was designed to answer the following questions:

- What is the sediment concentration at discrete times throughout a storm event hydrograph at the bases of the three major creeks that discharge to the Lagoon?
- What are the estimated current sediment loads from these creeks, and how do they compare to the Sediment TMDL WLA?
- How do the wet weather sediment delivery potentials of each creek compare with each other?

These data will allow comparison of the WMA's current sediment transport conditions to the Sediment TMDL WLA and will help the RAs evaluate potential management measures, such as best management practices (BMPs) and low-impact development (LID).

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2.0 MONITORING APPROACH AND ANALYTICAL METHODS

This Monitoring Program is a continuation of previous monitoring projects, and uses the same monitoring approach and analyses.[3] The project's monitoring elements are:

Prior to the wet season:

- Volumetric streambed samples for particle-size distribution
- Initial pebble counts and photodocumentation
- Channel cross-sectional surveys

Wet season:

- Continuous flow and rainfall measurements
  - Sampling during three wet weather events
  - SSC pollutograph sampling
- Bedload sampling for particle-size distribution
- Post-storm pebble counts and photodocumentation
- Field flow measurements to calibrate head-versus-flow table (using wading rod and acoustic Doppler current profiler [ADCP] methods)

Figure 2-1 shows the Monitoring Program's monitoring locations and also depicts the Los Peñasquitos Watershed Management Area Sediment Load Special Study (Amec Foster Wheeler, 2016) monitoring locations for reference purposes. These monitoring locations are discussed in detail in the Los Peñasquitos Lagoon Total Maximum Daily Load Sediment Monitoring Final Compliance Monitoring Plan (Amec Foster Wheeler, 2015) (Appendix A).

[3] For brevity, this monitoring report does not include the details of the project's monitoring elements; they are provided in the final *Los Peñasquitos Lagoon Total Maximum Daily Load Sediment Monitoring Final Compliance Monitoring Plan* (Amec Foster Wheeler, 2015), which is provided as Appendix A. This plan discusses vegetation monitoring that will not initiate until fall 2016, and, therefore, is not discussed in this report.

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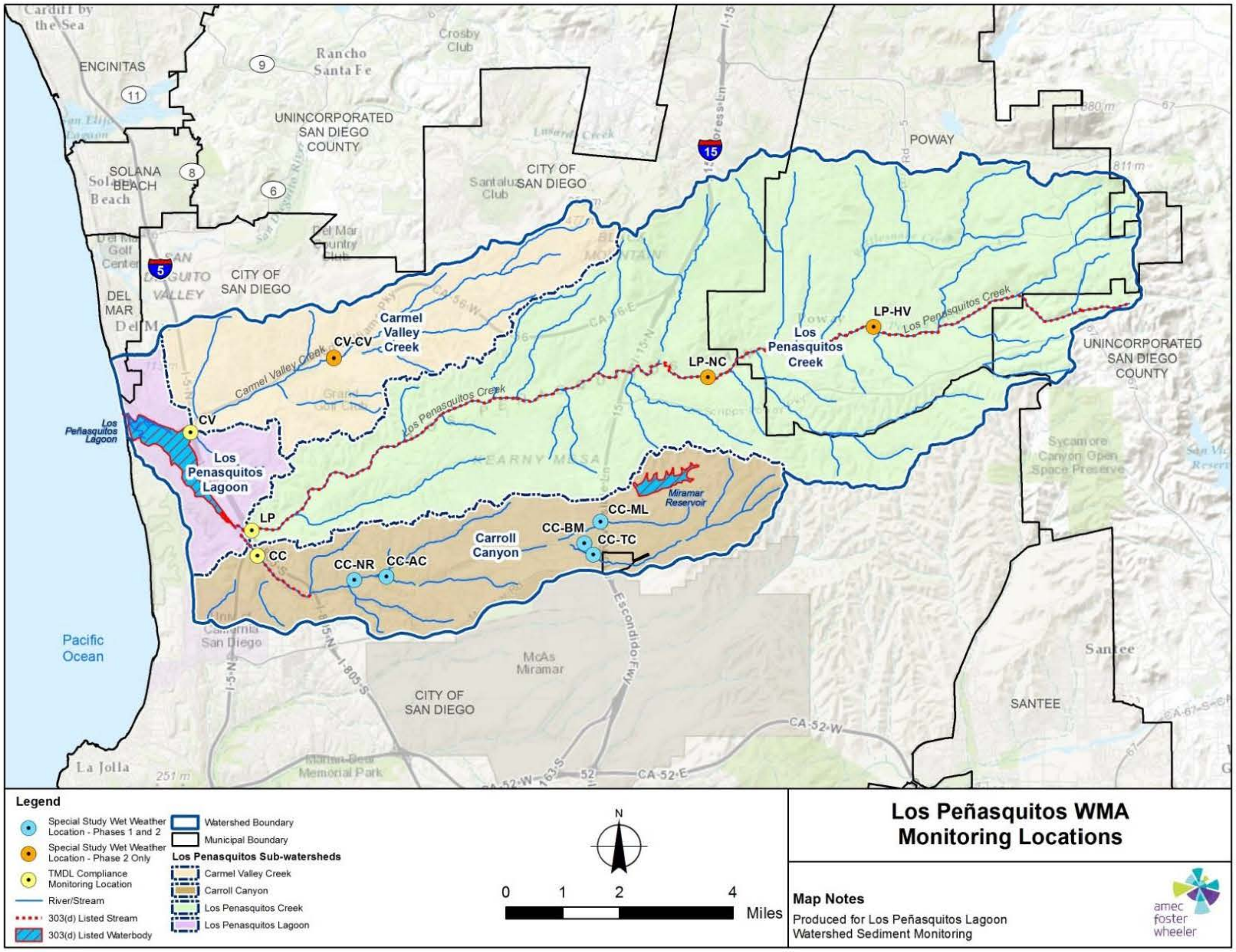

Figure 2-1
Los Peñasquitos WMA Monitoring Locations

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3.0 RESULTS AND DISCUSSION

This section presents the data collected during the 2015–2016 wet season and discusses how the analytical results are used to determine compliance with the Sediment TMDL. Monitoring was conducted during three storm events during the 2015–2016 wet season (October 1 through April 31). Table 3-1 presents the dates and rainfall totals for monitored events. Based on the *San Diego County Hydrology Manual* (County of San Diego, 2003), the 85th percentile, 24-hour storm for the project area is approximately 0.60 inch. The first and third monitored rainfall events were greater than the 85th percentile threshold, while the second was below it.

Table 3-1
Monitored Wet Weather Events

Event	Dates	Rainfall Total[a] (inches)
1	January 5–6, 2016	1.55
2	January 31, 2016	0.49
3	March 6–8, 2016	0.90

a. Rainfall was measured at the Los Peñasquitos Creek monitoring location rain gauge, except during the event on January 5-6, 2016, when it was replaced by Carmel Valley Creek monitoring location rain gauge because of equipment malfunction. Rainfall totals reported are only during the monitoring period. Rainfall continued later on the January 6, 2016, after sampling concluded for Event 1.

3.1 HYDROLOGY AND ANALYSIS

Table 3-2 presents the monthly rainfall totals during the 2015–2016 wet season, as compiled from the onsite rain gauge[4]. Rainfall data were also used to determine the number of “wet” days throughout the year. For the purposes of this project, a wet day is defined as a day with at least 0.1 inch of rainfall. A total of 21 wet days were recorded during the 2015–2016 wet season.

The final number of pollutograph samples selected for analysis varied, depending on the characteristics of each storm event. Table 3-3 summarizes the number of pollutograph samples submitted per monitoring location during the monitored wet weather events.

Figures 3-1 through 3-9 present the event hydrographs showing flow, selected pollutograph samples, and analytical results for SSC analysis at each monitoring location. SSC concentration spikes generally correlate with peaks in storm flow, particularly for Carroll Canyon Creek. Increases in SSC concentrations are related to the start of peak runoff for Carmel Valley and Los Peñasquitos Creeks. Although peak flow typically is most strongly associated with increased SSC, other factors also affect SSC, such as supply fluctuations and limitations, rainfall intensity and the

[4] Rainfall was measured at the Los Peñasquitos Creek monitoring location rain gauge, except during the October 29–November 26, 2015, and January 5–11, 2016, events, when it was replaced by the Carmel Valley Creek monitoring location rain gauge because of equipment malfunction.

associated rate of rise in flow, the preceding baseline flow, sampling timing, and duration of storm flow. Summarized SSC analytical results and laboratory reports are provided in Appendix B.

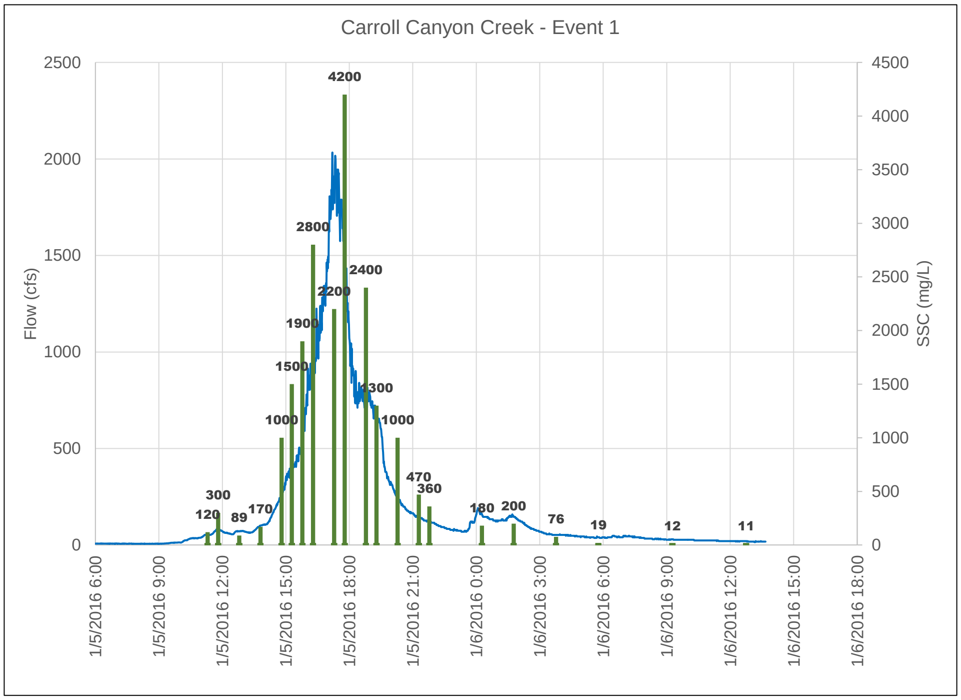
Table 3-2
Monthly Rainfall Totals for the Wet Season

Month	Rainfall Total[a] (inches)
October 2015	0.66
November 2015	0.46
December 2015	1.58
January 2016	4.37
February 2016	0.15
March 2016	1.32
April 2016	0.94
Season Total	9.48

a. Rainfall was measured at the Los Peñasquitos Creek monitoring location rain gauge, except during the October 29–November 26, 2015, and January 5–11, 2016, events, when it was replaced by the Carmel Valley Creek monitoring location rain gauge because of equipment malfunction.

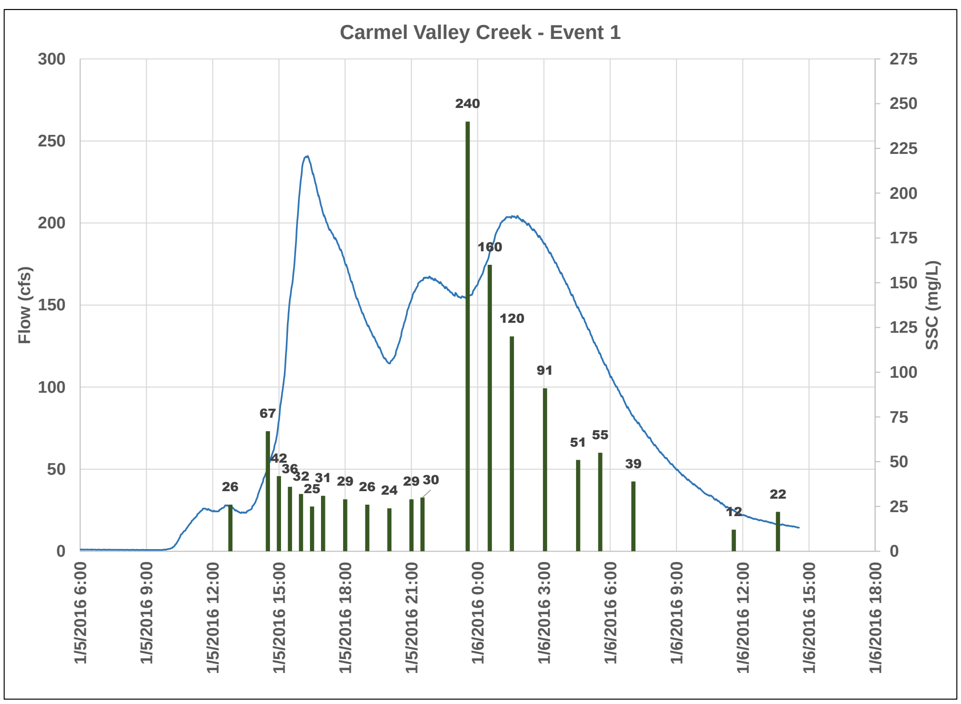
Table 3-3
Number of Samples Submitted
During Wet Weather Monitoring Events

Site	Number of Samples Submitted		
	Event 1	Event 2	Event 3
Carroll Canyon Creek	21	18	22
Carmel Valley Creek	21	20	31
Los Peñasquitos Creek	16	14	14



Note: Bars and data labels indicate SSC results and when samples were collected.

Figure 3-1
Hydrograph and Results—Wet Weather Event 1, Carroll Canyon Creek



Note: Bars and data labels indicate SSC results and when samples were collected.

Figure 3-2
Hydrograph and Results—Wet Weather Event 1, Carmel Valley Creek

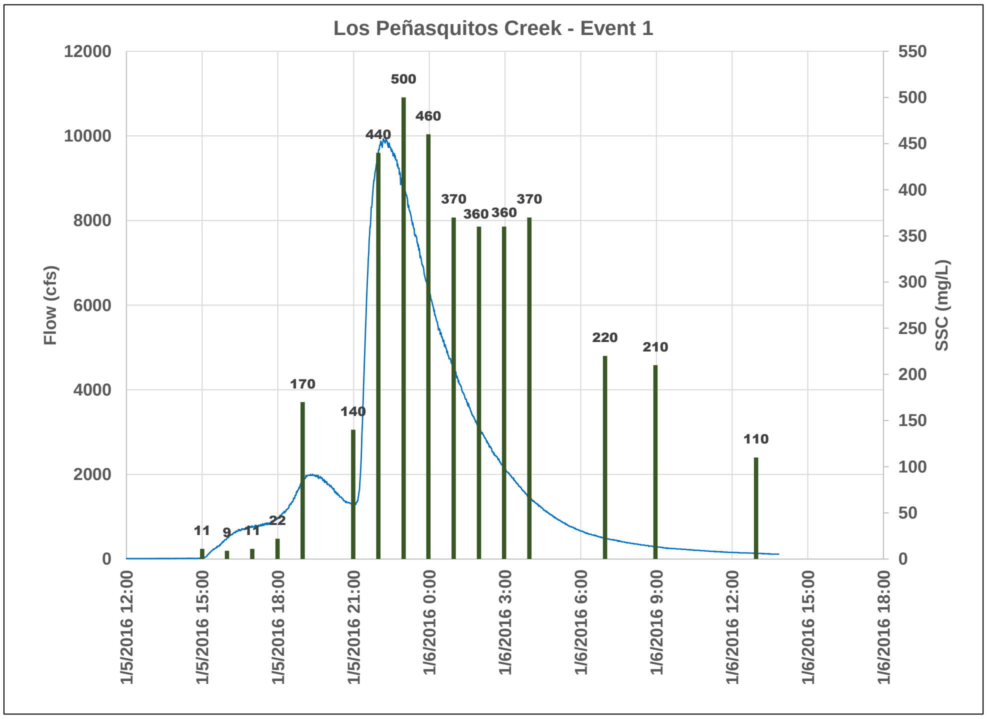


Figure 3-3
Hydrograph and Results—Wet Weather Event 1, Los Peñasquitos Creek

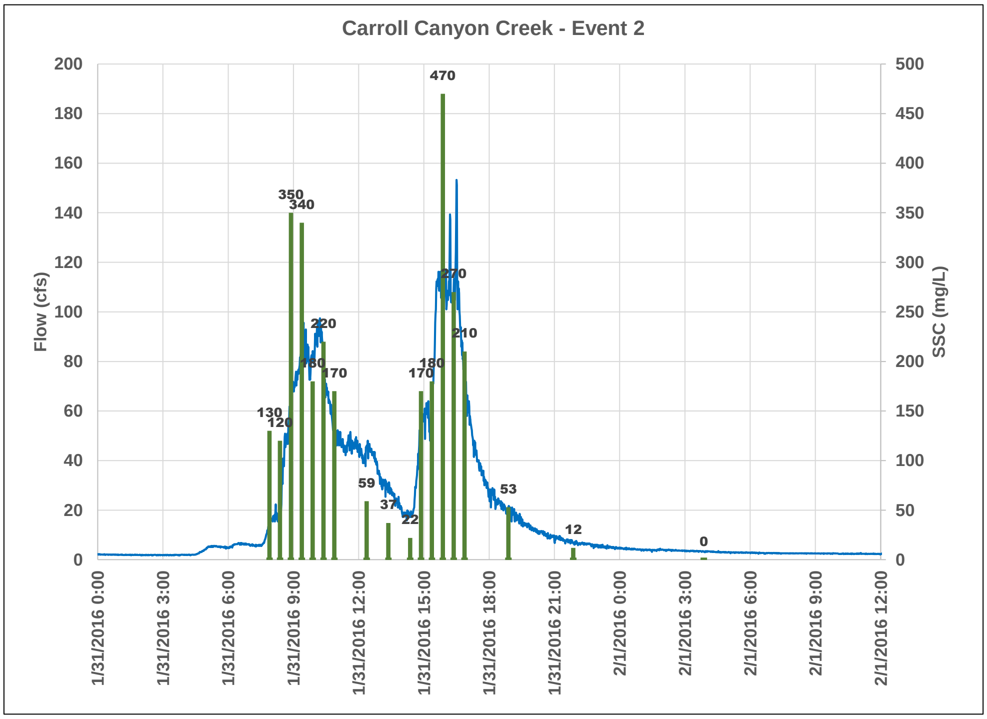


Figure 3-4
Hydrograph and Results—Wet Weather Event 2, Carroll Canyon Creek

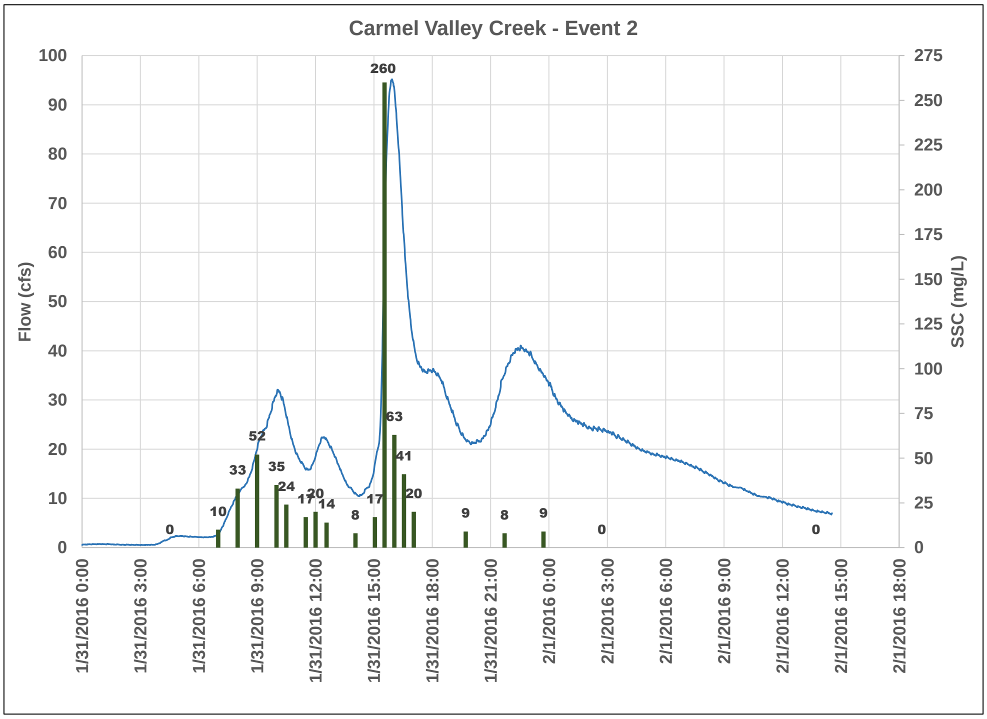


Figure 3-5
Hydrograph and Results—Wet Weather Event 2, Carmel Valley Creek

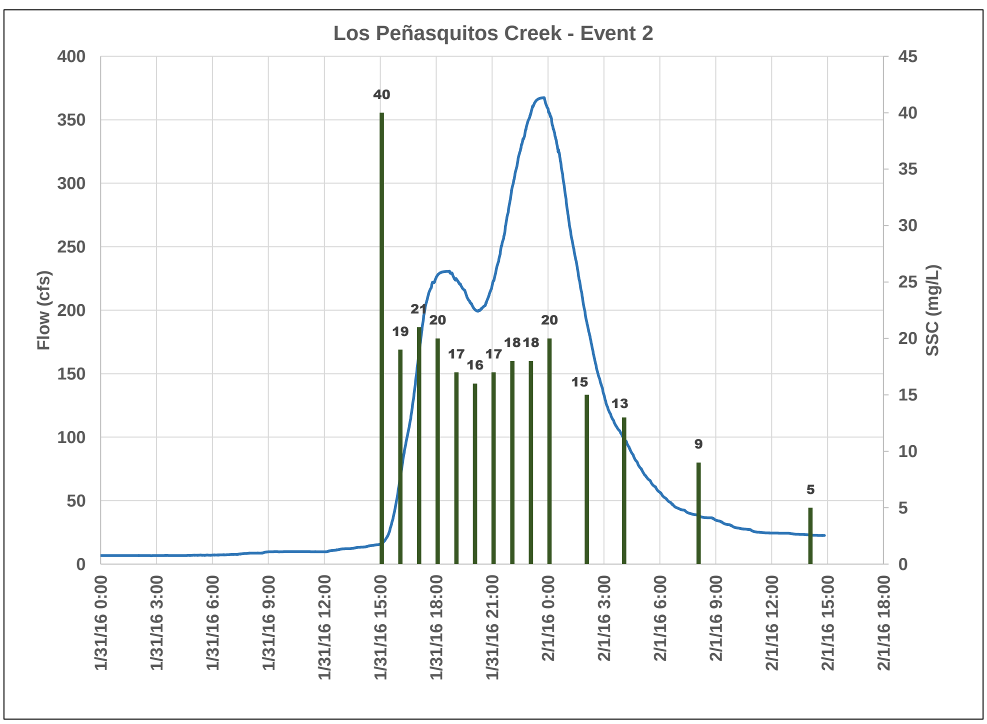


Figure 3-6.
Hydrograph and Results—Wet Weather Event 2, Los Peñasquitos Creek

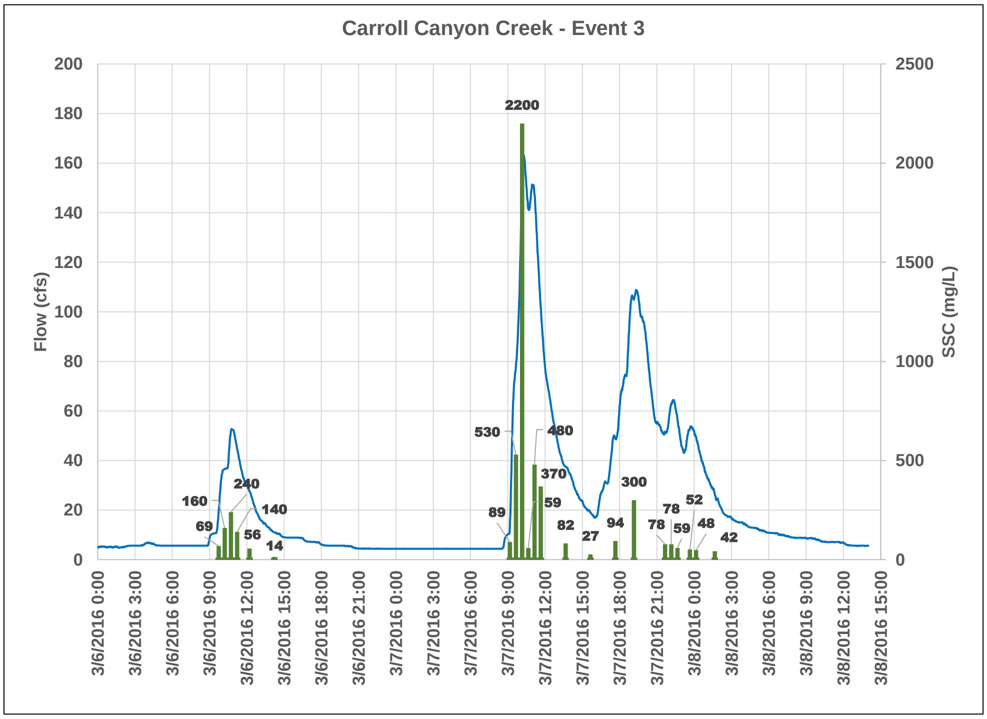


Figure 3-7
Hydrograph and Results—Wet Weather Event 3, Carroll Canyon Creek

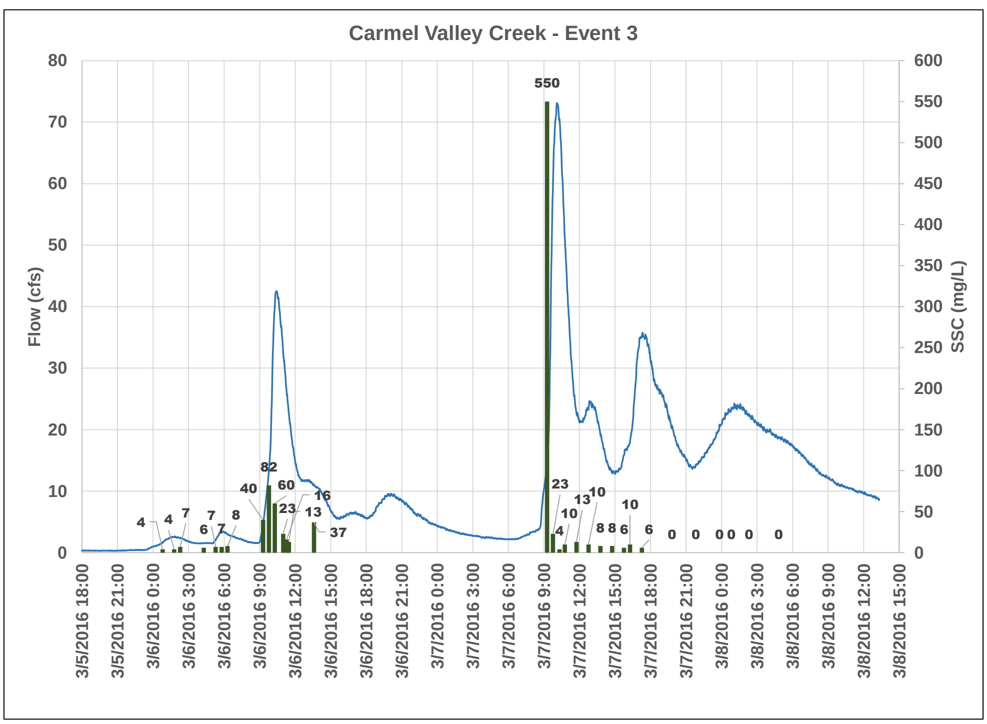


Figure 3-8
Hydrograph and Results—Wet Weather Event 3, Carmel Valley Creek

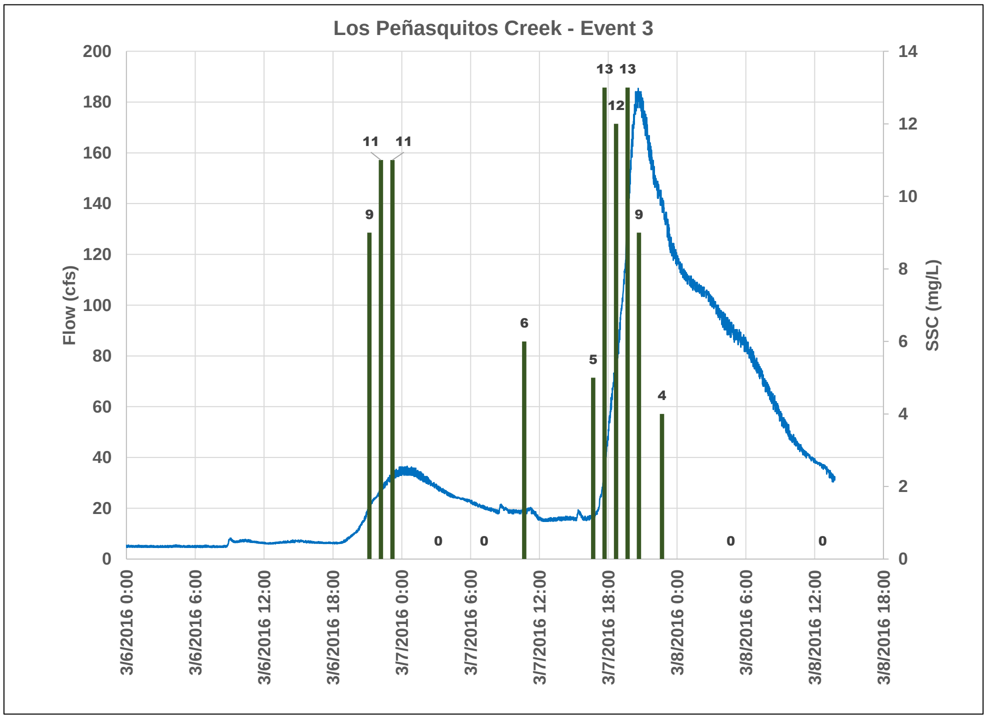


Figure 3-9
Hydrograph and Results—Wet Weather Event 3, Los Peñasquitos Creek

3.2 BEDLOAD SAMPLE COLLECTION

Collection of bedload samples was attempted during each monitored event at the three monitoring locations. Bedload sampling was conduct using both the trap samplers (installed in streambed), which have been used in previous monitoring years (Fiscal Year 2014 [FY14] [July 1, 2013 – June 30, 2014] and Fiscal Year 2015 [FY15] [July 1, 2014 – June 30, 2015]), and manual bedload samplers.

No bedload samples were successfully collected during the first event. Most samplers were lost or damaged because of the high flows. One bedload sample from each site was collected during the second event and one sample was collected from Carroll Canyon Creek during the third event. However, in each case, samplers were either displaced or partially buried/overfilled upon retrieval, making assessment of the amount of material collected and the associated time frame unreliable.

Manual bedload sample collection attempts occurred during low flows, when it was safe to enter the stream. This method yielded one result from Los Peñasquitos Creek during the second event only. Samples collected and measured from this site resulted in load estimates of 0.0022 ton per day (not significant relative to washload estimated with SSC results). However, this sample was collected at one point during one storm and may not be representative of a consistent bed movement condition throughout the storm or day, nor of bedload during other non-sampled events. Although this sample collection was an improvement over that of previous monitoring efforts, further bedload results are required to accurately quantify this factor.

Visual observations after the first monitored event (January 4-5, 2016), and the subsequent large events (January 6 and 7, 2016) confirmed that a large amount of cobble and streambed material was transported into the concrete-lined portion of Carroll Canyon Creek, but was deposited there and not transported into the Lagoon.

Appendix C provides the bedload particle size analysis for the bedload trap sample. Appendix C also provides the results from the volumetric bedload particle size analysis performed in the pre-wet-season sample at each monitoring location.

3.3 POST-STORM PEBBLE COUNT AND PHOTODOCUMENTATION

Post-storm pebble counts were conducted on six occasions during the 2015–2016 wet season. Results showed that there was a shift toward a higher proportion of sands (i.e., larger particle size) after the series of large rain events in early January 2016 at Carroll Canyon Creek, which typically has higher velocity flows compared with the other two creeks. Pebble count data show a return to a lower proportion of sands and more fines, likely due to lower intensity storms. This trend is less apparent or does not exist for the other two creeks. The lack of a clear shift after the large January 2016 storms is most likely due to the lower velocities observed in these two creeks, but may also be attributable to supplies within the creeks (i.e., higher proportion of fines compared to sands upstream).

For a complete summary and graphs of the pebble count data, refer to Appendix D.

Streambed photographs were taken throughout the wet season at each monitoring location and were compiled into a photograph log in Appendix E.

3.4 EVENT MEAN CONCENTRATION AND SEDIMENT LOAD RESULTS

The annual sediment load was estimated by multiplying the average of the three daily load estimates at each site by the number of wet days per year. In addition, annual sediment load was also estimated using results from a regression between maximum 1-hour rainfall intensity and estimated loads during monitored events (described further in Section 3.5).

Table 3-4 provides the event mean concentrations (EMCs) and sediment load estimates for the monitored events during the 2013–2014, 2014–2015, and 2015–2016 wet seasons.

Based on the monitoring during the 2015–2016 wet season, the annual load estimate of sediment entering the Lagoon from the three creeks is approximately 23,500 tons per year. This total load is significantly greater than the Sediment TMDL WLA of 2,580 tons per year. Data collected during this wet season indicated a shift in the dynamics of load inputs to the Lagoon, likely due to the unusually intense storms that occurred this season that produced high flows, particularly in Los Peñasquitos Creek. Carroll Canyon Creek typically accounts for the majority (80 to 90 percent) of the sediment loads to the Lagoon. However, because of these unusually high flows, Los Peñasquitos Creek accounted for approximately 60 percent of the total load this season. Although SSC results were higher than previous seasons' results at Los Peñasquitos Creek, they were much lower than those at Carroll Canyon Creek. The increase in proportional load from Los Peñasquitos Creek is primarily the result of large flow volumes. Carroll Canyon Creek accounted for approximately 39 percent and Carmel Valley Creek accounted for approximately 1 percent. The relative contributions measured this season differ greatly from data collected over the past two seasons and a previous estimate (Weston, 2009a) that Carroll Canyon Creek can supply up to 92 percent of the total sediment contribution to the Lagoon.

During the 2015–2016 wet season, cross-sectional areas of streambeds at the monitoring locations were updated and used to revise the head-versus-flow tables. Multiple field flow measurements using wading rods and StreamPro ADCPs were used to verify and calibrate the head-versus-flow tables. The primary change to the head versus flow tables was extending the Los Peñasquitos Creek table to higher stages, as the stages measured during the large storms in early January 2016 exceeded the previously developed tables. Appendix F provides further detail on head-versus-flow table development.

Table 3-4
EMC and Sediment Load Monitoring Results

Site	SSC Flow-Weighted EMC (mg/L)			Estimated Daily Load (tons/day)			Estimated Annual Load (tons/year)
	Event 1	Event 2	Event 3	Event 1	Event 2	Event 3	
Previous Monitoring - 2013–2014							
Rainfall Totals (inches)	0.32	0.14	1.9	0.32	0.14	1.9	—
Carroll Canyon Creek (2014)	213	120	284	3.3	2.62	24.5	112 [a]
Carmel Valley Creek (2014)	39.2	14	8.24	0.93	0.14	0.2	4.66 [a]
Los Peñasquitos Creek (2014)	3.03	2.27	10.1	0.048	0.0487	1.69	6.54 [a]
Total WMA Estimated Loads	**—**	**—**	**—**	**4.28**	**2.81**	**26.4**	**123**
Previous Monitoring - 2014–2015							
Rainfall Totals (inches)	1.99	1.44	0.16	1.99	1.44	0.16	—
Carroll Canyon Creek (2015)	381	235	75.6	44.4	33.5	2.6	376 [b]
Carmel Valley Creek (2015)	5.48	10.2	10.6	0.198	0.902	0.041	5.32 [b]
Los Peñasquitos Creek (2015)	11	6.74	1.97	10.4	4.67	0.0855	70.7 [b]
Total WMA Estimated Loads	—	—	—	**55.0**	**39.1**	**2.73**	**452**
Current Year Monitoring - 2015–2016							
Rainfall Totals (inches)	1.55	0.49	0.9	1.55	0.49	0.9	—
Carroll Canyon Creek (2016)	2,030	197	307	1,283	15.2	25.8	9,270 [c]
Carmel Valley Creek (2016)	79.4	30.4	47	23.9	1.73	1.67	191 [c]
Los Peñasquitos Creek (2016)	373	17.1	4.94	2,004	6.11	0.75	14,100 [c]
Total WMA Estimated Loads	—	—	—	**3,311**	**23**	**28.2**	**23,500**

a. Based on the 11 wet days recorded during the 2013–2014 wet season.
b. Based on the 14 wet days recorded during the 2014–2015 wet season.
c. Based on the 21 wet days recorded during the 2015–2016 wet season.
EMC = event mean concentration; mg/L = milligrams per liter
NOTE: for 2014–2015 WMA Estimated Loads, previously the totals for Events 1, 2, and 3 were incorrectly reported as 57, 40.5, and 2.89 tons/day (the total annual estimate was reported correctly as 452 tons/year). This has been corrected to 55, 39.1, and 2.73 tons/day.

3.5 ANALYSIS OF RAINFALL INTENSITY, EMC, AND DAILY SEDIMENT LOAD

A traditional method of annual load estimation includes monitoring a few events (e.g., three per year), and taking the average of the results and applying that average to all wet days during the wet season (referred to herein as the "average estimation method"). This is the approach used to calculate the values in Table 3-4. Load estimation options are often limited to this type of approach based on the amount of data. This approach can potentially skew overall estimates in either direction. For example, as in the case for the 2015–2016 wet season, the high load estimate resulting from the unusually large January event drives up the average load. This elevated averaged gets applied to all wet days, regardless of storm size or intensity, potentially resulting in an overestimation.

In an effort to better represent load estimations for non-monitored storms, alternative approaches were explored last year by assessing the relationships among rainfall intensity, EMC, and sediment load. The analysis looked at whether EMC and/or sediment load values can be reasonably estimated based on rainfall intensity. This type of estimation approach allows for load estimations based on a measured parameter (e.g., rainfall) for a non-monitored storm, rather than simply applying an average of monitored events.

Analysis of data collected during FY14 and FY15 included rainfall intensities, EMC and sediment loads, and the 1-hour maximum rainfall intensity versus EMC and sediment load. Additionally, a regression analysis was used as a part of these analyses as a basis for discarding any statistical outlier data points. Data analysis indicated that there was a stronger relationship between maximum 1-hour rainfall intensity and sediment load compared to that of overall maximum rainfall intensity and sediment load. This approach and estimates are provided in greater detail in Appendix G.

When incorporating data collected during the 2015–2016 wet season, the strength of these relationships decreased and they were deemed unreliable for use in estimating loads. This change is most likely due to the unusually intense storms monitored this wet season, in particular the large, high-intensity storm in early January 2016. Moving forward, the relationships between rainfall intensity and loads, as well as other parameters, will continue to be assessed. The goal is to provide a reliable means of estimating loads for non-monitored events (referred to herein as the "rainfall intensity estimation method"). Figures 3-10, 3-11, and 3-12 present the maximum 1-hour rainfall intensity versus estimated daily sediment load, resulting trend curve, and associated coefficient of determination (R^2) for each monitoring location, based on FY14 and FY15 monitoring data.

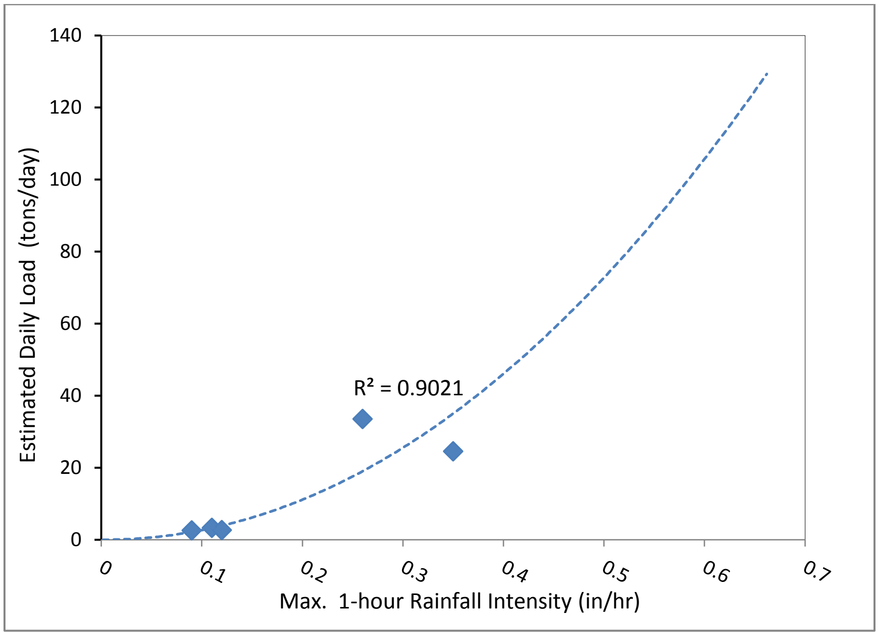


Figure 3-10
Maximum 1-Hour Rainfall Intensity vs. Estimated Daily Load—Carroll Canyon Creek

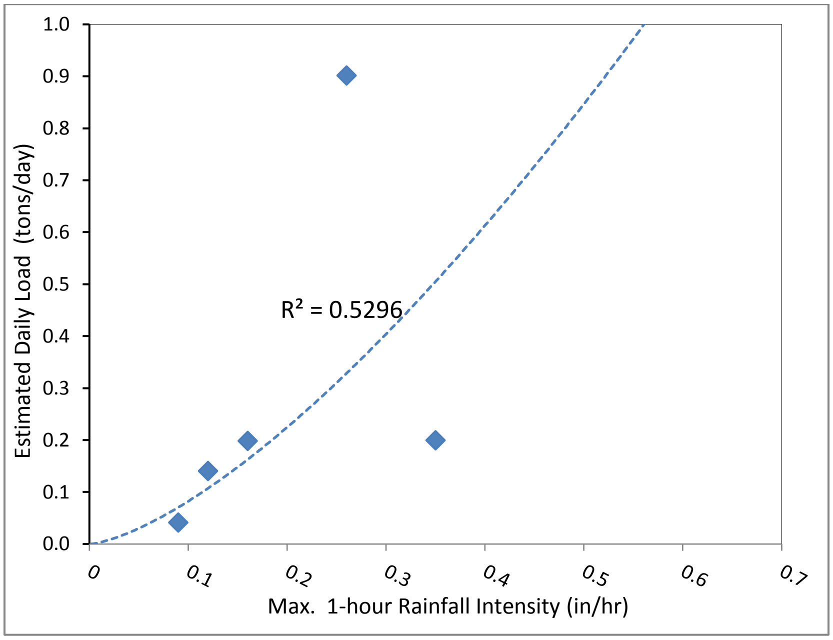


Figure 3-11
Maximum 1-Hour Rainfall Intensity vs. Estimated Daily Load—Carmel Valley Creek

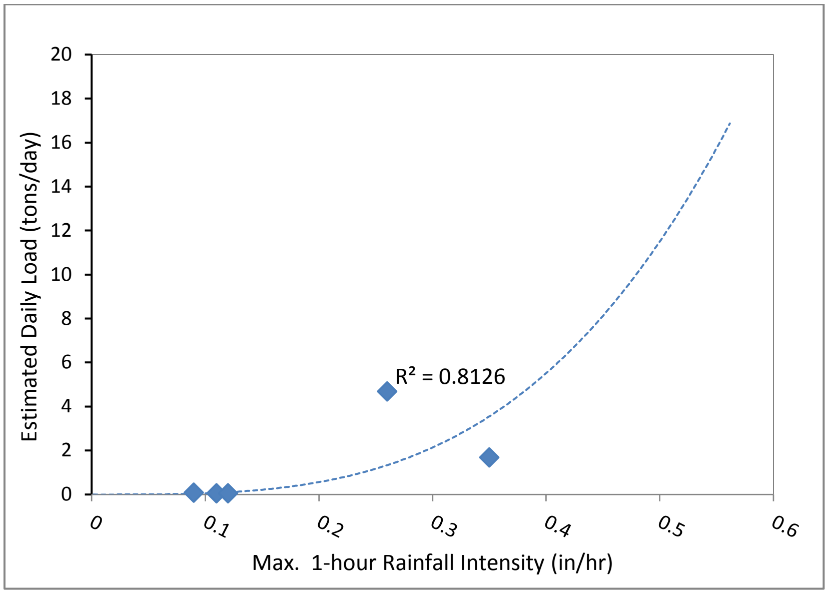


Figure 3-12
Maximum 1-Hour Rainfall Intensity vs. Estimated Daily Load—
Los Peñasquitos Creek

Table 3-5 summarizes the estimated load values based on the rainfall intensity analysis and resulting equations of the curves shown in Figures 3-10 through 3-12. Using these equations, annual load is estimated at 688 tons, which is approximately 24 percent of the 2,850-ton WLA. This method estimated total annual loads as follows:

- Carroll Canyon Creek: 554 tons (approximately 80 percent of the total 2015–2016 annual load and 19 percent of the WLA)
- Carmel Valley Creek: 6.4 tons (approximately 1 percent of the total 2015–2016 annual load, and 0.2 percent of the WLA)
- Los Peñasquitos Creek: 128 tons (approximately 19 percent of the total 2015–2016 annual load, and 4.5 percent of the WLA)

Given the difference between the average estimation method and rainfall intensity estimation methods, there is a clear need for further refinement of load estimation methods for non-monitored storms.

Table 3-5
Annual Load Estimate Method Comparison (FY15 and FY16)

Estimated Annual Loads	Average Estimation Method	Rainfall Intensity Estimation Method
Carroll Canyon Creek 2014–2015 Annual Load (tons/year)	250	376
Carmel Valley Creek 2014–2015 Annual Load (tons/year)	3.80	5.32
Los Peñasquitos Creek 2014–2015 Annual Load (tons/year)	30.6	70.7
Total Estimated Annual Load 2014–2015 (tons/year)	**284**	**452**
Carroll Canyon Creek 2015–2016 Annual Load (tons/year)	554	9,270
Carmel Valley Creek 2015–2016 Annual Load (tons/year)	6.37	191
Los Peñasquitos Creek 2015–2016 Annual Load (tons/year)	128	14,100
Total Estimated Annual Load 2015–2016 (tons/year)	**688**	**23,500**

3.6 ANALYSIS OF SSC AND FLOW

A preliminary analysis compared SSC measured during three wet seasons (2013–2016) and the corresponding flow rates for those samples. Results of this analysis are provided in Figures 3-13, 3-14, and 3-15.

Carroll Canyon Creek and Los Peñasquitos Creek showed similar SSC-versus-flow relationship strengths, with coefficient of determination (R^2) values of 0.66 and 0.69, respectively. These two creeks also showed the strongest relationships between maximum 1-hour rainfall intensity and load estimates, indicating that further in-depth data assessment may help determine a reliable method for predicting sediment transport behavior and estimating loads for non-monitored events. Building on the nine data points collected over the previous three years will provide a more robust data set, offering greater confidence in results of these assessments.

Carmel Valley Creek did not show a relationship between the two variables, likely because of the location of the sampling point, which is at the entrance to a relatively large pool where suspended material may settle out of the water column at variable rates when compared to suspension in flowing sections of other creeks. However, this sampling point is at the transition from the creek to the Lagoon, and is considered representative of what is actually entering the Lagoon. Given the conditions at this sampling point, further data assessment similar to that described above would present many challenges and may not be feasible at the current location. However, Carmel Valley Creek consistently delivers a small fraction of the annual load and is the lowest priority subwatershed on which to focus efforts and resources, so the same level of data analysis may not be needed on Carmel Valley Creek to inform management decisions.

Key elements of further data assessment should include gaining a better understanding of the impacts of varying sediment supply in each creek. The creeks go through changing supply conditions within storms, between storms, and throughout the years. These changes in supply have a direct impact on the ability to determine relationships among storm-related factors such as rainfall intensity and flow rates with sediment transport factors such as SSC and load estimations. In-depth analysis of monitoring data, such as development of flow-duration and load-duration curves, along with other data (e.g., pebble counts), will allow for an understanding of shear stress, probabilities of exceeding conditions, and other related factors that will facilitate reliable estimates of loads throughout the season and determine whether estimated loads are discharging to the Lagoon or settling out prior to reaching the Lagoon.

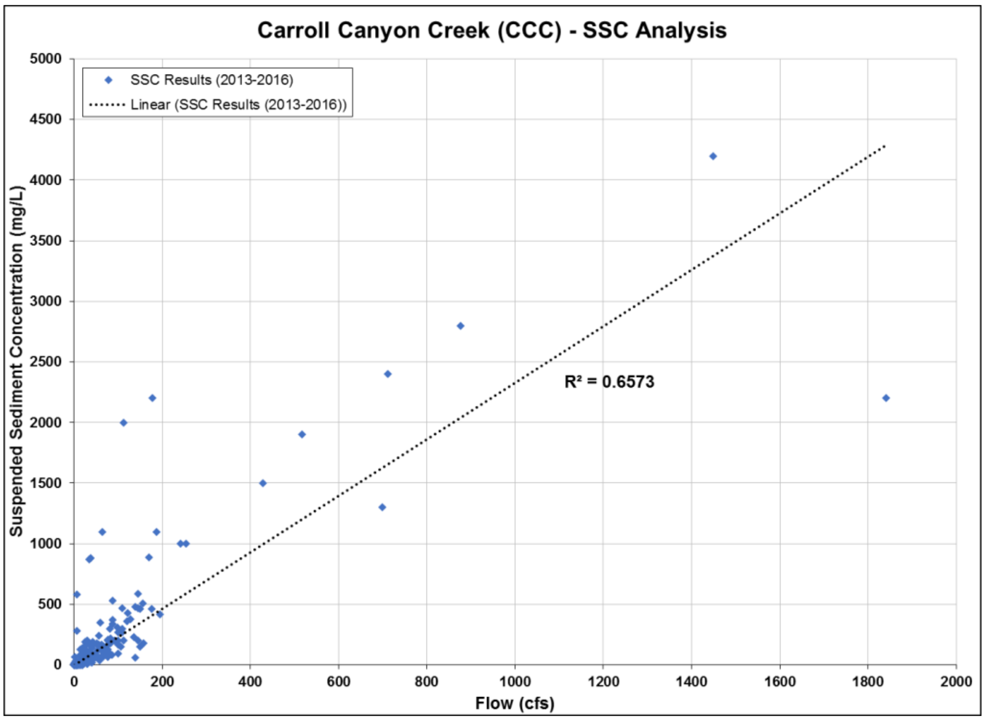


Figure 3-13
Flow Rate vs. SSC—Carroll Canyon Creek

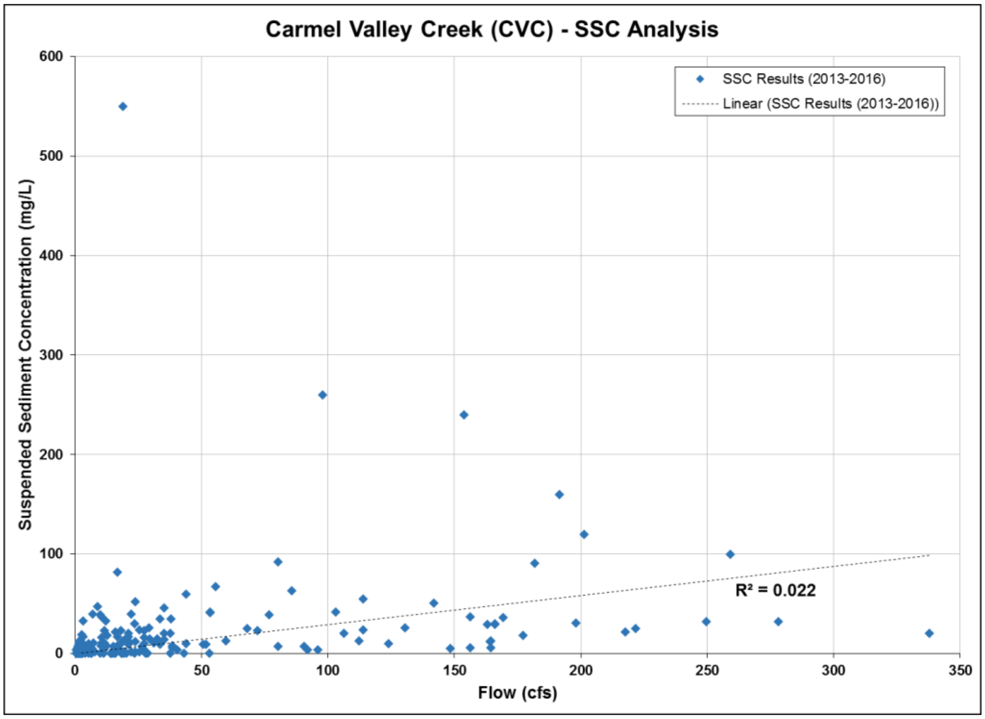


Figure 3-14
Flow Rate vs. SSC—Carmel Valley Creek

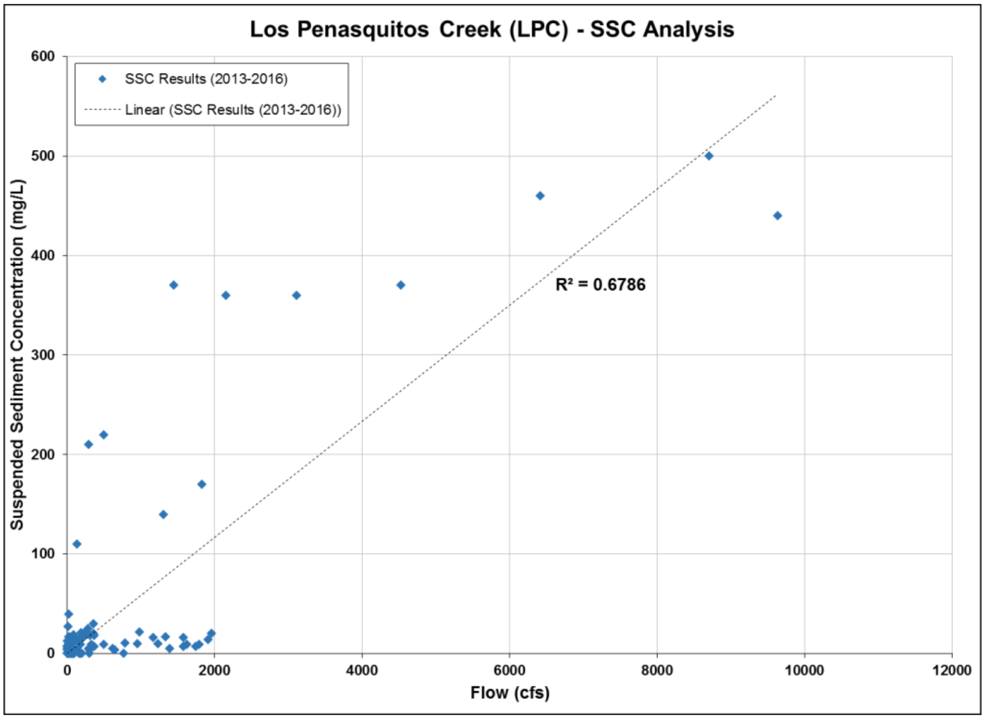


Figure 3-15
Flow Rate vs. SSC—Los Peñasquitos Creek

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4.0 CONCLUSIONS AND RECOMMENDATIONS

Data generated during this Monitoring Program provided additional insight into the sediment transport characteristics of Carroll Canyon, Carmel Valley, and Los Peñasquitos Creeks. The Monitoring Program was designed to answer the following questions:

- What is the sediment concentration at discrete times throughout a storm event hydrograph at the bases of the three major creeks that discharge to the Lagoon?
- What are the estimated current sediment loads from these creeks, and how do they compare to the Lagoon's WLA?
- How do the wet weather sediment delivery potentials of each creek compare with each other?

4.1 CONCLUSIONS

Data collected during this wet season indicated a shift in the dynamics of load inputs to the Lagoon, compared to results of previous years. This finding is likely due to the unusually intense storms that occurred this season that produced high flows, particularly in Los Peñasquitos Creek. Carroll Canyon Creek typically accounts for the majority (80 to 90 percent) of the sediment loads to the Lagoon. However, because of these high flows, Los Peñasquitos Creek accounted for approximately 60 percent of the total load this season. Carroll Canyon Creek accounted for approximately 39 percent and Carmel Valley Creek accounted for approximately 1 percent. The relative contributions measured this season differ greatly from data collected over the past two seasons and a previous estimate (Weston, 2009a) that Carroll Canyon Creek can supply up to 92 percent of the total sediment contribution to the Lagoon.

Despite the shift in relative loads observed this season, SSC results in samples collected from Carroll Canyon Creek were consistently greater than those in samples from both Carmel Valley and Los Peñasquitos Creeks. The results of this Monitoring Program further indicate that the high sediment concentrations observed in Carroll Canyon Creek may be originating farther upstream. Sediment concentrations from the other two creeks are relatively low compared to those in Carroll Canyon Creek, and under typical conditions, contribute a smaller portion of the total loading into the Lagoon.

Data collected during the three 2015–2016 wet weather events showed fluctuations of SSC that generally correlated with changes in flow. However, when compared to those of previous seasons, concentrations tended to be higher and to remain higher throughout the storm because of the unusually intense rainfall experienced during this season. In general, data collected from the 2013–2016 monitoring events (three seasons) indicated that SSC was higher at or just after the times that higher flows were recorded and during the rising limb of the hydrograph, as expected for sediment transport that is affected by sediment supply. Data collected during the 2013–2015 seasons at Los Peñasquitos Creek indicated that SSC was higher during the earlier portions of the hydrographs, and SSC was lower or not detected at the peak of the hydrograph. However, data collected during the 2015–2016 season showed higher sustained concentrations at Los Peñasquitos Creek throughout the storm, particularly for the large storm in early January 2016. This result may be due to the high flows releasing and carrying sediments previously entrained within the vegetation and streambed throughout the lower portion of Los Peñasquitos Creek.

The varied levels of SSC relative to flow, as identified by the SSC versus flow analysis, can be explained by various factors. Carmel Valley and Los Peñasquitos Creeks are characterized by lower gradients, armored banks, and thick vegetation. These features are often associated with supply-limited creeks, where the water column is left deprived of sediment even though the creek experiences significantly higher flow. This is particularly true of Los Peñasquitos Creek, where storm event flows are longer and up to six times greater than in Carroll Canyon Creek. Conversely, Carroll Canyon Creek is generally characterized by exposed, erodible banks and less vegetation within the channel and experiences higher velocities compared to Los Peñasquitos and Carmel Valley Creeks.

The relationship between SSC and flow was analyzed to determine their correlation. While SSC was generally shown to increase with higher flows, this correlation showed moderate to weak relationships at the Carroll Canyon and Los Peñasquitos Creek monitoring locations, where R^2 values were 0.65 and 0.67, respectively. Carmel Valley Creek data did not exhibit a reliable relationship between the two parameters. Further analysis of this relationship including other factors such as rainfall intensity, onset of flow, antecedent dry periods, and others may contribute to improved accuracy of estimating loads.

Additional analysis evaluated whether estimated sediment loads for non-monitored events can be based on rainfall intensities. Based on limited data (6 events) collected during the 2013–2014 and 2014–2015 wet seasons, the limited amount of data collected to date indicated that a causal relationship may exist between the maximum 1-hour rainfall intensity and the estimated sediment load for each creek. When incorporating data from the 2015–2016 season, these relationships were not as strong and were not considered to be a reliable avenue for load estimation. This result is likely because of the unusual and intense nature of storms this season, in particular, the large January 2016 event.

Using an average load applied to all non-monitored wet days can misrepresent non-monitored storms. In the case of this season, the unusually high loads for the January 2016 event skew the average to higher loads, which is then applied to storms that are much smaller and/or less intense. To provide some level of comparison of load estimation methods between seasons, the best-fitting curve equations developed over the 2013–2014 and 2014–2015 wet seasons for Carroll Canyon, Carmel Valley, and Los Peñasquitos Creeks were used to estimate loads for the 2015–2016 season. Using this method for estimating the annual sediment load for the 2015–2016 wet season resulted in a total contribution of 688 tons per year compared to the estimated total of 23,500 tons per year calculated using the average of the three monitored events applied to all wet days. Although this alternative assessment approach is in a preliminary stage, this approach, or a similar one, may ultimately provide a more realistic assessment of the annual load. However, the large discrepancy between the load estimates currently using these two methods highlights the clear need for further data assessment to refine load estimations for non-monitored events.

This relationship, along with other alternative estimation approaches, will continue to be assessed moving forward.

4.2 RECOMMENDATIONS

Following are recommendations for the monitoring planned for fiscal year (FY)17 and potentially for later monitoring years as well.

- Continue to monitor at the base of each of the three creeks discharging to the Lagoon. Compliance monitoring for the Sediment TMDL is now required under the WQIP for the Los Peñasquitos WMA (Amec Foster Wheeler, 2015). This includes not only continuing to monitor consistent with this 2015–2016 program, but also monitoring Lagoon vegetation that will begin in fall 2016, as required by the Sediment TMDL. Data gathered under this program will address the goals of both the Sediment TMDL and WQIP.
- Continue to assess storm event load and EMC compared to maximum 1-hour rainfall intensity, a relationship that was shown to be relatively strong for two of the three monitoring locations based on data from 2013–2015. When data were included from 2015–2016, the strength of the relationship decreased, which could be due to the anomalous storms this year, particularly those in early January 2016. Over time, such an assessment may more accurately estimate the annual load, as it is based on empirical data using monitored and non-monitored storm characteristics and direct relationships observed during monitored events, rather than assuming consistent characteristics of every storm within a given year (as assumed when multiplying average load by the number of wet days).
- Perform detailed data analysis using applicable sediment transport methods by utilizing available hydrologic, hydraulic, and geomorphic data for the study reaches. Calibrate the sediment transport prediction with sediment loads collected through previous monitoring efforts. Assessment of data collected during this program over the past three years may be used to develop flow-duration and load-duration curves, assess shear stress within the creeks, and ultimately support sediment transport predictions that provide more accurate annual load estimations.
- Continue to monitor long-term flow throughout the entire year (including the dry season) to provide a data set that (a) increases the accuracy of annual load calculations, (b) increases opportunities to manually measure flows used to validate the head vs. flow tables, and (c) provides greater insight into how these three creeks respond to storm events and the variability throughout the season.
- Continue cross-section surveys at the beginning and end of each wet season to verify or increase the accuracy of head versus flow estimates. Cross-sectional surveys may also be used to assess changes in channel morphology.
- Continue to gauge higher flows during storm conditions to improve head versus flow table verification, which can be done by using a StreamPro ADCP flow

monitor. These measurements, along with stream gauging directly in the creek when it is safe to do so, should be conducted on multiple occasions throughout the season (as budget allows), to validate and calibrate the head-versus-flow table.

- Continue attempting bedload sampling using manual samplers. Attempts to collect bedload samples during storm events monitored between 2012 and 2016 were largely unsuccessful. This failure may be related to the accumulation of debris in the trap samplers. Manual bedload samplers used during the storm event may provide more accurate samples of the bedload transport, because field staff can target specific portions of the creek at various points in the hydrograph (as safe access allows) and accurately time the measurement period. This method provided minimal successful samples in 2015-2016; however, they were successful compared to repeated failures or uncertainties associated with the portable samples. Continued manual bedload sampling efforts will build on data collected this season and provide important data to relate suspended sediment and bedload sediment loads.

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APPENDIX A
LOS PEÑASQUITOS LAGOON WMA SEDIMENT TMDL MONITORING FINAL COMPLIANCE MONITORING PLAN

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LOS PEÑASQUITOS LAGOON
TOTAL MAXIMUM DAILY LOAD
SEDIMENT MONITORING
FINAL COMPLIANCE MONITORING PLAN

Submitted to:

Submitted by:
Amec Foster Wheeler Environment & Infrastructure, Inc.
San Diego, California

June 2015

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
303(d) List	Clean Water Act (CWA) Section 303(d), List of Water Quality Limited Segments
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
ASTM	ASTM International (formerly known as American Society for Testing and Materials)
AVB	area-velocity bubbler
Caltrans	California Department of Transportation
CC	Carroll Canyon (used for Site ID)
COC	chain of custody
CV	Carmel Valley (used for Site ID)
CWA	Clean Water Act
EDD	electronic data deliverable
ELAP	California Environmental Laboratory Accreditation Program
GPS	Global Positioning System
HASP	Health and Safety Plan
ID	identification
Lagoon	Los Peñasquitos Lagoon
LCS	laboratory control sample
LP	Los Peñasquitos (used for Site ID)
MCV	Manual of California Vegetation
mg/L	milligrams per liter
MLS	mass loading station
mm	millimeters
MOU	Memorandum of Understanding
MQO	measurement quality objective
NA	not applicable
NWS	National Weather Service
OAL	California Office of Administrative Law
QA	quality assurance
QA/QC	quality assurance and quality control
QC	quality control
RL	reporting limit

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Regional Board	San Diego Regional Water Quality Control Board
Sediment TMDL	Resolution Number R9-2012-0033: *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Total Maximum Daily Load for Sedimentation in Los Peñasquitos Lagoon*
SOP	standard operating procedure
State Board	State Water Resources Control Board
SSC	suspended sediment concentration
TMDL	total maximum daily load
TSS	total suspended solids
TWAS	temporary watershed assessment station
USEPA	United States Environmental Protection Agency
VDC	volts direct current
Weck	Weck Laboratories, Inc.
WMA	Watershed Management Area

1.0 INTRODUCTION

1.1 BACKGROUND

The Los Peñasquitos Watershed Management Area (WMA) encompasses an approximate 94-square-mile drainage area in west-central San Diego County. Within the WMA are the City of Poway, a portion of the City of Del Mar, unincorporated areas of San Diego County, and the City of San Diego communities of Mira Mesa, Scripps Ranch, Carmel Valley, and Sorrento Valley.

The WMA drains a highly urbanized region that supports a variety of water supply, economic, recreational, and habitat-related beneficial uses. The WMA includes four subwatersheds: Carmel Valley Creek, Los Peñasquitos Creek, Carroll Canyon Creek, and Los Peñasquitos Lagoon (the area immediately surrounding the lagoon). For the purposes of this monitoring plan, the three major streams (Carmel Valley Creek, Los Peñasquitos Creek, and Carroll Canyon Creek [also known as Soledad Canyon Creek]) will be referred to collectively as the subwatersheds that are included for monitoring purposes, as these are the primary conveyances that ultimately discharge into Los Peñasquitos Lagoon (Lagoon). The subwatershed of Los Peñasquitos Lagoon is not included in the monitoring under this program.

The Lagoon has incurred a number of anthropogenic disturbances, which have resulted in excessive sedimentation and the gradual degradation and loss of the estuarine habitat. Accordingly, the Lagoon was placed on the 2006 Clean Water Act (CWA) Section 303(d) List of Water Quality Limited Segments (303(d) list) for sedimentation and siltation on June 28, 2007. Under the 303(d) listing, beneficial uses that are most impaired by sedimentation are estuarine habitat and preservation of biological habitats of special significance. Sedimentation in the Lagoon also restricts tidal flows between the Lagoon and the ocean, and degrades critical saltmarsh habitats.

On June 13, 2012, the San Diego Regional Water Quality Control Board (Regional Board) adopted Resolution Number R9-2012-0033, *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Total Maximum Daily Load (TMDL) for Sedimentation in Los Peñasquitos Lagoon* (hereinafter referred to as the Sediment TMDL). The Sediment TMDL is designed to restore the Los Peñasquitos Lagoon to its mid-1970s condition. The Sediment TMDL has been approved by the State Water Resources Control Board (State Board) and was approved by the California Office of Administrative Law (OAL) on July 14, 2014, and the United States Environmental Protection Agency (USEPA) on October 30, 2014. This Compliance Monitoring Plan will be adopted to evaluate progress toward meeting TMDL targets and sediment reduction goals.

The Sediment TMDL will be incorporated into the San Diego Regional Municipal Separate Storm Sewer System (MS4) Permit (MS4 Permit) (Order Number R9-2013-0001) (Regional Board, 2013) and will be included in the Water Quality Improvement Plan for the Los Peñasquitos WMA. The requirements of the Sediment TMDL and the MS4 Permit will be addressed in the Los Peñasquitos WMA Water Quality Improvement Plan. The Sediment TMDL monitoring will include watershed and vegetation monitoring. Compliance monitoring requires quantitative evaluations of the sediment load from the watershed to the Lagoon, comparison of results with TMDL numerical targets, assessment of progress toward TMDL goals, consistent reporting of sedimentation levels to Responsible Agencies, and projections of the Lagoon's vegetative habitat diversity and response to decreasing sediment loads.

The Responsible Agencies that are party to the development of the Water Quality Improvement Plan for this WMA are:

- City of Del Mar
- City of Poway
- City of San Diego
- County of San Diego
- California Department of Transportation (Caltrans)

Caltrans has partial responsibility for the implementation of the Sediment TMDL along with the Comprehensive Load Reduction Plan (CLRP) for the TMDL for indicator bacteria, *Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001 (Regional Board, 2010), referred to as the Bacteria TMDL. Caltrans is therefore included as a Responsible Agency, but is not listed in the MS4 Permit as a Copermittee. Caltrans is under a separate storm water permit from the State to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters (Order No. 2012-0011-DWQ and Amendment Order No. WQ 2014-0077-DWQ) (State Board, 2014 and 2013). Caltrans is voluntarily participating in the development of several Water Quality Improvement Plans across the San Diego region.

Figure 1-1 shows the Los Peñasquitos WMA, subwatershed boundaries, and jurisdictional boundaries.

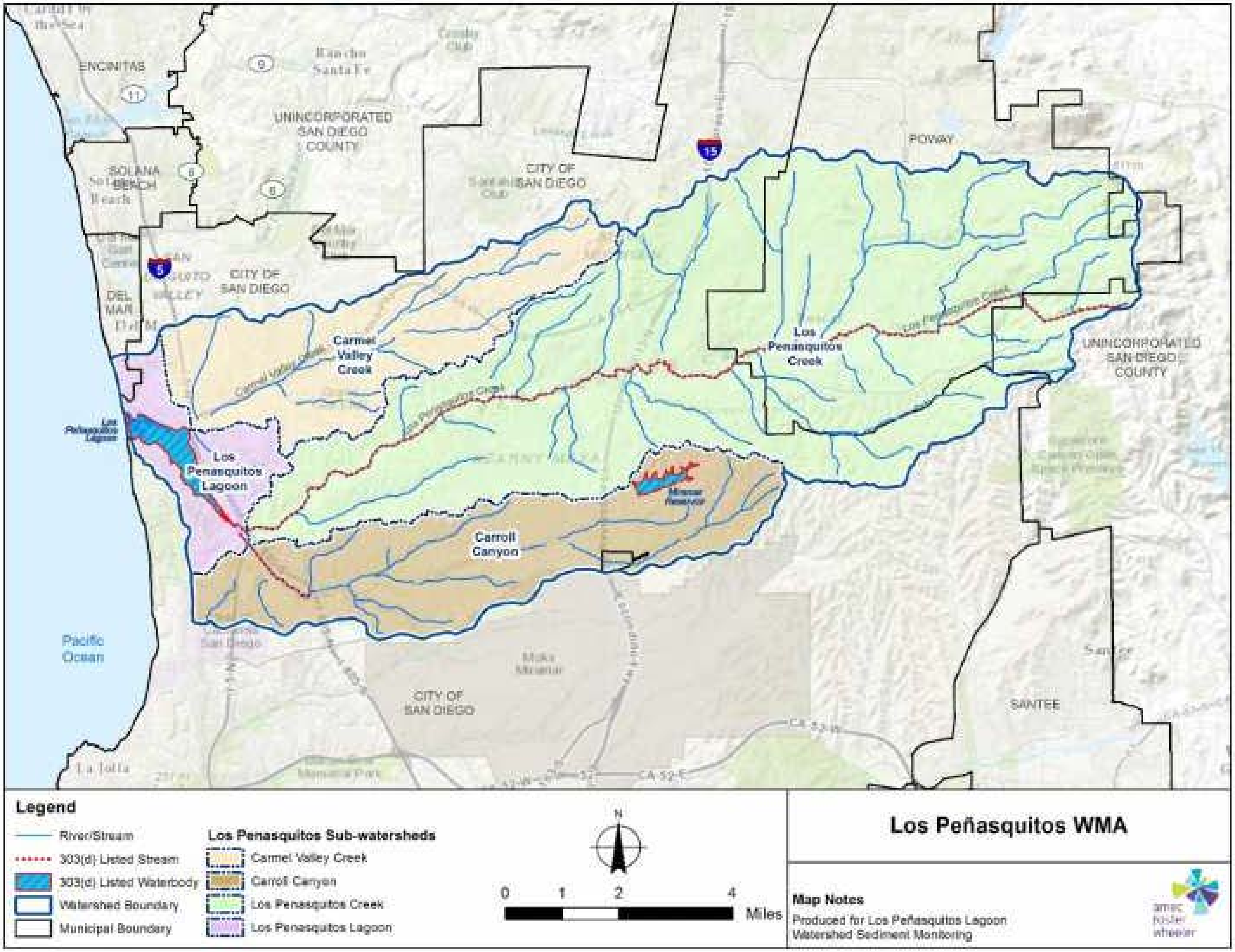

Figure 1-1.
Los Peñasquitos WMA

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1.2 MONITORING OBJECTIVES

The purpose of this project is to monitor suspended sediment concentrations (SSC) and estimate wet weather sediment loads in each of the watershed's three major tributary creeks during wet weather. This TMDL Compliance Monitoring Program is designed to answer the following questions:

- What is the ecological health of the Lagoon?
- How is the Lagoon's health changing with time?
- What is the progress toward ultimate restoration of the Lagoon?
- What additional regulatory and implementation actions are needed to restore the Lagoon?

This information will allow Responsible Agencies to assess their progress toward meeting milestones and final load reduction goals in accordance with the TMDL compliance schedule.

1.3 PROJECT ORGANIZATION

The City of San Diego is the municipal government agency that oversees the project. The other municipalities within the WMA will contribute to the program through a Memorandum of Understanding (MOU). The City of San Diego has assigned two staff members to provide project oversight:

- Ruth Kolb will be responsible for policy-related and special study projects.
- Andre Sonksen will be responsible for compliance-related projects at the City of San Diego. Based on those roles, they will both provide project oversight.

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) will coordinate sample collection, laboratory analysis, data management, data analysis, and reporting. Amec Foster Wheeler has assigned project responsibilities to several staff members:

- Jeremy Burns will serve as the Amec Foster Wheeler Project Manager, and will be responsible for project coordination and development, scheduling, budget management, and oversight of all project plans and reports.
- Kiernan Brtalik, the Amec Foster Wheeler Project Coordinator and Field Sampling Manager, will be responsible for implementing the monitoring activities, coordinating laboratory work, and developing the project report.
- Carla Scheidlinger will be the Amec Foster Wheeler lead for vegetation monitoring and mapping.
- Dr. Theodore VonBitner will be the Amec Foster Wheeler Quality Assurance Officer, with responsibility for the project quality assurance (QA) and quality control (QC) procedures used during sampling, laboratory analysis, data management, and data analysis.

- Jesse Davis, the Amec Foster Wheeler Health and Safety Officer, will be responsible for implementing the project health and safety plan and related practices.
- Dr. Habib Matin, as part of the Amec Foster Wheeler team, will provide senior principal-level oversight and review during development of this monitoring plan, implementation of sampling, data analysis, and reporting.
- Liz Collins is the manager of Amec Foster Wheeler's material testing laboratory, which will conduct particle size distribution analyses for bedload samples; she will ensure that samples are analyzed in accordance with the methods and QA requirements outlined in this monitoring plan.

Weck Laboratories, Inc. (Weck), located in City of Industry, California, will be responsible for SSC analysis:

- Hai Van Nguyen is the Weck Project Manager and will ensure that samples are analyzed in accordance with the methods and QA requirements outlined in this monitoring plan. The Weck laboratory QA/QC manual is in Appendix A.

Figure 1-2 shows the project organization.

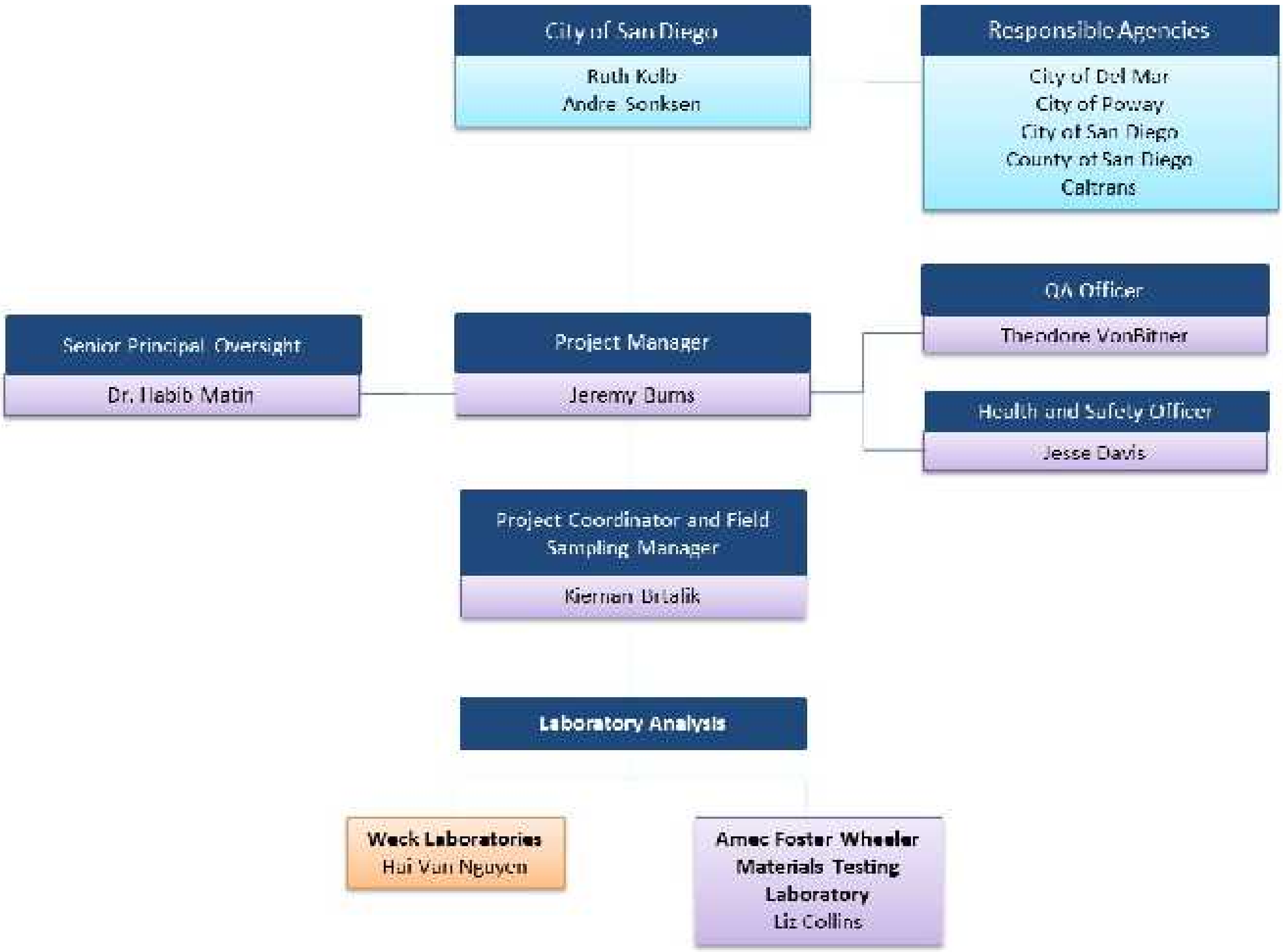

Figure 1-2.
Project Team Organization

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2.0 DESCRIPTION OF MONITORING LOCATIONS

Water quality and sediment will be sampled at one location at the base of each of the three creeks within the project boundary. The monitoring locations are shown in Figure 2-1. Vegetation monitoring will be conducted within the Lagoon and is discussed in detail in Section 5.0

Site names, identifications (IDs), and the geographic coordinates of each creek monitoring location are listed in Table 2-1.

Table 2-1.
Los Peñasquitos WMA Compliance Monitoring Locations

Site Name	Site ID	Latitude	Longitude
Carmel Valley Creek	CV	32.9297	-117.2412
Los Peñasquitos Creek	LP	32.9046	-117.2229
Carroll Canyon Creek	CC	32.8981	-117.2212

Carmel Valley Creek

The Carmel Valley Creek monitoring location is at a culvert that runs below Sorrento Valley Road, south of its intersection with Carmel Valley Road. Long-term flow monitoring data and stream rating curves from this location were incorporated into this monitoring program.

Los Peñasquitos Creek

The Los Peñasquitos Creek monitoring location is the existing San Diego Copermittee Mass Loading Station (MLS) under the Receiving Waters and Urban Runoff Monitoring Program, per Regional Board Order R9-2007-0001 (Regional Board, 2007). This site is at the bridge crossing of Vista Sorrento Parkway, near Sorrento Valley Boulevard. Long-term flow monitoring data and stream rating curves from this location were incorporated into this monitoring program.

Carroll Canyon Creek

The Carroll Canyon Creek monitoring location is approximately 600 feet upstream of the historical San Diego Copermittee Temporary Watershed Assessment Station (LPC-TWAS-1), near 10655 Roselle Street. The TWAS site itself is highly vegetated and full of debris; this condition makes it unsuitable for flow monitoring. Streambed assessments (volumetric sampling, pebble counts, and photo documentation) were conducted approximately 700 feet upstream of this station, where the stream returns to a natural bottom prior to entering the trapezoidal concrete channel. Long-term flow monitoring data and stream rating curves from this location were incorporated into this monitoring program.

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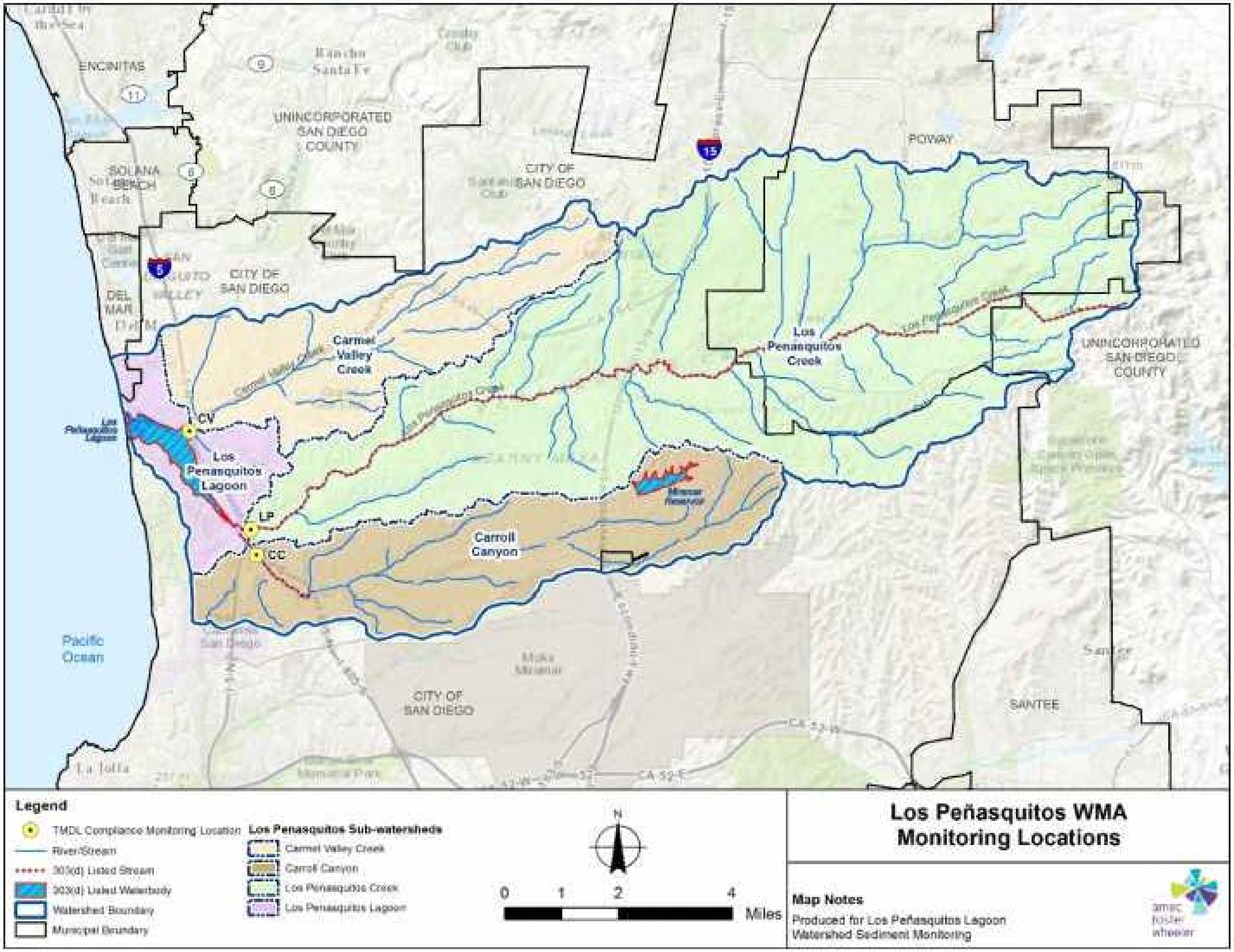

Figure 2-1.
Los Peñasquitos WMA Compliance Monitoring Locations

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3.0 SAMPLING METHODOLOGY

3.1 PRE-STORM SEASON SAMPLING

Sections 3.1.1 through 3.1.3 describe sampling activities for this compliance monitoring program that will be conducted before the wet season (October 1 through April 30) begins.

3.1.1 Volumetric Streambed Sampling

Volumetric stream bed sampling will be conducted at each monitoring location on one occasion prior to the wet season. Two stream bed material samples will be collected at a representative portion along a cross-sectional transect at each monitoring location. Samples will be collected in an area approximately 12 inches by 12 inches in size, and dug down approximately 12 inches, yielding a sample size of approximately 1 cubic foot. If an armor layer of large cobble exists that is distinctly larger than the underlying material grain size, the layers will be sampled separately. Samples will be placed in 5-gallon buckets and will be labeled appropriately. Samples will be transported to Amec Foster Wheeler’s materials testing laboratory and analyzed for particle size distribution.

3.1.2 Pebble Count Before Wet Season

A pebble count will be conducted at each monitoring location prior to the wet season. This data point will be used as the baseline for the season and as a comparison point for the subsequent pebble counts that will be conducted after monitored storms and after non-monitored major storms throughout the wet season. It is anticipated that a total of eight pebble counts will occur throughout the season. The method used will be the sampling frame and template method developed by Bunte and Abt (2001a and 2001b), which uses a minimum of 100 particles and half-phi template (gravelometer) to measure particle sizes. A tape measure will be used to space three sampling transects across riffle sections at each location. The pebble count represents the size of material in the area and can be used to assess the representativeness of the volumetric samples. Site locations will be physically marked and recorded using Global Positioning System (GPS) for subsequent pebble counts throughout the wet season.

3.1.3 Photodocumentation

The stream bed will be documented with photographs taken during dry weather volumetric sample collection and initial pebble counts. Photos will be taken of the stream bed using a 1-square-foot frame placed in three designated locations within each stream. These same points will be photographed during subsequent pebble counts, based on pebble count site markings.

3.2 WET WEATHER MONITORING

Wet weather monitoring will occur during three qualifying rainfall events (storms forecast to produce greater than 0.20 inch of rainfall) during each wet season. Monitoring will consist of pollutograph and bedload sampling, post-storm pebble counts, photodocumentation, and long-term flow monitoring.

3.2.1 Pollutograph Sampling

During each monitored event, water samples will be collected for SSC analysis. A target of 10 pollutograph samples will be collected at each monitoring location (as listed in Table 2-1) during each of the three monitored events. More samples may be collected if storm duration is prolonged. Sampling will be conducted either manually or with automated samplers at each monitoring location. Samples will be collected at equal time intervals or at times adjusted to capture multiple peaks throughout the storm duration. Flow data will be collected throughout the wet season at each monitoring location (Section 3.2.5).

3.2.2 Bedload Sampling

Samplers will be installed per United States Department of Agriculture guidelines (Bunte et al., 2007). Attempts will be made to collect bedload samples during monitoring events at the three monitoring locations. Previous sample collection by Amec Foster Wheeler in other City of San Diego project locations (Flanders Canyon Creek [2011–2012] and Carroll Canyon Creek [2011–2013]) has been successful on limited occasions; however, based on best professional judgment for these previous monitoring efforts, bedload sample collection may be unsuccessful for a given storm event. For the aforementioned studies, the cause of sample failure is unknown. It is hypothesized that flows may redirect around bedload samplers because of stream hydrology or sample exclusion caused by large cobbles.

For these challenged bedload sampling locations, efforts will be made to move the in-stream samplers around in the channel if flows appear to be bypassing the samplers. Bedload samples will be collected using a bedload trap sampler installed at two points across the channel at each site. If primary channels are narrow, only one sampler may be used. If a sampler fills with material during the storm and it is safe to access it, attempts will be made to change the mesh bag. These samples will provide data on material that is moving along the stream bed during storms and is not suspended in the water column. If collection is successful, bedload samples will be analyzed for particle size distribution.

3.2.3 Post-Storm Pebble Count

A pebble count will be conducted at each monitoring location after each monitored storm and after major storms throughout the wet season, as budget permits. See Section 3.1.3 for procedure details.

3.2.4 Photodocumentation

The stream bed will be documented with photographs taken during post-storm pebble counts. Photographs will be taken at the same locations that were photographed during the dry weather volumetric sampling. These photographs will provide a time series of stream bed material changes throughout the season. See Section 3.1.4 for procedure details.

3.2.5 Long-term Flow Monitoring

In addition to storm event monitoring, flow will be measured continuously at each of the monitoring locations. Flow data will be logged at 1-minute intervals during storm events and at 15-minute intervals during non-storm events. Data will be downloaded, twice per month, to confirm that data are being recorded and that the equipment is functioning properly.

3.3 WET WEATHER MONITORING PREPARATION AND LOGISTICS

3.3.1 Weather Tracking

Weather will be tracked for monitoring purposes throughout the wet season (October 1 through April 30). Throughout the wet season, several sources of weather information will be monitored continuously; however, the National Weather Service (NWS) webpage will be the primary source used to determine whether and when to mobilize monitoring crews.

3.3.2 Storm Selection Criteria

The following criteria will be used to determine whether to mobilize, on the basis of forecast data from the NWS, for an impending storm event:

- Storm forecasts must meet criteria at least 48 hours prior to the onset of rainfall;
- A storm must be forecast to produce at least 0.20 inch of rainfall;
- The probability of precipitation must be greater than 60 percent; and
- A storm event must be preceded by at least 72 hours of dry conditions (less than 0.10 inch of precipitation).

The Field Sampling Manager and/or Project Manager may modify the criteria on a storm-by-storm basis in consultation with the City of San Diego.

3.3.3 Staffing and Mobilization

Staffing Plan

Monitoring both the flow characteristics and water quality of storm water requires considerable planning before any actual rain falls. Obtaining representative samples and complete storm data is possible only with trained and alert field teams. The uncertainty of weather forecasts coupled with abrupt changes in the weather can greatly alter the expected workload. It is critical to plan and prepare in advance as many aspects of the field work as possible. A staffing plan that designates personnel and specifies the equipment required for each facet of monitoring will be completed as soon as a potential event has been forecast.

Each monitoring team will consist of two field individuals. The staffing plan will include the following:

- Personnel assigned to each position
- Shift (e.g., startup and relief) and monitoring location designations
- Equipment mobilization requirements
- Communication channels

No field teams will be mobilized for a storm event that would require field sampling or laboratory analysis on federal holidays.

Staffing Positions and Personnel

Storm monitoring tasks require a variety of skills. Amec Foster Wheeler personnel will be assigned to the following positions:

- Project Manager
- Field Sampling Manager
- Field technicians

Project Manager

During storm events, the Project Manager will monitor the status of the storm conditions and communicate with the Field Sampling Manager. The Project Manager must be able to obtain and interpret the most recent weather forecasts to estimate the appropriate timing and duration of the storm. This information will be used to determine the time span between pollutograph sample collections and to make informed decisions regarding the storm status. It is also the responsibility of the Project Manager to notify all personnel of shift start- and end-time changes.

The assigned Project Manager has excellent decision-making and dispatching skills as well as an understanding of the project requirements. If the Project Manager is not available during the storm event, an individual with similar skills will be assigned; however, the Project Manager will be available to answer questions.

Field Sampling Manager

This position requires an understanding of project requirements, sampling procedures, and equipment operations. The Field Sampling Manager must be able to troubleshoot most of the common problems that could be experienced by any of the field teams. The Field Sampling Manager will lead sampling activities, monitor the ability of field teams to safely and effectively complete their shifts, and communicate frequently with the Project Manager to prioritize tasks, request relief teams as needed, and provide onsite weather observations.

The Field Sampling Manager is a technically skilled field supervisor and is the most experienced member of the field team.

Field Technicians

Field technicians are field personnel trained in storm water sample collection and health and safety procedures. They will assist the Field Sampling Manager in storm water sample collection.

Equipment Mobilization

Equipment needed for storm water sampling includes automated sampling equipment, sample containers, safety equipment, personal rain gear, and storm kits. The necessary equipment will be loaded into the appropriate vehicles early in the storm preparation sequence. During the monitoring season, field crews will use safety equipment, personal rain gear, and other monitoring location maintenance equipment.

Table 3-1 lists the contents of a field technician's "field kit."

Table 3-1.
Storm Kit Equipment and Mobilization List

Storm Kit Equipment List	Mobilization List
Flashlights or headlamps	Field notebook
High-quality alkaline batteries for lamps	Paper towels
Maps of all required areas	Cellular phone
Pencils and indelible markers	Personal rain gear
Desiccant (packages and jar)	Digital or disposable camera
Diagonal clipper	Safety gear (see Appendix B, Health and Safety Plan)
Electrical tape	Spare sample labels
Cable ties (assorted sizes)	Sample control paperwork
Utility knife	Spare sets of 1-liter bottle suites for carousel
Ziploc® plastic bags (assorted sizes)	Automated sampling equipment not existing onsite (including appropriate spare batteries)
Nitrile gloves	
Full set of keys (if necessary)	Spoons, trowels, and shovels
	Bedload trap equipment and spare bedload trap nets

Communication Channels

Communication channels must be established for personnel to contact each other before and during the event. The project field notebook will include lists of home, work, and cellular telephone numbers of the Amec Foster Wheeler field team and the work telephone numbers of the primary laboratory contacts and City of San Diego personnel. Cellular telephone communication links to field teams are essential for efficient storm water monitoring because the Project Manager and the Field Sampling Manager will need to track the location and workload of each field team and to prioritize tasks.

Training of Field Personnel

Field personnel will be properly trained in the use of the monitoring equipment and in all appropriate health and safety protocols (Appendix B). Specifically, the following elements will be included in the training of all field personnel:

- Review of health and safety plan
- Classroom training
- Field training (if necessary)

Each field team member will review the Health and Safety Plan (HASP) and consult with the Field Sampling Manager for any questions before mobilization. Classroom and field training will be provided prior to the first monitored storm event to inform field personnel of the project-specific objectives.

3.3.4 Station Preparation

Field Equipment Installation

Each field installation team will consist of two technicians who are knowledgeable about using the storm water samplers. The technicians will also be familiar with equipment siting requirements. The team will deliver and install the enclosure, monitoring equipment, intake tubing, and flow monitoring sensors prior to the onset of the storm season. Any equipment that is not installed or stored on site will be mobilized during pre-storm activities.

Determination of Sampling Time Intervals

Water quality monitoring using pollutograph sampling requires an understanding of forecast storm length to determine the proper time intervals between the targeted ten samples. If automated samplers are used to collect pollutograph samples, the proper time interval must be entered into the automated samplers before the storm starts. Although 10 samples are targeted to be collected throughout the storm, achievement of that target is based on actual storm duration. If the storm ends much earlier than forecast, 10 samples may not be collected; if the storm runs longer than anticipated, more than 10 samples may be collected.

This project requires individual samples per analysis based on analytical methods. One-liter containers will be used to collect water samples for SSC; one container will be filled at each sample collection interval.

Preparation of Automated Equipment

A maintenance program will be performed on each automated sampler before each wet weather event during each wet season. Maintenance will include checking the performance of all the equipment, checking power supplies, inspecting and clearing intake structures, checking the status of the instrumentation desiccant, and performing any necessary equipment repairs to keep the monitoring equipment operational.

Field teams will make sure that the flow-monitoring equipment at all flow-monitoring locations is functional. The equipment will be inspected and then its functionality verified on the field forms.

If automated samplers are used for sample collection, field teams will check that the automated sampler has been reset and that it has been programmed to collect samples based on specified time intervals. The automated sampler will be programmed to collect 10 samples.

Sample Handling

Once samples are collected, the sample bottles will be iced, with sufficient ice maintained around the bottle to ensure that the sample temperature is 6 degrees Celsius or less.

General Inspection of Monitoring Location

The general suitability for installation of monitoring equipment will be surveyed at each location and assessed to determine whether there is debris or trash that could clog or foul equipment. The equipment will be physically observed for potential problems, such as a damaged cable or a kinked hose. When access allows, intake strainers and flow sensors will be visually checked and cleared of debris, if necessary.

3.3.5 Documentation

Each time a monitoring location is visited (whether during a storm or not), the visit will be recorded in the field log. The field data sheets in Appendix C are a guide to ensure that all the required data are obtained. Occasional checks of equipment parameters, such as date, time, and current water level (when safe access allows), will be conducted to verify that the data being recorded is accurate and that any deviations can be addressed in a timely fashion.

The following information will be entered during monitoring location visits during storms:

- Site ID (alphanumeric)
- Date and time
- Monitoring program
- Field team
- Conveyance type
- Weather conditions
- Runoff characteristics
- Equipment condition
- Sample count (if applicable)
- Miscellaneous comments

Additional data will be recorded on the field data sheet at the end of a storm event. The following data will be collected at all stations where applicable:

- Total Flow Volume—Total volume of water that passed the station during the storm
- Pollutograph Sample Count and Collection Times and Flow Rates—Total number of pollutograph samples collected throughout the storm, the time at which each was collected, and the flow rate at the time of sample collection
- Total Rainfall—Total accumulated rainfall (in inches) since the start of the storm, measured each time the rain bucket tips

Flow and rainfall data will be logged by the flow meter and will be downloaded after the storm. However, if downloaded data are lost for any reason, the data recorded on the field data sheet will serve as a secondary data reference.

3.3.6 Field Equipment Installation, Calibration, and Maintenance

Field teams will install the equipment, making sure that all equipment is securely mounted, using stainless-steel hardware. Sampling tubing and wiring will be routed through conduits that will be placed between the monitoring locations and the sampling enclosures. Above-ground instruments will be protected within the monitoring location equipment enclosure. Conduit runs will be buried in short, shallow trenches or secured to other basin features using stainless-steel hardware. Exposed conduit, intakes, and sensors will be securely fastened using stainless-steel brackets, screws, and anchors.

Bedload trap samplers will be installed prior to a monitored event.

Calibration of monitoring equipment will be performed upon installation and during maintenance and pre-storm visits. During wet weather events, the field crew will document the equipment status, which will include:

- Checking the performance of all equipment
- Checking power supplies
- Inspecting and clearing intake structures
- Calibrating equipment, as necessary

Field crews will attempt to address maintenance needs that arise while onsite. If issues remain, field crews will note the nature of the problem and return to perform required maintenance.

3.3.7 Flow Monitoring and Water Quality Monitoring Equipment Specifications

Data-Logging Flow Meter

The Sigma 950 area-velocity-bubbler (AVB) data-logging flow meters measure, calculate, and log flow data, based on a set of continuous measurements and programmed information.

Based on channel type and available historical flow data, water flow at each monitoring location will be measured, using either a head vs. flow table or an AVB probe, which measures water stage and velocity. The flow meter allows programming of the geometry of the conveyance and, based on input from the AVB probe, the flow meter calculates instantaneous flow rates. The flow meters also have inputs for a rain gauge and sampler communication.

Flow meters will have data logging capability that allows the flow meter to be connected to an automated sampler. The flow meter provides a method for controlling (pacing or triggering) the sampler and storing the corresponding sampling data.

The flow meters will measure and log flow levels and rainfall at 1-minute intervals. During storm events, the flow meters convert instantaneous flow into total runoff volume. Storm and hydrological data are electronically stored in the flow meter. The information recorded includes:

- Level, velocity (if applicable), flow, and rainfall data at the programmed logging interval
- Flow rate at the time of each sample
- Time of peak flow rate
- Cumulative rainfall
- Discharge volume totals

Automated Sampler

One of two automated samplers will be used for this project: an American Sigma 900 MAX or a SD900 sampling system. Each system consists of an intake strainer, Teflon-lined intake tubing, flexible silicon pump tubing, a peristaltic pump, a distributor arm, and sample bottles. If manual sample collection is determined to be more practical or successful, the automated samplers will not be used. The decision regarding the method of sample collection will be made on a case-by-case basis by the Field Sampling Manager.

The intake strainers will be securely fastened in a manner that allows sample collection in the estimated middle depth of water column. The intake tubing will be securely fastened to the intake strainer and will be housed in protective conduit to the point where the tubing enters the monitoring equipment enclosure. The intake tubing will be attached to the flexible silicon pump tubing at the sampler. The flexible silicon pump tubing will run through the sampler peristaltic pump into a distributor arm to fill the sample bottles.

Rain Gauges

A tipping bucket rain gauge is configured with a small "bucket" that holds a known amount of rainfall. When the bucket is full, it tips the water out, momentarily closes a switch, and then resets itself and starts the process again. The data logger counts each switch closure and so accumulates rainfall totals. The rain gauges to be used in this monitoring program are manufactured by American Sigma and will tip after every 0.01 inch of rainfall.

Rain gauges are installed at the Los Peñasquitos Creek and Carmel Valley Creek locations. The Carroll Canyon Creek location has trees surrounding the enclosure, not allowing for accurate rainfall measurement. Given the proximity of these sites, only one rain gauge is necessary.

Power

The automated sampling equipment (if used) will be powered by 12-volts direct current (VDC) power sources, either 12-VDC deep-cycle marine batteries or 12-VDC gel cell batteries. At each monitoring station, one battery will power each piece of equipment separately; this reduces the chance of batteries running low on power and also gives redundancy in the power system at the monitoring locations. If a battery fails, the other battery can power all of the equipment until a backup battery can be installed by the field crew.

Equipment Security Housing

All monitoring equipment will be housed in fiberglass or metal equipment enclosures at the monitoring locations, where access allows. The enclosures will be installed for the entire monitoring season.

4.0 ANALYTICAL PROCEDURES

Analytical procedures and laboratory information are provided in Sections 4.1 through 4.5. Table 4-1 provides the analytical methods, units, and reporting limits (RLs). Table 4-2 provides the analytical holding times, container types, and preservation requirements.

Table 4-1.
Analytical Requirements for Water and Sediment Samples

Analysis	Method	Matrix	Units	Reporting Limit
Particle Size Distribution	ASTM C 136/117	Sediment	Millimeters (mm)	NA
Suspended Sediment Concentration	ASTM D 3977	Water	Milligrams per liter (mg/L)	2.0

ASTM = ASTM International
NA = not applicable

Table 4-2.
Analytical Holding Times, Container Types, and Preservation Requirements

Analysis	Method	Matrix	Holding Time	Container Type	Preservation
Particle Size Distribution	ASTM C 136/117	Sediment	None	Mesh bag or bucket	None
Suspended Sediment Concentration	ASTM D 3977	Water	7 days	½-gallon glass	≤6 Degrees Celsius (°C)

ASTM = ASTM International

4.1 VOLUMETRIC SAMPLE ANALYSIS

Two stream bed material samples will be collected at each monitoring location prior to the start of the wet season. Samples will be analyzed for particle size distribution. If a distinct layer of large cobble (i.e., armor layer) exists above smaller grain size material at any sample point, the two layers will be sampled separately. Table 4-1 provides the analytical methods, units, and RLs. Table 4-2 provides the analytical holding times, container types, and preservation requirements.

4.2 WET WEATHER SAMPLE ANALYSIS

Water samples collected will be analyzed for SSC; bedload sediment samples will be analyzed for particle size distribution. Table 4-1 provides the analytical methods, units, and RLs. Table 4-2 provides the analytical holding times, container types, and preservation requirements. SSC was selected for water sample analysis over total suspended solids (TSS) because SSC analysis uses the entire sample volume rather than an aliquot used in TSS analysis. Based on this analytical difference, SSC is considered more representative than TSS of actual sample concentrations, particularly when a sample is composed of larger, heavier particle sizes.

4.3 PEBBLE COUNT

The pebble count procedure measures the size of a random selection of pebbles along a selected stream path to represent the size of material in the area. This procedure does not require collection of samples.

4.4 PHOTODOCUMENTATION

Photodocumentation of the stream bed will occur initially during the dry weather volumetric sample collection. It will also occur following major storm events, when pebble counts are conducted. This procedure does not require collection of samples.

4.5 LABORATORY SELECTION

For volumetric and bedload samples, particle size distribution analyses will be conducted by Amec Foster Wheeler's materials testing laboratory at:

- **Amec Foster Wheeler Environment & Infrastructure, Inc.**
  9177 Sky Park Court, San Diego, CA 92123
  (858) 278-3600 (office); (858) 278-5300 (fax)

For water samples, SSC analysis will be performed by:

- **Weck Laboratories, Inc**.
  14859 East Clark Avenue, City of Industry, CA 91745
  (626) 336-2139 (office); (626) 336-2634 (fax)

4.6 SAMPLE LABELING

Sample bottles and containers will be pre-labeled, to the extent possible, before each monitoring event. Pre-labeling simplifies field activities and leaves only date, time, and sampling personnel names to be filled out in the field. Each sample container provided will be labeled with the following information:

- Sample ID
- Project name
- Event number
- Sample collection date (month/day/year)
- Time of collection (24-hour time)
- Bottle _ of _ (for multi-bottle samples)
- Sampler's initials
- Analysis

Field samples will be labeled as described below. Samples will be labeled, recorded on the chain of custody (COC) form, and then transported to the analytical laboratory.

Each sample collected will be assigned a unique alphanumeric code (sample ID) for tracking. The sample ID will be standardized for all samples and will contain information related to the monitoring location, event, and type of sample. The required sample ID components, applicable to all samples, are:

- Site ID:
  - CV = Carmel Valley Creek
  - LP = Los Peñasquitos Creek
  - CC = Carroll Canyon Creek
- Event Number:
  - DW = Dry weather
  - 1 = First wet weather event
  - 2 = Second wet weather event
  - 3 = Third wet weather event
- Sample Type:
  - PG1–PG10 = Pollutograph number (for water samples)
  - RB or LB = Right bank or left bank (for bedload samples)

4.7 LABORATORY DATA PACKAGE DELIVERABLES

Laboratories will be required to provide a deliverable package within a three-week turnaround time per event. The deliverable package will include a hard copy of the report and electronic data files. The hard copy will include standard narratives identifying any analytical problems, QA/QC exceedances, and corrective actions. Individual data sets may be submitted to Amec Foster Wheeler as either Microsoft Excel workbook files or as Microsoft Access database files.

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5.0 VEGETATION MONITORING

As stated in Section 4 of the Los Peñasquitos WMA Water Quality Improvement Plan (Regional Board, 2014), a numeric target has been set for wetland restoration of the Los Peñasquitos Lagoon. Specifically the target area is defined as “an increasing trend in the total area of tidal saltmarsh and non-tidal saltmarsh toward 346 acres.” The main restoration objective is to convert non-tidal saltmarsh wetland and upland or weed-infested non-tidal saltmarsh wetland habitat areas to “tidal wetland” and “native-dominated non-tidal wetland” habitats. These two vegetation types were identified in the Sediment TMDL for the numeric target. For vegetation monitoring, however, the seven vegetation types consistent with the categories historically used in the 2011 California State Parks analysis (California State Parks, 2011) of Lagoon vegetation from 2010 will be evaluated. These seven vegetation categories will be mapped using the methodology described below as part of the Sediment TMDL compliance monitoring to identify where and how changes in habitat are occurring in Los Peñasquitos Lagoon.

5.1 SEDIMENT TMDL AERIAL IMAGERY VEGETATION TYPE DETERMINATION

The Sediment TMDL Staff Report (Regional Board 2012b) described how the different vegetation types were mapped for the information shown in Figure 5-1 and described in Table 5-1.

Table 5-1.
Los Peñasquitos Lagoon Vegetation Types with Acres and Confidence of Mapping in 2010 (California State Parks, 2011)

	Acres	Confidence in Mapping (2010)
Saltmarsh	217	High (saltmarsh) to Moderate (tidal)
Non-tidal Saltmarsh	45	Moderate (non-tidal) to High (saltmarsh)
Non-tidal Saltmarsh with *Lolium*[1]	67	Moderate
Freshwater Marsh	55	High
Southern Willow Scrub	147	High
Herbaceous Wetland	34	High
Upland	0	High

1. The name of this species was recently changed to Festuca perennis. The original name Lolium perenne will be used throughout this document.

A detailed description of the seven vegetation types and discussion of the confidence in the aerial mapping are provided in the following subsections.

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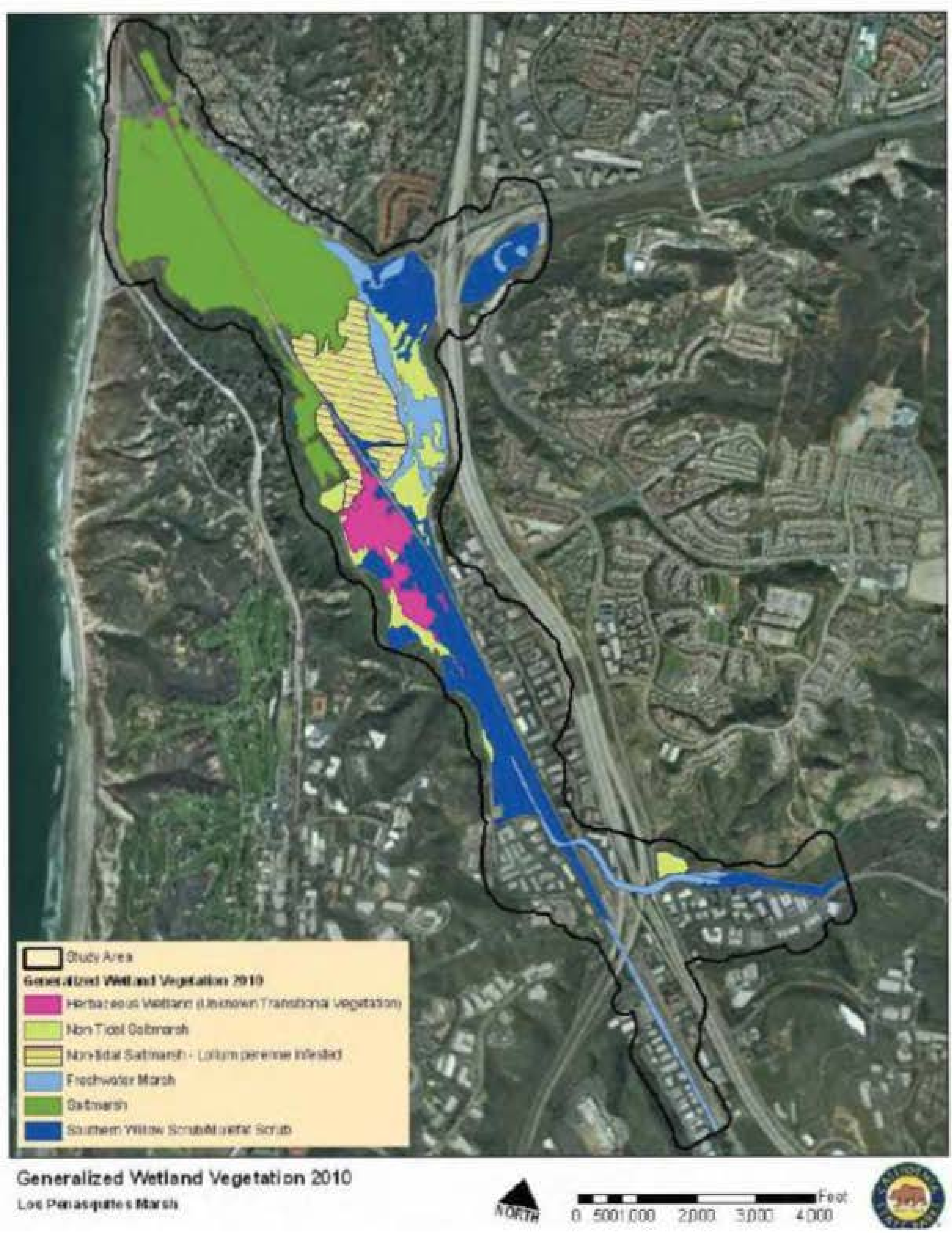

Figure 5-1.
Map of Vegetation in Los Peñasquitos Lagoon 2010

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5.1.1 Saltmarsh

Tidal wetland habitat areas consist of vegetated saltmarsh floodplain where the direct or immediately adjacent hydrology is influenced primarily by tidal flooding hydrology. This type of vegetation exists below 6 feet (mean sea level) in elevation with an obvious tidal connection and no obvious presence of annual grasses or freshwater marsh vegetation. It also includes salt panne, mudflat, and tidal channels, none of which are vegetated (Mendel et al., 2014).

Because of the variety of physical conditions (e.g. elevation, inundation regime, soil texture), tidal saltmarsh habitat supports a diverse range of vegetation sub-types, which will not be distinguished in this mapping and monitoring exercise. Although low marsh may be absent, both marsh plain and high marsh are present.

Image indicators for this type are deep brown and red-orange colors, with smooth textured vegetation. Common species in this type include *Sarcoconia pacifica* (*Salicornia virginica*), *Frankenia grand flora,* and *Jaumea carnosa*.

The mapper found that they could distinguish this type with moderate to high confidence. Confidence that the vegetation was saltmarsh was high; confidence that it was tidal was moderate (Regional Board, 2012a). This is presumably because it is not possible to determine from an air photo the elevation of the area relative to mean sea level. Also, some mixed non-native grasses are found in areas with minimal tidal inundation, which would indicate that these areas intergrade with non-tidal saltmarsh.

5.1.2 Non-tidal Saltmarsh

Non-tidal saltmarsh habitat is defined by the persistence of native-dominant saltmarsh vegetation in areas whose hydrology is not influenced by tides. This type of vegetation exists above 4 feet (mean sea level) in elevation with no obvious tidal connection, but has the presence of annual grasses or freshwater marsh vegetation. This habitat is typically in depressional or historical saltmarsh areas where remnant accrued salts remain in high enough concentrations within soils to sustain salt-tolerant vegetation and to eliminate non-halophytes (Mendel et al., 2014).

Image indicators for this vegetation type are deep brown and red-orange colors with smooth textured vegetation as was found for saltmarsh, but with overall lighter or less intense color than tidal saltmarsh due to there being less moisture. This type may also include unvegetated salt panne, but with no obvious tidal connection. Common species in this type include *Sarcoconia pacifica* (*Salicornia virginica*) and *Frankenia grandiflora*. Vegetation distant from tidal connection has higher cover of *Frankenia salina, which shows as an* orange color in aerials, and includes more brackish species such as *Scirpus maritimus* and *Iva hayesiana*. Based on species composition, this vegetation could be considered cismontane alkali marsh. Non-native plant species are more prevalent within non-tidal habitats than tidal saltmarsh areas but should not be co-dominant. Common non-native plant species may include *Brassica nigra* (black mustard), *Festuca perennis* (Italian rye grass), *Polypogon monspeliensis* (rabbit's foot grass), and *Bromus* spp. (brome grass) (Regional Board, 2012b).

Confidence that the vegetation mapped as such in the image was non-tidal saltmarsh was moderate to high, with high confidence that vegetation was saltmarsh, and moderate confidence it was non-tidal.

5.1.3 Non-tidal Saltmarsh – *Lolium perrene* Infested

This type of vegetation exists above 4 feet (mean sea level) in elevation with no obvious tidal connection. It is dominated by annual grasses, but has presence of saltmarsh vegetation as well. This category is similar to non-tidal saltmarsh habitat but with higher or codominant non-native species cover and distinct functional differences and reductions based primarily on altered and non-native vegetation communities. These areas may experience lower soil salinities or more infrequent freshwater inundation, which would serve to increase the habitat vulnerability to non-native species invasion along the saltmarsh–upland transitional boundaries.

The principal image indicator for this type of vegetation is the straw color of senescent annual grasses. Common species present include *Sarcoconia pacifica* (*Salicornia virginica*), *Frankenia grandiflora,* and *Lolium perenne*. *Bromus diandrus* or other nonnative grasses may be present as well.

Confidence that the vegetation mapped as such in the image was non-tidal saltmarsh *Lolium perrene* infested was moderate.

5.1.4 Freshwater Marsh

This type of vegetation contains typical freshwater marsh species. This marsh habitat has high levels of freshwater influence and is typically found in areas lacking direct tidal influence. Most of the Los Peñasquitos WMA freshwater marshes include areas that experience seasonal freshwater inputs from wet weather and storm water flows. The image indicators were of vegetation that is taller statured, more round-patterned, and of a more pillowy texture than saltmarsh and non-tidal saltmarsh vegetation. This vegetation shows with a lighter color than saltmarsh and non-tidal saltmarsh. It has a smooth texture and light color compared to Southern Willow Scrub/Mulefat Scrub. Common species include *Typha* spp., *Scirpus californica,* and *Scirpus americanus.*

Confidence that the vegetation mapped as such in the image was high.

5.1.5 Southern Willow Scrub/Mulefat Scrub

This vegetation type consists of tall-statured woody vegetation. These habitat areas generally occur in lower elevation regions that direct and capture both overland and subterranean water flows from higher elevation areas; the primary characteristic is defined by the presence of riparian woody vegetation. Image indicators are lumpy texture and bright green color, with presence of shadows. Common species include *Salix lasiolepis (*western willow*) and Baccharis salicifolia (*mulefat*)*.

Confidence that the vegetation mapped as such in the image was high.

5.1.6 Herbaceous Wetland (Unknown or Transitional Vegetation)

This generalized vegetation type may contain a variety of more specific but undifferentiated vegetation types and textures mixed at close scales. Mappers indicated that in these areas, it was difficult to differentiate between vegetation types. Common species in this type may include non-native grasses, some freshwater marsh species, saltmarsh species, *Leymus tritichoides, Scirpus maritimus*, *Anemopsis californica* (yerba mansa), *Euthamia occidentalis* (western goldenrod), and others.

Confidence that the vegetation mapped as such in the image was high, primarily based on location in the Lagoon footprint and the lack of evidence for inclusion in other vegetation types.

5.1.7 Upland Land Cover (Urban, Beach, Dune, Upland Vegetation, etc.)

This type of vegetation is non-wetland. Image indicators are inclusion in areas with urban infrastructure or non-wetland vegetation. Common species are not distinguished.

Confidence that areas mapped as such in the image was high.

5.2 VEGETATION MONITORING METHODOLOGY

5.2.1 Mapping Standards

The vegetation types in Los Peñasquitos Lagoon will be monitored annually, in the fall, starting in 2014, to measure changes in the spatial extent of the vegetation types. The monitoring will be conducted via aerial photography and/or land-based survey methods. The monitoring will be consistent with the methodology used to calculate the numeric target. Ground truthing of aerial mapping “may” be performed to distinguish between vegetation types.

The vegetation mapping will be conducted according to the preferred vegetation classification that is compatible with the documentation of the attainment of the requirements of the Sediment TMDL. At the minimum, mapping will be able to distinguish with high confidence between the two major vegetation types called out in the Sediment TMDL, tidal saltmarsh and native-dominated non-tidal saltmarsh. The current plan is to provide sufficient detail to map to the seven communities described in Section 5.1. This level of mapping will provide a more detailed understanding of the dynamics of the changes in habitat in the Lagoon. Mapping will be done with aerial photographs, using image and mapping standards employed in the Sediment TMDL. Alliance species as described in the most recent Manual of California Vegetation (MCV) (Sawyer et al., 2009) with an appropriate crosswalk to the vegetation types in the Sediment TMDL listed above will be used as a reference, as the MCV is the current standard for vegetation mapping state-wide. This approach may be supplemented with additional input as provided by the City of San Diego and California Department of Fish and Wildlife, prior to the survey. Table 5-2 shows that cross-walk.

Table 5-2.
Crosswalk Between Vegetation Types Identified in the Sediment TMDL and Vegetation Alliances in MCV (MCV Crosswalk, 2009)

Vegetation Type	Potential Alliances (MCV 2009)
Non-Tidal Saltmarsh	*Arthocnemum subterminale*
	Cressa truxillensis-Distichlis spicata
	Distichlis spicata
	Frankenia salina
	Grindelia stricta
	Lasthenia fremontii-distichlis spicata
	Sueda moquinii
	Schoenoplectus americanus
Non-Tidal Saltmarsh with *Lolium*	*Lolium perenne* semi-natural stand
Freshwater Marsh	*Typha*
	Phragmites australis
	Schoenoplectus acutus
	Schoenoplectus californicus
Southern Willow Scrub	*Salix gooddingii*
	Baccharis salicifolia
	Sambucus mexicana
	Salix lasiolepis
	Salix exigua
Herbaceous Wetland	*Atriplex prostrata-Cotula coronopifolia* semi-natural stands
	Sesuvium verrucosum
Upland	Not applicable to Lagoon Vegetation
	California Annual Grassland

MCV = Manual of California Vegetation
TMDL = Total Maximum Daily Load

5.2.2 Mapping Methods

The Sediment TMDL Staff Report and its attachments (Regional Board, 2012b) detail the methods that were used for mapping Los Peñasquitos Lagoon pursuant to the development of the numeric target for Lagoon restoration. Aerial photos were digitized on-screen at a 1:2,500 scale and mapped into generalized classifications that could be reliably interpreted without field verification. Future mapping efforts will utilize the same methodology. Aerial photographs will be taken at the height of the growing season (late summer to early fall) for the year for which monitoring is to be accomplished. Vegetation types will be mapped as described, with the polygons for each type totaled to indicate the number of acres of each type that was identified. Change in each vegetation type from the previous mapping efforts will then be quantified to determine if progress is being made toward the Sediment TMDL numeric target.

5.2.3 Ground Truthing Standards

Although ground truthing was not specified in the Sediment TMDL document, it will be conducted for two reasons. The first is that it will assist in improving the accuracy of the maps, by allowing the mappers to field verify the appearance of various vegetation types in the photographs. Of particular importance will be the ability to distinguish transitions between target and non-target vegetation. Small detection differences over a long vegetation type interface can amount to a considerable number of acres, and those acres of target communities are important to Sediment TMDL compliance. Second, the ground truthing allows for some level of interpretation regarding how and why vegetation changes are occurring. This interpretation will guide any efforts that may need to be made for active restoration to accomplish the numeric target goals.

Ground truthing will be conducted during the first year to increase the confidence level of identification of the tidal and non-tidal saltmarsh communities, which is required for Sediment TMDL compliance. Ground truthing will continue during subsequent years of monitoring until a high level of confidence in vegetation type identification is attained. Ground truthing will be performed using maps that have delineated polygons of vegetation derived from the aerial imagery, with the vegetation type assigned to each polygon. Using information recorded with GPS units, the exact location of the transition from one vegetation type to another will thus be verified in the field. The map will be updated, and the acres of each vegetation type will be recalculated.

The seven vegetation types are listed below, with some discussion of how transitions between a non-target type and a target type could be realized, thus advancing toward attainment of the numeric target of the Sediment TMDL.

- Tidal saltmarsh: This vegetation type should either remain the same or expand for Sediment TMDL compliance. Expansion would be by conversion from a non-tidal saltmarsh type. Such expansion would occur if less sediment were introduced into the Lagoon, or if the connection to the ocean were expanded. Both actions would allow for increased tidal flow into higher Lagoon areas.
- Non-tidal saltmarsh: This category should either remain the same or expand for Sediment TMDL compliance. Expansion would be by conversion from a non-saltmarsh type. Increased tidal flow could introduce enough salinity into areas that were not acquiring new sediment load, converting non-tidal areas to tidal saltmarsh.
- Non-tidal saltmarsh infested with *Lolium*: This type should be converted to saltmarsh without *Lolium* infestation. It is unlikely to convert to tidal saltmarsh unless there is active restoration that would move sediment to lower the marsh surface, or at least to develop channels to allow for flooding with saltwater. This type could also be converted to non-tidal saltmarsh with native species by active control of the *Lolium* using mechanical or chemical methods, followed by appropriate seed introduction. It could also convert to non-tidal saltmarsh dominated by native species if tidal action were increased and sediment introduction decreased, so that soil salinity is increased, making the area less suitable for weedy species and favoring native saltmarsh species.

- Freshwater marsh: This vegetation type should be shown to not be expanding. Reduction of nuisance flows of fresh water could slowly convert some areas to non-tidal saltmarsh, as freshwater supplies diminish. Otherwise, the vegetation type could convert to saltmarsh only with active intervention for sediment removal either by earthmoving or by increasing local scouring from tributary creeks that would carry sediment out to sea.
- Southern willow scrub/mulefat scrub: This vegetation type should not be expanding. It could convert to saltmarsh only with active intervention for sediment removal either by earthmoving or by increasing local scouring from tributary creeks that would carry sediment out to sea.
- Herbaceous wetland: This vegetation type should be shown to not be expanding. It could convert to saltmarsh only with active intervention for sediment removal either by earthmoving or by increasing local scouring that would carry sediment out to sea.
- Upland: No changes would be expected in this area without extensive earthwork to lower the surface into the tidal range. It was not mapped as part of the Lagoon in 2010.

Transects will be used for the ground truthing. They will be positioned strategically to allow for increasing confidence regarding the location of transition zones between mapped vegetation types. Although transects are often used in restoration and monitoring work, there are no general standards for the placement or sampling of transects for vegetation mapping unless such sampling is coupled with additional sampling to identify and describe ecological parameters and processes such as soil characteristics, tidal channels, or elevation changes (Vasey et al., 2002; U.S. Geological Survey [USGS], 2011; South Bay Salt Pond, 2012). This effort would ***not*** identify and describe such parameters; it will be limited to the evaluation of vegetation type. These transects will be referenced to aerial imagery, and their location will be identified by installing permanent endpoints in the field using T-posts or other durable markers. Transect locations will be selected for specific ability to quantify with optimum accuracy the habitat acres of target vegetation types needed to conform to numeric targets for the TMDL.

Figure 5-2 shows the 2010 Los Peñasquitos Lagoon vegetation map with the preliminary location of transects that would assist in refining any changes in the boundaries between target and non-target vegetation types. The exact location of these transects will be determined in the field. Specifically, the transect purpose, by transect number, is as follows:

1. Identify the extent of the conversion of freshwater wetland or southern willow/mulefat scrub to tidal saltmarsh.
2. Identify the extent of the conversion of non-tidal *Lolium* infested marsh tidal to tidal saltmarsh.
3. Same as (2) in a different location.

4. Identify the conversion of freshwater marsh to non-tidal saltmarsh. The area shown is currently infested with *Lolium*; monitoring any reduction in *Lolium* at these interfaces and determining that the reduction can be detected in aerial photographs will be of value.
5. Same as (4) in a different location.
6. Identify the conversion of freshwater marsh to native non-tidal saltmarsh.
7. Identify the conversion of freshwater marsh and of *Lolium* infested non-tidal saltmarsh to native non-tidal saltmarsh.
8. Identify the conversion of herbaceous wetland and non-tidal *Lolium* infested saltmarsh to native non-tidal saltmarsh. These interfaces will become important with time and being able to identify them readily from aerial photographs will be useful.
9. Identify the conversion of southern willow/mulefat scrub and herbaceous wetland to non-tidal saltmarsh. These interfaces will become important with time and being able to identify them readily from aerial photographs will be useful.

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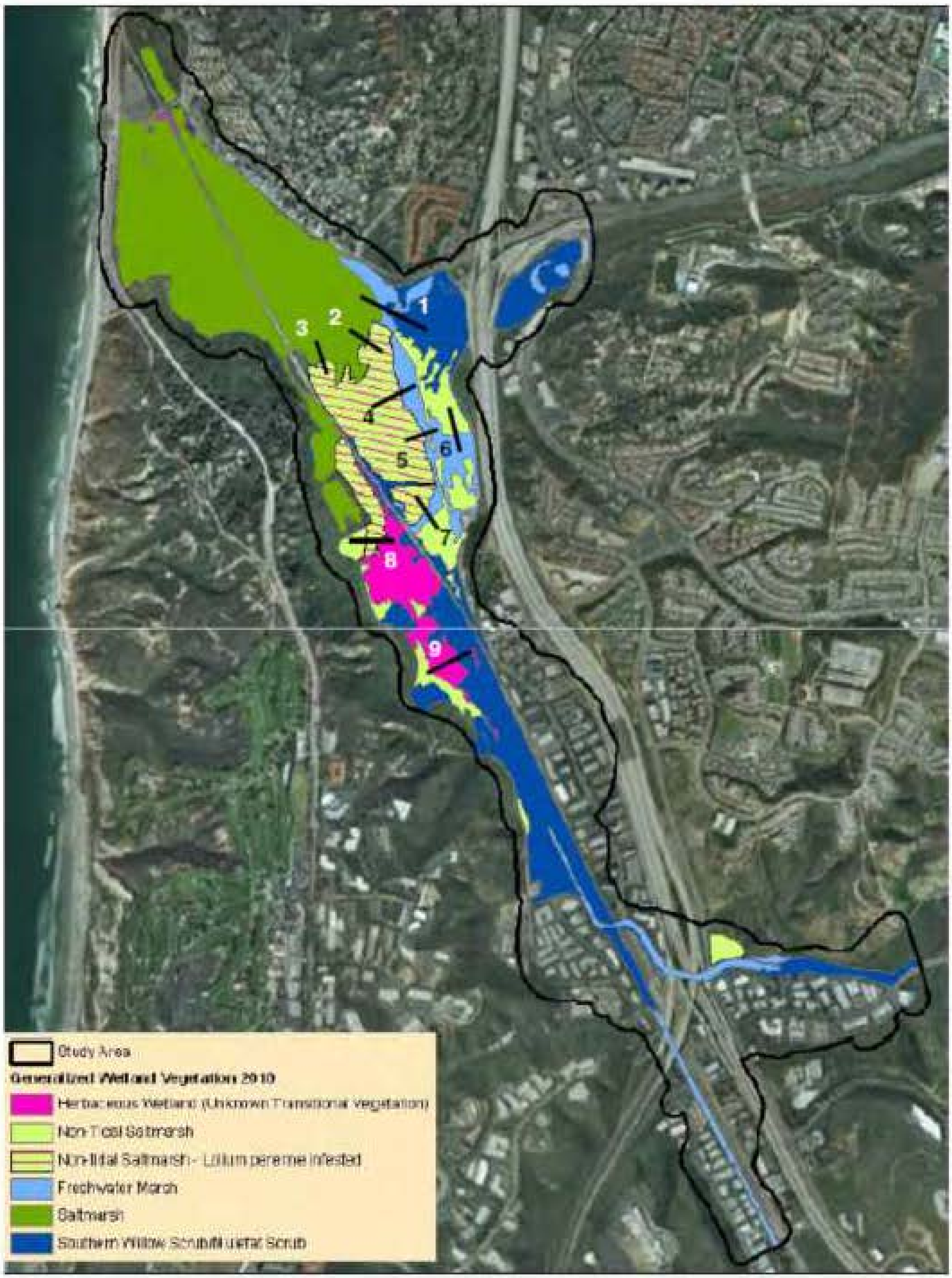

Figure 5-2.
Preliminary Location of Transects for Ground Truthing

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5.2.4 Ground Truthing Methods

Data fields for ground truthing along the transects should include dominant species, and total vegetation cover quantified at least to cover class (Daubenmire, 1959). Methods for transect establishment and sampling are as follows:

1. Use the vegetation map generated during the first year of monitoring to select tentative transect locations that will accomplish the monitoring goals described above. Assign preliminary GPS coordinates to each end of each transect so that they can be located in the field.
2. Install the transects in the field, adjusting location and end points to suit actual field conditions. Collect actual GPS coordinates for each endpoint. Install a permanent marker such as a T-post at each end of each transect.
3. Finalize a data collection sheet for use in the field. Data fields will include cover of major species as well as an inventory of species present in a belt along each transect.
    a. A belt transect is a 1-meter-wide band that extends from the transect line to one side of the transect. Class cover for each major species and all species present along it based on 1-meter increments will be recorded (Daubenmire, 1959). This information converts to species cover, total cover, and species richness.
    b. The data sets will indicate when one vegetation type stops and another one begins, and will show how sharp the boundary is between those two types. That boundary can then be placed with great accuracy on the map, which will allow for a clear evaluation of the photographic appearance of each vegetation type evaluated.
4. Update the vegetation map using the data from the transects. Provide a narrative of what the differences were in initial assessment and final assessment, and indicate the image information that should be taken into consideration for future mapping efforts.

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6.0 QUALITY ASSURANCE AND QUALITY CONTROL

This section addresses QA/QC activities associated with laboratory analyses.

6.1 WATER SAMPLING QUALITY OBJECTIVES

The laboratory will have written standard operating procedures (SOPs) that specify (for each analytical method) instrument operation and maintenance, determination of method detection limits, QC acceptance criteria, blank requirements, and stepwise procedures. At a minimum, SOPs will be written for the following procedures: sample receipt, control, and disposal; sample preparation; health and safety practices; and corrective action.

The SOPs and all revisions will be available to the analysts in the laboratory. The laboratory will maintain written records of all activities that might affect the quality of the laboratory results.

All instruments will be calibrated and the calibration acceptance criteria will be met before samples are analyzed. For SSC analysis, the balance used will be calibrated on the day of sample analysis in the range of samples.

6.1.1 Measurement Quality Objectives

Measurement Quality Objectives (MQOs) establish acceptable levels of uncertainty for each measurement process conducted during monitoring. Analytical MQOs will be assessed through application of accuracy, completeness, and representativeness parameters, as discussed in this section. For SSC analyses, laboratory duplicates are not conducted because the entire sample is used for analysis, so precision is not measured. Table 6-1 specifies the analytes and specific MQOs for each.

Table 6-1.
Measurement Quality Objectives for Laboratory Analyses

Analyte	Accuracy	Completeness
Particle Size	NA	90%
Suspended Sediment Concentration	90% below RL of 2.0 for each method blank	90%

NA = Not Applicable

Accuracy

Accuracy is defined as the nearness of a result, or the mean of a set of results, to the true or accepted value. Because there are no analyte spikes or laboratory control samples (LCSs) available for SSC analysis, analytical accuracy for SSC analysis is measured only by analysis of method blanks. The goal of accuracy is 90 percent below the RL.

The method blank ensures that the equipment used in preparing the samples is free of contaminants that could interfere with the analysis. For SSC analysis, one method blank will be analyzed per batch or 20 samples, whichever is more frequent.

Completeness

Completeness is a measure of the percentage of project-specific data that are valid. Valid data are obtained when samples are collected and analyzed in accordance with QC procedures outlined in this monitoring plan, and when none of the QC criteria that affect data usability are exceeded. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. The requirement of completeness is 90 percent for samples and is determined using the following equation:

$$Completeness = \frac{Actual\ number\ of\ samples\ collected}{Project\ required\ total\ samples\ to\ be\ collected} * 100$$

Representativeness

Representativeness is a measure of how well the samples represent the area from which they were taken. In order to ensure representativeness in the samples, this study will temporal variability by using automated equipment that collects samples during regular time intervals. Sampling locations were chosen because of their representation of the entire stream channel. Monitoring locations will be inspected to ensure that debris or other outside forces do not inhibit the representativeness of the samples. Representativeness does not have a quantitative MQO.

6.1.2 Corrective Action

Corrective action is taken when an analysis is deemed suspect for some reason, such as high blank concentrations. The corrective action varies somewhat from analysis to analysis, but typically involves:

- Checking the procedure
- Reviewing the documents and calculations to identify any possible error
- Correcting the error
- Re-analyzing the sample, if it is available, to see whether results can be improved
- Completely reprocessing and re-analyzing additional sample material, if it is available

The laboratories have procedures in place to follow when failures occur, will identify the individual(s) responsible for corrective action, and will appropriately document the incident.

6.2 VEGETATION MONITORING QUALITY OBJECTIVES

In the field, data collectors will work in pairs, and each person will independently be able to identify species and to estimate cover class. This provides onsite quality control.

When data sheets are returned to the office, they will be scanned and the data digitized. A preliminary evaluation of data completeness will be made by inspection.

The map specialist will incorporate the field data into revised map polygons and evaluate the photographic signatures for each vegetation type. If this specialist detects apparent discrepancies in the vegetation identifications within a transect, the transect may be resurveyed to resolve the issue.

Based on the results of the initial air photo mapping and the ground truthing verification, a confidence for the aerial identification of each vegetation type will be developed. It is expected that the confidence for mapping the vegetation types from aerial photography will increase with the incorporation of ground truthing results.

6.3 DATA COMPILATION, ANALYSIS, AND REPORTING

6.3.1 Review of data transfer and lab reports

Once field data are collected, field sheets will be checked for accuracy and completeness by the Project Manager. Before submitting samples to the analytical lab, the field technician is responsible for ensuring that all samples are labeled correctly.

COC forms will accompany all samples submitted for laboratory analysis. COC forms will be filled out completely and will include the date, time, and signature of the Amec Foster Wheeler and laboratory employees present during the transfer. The technician making the transfer to the laboratory should make copies of all COC forms for the project records.

Electronic data deliverables (EDDs) and reports received from the lab will be reviewed for accuracy. Once the lab result data has passed QA/QC criteria, summary tables and figures can be created. The summary tables will then be checked against lab reports to confirm that the data has been transferred correctly. Laboratory raw data from 10 percent of monitoring events will be chosen randomly and checked against the original data set. If errors are found during this 10 percent check, they will be corrected and an additional 10 percent will be checked for accuracy. The process will be continued until no errors are found in the data sets.

6.3.2 Training and Certification

Field sampling will be carried out by trained field technicians and sampling managers. Field technicians will have sufficient storm water classroom and field training, as well as preliminary training in health and safety procedures.

The sample analysis will be conducted by Weck Laboratories. Weck is certified under the State of California Environmental Laboratory Accreditation Program (ELAP).

6.3.3 Equipment Maintenance and Calibration

Equipment calibration will be performed upon installation, during maintenance, and during pre-storm visits. The equipment status will be documented during wet weather events to ensure that performance, power, calibration, and intake structures are working properly.

Maintenance will also be addressed as necessary when field crews visit the sites. Any remaining problems with equipment will be documented and perform the required maintenance once they are able to do so, prior to the next sampling event.

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APPENDIX A
LABORATORY QA/QC MANUALS

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Weck Laboratories, Inc.
Analytical Laboratory Service - Since 1964

Quality Assurance Manual

Rev 20 – Effective Date 10/21/2013
Updated 9/30/2013

Weck Laboratories, Inc.

Analytical Laboratory Services - Since 1964

QUALITY ASSURANCE MANUAL

For
Weck Laboratories, Inc.

14859 E. Clark Avenue
City of Industry, CA 91745
Telephone 626-336-2139 Fax 626-336-2634
www.wecklabs.com

Name	Function	Signatures	Date
Alfredo E. Pierri	Laboratory Director		10/21/2013
Alan Ching	Quality Assurance Director		10/21/2013
Joe Chau	Technical Director Inorganic Department		10/21/2013
Ricci Tipon	Technical Director Volatile Organics		10/21/2013
Hai-Van Nguyen	Technical Director Microbiology		10/21/2013

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Section 3

INTRODUCTION AND SCOPE
(TNI V1:M2 – Sections 1,2,3)

The purpose of this *Quality Assurance Manual (QM)* is to outline the management system for Weck Laboratories, Inc. The QM defines the policies, procedures, and documentation that assure analytical services continually meet a defined standard of quality that is designed to provide clients with data of known and documented quality and, where applicable, demonstrate regulatory compliance.

The *Quality Manual* sets the standard under which all laboratory operations are performed, including the laboratory's organization, objectives, and operating philosophy. The *Quality Assurance Manual* has been prepared to assure compliance with the 2009 TNI Environmental Laboratory Sector Standard – Volume 1 – Management and Technical Requirements for Laboratories Performing Environmental Analysis (EL-V1-M1 through M7-ISO-2009) as well as the DoD Quality Systems Manual for Environmental Laboratories, Version 4, dated 3/19/09. It also covers all applicable requirements, regulations, guidance, and technical standards from the USEPA and State regulatory agencies. This Standard is consistent with ISO/IEC 17025:2005 requirements that are relevant to the scope of environmental testing services and thus, the laboratory operates a quality system in conformance with ISO/IEC 17025:2005(E). In addition, the policies and procedures outlined are compliant with the various accreditation and certification programs listed in Appendix F.

3.1 Scope of Testing

The services provided by this facility include Organic Chemical Analyses, Inorganic Chemical Analyses, Trace Metal analyses, Microbiological Analysis, Physical Analyses and Field services (sampling and simple field determinations).
The laboratory's scope of analytical testing services includes those listed in Appendix E (list of Standard Operating Procedures) and also in the certifications presented in Appendix F.

3.2 Table of Contents, References and Appendices

The Table of Contents is in Section 2 and Appendices are in Section 29.

This *Quality Manual* uses the references included in Modules 1-7 in the 2009 TNI Environmental Laboratory Sector Standard – Volume 1 – Management and Technical Requirements for Laboratories Performing Environmental Analysis.
Other references used in this QM include the following in addition to SW-846, Standard Methods, EPA methods for drinking water and wastewater, ASTM and other recognized sources of analytical methods and guidance documents:

a) Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80, December 29, 1980, Office of Monitoring Systems and Quality Assurance, ORD, USEPA, Washington, DC 20460
b) RCRA QAPP Instructions, USEPA Region 5, Revision: April 1998

c) ASTM D-5283-92. Generation of Environmental Data Related to Waste Management Activities: Quality Assurance and Quality Control Planning and Implementation.
d) American National Standards Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs (ANSI/ASQC E-4), 1994.
e) EPA 2185 – Good Automated Laboratory Practices, 1995
f) ISO/IEC Guide 25: 1990. General Requirements for the Competence of Calibration and Testing Laboratories.
g) QA/R-2: EPA Requirements for Quality Management Plans, August 1994.
h) QA/G-4: Guidance for the Data Quality Objectives Process EPA/600/R-96/055, September 1994.
i) A/R-5: EPA Requirements for Quality Assurance Project Plans Draft – November 1997
j) QA/G-5: Guidance on Quality Assurance Project Plans EPA/600/R-98/018, February 1998.
k) A/G-6: Guidance for the Preparation of Standard Operating Procedures for Quality Related Operations EPA/600/R-96/027, November 1995.
l) A/G-9: Guidance for the Data Quality Assessment: Practical Methods for Data Analysis EPA/600/R-96/084, January 1998.
m) Manual for the Certification of Laboratories Analyzing Drinking Water EPA/570/9-90/008.
n) ISO. 2005. General requirements for the competence of testing and calibration laboratories. ISO 17025
o) DoD Quality Systems Manual for Environmental Laboratories, Version 4, dated 3/19/09.

3.3 Glossary and Acronyms Used

Quality control terms are generally defined within the Section that describes the activity.

3.3.1 Glossary

The *Terms and Definitions* Section of Modules 1-7 in the 2009 TNI Environmental Laboratory Sector Standard – Volume 1 – Management and Technical Requirements for Laboratories Performing Environmental Analysis.

Other Terms and Definitions used in the laboratory are the following:

Accreditation body - Authoritative body that performs accreditation.
Aliquot - A discrete, measured, representative portion of a sample taken for analysis.
Analyte - The specific chemicals or components for which a sample is analyzed; it may be a group of chemicals that belong to the same chemical family, and which are analyzed together.
Assessment - The evaluation process used to measure the performance of effectiveness of a system and its elements against specific criteria. It includes any of the following: audit, performance evaluation, peer review, inspection, or surveillance.

Atomization - A process in which a sample is converted to free atoms.
Audit - A documented investigative evaluation used to determine the degree of compliance with established procedures and guidelines, applied to specific analytical processes.
Calibration Range - The range of values (concentrations) between the lowest and highest calibration standards of a multi-level calibration curve. For metals analysis with a single-point calibration, the low-level calibration check standard and the high standard establish the linear calibration range, which lies within the linear dynamic range.
Chain of Custody - An unbroken trail of accountability that verifies the physical security of samples, data and records.
Client - Any individual or organization for whom items or services are furnished or work performed in response to defined requirements and expectations.
Congener - A member of a class of related chemical compounds (e.g., PCBs, PCDDs).
Consensus Standard - A standard established by a group representing a cross-section of a particular industry or trade, or a part thereof.
Continuing calibration verification (CCV) - The verification of the initial calibration that is required during the course of analysis at periodic intervals. Continuing calibration verification applies to both external standard and internal standard calibration techniques, as wells as to linear and non-linear calibration models.
Definitive Data - Analytical data of known quality, concentration, and level of uncertainty. The levels of quality and uncertainty of the analytical data are consistent with the requirements for the decision to be made. Suitable for final decision-making.
Detection Limit (DL) - The lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence. At the DL, the false positive rate (Type I error) is 1%.
Digestion - A process in which a sample is treated (usually in conjunction with heat) to convert the sample to a more easily measured form.
Dissolved - The concentration of analyte in an aqueous sample that will pass through a 0.45 µm membrane filter assembly prior to sample acidification.
Duplicate - The analysis or measurement of the variable of interest performed identically on two subsamples of the same sample. The results of duplicate analysis are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.
Eluent - A solvent used to carry the components of a mixture through a stationary phase.
Elute - To extract; specifically, to remove (adsorbed material) from an adsorbent by means of a solvent.
Elution - A process in which solutes are washed through a stationary phase by a movement of a mobile phase.
Environmental Data - Any measurement or information that describe environmental processes, locations, or conditions; ecological or health effects and consequences; or the performance of environmental technology.
Environmental Monitoring - The process of measuring or collecting environmental data.

False Negative - An analyte incorrectly reported as absent from the sample, resulting in potential risks from their presence.
False Positive - An item incorrectly identified as present in the sample, resulting in a high reporting value for the analyte of concern.
Finding - An assessment conclusion referenced to a NELAC Standard and supported by objective evidence that identifies a deviation from a NELAC requirement. An assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive or negative and is normally accompanied by specific examples of the observed condition and may be linked to a specific requirement.
Holding Times - The maximum times that samples may be held prior to analysis and still be considered valid or not compromised. The time elapsed from the time of sampling to the time of extraction or analysis, or from extraction to analysis, as appropriate.
Homologue - One in a series of organic compounds in which each successive member has one more chemical group in its molecule than the next preceding member. For instance, CH_3OH (methanol),
C_2H_5OH (ethanol), C_3H_7OH (propanol), C_4H_9OH (butanol), etc., form a homologous series.
Interference, spectral - Occurs when particulate matter from the atomization scatters the incident radiation from the source or when the absorption or emission of an interfering species either overlaps or is so close to the analyte wavelength that resolution becomes impossible.
Instrument Performance Check Solution (IPC) - A solution of the method analyte, used to evaluate the performance of the instrument system with respect to a defined set of method criteria.
Isomer - One of two or more compounds, radicals, or ions that contain the same number of atoms of the same elements but differ in structural arrangement and properties. For example, hexane (C_6H_{14}) could be n-hexane, 2-methylpentane, 3-methylpentane, 2,3-dimethylbutane, 2,2-dimethylbutane.
Limit of Detection (LOD) - An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte and matrix-specific and may be laboratory-dependent. The smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.
Limits of Quantitation (LOQ) - The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The lowest concentration that produces a quantitative result within specified limits of precision and bias. The LOQ is set at or above the concentration of the lowest initial calibration standard. Also known as Practical Quantitation Limit or PQL and Method Reporting Limit or MRL.
Laboratory Reagent Blank - An aliquot of reagent water or other blank matrices that are treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, and internal standards that are used with other samples. The LRB is used to determine if the method analyte or other interferences are present in the laboratory environment, reagents, or apparatus.
Management - Those individuals directly responsible and accountable for planning, implementing, and assessing work.
Management System - System to establish policy and objectives and to achieve those objectives.

Matrix Spike (MS) - Also known as spiked sample or fortified sample, it is a sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Matrix Spike Duplicate (MSD) - Also known as fortified sample duplicate, a second replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte.

Method Detection Limit - One way to establish a Limit of Detection, defined as the minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Method of Standard Additions (MSA) - A set of procedures adding one or more increments of a standard solution to sample aliquots of the same size in order to overcome inherent matrix effects. The procedures encompass the extrapolation back to obtain the sample concentration. (This process is often called spiking the sample.)

Nonconformance - An indication or judgment that a product or service has not met the requirement of the relevant specifications, contract, or regulation; also the state of failing to meet the requirements.

Quality Assurance Project Plan (QAPP) - A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved.

Quality Control Sample (QCS) - A solution of the method analyte of known concentration, which is used to fortify an aliquot of LRB or sample matrix. The QCS is obtained from a source external to the laboratory and different from the source of the calibration standards. It is used to check either laboratory or instrument performance.

Quantitation Range - The range of values in a calibration curve between the LOQ and the highest successfully analyzed initial calibration standard. The quantitation range lies within the calibration range.

Reporting Limit (RL) - A client-specified lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

Retention Time (RT) - The time between sample injection and the appearance of a solute peak at the detector.

Sample - Portion of material collected for analysis, identified by a single, unique alphanumeric code. A sample may consist of portions in multiple containers, if a single sample is submitted for multiple or repetitive analysis.

Sampling and Analysis Plan (SAP) - See Quality Assurance Project Plan.

Second-source calibration verification (ICV) - A standard obtained or prepared from a source independent of the source of standards for the initial calibration. Its concentration should be at or near the middle of the calibration range. It is done after the initial calibration.

Signal to Noise Ratio - The signal carries information about the analyte, while noise is made up of extraneous information that is unwanted because it degrades the accuracy and precision of an analysis and also places a lower limit on the amount of analyte that can be detected. In most measurements, the average strength of the noise is constant and independent of the magnitude of the signal. Thus, the effect of noise on the relative error of a measurement becomes greater and greater as the quantity being measured (producing the signal) decreases in magnitude.

Standard - Standard samples are comprised of a known amount of standard reference material in the matrix undergoing analysis. A standard reference material is a certified reference material produced by the US National Institute of Standards and Technology (NIST) and characterized for absolute content, independent of analytical test method.

Target Analytes - Analytes specifically named by a client (also called project-specific analytes).

Tuning - A check and/or adjustment of instrument performance for mass spectrometry as required by the method.

Work Cell - A well-defined group of analysts that together perform the method analysis. The members of the group and their specific functions within the work cell must be fully documented.

3.3.1.1 The TNI Standard: Modules 1-7 in the 2009 TNI Environmental Laboratory Sector Standard – Volume 1 – Management and Technical Requirements for Laboratories Performing Environmental Analysis (EL-V1, M1 through M7, ISO-2009).

3.3.2 <u>Acronyms</u>

A list of acronyms used in this document and their definitions are:

AA	-	Atomic Absorption Spectrometry
AB	–	Accrediting Body
ANSI	–	American National Standards Institute
ASQC	–	American Society for Quality Control
ASTM	–	American Society for Testing and Materials
BFB	-	Bromofluorobenzene
Blk	–	Blank
BNA	-	Base, Neutral and Acid Extractables
BOD	-	Biochemical Oxygen Demand
BS	-	Blank Spike, equivalent to LCS and LFB
°C	–	degrees Celsius
cal	–	calibration, Calibration Standard (CAL)
CAR	-	Corrective Action Report
CAS	–	Chemical Abstract Service
CCV	–	Continuing calibration verification
CCC	-	Continuing Calibration Check, equivalent to CCV
CFR	-	Code of Federal Regulations
CI	-	Chemical Ionization
CLP	–	Contract Laboratory Program
COC	–	Chain of custody
COD	–	Chemical Oxygen Demand
CRDL	-	Contract Required Detection Limit
CV	-	Coefficient of Variation
CVAA	-	Cold Vapor Atomic Absorption
DBP	-	Disinfection by Product
DFTPP	-	Decafluorotriphenylphosphine
DLR	-	Detection Limit for Reporting Purposes (established by California)
DO	–	Dissolved oxygen

DOC	**–**	**Demonstration of Capability**
DOD	**-**	**Department of Defense**
DOE	**-**	**Department of Energy**
DOT	**-**	**Department of Transportation**
DQO	**-**	**Data Quality Objectives**
DQI	**-**	**Data Quality Indicators**
DRO	**-**	**Diesel-range Organics**
ECD	**-**	**Electron Capture Detector**
EDD	**-**	**Electronic Data Deliverable**
EI	**-**	**Electron Impact Ionization**
ELAP	**-**	**Environmental Laboratory Accreditation Program**
EPA	**–**	**Environmental Protection Agency**
FIA	**-**	**Flow Injection Analysis**
FID	**-**	**Flame Ionization Detector**
g/L	**–**	**grams per liter**
GC/MS	**–**	**gas chromatography/mass spectrometry**
GPC	**-**	**Gel Permeation Chromatography**
GRO	**-**	**Gasoline Range Organics**
HAA	**-**	**Haloacetic acids**
HDPE	**-**	**High Density Polyethylene**
HPLC	**-**	**High Performance Liquid Chromatography**
HRMS	**-**	**High Resolution Mass Spectrometry**
IC	**-**	**Ion Chromatography**
IC/MS/MS-		**Ion Chromatography Tandem Mass Spectrometry**
ICP	**–**	**Inductively coupled Optical Emission Spectrometry (ICP-OES)**
ICP-MS	**–**	**Inductively coupled plasma-mass spectrometry**
ICV	**–**	**Initial calibration verification**
ICS	**-**	**Interference Check Sample**
ICS	**-**	**Interference Check Sample**
IDL	**-**	**Instrument Detection Limit**
IEC	**-**	**Interelement Correction Factor**
ISE	**-**	**Ion Selective Electrode**
ISO/IEC	**–**	**International Organization for Standardization/International Electrochemical Commission**
lb/in2	**–**	**Pound per square inch**
LC/MS/MS-		**Liquid chromatography Tandem Mass Spectrometry**
LCL	**–**	**Lower Control limit**
LCS	**–**	**Laboratory control sample, equivalent to LFB and BS**
LD	**-**	**Laboratory Duplicates (LD1 and LD2)**
LDR	**-**	**Linear Dynamic Range**
LFB	**–**	**Laboratory fortified blank**
LFM	**-**	**Laboratory Fortified Matrix, equivalent to Matrix Spike (MS)**
LFMD	**-**	**Laboratory fortified Matrix Duplicate, equivalent to MSD**
LIMS	**-**	**Laboratory Information Management System**
LLE	**-**	**Liquid-Liquid Extraction**
LOD	**-**	**Limit of Detection**
LOQ	**-**	**Limit of Quantitation**
LRB	**-**	**Laboratory Reagent Blank**
LWL	**-**	**Lower Warning Limit**
MDL	**–**	**Method detection limit**
MRL	**-**	**Method Reporting Limit or Level, equivalent to RL**

mg/Kg	–	Milligrams per kilogram
mg/L	–	Milligrams per liter
MS	–	Matrix spike, equivalent to LFM
MSD	–	Matrix spike duplicate, equivalent to LFMD
MSDS	–	Material Safety Data Sheet
NELAC	–	National Environmental Laboratory Accreditation Conference
NELAP	–	National Environmental Laboratory Accreditation Program
NIOSH	-	National Institute for Occupational Safety and Health
NIST	–	National Institute of Standards and Technology
NPD	-	Nitrogen-Phosphorus Detector
NPDES	-	National Pollutant Discharge Elimination System
OCP	-	Organochlorine Pesticides
OPP	-	Organophosphorus Pesticides
OSHA	-	Occupational Safety and health Administration
PAH	-	Polynuclear Aromatic Hydrocarbons
PMBS	-	Performance based Measurement System
PCBs	-	Polychlorinated Biphenyls
PCDD	-	Polychlorinated dibenzo-p-dioxins
PCDF	-	Polychlorinated dibenzofurans
PID	-	Photoionization Detector
PQL	-	Practical Quantitation Limit
PT	–	Proficiency Test(ing)
PTP	-	Proficiency Testing Provider
PTPA	–	Proficiency Testing Provider Accreditor
QA	–	Quality Assurance
QAP	-	Quality Assurance Program
QAPP	-	Quality Assurance Project Plan
QC	–	Quality Control
QCS	-	Quality Control Sample
QM	–	*Quality Manual*
RF	–	Response Factor
RL	–	Reporting level
RPD	–	Relative percent difference
RSD	–	Relative standard deviation
RT	-	Retention Time
SCAQMD	-	Southern California Air Quality Management District
SI	-	International System of Units
SIM	-	Selected Ion Monitoring
SOC	-	Synthetic Organic chemical
SOPs	–	Standard operating procedures
SPCC	-	System Performance Check Compounds
SPE	-	solid Phase Extraction
SPME	-	Solid Phase Microextraction
spk	–	Spike
SRM	-	Standard Reference Material
std	–	standard
SUR	-	Surrogate compound
SVOA	-	Semivolatile Organic Analysis
TCD	-	Thermal conductivity Detector
TCLP	-	Toxic Characteristics leaching Procedure
TDS	-	Total Dissolved Solids

TEM	**-**	**Transmission Electron Microscope**
TIC	**-**	**Tentatively Identified Compound**
TKN	**-**	**Total Kjeldahl Nitrogen**
TNI	**-**	**The NELAC Institute**
TOC	**-**	**Total Organic Carbon**
TOX	**-**	**Total Organic Halogens**
TPH	**-**	**Total Petroleum Hydrocarbons**
TRPH	**-**	**Total Recoverable Petroleum Hydrocarbons**
TSS	**-**	**Total Suspended solids (Non-filterable residue)**
UCL	**-**	**Upper control limit**
ug/L	**–**	**micrograms per liter**
UV-Vis	**–**	**Ultraviolet visible light**
UWL	**–**	**Upper Warning Limit**
VOA	**–**	**Volatile organic analysis**
VOC	**–**	**Volatile organic compound**
WET	**–**	**Whole effluent toxicity**
WET	**–**	**Waste Extraction Test (California leaching test for hazardous waste)**
ZHE	**–**	**Zero Headspace extraction**

3.4 Management of the *Quality Manual*

The Quality Assurance Manager is responsible for maintaining the currency of the *Quality Manual*.

The *Quality Manual* is reviewed annually by the Quality Manager and laboratory personnel to ensure it still reflects current practices and meets the requirements of any applicable regulations or client specifications. Sections of the manual are updated by making a change to the Section and then increasing the revision number by one. The cover sheet of the *Quality Manual* (Section 1) must be re-signed and the Table of Contents (Section 2) is updated whenever a Section is updated.

The *Quality Manual* is considered confidential within Weck Laboratories, Inc. and may not be altered in anyway except by approval of the Laboratory Director and Quality Manager. If it is distributed to external users, it is for the purpose of reviewing Weck Labs' management system and may not be used for any other purpose without written permission.

Section 4

ORGANIZATION
(TNI V1:M2 – Section 4.1)

The laboratory is a legally identifiable organization. The laboratory is responsible for carrying out testing activities that meet the requirements of the TNI Standard, the ISO/EIC 17025 Standard, and that meet the needs of the client. Through application of the policies and procedures outlined in this Section and throughout the *Quality Manual*:

- **The laboratory assures that it is impartial and that personnel are free from undue commercial, financial, or other undue pressures that might influence their technical judgment.**
- **Management and technical personnel have the authority and resources to carry out their duties and have procedures to identify and correct departures from the laboratory's management system.**
- **Personnel understand the relevance and importance of their duties as related to the maintenance of the laboratory's management system.**
- **Ethics and data integrity procedures (see Appendix A, Section 5 – "Management" and Section 19 – "Data Integrity Investigations") ensure personnel do not engage in activities that diminish confidence in the laboratory's capabilities.**
- **Confidentiality is maintained.**

4.1 Organization

**The laboratory is a commercial enterprise organized as a California corporation under the legal name Weck Analytical Environmental Services, Inc, DBA Weck Laboratories Inc. The Tax ID number is available upon request, if applicable.
The laboratory operates in the City of Industry, Los Angeles County, California.**

The laboratory's organization chart can be found in Appendix B. Additional information regarding responsibilities, authority and interrelationship of personnel who manage, perform or verify testing is included in Section 5 –"Management" and Section 20 – "Personnel". These Sections also include information on supervision, training, technical management, job descriptions, quality personnel, and appointment of deputies for key managerial personnel.

The laboratory has the resources and authority to operate a management system that is capable of identifying departures from that system and from procedures during testing, and initiates actions to minimize or prevent departures.

4.2 Conflict of Interest and Undue Pressure

The organizational structure indicated above minimizes the potential for conflicting or undue interests that might influence the technical judgment of analytical personnel. In addition, procedures are in place to prevent outside pressures or involvement in activities that may affect competence, impartiality, judgment, operational integrity, or the quality of the work performed at the laboratory.

In order to assist the laboratory technical personnel in performing their duties without detrimental influences, it is the policy of the Company that the laboratory be impartial and that it and its personnel are free from any undue commercial, financial and other pressures which might influence or adversely affect their normal performance having an impact on the quality of the work they produce or their technical judgment. By this policy all laboratory personnel dedicated to technical activities should not be influenced by, or involved in any financial or commercial matter while performing laboratory work. If any employee feels that he or she might be under any kind of pressure as described above, the Laboratory Director must be notified immediately. Additionally, the Laboratory will not engage in any activities that may endanger the trust in its independence of judgment and integrity in relation to its environmental testing.

Section 5

MANAGEMENT
(TNI V1:M2 – Section 4.2)

The laboratory maintains a management system that is appropriate to the scope of its activities.

5.1 Management Requirements

Top management includes the Laboratory Director, Technical Directors, Laboratory Supervisors/Team Leaders and Customer Service/Project Managers and the Quality Assurance Director.

Management's commitment to good professional practice and to the quality of its products is defined in the Quality Policy statement, Section 5.3

Management has overall responsibility for the technical operations and the authority needed to generate the required quality of laboratory operations. Management ensures communication within the organization to maintain an effective management system and to communicate the importance of meeting customer, statutory, and regulatory requirements. Management assures that the system documentation is known and available so that appropriate personnel can implement their part. When changes to the management system occur or are planned, managers ensure that the integrity of the system is maintained.

Management is responsible for carrying out testing activities that meet the requirements of the TNI Standard, the ISO/IEC 17025 Standard, and that meet the needs of the client in relation to other Federal and State requirements, such DoD.

Managers implement, maintain, and improve the management system, and identify noncompliance with the management system of procedures. Managers initiate actions to prevent or minimize noncompliance.

Management ensures technical competence of personnel operating equipment, performing tests, evaluating results, or signing reports, and limits authority to perform laboratory functions to those appropriately trained and/or supervised. This is done by requiring minimum level of education for each position as specified in the corresponding job descriptions, receiving training from senior chemists or lab managers and as described in Section 20 of this QM.

Management is responsible for defining the minimal level of education, qualifications, experience, and skills necessary for all positions in the laboratory and assuring that technical staff have demonstrated capabilities in their tasks.

Training is kept up to date as described in Section 20 – "Personnel" by periodic review of training records and through employee performance review.

Management bears specific responsibility for maintenance of the management system. This includes defining roles and responsibilities to personnel, approving documents, providing required training, providing a procedure for confidential reporting of data integrity issues, and periodically reviewing data, procedures, and documentation. The assignment of responsibilities, authorities, and interrelationships of the personnel who manage, perform, or verify work affecting the quality of environmental tests is documented in Job Descriptions documentation.

Management ensures that audit findings and corrective actions are completed within required time frames.

Designated deputies are appointed by management during the absence of the Laboratory Manager, Technical Manager or the Quality Manager, and always if the absence is more than 15 days.

5.2 Management Roles and Responsibilities

5.2.1 Laboratory Director

The Laboratory Director is responsible for the overall quality, safety, financial, technical, human resource and service performance of the laboratory. The Laboratory Director provides the resources necessary to implement and maintain an effective quality and data integrity program.

5.2.1.1 Responsibilities

The Laboratory Director is responsible for:

a. **Ensuring that personnel are free from any commercial, financial, and other undue pressures that might adversely affect the quality of their work**
b. **Ensuring that all analysts and supervisors have the appropriate education, skills and training to properly carry out the duties assigned to them and ensures that this training has been documented.**
c. **Ensuring that appropriate corrective actions are taken to address analyses identified as requiring such actions by internal and external performance or procedural audits. Procedures that do not meet the standards set forth in the Quality Manual, laboratory SOPs or laboratory policies may be temporarily suspended by the Laboratory Director.**
d. **Reviews and approved all SOPs and policies prior to their implementation and ensures all approved SOPs and policies are provided to laboratory personnel and are adhered to.**
e. **Documenting all relevant analytical and operational activities**
f. **Supervising all personnel**
g. **Performing with the other management staff an annual Management System Review**

h. Ensuring that the laboratory has the appropriate resources and facilities to perform requested work
i. Nominating deputies when the Technical Directors or QA Officer are absent for a prolonged period of time
j. Developing and implementing a proactive program for prevention and detection of improper, unethical or illegal actions and operating in accordance with the Laboratory's documented ethics policy
k. Ensuring that only those outside support services and supplies that are of adequate quality to sustain confidence in the laboratory's tests are used
l. Commitment to meet customer requirements and whenever possible exceed their expectations
m. Commitment to operate in accordance with statutory and regulatory requirements

5.2.2 Quality Assurance Manager (QA Manager)

The QA Manager (or designee) is responsible for the oversight and review of quality control data, but is independent from laboratory operations. The QA manager reports directly to the Officers of the Corporation as indicated in the Organizational chart (Appendix B). The QA Manager's training and proof of experience in QA/QC procedures, knowledge of analytical methods, and the laboratory's management system are available in the personnel records.

5.2.2.1 Responsibilities

The Quality Manager is responsible for:

a. serving as a focal point for QA/QC;
b. arranging or conducting annual internal audits without outside (e.g., managerial) influence;
c. notifying management of deficiencies, and monitoring corrective actions;
d. oversight and review of quality control data;
e. arranging or conducting internal audits annually;
f. monitoring corrective actions;
g. ensuring that the management system related to quality is implemented and followed at all times;
h. have a general knowledge of the analytical test methods for which data review is performed;
i. Ensuring communications take place within the laboratory regarding the effectiveness of the quality system;
j. Using available tools, such as audit and surveillance results, control charts, proficiency testing results, data analysis, corrective and preventive actions, customer feedback, and management reviews in efforts to monitor trends and continually improve the quality system;
k. Stop work as deemed necessary in the event of serious QA/QC issues;
l. monitoring and maintaining laboratory certifications; and
m. keeping this *Quality Manual* current.

5.2.3 Technical Directors

The Technical Director (or designee) is a full-time laboratory staff member and supervises laboratory operations and data reporting. The Technical Director's proof of experience in the fields of accreditation may be found in the personnel records.

If the Technical Director is absent for fifteen (15) calendar days or more, a deputy (see Table 5-1 below) with appropriate qualifications will perform the Technical Directors' duties. Beyond a thirty-five (35) calendar day absence, management will notify the primary accreditation body in writing of the absence of the Technical Director and the appointment of the deputy.

The Technical Director is the technical director of more than one accredited environmental laboratory.

5.2.3.1 Responsibilities

The Technical Manager is responsible for:

a. meeting the general and education requirements and qualifications found in Sections 4.1.7.2 and 5.2.6.1 of the TNI Standard - EL-V1M2-2009;
b. monitoring performance data and the validity of the analyses for the laboratory;
c. Ensuring that sufficient number of qualified personnel are employed to supervise and perform the work of the laboratory;
d. Provide educational direction to laboratory staff;
e. Exercise day-to-day supervision of laboratory operations for the corresponding department
f. Ensuring personnel have the appropriate education and technical background to perform the tests for which the laboratory is accredited.

5.2.4 Lab Supervisors/Team Leaders

The Lab supervisors are full time employees that work under the direction of the Technical Directors and are responsible managing the group or section. Training records and educational background can be found in the personnel records.

5.2.4.1 Responsibilities

The Lab Supervisor/Team leader is responsible for:

a. Reviewing section workload and distribute work among available chemists;
b. Perform secondary data review of data packages;
c. ensuring analytical instruments are performing correctly;
d. Provide educational direction to laboratory staff;
e. Assist the Technical Director in performing day-to-day supervision of laboratory operations for the corresponding department

5.2.5 Customer Service/Project Managers (PM)

The PMs are full time or part-time employees that work under the direction of the Laboratory Director and are responsible for the relationship between the laboratory and the external clients. Training records and educational background can be found in the personnel records.

5.2.5.1 Responsibilities

The PMs are responsible for:

f. **Reviewing final reports for completeness and accuracy prior to be submitted to clients;**
g. **Maintain projects and bids in LIMS accurate and updated;**
h. **Maintain good communications with customers in all aspects related with their projects;**
i. **Make the necessary arrangements for sampling supplies delivery and samples pick up;**
j. **Answer customer technical questions or relate to appropriate lab personnel when needed**
k. **Ensure data deliverables including hard copy reports, EDDs and invoices are accurate and delivered on time**

5.2.6 Laboratory Key Personnel Deputies

The following table defines who assumes the responsibilities of key personnel in their absence:

Table 5-1 Key Personnel Deputies

Key Personnel	Deputy
Laboratory Director	Technical Director Inorganics
QA Manager	Laboratory Director
Technical Director Inorganics	Inorganic Section Group Leader
Technical Director Organics	Organic Section Group Leader
Technical Director Microbiology	Laboratory Director
Technical Director Radiochemistry	Laboratory Director

Note: The designees or deputies are for temporary absence only; for prolonged absence a new person should be appointed to the position on a permanent basis.

5.3 Quality Policy

Management's commitment to quality and to the management system is stated in the Quality Policy below, which is upheld through the application of related policies and procedures described in the laboratory's *Quality Manual*, SOPs and policies.

Weck Laboratories provides qualitative and quantitative data for use in critical decisions relating to the protection of the public and the environment. The data used

for such purposes must be scientifically valid, defensible and of known and documented quality. All environmental testing activities are carried out in such a way as to meet the requirements of the current TNI Standard and to satisfy the needs of the client, the regulatory authorities or organizations providing recognition.

It is our goal to provide our clients with the best possible services, in terms of quality of laboratory work, honesty in our procedures and reporting, efficiency in our turnaround time and reasonable prices for our services and at the same time satisfy the needs of the regulatory authorities and organizations providing recognition.

The management of the laboratory is totally committed to the attainment of the best possible quality of data and instructs and educates the staff on this company policy.

All the necessary resources and materials shall be provided to the personnel of the laboratory in order to meet and/or improve the quality requirements of TNI and consequently of ISO 17025, of the analytical methods performed at the lab and any special requirements from clients.

Our policy is to use good professional practices, to maintain quality, to uphold the highest quality of service, and to comply with the TNI Standard. The laboratory ensures that personnel are free from any commercial, financial, and other undue pressures, which might adversely affect the quality of work. This policy is implemented and enforced through the unequivocal commitment of management, at all levels, to the Quality Assurance (QA) principles and practices outlined in this manual. However, the primary responsibility for quality rests with each individual within the laboratory organization. Every laboratory employee must ensure that the generation and reporting of quality analytical data is a fundamental priority. Every laboratory employee is required to familiarize themselves with the quality documentation and to implement the policies and procedures in their work. All employees are trained annually on ethical principles and procedures surrounding the data that is generated. The laboratory maintains a strict policy of client confidentiality.

The objective of the Quality Assurance Program is to monitor the reliability of the analytical data produced by the Laboratory and to implement effectively the quality control procedures and operations defined for each analysis. The purposes of this program are:

a. **Provide data that is scientifically valid, defensible, and of known and documented quality in accordance with standards developed by TNI and any applicable state or EPA regulations or requirements.**
b. Ensure that analytical results fall between acceptable control limits.
c. Provide mechanisms for corrective action when necessary.
d. Establish standardized practices to provide consistency in the generation of data.
e. Define the quality of each analytical system in terms of accuracy, precision and sensitivity.
f. Identify in the early stages possible problems that may affect data quality.
g. Ensure that all personnel involved with testing and calibration are familiar with the quality documentation;
h. Ensure that all policies and procedures are implemented;

i. Commitment that management will comply with the standard and will continually improve the effectiveness of the management system

5.4 Ethics and Data Integrity System

The laboratory has developed an Ethics and Data Integrity policy for prevention and detection of improper, unethical or illegal actions that is included in Appendix A. The laboratory's Ethics and Data Integrity program, training and investigations are discussed in Section 19 – "Data Integrity Investigations".

A main component of this program is the periodic training and communications that the employees receive from management about the ethics policy and the utmost importance of an honest and ethical behavior in all activities performed at the laboratory.

Proper ethical conduct in the laboratory is strictly enforced. The Company's Code of Ethics is presented to current and prospective employees in both the QA manual and the Employee Handbook.

The Data Integrity Plan, which includes the description of the data integrity procedures, serves to combine the elements currently in place and document further procedures to ensure our compliance with requirements in the TNI standard and from other regulatory agencies.

These procedures include the following elements:

a. data Integrity training
b. signed data integrity documentation for all laboratory employees
c. in-depth, periodic monitoring of data integrity
d. data integrity procedure documentation.

The data integrity procedures are signed and dated by senior management. These procedures and the associated implementation records are properly maintained and made available for assessor review. The data integrity procedures are annually reviewed and updated if necessary by management.

The Data Integrity Plan also provides a mechanism for confidential reporting of data integrity issues in the laboratory. A primary element of the mechanism is to assure confidentiality and a receptive environment in which all employees may privately discuss ethical issues or report items of ethical concern. In instances of ethical concern, the mechanism also includes a process whereby laboratory management is to be informed of the need for any further detailed investigation.

Each employee is required to understand and sign a Data Integrity Agreement, contained in the Data Integrity Plan document. The Laboratory Ethics seminar that is presented as a refresher to current employees on an annual basis and as part of the hiring process for new employees include elements describing examples of improper and illegal actions, how to identify appropriate and inappropriate laboratory and

instrument manipulation practices, guidance for manual integration practices and consequences of unethical or improper behavior.

Punishment for improper, illegal or unethical activities range from suspension to termination, depending on the degree and nature of the unethical activity.

Employees are required and encouraged to bring up to management any improper activities they detect or are suspicious of. Any incident reported is immediately investigated by the management and the person or persons involved are subject to disciplinary actions.

The Management shall also monitor the program for detecting improper, unethical or illegal action by performing internal proficiency testing (single or double blind), reviewing of analytical data post-analysis, performing electronic data audits using special software as Mint Miner® and providing an open door policy for employees to report any suspicious activity without fears.

In order to assist the laboratory technical personnel in performing their duties without detrimental influences, it is the policy of the Company that the laboratory be impartial and that it and its personnel are free from any undue commercial, financial and other pressures which might influence or adversely affect their normal performance having an impact on the quality of the work they produce or their technical judgment. By this policy all laboratory personnel dedicated to technical activities should not be influenced by, or involved in any financial or commercial matter while performing laboratory work. If any employee feels that he or she might be under any kind of pressure as described above, the Laboratory Director must be notified immediately. Additionally, the Laboratory will not engage in any activities that may endanger the trust in its independence of judgment and integrity in relation to its environmental testing.

5.5 Documentation of Management / Quality System

The management system is defined through the policies and procedures provided in this *Quality Manual* and written laboratory Standard Operating Procedures (SOPs) and policies.

5.5.1 Quality Manual

The *Quality Manual* contains the following required items:

5.5.1.1 document title;

5.5.1.2 laboratory's full name and address;

5.5.1.3 name, address (if different from above), and telephone number of individual(s) responsible for the laboratory;

5.5.1.4 identification of all major organizational units which are to be covered by this quality manual and the effective date of the version;

5.5.1.5 identification of the laboratory's approved signatories;

5.5.1.6 the signed and dated concurrence (with appropriate names and titles), of all responsible parties including the quality assurance manager, technical

directors, and the agent who is in charge of all laboratory activities, such as the laboratory director or laboratory manager;

5.5.1.7 the objectives of the management system and contain or reference the laboratory's policies and procedures;

5.5.1.8 the laboratory's official quality policy statement, which shall include management system objectives and management's commitment to ethical laboratory practices and to upholding the requirements of this Standard; and

5.5.1.9 a table of contents, and applicable lists of references, glossaries and appendices.

This *Quality Manual* contains or references all required elements as defined by the TNI Standard - V1:M2, Section 4.2.8.4.

5.5.2 Standard Operating Procedures (SOPs)

Standard operating procedures (SOPs) represent all phases of current laboratory operations (they include an effective date, revision number, and signature of the approving authorities which are the Technical Director of the section involved or the Laboratory Director and QA Manager and are available to all personnel. They contain sufficient detail such that someone with similar qualifications could perform the procedures. There are two types of SOPs used in the laboratory: 1) test method SOPs, which have specific requirements as outlined below, and 2) general use or administrative SOPs which document general procedures.

A list of the SOPs currently in use at the laboratory can be found in Appendix E.

Each accredited analyte or method has an SOP. Sometimes an SOP is a copy of a method, and any additions are clearly described. The laboratory's test method SOPs include the following topics, where applicable, as indicted in the SOP MIS048:

i. identification of the method;
ii. applicable matrix or matrices;
iii. limits of detection and quantitation;
iv. scope and application, including parameters to be analyzed;
v. summary of the method;
vi. definitions;
vii. interferences;
viii. safety;
ix. equipment and supplies;
x. reagents and standards;
xi. sample collection, preservation, shipment and storage;
xii. quality control;
xiii. calibration and standardization;
xiv. procedure;
xv. data analysis and calculations;
xvi. method performance;
xvii. pollution prevention;
xviii. data assessment and acceptance criteria for quality control measures;
xix. corrective actions for out-of-control data;

xx. contingencies for handling out-of-control or unacceptable data;
xxi. waste management;
xxii. references; and
xxiii. any tables, diagrams, flowcharts and validation data.

5.5.3 <u>Order of Precedence</u>

In the event of a conflict or discrepancy between policies, the order of precedence is as follows unless otherwise noted:

1. Quality Manual
2. SOPs and Policies
3. Other (Work Instructions (WI), memos, flow charts, etc.

If there is a Quality assurance Project Plan (QAPP) for a particular project, this will take precedence over the above item just for that particular project.

Section 6

DOCUMENT CONTROL
(TNI V1:M2 – Section 4.3)

This Section describes how the laboratory establishes and maintains a process for document management. Procedures for document management include controlling, distributing, reviewing, and accepting modifications. The purpose of document management is to preclude the use of invalid and/or obsolete documents.

Documents can be SOPs, policy statements, specifications, calibration tables, charts, textbooks, posters, notices, memoranda, software, drawings, plans, etc. These may be on various media, whether hard copy or electronic, and they may be digital, analog, photographic or written.

The laboratory manages three types of documents: 1) controlled, 2) approved, and 3) obsolete.

A controlled document is one that is uniquely identified, issued, tracked, and kept current as part of the management system. Controlled documents may be internal documents or external documents.

An approved document means it has been reviewed and either signed and dated, or acknowledged in writing or by secure electronic means by the issuing authority(ies).

Obsolete documents are documents that have been superseded by more recent versions or are no longer needed.

6.1 Controlled Documents

Documents will be reviewed, revised (as appropriate) and approved for use by appropriate management personnel prior to issue. SOPs are approved by both the Technical Director or Laboratory Director and the QA Manager. Policies and other similar documents are approved by the Laboratory Director alone. The QA Manual is approved by all management personnel (Lab Director, Technical Directors and QA Manager).

Documents are reviewed annually to ensure their contents are suitable and in compliance with the current management systems requirements, and accurately describe current operations.

Approved copies of documents are available to staff at all locations where operations are essential to the effective functions of the laboratory.
The procedure for document control and distribution of documents is detailed in SOP MIS045.

SOPs and other controlled documents are accessible to all analysts electronically as PDF documents located in the laboratory computer network. Each analysis in LIMS has a link to the corresponding SOP for that method.

The QA Manager or Laboratory Director will update the controlled documents by keeping in the active folder the current documents and moving to the "obsolete" folder the documents that have been replaced. The new document will have the date it is effective and the revision number while the old document with a prior revision number will be considered obsolete starting with the date the new revision becomes effective.

Controlled internal documents are uniquely identified with 1) a unique name or number identification 2)date of issue, 3) revision identification, 4) page number, 5) the total number of pages (or a mark to indicate the end of the document), and 6) the signatures of the issuing authority (i.e. management) that approve documents after reviewing for accuracy.

A master list of controlled internal documentsis maintained that includes distribution, location, and revision dates. A master list of controlled external documents is also maintained that includes title, author, copyright date, and date of publication, and location. The controlled document list is maintained electronically by the QA Manager and is updated as needed and reviewed annually for accuracy.

6.1.1 Document Changes to Controlled Documents

6.1.1.1 Paper Document Changes

Document changes are approved by the original approving authority.

The document management process allows for handwritten modifications to documents if the modifications are not substantial. The date and approval is documented with the modifications and these changes are tracked by the QA Manager who will redistribute the modified document to its users.

All document modifications are approved. Changes that are not process modifications but clarifications may be performed without revision. Approval is required. The modified document is then copied and distributed, and obsolete documents are removed according to the master list of controlled documents.

Amendments/modifications to documents are incorporated into a new revision and reissued when the document is reviewed and updated on or before its scheduled review cycle.

A reason for the modification or change is provided as historical information in the revised document as an appendix.

6.1.1.2 Electronic Document Changes

Suggested revisions to electronic documents are presented to the QA Manager or Laboratory Director for review and approval. Changes to electronic documents are approved through electronic means such as an email notification for interested parties.

Where practical, the altered text or new text in the draft is identified during the revision or review process to provide for easy identification of the modifications.

6.2 Obsolete Documents

All invalid or obsolete documents are removed from general distribution, or otherwise prevented from unintended use.

Obsolete documents retained for legal use or historical knowledge preservation are appropriately marked and retained. Obsolete documents are identified as being obsolete by management. All copies of the obsolete document are collected from employees according to the master distribution list and destroyed; the original copy or a remaining copy is clearly marked "Old" or "Obsolete" on the front cover and kept in a folder properly identified as containing old or obsolete documents. They are retained for 10 years or as required by regulations or clients from the date they became obsolete in the area designated for document storage.
Electronic documents that have being identified obsolete or old are also moved to a computer directory or folder clearly identified as such.

Section 7

REVIEW OF REQUESTS, TENDERS AND CONTRACTS
(TNI V1:M2 – Section 4.4)

The review of all new work assures that oversight is provided so that requirements are clearly defined, the laboratory has adequate resources and capability, and the test method is applicable to the customer's needs. This process assures that all work will be given adequate attention without shortcuts that may compromise data quality.

Contracts for new work may be formal bids, signed documents, verbal, or electronic. The client's requirements, including the methods to be used, must be clearly defined, documented and understood. Requirements might include target analyte lists, project specific reporting limits (if any), project specific quality control requirements (if any), turnaround time, and requirements for data deliverables. The review must also cover any work that will be subcontracted by the laboratory.

7.1 Procedure for the Review of Work Requests

The Client Service Manager in conjunction with the Technical Directors or Laboratory Director determines if the laboratory has the necessary accreditations, physical, personnel and information resources, including schedule, equipment and deliverables to meet the work request. The purpose of this review of capability is to establish that the laboratory's personnel have the skills and expertise necessary for the performance of the tests in question. The review may encompass results of earlier participation in interlaboratory comparisons or proficiency testing and/or the running of trial environmental test or calibration programs using samples or items of known value in order to determine uncertainties of measurement, detection limits of confidence limits, or other essential quality control requirements. The current accreditation status of the laboratory is also reviewed. The laboratory then informs the client of the results of this review if it indicates any potential conflict, deficiency, lack of appropriate accreditation status, or inability on the laboratory's part to complete the client's work.

Other aspects to be evaluated and reviewed include whether or not the appropriate test method is selected and capability of meeting the clients' requirements, contractual obligations, bonding issues and payment terms, method capabilities, analyte lists, reporting limits, quality control limits turnaround time feasibility, QA/QC issues, formal laboratory quote, final report formatting, electronic deliverable documents, time required to keep sample in house and final sample disposal requirements.

The Client Services Manager or designated staff will discuss and resolve any differences between the request or tender and the contract before any work commences in order to assure that each contract is acceptable both to the laboratory and the client. A contract may be any written or oral agreement to provide a client with environmental testing or other laboratory services.

Records of reviews, including any significant changes, shall be maintained either as written documents in the project/client folder, in forms of emails received and sent or in other electronic documentation such as electronic files in the client computer folders or LIMS. Records shall also be maintained of pertinent discussions with a client relating to the client's requirements or the results of the work during the period of execution of the contract.

For review of routine and other simple tasks, the date and the identification (e. g. the initials) of the person in the laboratory responsible for carrying out the contracted work are considered adequate.

For repetitive routine tasks, the review need be made only at the initial enquiry stage or on granting of the contract for on-going routine work performed under a general agreement with the client, provided that the client's requirements remain unchanged. For new, complex or advanced environmental testing, a more comprehensive record should be maintained.

The review shall also cover any work that is subcontracted by the laboratory.

The client shall be informed of any deviation from the contract. If a contract needs to be amended after work has commenced, the same contract review process shall be repeated and any amendments shall be communicated to all affected personnel.

If there is any suspension of accreditation, revocation of accreditation, or voluntary withdrawal of accreditation during the time the contract is in effect, this must be reported to the client

The review process is repeated when there are amendments to the original contract by the client. The participating personnel are given copies of the amendments. The amendments are maintained electronically in the project information area of LIMS.

7.2 Documentation of Review

Records are maintained for every contract or work request, when appropriate. This includes pertinent discussions with a client relating to the client's requirements or the results of the work during the period of execution of the contract. The information if in the form of hard copies, is maintained in folders kept by the assigned Project Manager, this will also include phone logs, communications and faxes. Electronic records, such as emails, PDF files, word processing documents, spreadsheets and charts are kept electronically in the "Office_PM" section of the file server under the client's folder and project subfolder.

Section 8

SUBCONTRACTING OF ENVIRONMENTAL TESTS
(TNI V1:M2 – Section 4.5)

A subcontract laboratory is defined as a laboratory external to this laboratory, or at a different location than the address indicated on the front cover of this manual, that performs analyses for this laboratory.

A subcontracted laboratory will be used only if Weck Laboratories does not have the capability of performing the requested test, because of unforeseen reasons (e. g. workload, need for further expertise or temporary incapacity) or if the client specifically requests a particular analysis to be subcontracted.

For DoD related work, only subcontracted laboratories accredited by DoD or its designated representatives will be used. Subcontracted laboratories must receive project-specific approval from the DoD client before any samples are analyzed.

When subcontracting analytical services, the laboratory assures work requiring accreditation is placed with an appropriately accredited laboratory or one that meets applicable statutory and regulatory requirements for performing the tests.

The laboratory will ensure that the subcontract laboratory understands the requirements and will meet the same commitments made to the client by the primary laboratory.

8.1 Procedure

The Client Service Manager maintains a list of subcontractors.

A register for all subcontractors that are routinely used by the laboratory is kept on file including copies of the certifications and analyte list among other documents. This information is maintained by the Client Services Manager and is kept at the main office and electronically in the "Marketing-Sales" folder of the file server under subcontractor information.

The certificate and analyte list are reviewed by the Client Services Manager to ensure the subcontracting laboratory has the appropriate accreditation to do the work.

The Client Services Manager or the Project Manager involved notifies the client of the intent to subcontract the work in writing or by verbal communications. When possible, the laboratory gains the approval of the client to subcontract their work prior to implementation, preferably in writing.

The laboratory performing the subcontracted work is identified in the final report and a copy of the subcontractor's report is kept in file in case the client requests it at a later time.

The laboratory assumes responsibility to the client for the subcontractor's work, except in the case where a client or a regulating authority specified which subcontractor is to be used.

More detailed procedures for subcontracting laboratory work are in SOP MIS041.

Section 9

PURCHASING SERVICES AND SUPPLIES
(TNI V1:M2 – Section 4.6)

The laboratory ensures that purchased supplies and services that affect the quality of environmental tests are of the required or specified quality, by using approved suppliers and products.

The laboratory has procedures for purchasing, receiving, and storage of supplies that affect the quality of environmental tests.

Weck Laboratories, Inc. only uses those outside support services and supplies that are of adequate quality to sustain confidence in the laboratory's tests. Services and supplies that may affect the quality of environmental tests include, but are not limited to, balance calibration, solvents, standards, and sample containers; their records include the following, where applicable:

- **Date of receipt;**
- **Expiration date;**
- **Source;**
- **Lot or serial number;**
- **Calibration and verification records**
- **Certifications.**

9.1 Procedure

The Technical Directors review and approve the supplier of services and supplies and approves technical content of purchasing documents prior to ordering.

Specific procedures to evaluate, select and monitor suppliers of materials and services as well as required documentation are detailed in the corresponding SOP (MIS042).

Evaluation of suppliers is accomplished by ensuring the supplier ships the product or material ordered and that the material is of the appropriate quality by signing packing slips or other supply receipt documents. The purchasing documents contain the data that adequately describes the services and supplies ordered. The description may include type, class, grade, identification, specifications or other technical information.

The supplies received are inspected for breakage, leaks or any other damage. The supplies and chemicals are checked for Expiration date, concentration, grade and other relevant information. The supplies received are stored according to manufacturer's recommendations, laboratory SOPs or test method specifications.

Any documents received with the supplies and services including specifications, certificates of analyses, warranties, maintenance records, calibration records etc are kept on file as follows:

- **Certificates of standards are scanned and stored in the file server under by department and date, kept by the section leaders**
- **Records for instrument repair services are kept with each instrument maintenance records by the main analyst assigned to the instrument**
- **Records for balance calibration services, thermometers and other equipment requiring periodic calibration are kept in binders in the QA department by the QA Manager.**

The purchased supplies and reagents that affect the quality of the tests are not used until they are inspected or otherwise verified as complying with requirements defined in the test method.

9.2 Approval of Suppliers

The QA Manager maintains a list of approved suppliers, which is included in the SOP for Outside support Services and Supplies MIS042.

The evaluation procedure for approving vendors is described in the above mentioned SOP.

Section 10

SERVICE TO THE CLIENT
(TNI V1:M2 – Section 4.7)

The laboratory collaborates with clients and/or their representatives in clarifying their requests and in monitoring laboratory performance related to their work. Each request is reviewed to determine the nature of the request and the laboratory's ability to comply with the request within the confines of prevailing statutes and/or regulations without risk to the confidentiality of other clients.

10.1 Client Confidentiality

The laboratory confidentiality policy is to not divulge or release any information to a third party without proper authorization. Third party requests for data and information are referred to the client. Data and records identified as proprietary, privileged, or confidential are exempt from disclosure.

All electronic data (storage or transmissions) are kept confidential, based on technology and laboratory limitations, as required by client or regulation.

The client is the person or entity who requested the analyses. Any information or data is only released to third parties with written permission from a properly authorized representative of the client. This information includes, but is not limited to COCs, Certificates of Analysis, raw data, bench sheets, electronic information and sample results.
In addition no information pertaining to clients is posted in public areas where the access is not restricted.

Access to laboratory records and LIMS data is limited to authorized laboratory personnel except with the permission of the QA Officer or Laboratory Director. NELAC-related records are made available to authorized accrediting authority personnel.

10.2 Client Support

Communication with the client, or their representative, is maintained to provide proper instruction and modification for testing. Technical staff is available to discuss any technical questions or concerns the client may have.

The client, or their representative, may be provided reasonable access to laboratory areas for witnessing testing, provided that the laboratory ensures confidentiality to other clients.

Delays or major deviations to the testing are communicated to the client immediately. Communications are verbal, via telephone or in writing via email, fax or letter and are performed normally by the Project Manager assigned to that client or in some cases by the Client Services Manager or Laboratory Director.

The laboratory will provide the client with all requested information pertaining to the analysis of their samples. An additional charge may apply for additional data/information that was not requested prior to the time of sample analysis or previously agreed upon.

10.3 Client Feedback

The laboratory seeks both negative and positive feedback following the completion of projects and periodically for ongoing projects. Feedback provides acknowledgement, corrective actions where necessary, and opportunities for continuous improvement.

Negative customer feedback is documented as a customer complaint (see Section 11 – "Complaints").

The following are specific situations for which immediate clarification or feedback is required from the client:

- **The client has specified incorrect, obsolete, or improper methods;**
- **Methods require modification to ensure achievement of project-specific objectives contained in planning documents (e.g., difficult matrix, poor-performing analyte);**
- **Project-planning documents (e.g., Quality Assurance Project Plan (QAPP) or Sampling and Analysis Plan (SAP)) are missing or requirements in the documents (e.g., action levels, detection and quantification capabilities) require clarification; or**
- **The laboratory has encountered problems with sampling or analysis that may impact results (e.g., improper preservation of sample).**

Customer feedback are obtained by Project Managers that maintain regular communication with the clients, by the Client Services Manager, who contacts different client to ask about the development of each project and by survey conducted by external agencies such as ACIL Seal of Excellence in which the Laboratory participates on regular basis.

Section 11

COMPLAINTS
(TNI V1:M2 – Section 4.8)

The purpose of this Section is to assure that customer complaints are addressed and corrected. This includes requests to verify results or analytical data. Complaints provide the laboratory an opportunity to improve laboratory operation and client satisfaction.

Complaints by customers or other parties are reviewed by management and an appropriate action is determined. All customer complaints are documented by the person receiving the complaint and addressed to the responsible manager.

If it is determined that the complaint has merit, the procedures outlined in Section 14 – Corrective Action are utilized. If it is determined that a complaint is without merit, it is documented, and the client is contacted by the person who received the complaint or the Client Services Manager.

A complaint such as a concern that data is repeatedly late should be reviewed for preventive action (see Section 15 – "Preventive Action") to minimize a future occurrence.

Section 12

CONTROL OF NON-CONFORMING ENVIRONMENTAL TESTING WORK
(TNI V1:M2 – Section 4.9)

Non-conforming work is work that does not meet acceptance criteria or requirements. Nonconformances can include departures from standard operating procedures or test methods or unacceptable quality control results (see Section 27 – "Quality Assurance for Environmental Testing"). Identification of non-conforming work can come through customer complaints, quality control, instrument calibration, evaluating consumable materials, staff observation, final report review, management reviews and internal and external audits.

12.1 Exceptionally Permitting Departures from Documented Policies and Procedures

Requests for departures from laboratory procedures are approved by the QA Manager in agreement with the Laboratory Director and documented. The specific procedures are described in SOP MIS044. Planned departures from procedures or policies do not require audits or investigations.

12.2 Non-Conforming Work

The lab policy for control of non-conforming work is to identify the non-conformance, determine if it will be permitted, and take appropriate action. All employees have the authority to stop work on samples when any aspect of the process does not conform to laboratory requirements.

The responsibilities and authorities for the management of non-conforming work are detailed in SOP MIS044. The procedure for investigating and taking appropriate corrective actions of non-conforming work are described in Section 14 – "Corrective Actions". Section 14.3 describes procedures for Technical Corrective Actions. Formal corrective action procedures must be followed for non-conforming work that could reoccur (beyond expected random QC failures) or where there is doubt about the laboratory's compliance to its own policies and procedures.

The investigation and associated corrective actions of non-conforming work involving alleged violations of the company's Ethics and Data Integrity policies must follow the procedures outlined in Section 19 – "Data Integrity Investigations".

The laboratory evaluates the significance of the non-conforming work, and takes corrective action immediately. The customer is notified if their data has been impacted. The laboratory allows the release of non-conforming data only with approval by the QA Manager or appropriate Technical Director or their designee on a case-by-case basis. Non-conforming data is clearly identified in the final report (see Section 28 – "Reporting the Results").

The discovery of a nonconformance for results that have already been reported to the customer must be immediately evaluated for significance of the nonconformance,

its acceptability to the customer, and determination of the appropriate corrective action.

Corrective action for routine, non-recurring exceedances can be documented on raw data worksheets, logbooks, e-mail, a database or other documents. More serious corrective actions (non-conforming work that could reoccur or where there is doubt that the laboratory is in compliance with its own policies and procedures) will require a more formal corrective action process that usually includes the use of a corrective action report.

12.3 Stop Work Procedures

In some cases it might necessary to stop work until the issue is corrected; the procedure to stop work and to evaluate when this is necessary is detailed in SOP MIS044.

Resumption of work after work has been stopped is authorized by the QA Manager in consultation with the Laboratory Director.

Section 13

IMPROVEMENT
(TNI V1:M2 – Section 4.10)

Improvement in the overall effectiveness of the laboratory management system is a result of the implementation of the various aspects of the laboratory's management system: quality policy and objectives (Section 5 – "Management"); internal auditing practices (Section 17 – "Internal Audits"); the review and analysis of data (Section 27 – "Quality Assurance for Environmental Testing"); the corrective action (Section 14 – "Corrective Action") and preventive action (Section 15 – "Preventive Action") process; and the annual management review of the quality management system (Section 18 – "Management Reviews") where the various aspects of the management/quality system are summarized, and evaluated and plans for improvement are developed.

During the Management review other aspects of the laboratory operation are evaluated; these include On Time Delivery, PT performance, re-issuing reports, numbers and types of corrective actions, Audit performance, complaints, control charting, customer feedback, etc.

Section 14

CORRECTIVE ACTION
(TNI V1:M2 – Section 4.11)

Corrective action is the action taken to eliminate the causes of an existing non-conformity, defect, or other undesirable situation in order to prevent recurrence.

Deficiencies cited in external assessments, internal quality audits, data reviews, customer feedback/complaints, control of nonconforming work or managerial reviews are documented and require corrective action. Corrective actions taken are appropriate for the magnitude of the problem and the degree of risk.

14.1 General Procedure

The laboratory uses forms to document and track corrective actions. The form used to document corrective as well as the procedures involved are in SOP MIS016.

The SOPs specify conditions during and after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, and automatic reinjection/reanalysis when certain QC criteria are not met.

Any QC sample result outside of acceptance limits requires corrective action, which may be document in worksheets, LIMS, etc. and not necessarily in the corrective Action form. Once the problem has been identified and addressed, corrective action may include the reanalysis of samples, or appropriately qualifying the results.

The data reviewers or supervisors will identify the need for corrective action and are responsible for initiating corrective action on routine data reviews where a nonconformance is found that could reoccur (beyond expected random QC failures) or where there is doubt about the compliance of the laboratory to its own policies and procedures. The Technical Director will approve the required corrective action to be implemented by the laboratory staff. The QA Manager will ensure implementation and recording of the corrective action.

All deficiencies are investigated and a corrective action plan is developed and implemented if determined necessary. The implementation is monitored for effectiveness.

14.1.1 Cause Analysis

When failures due to systematic errors have been identified, the first step of the corrective action process starts with the initial investigation and determination of root cause(s) of the problem. Records are maintained in the corrective action binder and the corrective action reports computer folder where electronic copies of the Corrective Action Reports are kept of nonconformances requiring corrective action to show that the root cause(s) was investigated, and includes the results of the investigation.

Where there may be non-systematic errors and as such the initial cause is readily identifiable or expected random failures (e.g. failed quality control), a formal root cause analysis is not performed and the process begins with selection and implementation of corrective action (also see Section 14.3 "Technical Corrective Actions").

14.1.2 Selection and Implementation of Corrective Actions

Where uncertainty arises regarding the best approach for analysis of the cause of exceedances that require corrective action, appropriate personnel will recommend corrective actions that are appropriate to the magnitude and risk of the problem and that will most likely eliminate the problem and prevent recurrence

The QA Manager or the appropriate Technical Director ensure that corrective actions are discharged within the agreed upon time frame.

14.1.3 Monitoring of Corrective Action

The QA Manager will monitor implementation and documentation of the corrective action to assure that the corrective actions were effective.
The procedures for the implementation of corrective action are detailed in SOP MIS016.

14.2 Additional Audits

Where the identification of nonconformances or departures from normal lab procedures cast doubt on the laboratory's compliance with its own policies and procedures, or on its compliance with the TNI Standard, the laboratory ensures that the appropriate areas of activity are audited in accordance with Section 17 – "Internal Audits" as soon as possible.

In many cases, the additional audits are follow-ups after the corrective action has been implemented to ensure it is effective. These are done when a serious issue or risk to the laboratory have been identified.

14.3 Technical Corrective Action

Sample data associated with a failed quality control are evaluated for the need to be reanalyzed or qualified. Unacceptable quality control results are documented, and if the evaluation requires cause analysis, the cause and solution are recorded (also see Section 12 – "Control of Nonconforming Environmental Testing Work"*).* Analysts routinely implement corrective actions for data with unacceptable QC measures. First level correction may include re-analysis without further assessment. If the test method SOP addresses the specific actions to take, they are followed. Otherwise, corrective actions start with assessment of the cause of the problem.

Corrective action for non-systematic errors or expected random failures is documented in as specified in SOP MIS016. Corrective actions for nonconformances

that may reoccur (beyond expected random QC failures) or where there is concern that the laboratory is not in compliance with its own policies and procedures require that a corrective action report be completed (see Section 14.1) and may trigger an Internal Audit to be performed on that area of the laboratory.

Technical Directors review corrective action reports and suggest improvements, alternative approaches, and procedures where needed.

If the data reported are affected adversely by the nonconformance, the affected data is clearly identified in the report and the customer is notified.

Section 15

PREVENTIVE ACTION
(TNI V1:M2 – Section 4.12)

Preventive action is a pro-active process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints.

Preventive action includes, but is not limited to: review of QC data to identify quality trends, regularly scheduled staff quality meetings to ensure staff is knowledgeable in quality procedures, review of client feedback to look for improvement opportunities, review of proficiency testing data to look for analytes that were nearly missed, annual managerial reviews, scheduled instrument maintenance and other actions taken to prevent problems.

When improvement opportunities are identified or if preventive action is required, action plans are developed, implemented and monitored to reduce the likelihood of the occurrence of nonconformities.

Procedures for preventive actions include the initiation of such actions and subsequent monitoring to ensure that they are effective.

All personnel have the authority to offer suggestions for improvements and to recommend preventive actions, however management is responsible for implementing preventive action.

laboratory has also implemented a Management of Change process. This process is designed to formally review any changes that are planned for the laboratory and look for potential issues that might arise. Issues are minimized through the development of preventive measures. Changes that are considered under this type of process include the installation of a new LIMS, key personnel changes, building renovations, addition/deletion of an accreditation, addition of a new technology that requires new instrumentation, etc. The process is evaluated by all Management personnel that will be affected in any way with the change and they take a decision on the convenience or not of implementing the change. The opinions of other laboratory personnel involved are also requested and evaluated.

Section 16

CONTROL OF RECORDS
(TNI V1:M2 – Section 4.13)

Records are a subset of documents, usually data recordings that include annotations, such as daily refrigerator temperatures posted to a laboratory form, lists, spreadsheets, or analyst notes on a chromatogram. Records may be on any form of media, including electronic and hard copy. Records allow for the historical reconstruction of laboratory activities related to sample-handling and analysis.

The laboratory maintains a record system appropriate to its needs, records all laboratory activities, and complies with applicable standards or regulations as required. Records of original observations and derived data are retained to establish an audit trail. Records help establish factors affecting the uncertainty of the test and enable test repeatability under conditions as close as possible to the original.

16.1 Records Maintained

Records of all procedures to which a sample is subjected while in the possession of the laboratory are kept. The laboratory retains all original observations, calculations and derived data (with sufficient information to produce an audit trail), calibration records, personnel records and a copy of the test report for a minimum of five years from generation of the last entry in the records. At a minimum, the following records are maintained by the laboratory to provide the information needed for historical reconstruction:

i) **all raw data, whether hard copy or electronic, for calibrations, samples and quality control measures, including analysts' worksheets and data output records (chromatograms, strip charts, and other instrument response readout records);**

ii) **a written description or reference to the specific method(s) used, which includes a description of the specific computational steps used to translate parametric observations into a reportable analytical value (a copy of all pertinent Standard Operating Procedures);**

iii) **laboratory sample ID code;**

iv) **date of analysis;**

v) **time of analysis is required if the holding time is seventy-two (72) hours or less, or when time critical steps are included in the analysis (e.g., extractions and incubations);**

vi) **instrumentation identification and instrument operating conditions/parameters (or reference to such data);**

vii) **all manual calculations (including manual integrations);**

viii) analyst's or operator's initials/signature or electronic identification;

ix) sample preparation, including cleanup, separation protocols, incubation periods or subculture, ID codes, volumes, weights, instrument printouts, meter readings, calculations, reagents;

x) test results (including a copy of the final report);

xi) standard and reagent origin, receipt, preparation, and use;

xii) calibration criteria, frequency and acceptance criteria;

xiii) data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions;

xiv) quality control protocols and assessment;

xv) electronic data security, software documentation and verification, software and hardware audits, backups, and records of any changes to automated data entries;

xvi) method performance criteria including expected quality control requirements;

xvii) proficiency test results;

xviii) records of demonstration of capability for each analyst;

xix) a record of names, initials, and signatures for all individuals who are responsible for signing or initialing any laboratory record;

xx) correspondence relating to laboratory activities for a specific project;

xxi) corrective action reports;

xxii) preventive action records;

xxiii) copies of internal and external audits including audit responses;

xxiv) copies of all current and historical laboratory SOPs, policies and *Quality Manuals*;

xxv) sample receiving records (including information on any interlaboratory transfers);

xxvi) sample storage records;

xxvii) data review and verification records;

xxviii) personnel qualification, experience and training records;

xxviv) archive records; and

xxviv) management reviews.

16.2 Records Management and Storage

The laboratory maintains a record management system for control of laboratory notebooks, instrument logbooks, standards logbooks, and records for data reduction, validation, storage, and reporting. Most records are maintained electronically as computer files, others are kept in appropriate binders. Data is recorded immediately and legibly in permanent ink (data generated by automated data collections systems is recorded electronically.) Corrections are initialed and dated with the reason noted for corrections other than transcription errors. A single line strikeout is used to make corrections so that the original record is not obliterated. The original record is not obliterated. Correction on electronic records is made by the addition of notes or by audit trails.
Electronic records are kept according to the procedures described in SOP MIS045. Data backups are routinely performed according to SOP MIS003. Records, including electronic records, are easy to retrieve, legible, and protected from deterioration or damage; held secure and in confidence; and are available to accrediting bodies for a minimum of five years or as required by regulation or contract. Records that are stored only on electronic media are supported by the hardware and software necessary for their retrieval. Access to protected records is limited to the QA Manager or Laboratory Director and the personnel they authorize to prevent unauthorized access or amendment.

Additional information regarding control of data is included in Section 22.5 – "Control of Data".

Procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records are found in SOP MIS045.

A document control system is used to ensure that all personnel have access to current policies and procedures at all times. Documents, which are managed by this system, include this Quality Manual, reports from internal audits and management reviews as well as records of corrective and preventive actions, all SOPs, policy statements, procedures, specifications, calibration tables, charts, textbooks, posters, notices, memoranda, software, drawings, plans, etc. The system consists of a document review, revision and approval system, and document control and distribution. The documents may be on various media, whether hard copy or electronic, and they may be digital, analog, photographic or written.

All quality documents (this manual, SOPs, policies, etc.) are reviewed and approved by the QA Officer, the Technical Directors and the Laboratory Director. Such documents are revised whenever the activity described changes significantly. All documents are reviewed at least every 5 years, with the exception of the QA Manual, which is reviewed annually.

More detailed procedures related to Document Control are specified in the corresponding SOP (MIS045).

If records are archived electronically as PDF files through scanning of hardcopy records and both are kept, the electronic copy is used for long term storage of vital records. The accuracy of the scanning procedure is verified upon the scan is completed to make sure all pages were properly copied and are legible. Storage of vital records is maintained by the IT manager to allow minimal access only to authorized personnel.

Archived information and access logs are protected against fire, theft, loss, environmental deterioration, vermin, and in the case of electronic records, electronic or magnetic sources. Archived records have limited access and are checked out through an access log. Records are archived on site.

In the event that the laboratory transfers ownership or goes out of business, records are maintained or transferred according to client instructions. Appropriate regulatory and state legal requirements concerning laboratory records shall be followed.

16.3 Legal Chain of Custody Records

Evidentiary sample data are used as legal evidence. Procedures for evidentiary samples can be found in SOP MIS038.

Section 17

AUDITS
(TNI V1:M2 – Section 4.14)

Audits measure laboratory performance and verify compliance with accreditation/ certification and project requirements. Audits specifically provide management with an on-going assessment of the management system. They are also instrumental in identifying areas where improvement in the management/quality system will increase the reliability of data. Audits are of four main types: internal, external, performance, and system. Section 17.5 discusses the handling of audit findings.

17.1 Internal Audits

Annually, the laboratory prepares a schedule of internal audits to be performed during the year. These audits verify compliance with the requirements of the management/quality system, including analytical methods, SOPs, the *Quality Assurance Manual*, ethics policies, data integrity, other laboratory policies, and the TNI Standard.

The internal audit program shall address all elements of the quality system, including all of the environmental testing activities.

The internal system audits include an examination of laboratory documentation and records on sample receiving, sample log-in, sample storage, chain-of-custody procedures, sample preparation and analysis, instrument operating records, etc. Specific records that are subject to review are detailed in the corresponding SOP for performing audits and data review (SOP MIS014).

It is the responsibility of the QA Manager to plan and organize audits as required by the schedule and requested by management. These audits are carried out by trained and qualified personnel who are, wherever resources permit, independent of the activity to be audited.

The auditor should not be the person responsible for the work being audited or be the supervisor of the person responsible for the work. The auditor should have the necessary qualifications to review the area being audited and use a checklist approved by the Quality Manager.

In addition to the scheduled internal audits, it may sometimes be necessary to conduct special audits as a follow-up to corrective actions, PT results, complaints, regulatory audits or alleged data integrity issues. These audits address specific issues.

The area audited, the audit findings, and corrective actions are recorded. Audits are reviewed after completion to assure that corrective actions were implemented and effective. This review may occur during the next scheduled audit unless findings are observed that cast doubt on the validity of data. Corrective actions that warrant sooner review cannot wait for the next scheduled audit.

17.2 External Audits

It is the laboratory's policy to cooperate and assist with all external audits, whether performed by clients or an accrediting body. Management ensures that all areas of the laboratory are accessible to auditors as applicable and that appropriate personnel are available to assist in conducting the audit.

17.2.1 Confidential Business Information (CBI) Considerations

During on-site audits, on-site auditors may come into possession of information claimed as business confidential. A business confidentiality claim is defined as "a claim or allegation that business information is entitled to confidential treatment for reasons of business confidentiality or a request for a determination that such information is entitled to such treatment." When information is claimed as business confidential, the laboratory must place on (or attach to) the information at the time it is submitted to the auditor, a cover sheet, stamped or typed legend or other suitable form of notice, employing language such as "trade secret", "proprietary" or "company confidential". Confidential portions of documents otherwise non-confidential must be clearly identified. CBI may be purged of references to client identity by the responsible laboratory official at the time of removal from the laboratory. However, sample identifiers may not be obscured from the information.

17.3 Performance Audits

Performance audits may be Proficiency Test Samples, internal single-blind samples, double-blind samples through a provider or client, or anything that tests the performance of the analyst and method.

Proficiency Test Samples are discussed in Section 27 – "Quality Assurance for Environmental Testing"*.*

17.4 System Audits

The Laboratory's management system is audited though annual management reviews. Refer to Section 18 – "Management Reviews" for further discussion of management reviews.

17.5 Handling Audit Findings

Internal or external audit findings are responded to within the time frame agreed to at the time of the audit. The response may include action plans that could not be completed within the response time frame. A completion date is established by management for each action item and included in the response.

The responsibility for developing and implementing corrective actions to findings is the responsibility of the Technical Directors or Lab supervisor corresponding to the particular section of the lab. Corrective actions are documented through the corrective action process described in Section 14 – "Corrective Actions".

Audit findings that cast doubt on the effectiveness of the laboratory operation to produce data of known and documented quality or that question the correctness or validity of sample results must be investigated. Corrective action procedures described in Section 14 – "Corrective Action" must be followed. Clients must be notified in writing if the investigation shows the laboratory results have been negatively affected and the clients requirements have not been met. The client must be notified within 30 days after the laboratory discovers the issue. Laboratory management will ensure that this notification is carried out within the specified time frame.

All investigations that result in findings of inappropriate activity are documented and include any disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients. See Section 19 (Data Integrity Investigation) for additional procedures for handling inappropriate activity.

Section 18

MANAGEMENT REVIEWS
(TNI V1:M2 – Section 4.15)

At least once per year, laboratory executive management (top management) conducts a review of the quality system and environmental testing activities to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements in the quality system and laboratory operations. The management review is a separate activity from the internal audit and records of review findings and actions are maintained.

18.1 Management Review Topics

The following are reviewed to ensure their suitability and effectiveness:

- **the suitability of policies and procedures;**
- **reports from managerial and supervisory personnel;**
- **the outcome of recent internal audits;**
- **corrective and preventive actions;**
- **assessments by external bodies;**
- **the results of interlaboratory comparisons or proficiency tests;**
- **changes in the volume and type of the work;**
- **customer feedback;**
- **complaints;**
- **recommendations for improvement;**
- **other relevant factors, such as quality control activities, resources, and staff training.**

18.2 Procedure

The procedure on how to conduct the managerial review is described in SOP MIS030.

Findings and follow-up actions from management reviews are recorded. Management will determine appropriate completion dates for action items and ensure they are completed within the agreed upon time frame.

Section 19

DATA INTEGRITY INVESTIGATIONS
(TNI V1:M2 – Section 4.16)

In addition to covering data integrity investigations, this Section covers all topics related to ethics and data integrity policies, procedures and training.

Weck Laboratories, Inc. is committed to ensuring the integrity of its data and providing valid data of known and documented quality to its clients. The elements in Weck Laboratories' Ethics and Data Integrity program include:

- **Documented data integrity procedures signed and dated by top management.**
- **An Ethics and Data Integrity Policy signed by all management and staff at the time of employment (see Appendix A). This policy is signed, dated and distributed by the President of the Company**
- **Annual data integrity training.**
- **Procedures for confidential reporting of alleged data integrity issues.**
- **An audit program that monitors data integrity (see Section 17 – "Audits") and procedures for handling data integrity investigations and client notifications.**

Proper ethical conduct in the laboratory is strictly enforced. The Company's Code of Ethics (Appendix A) is presented to current and prospective employees in both the QA manual and the Employee Handbook.

In order to assist the laboratory technical personnel in performing their duties without detrimental influences, it is the policy of the Company that the laboratory be impartial and that it and its personnel are free from any undue commercial, financial and other pressures which might influence or adversely affect their normal performance having an impact on the quality of the work they produce or their technical judgment. By this policy all laboratory personnel dedicated to technical activities should not be influenced by, or involved in any financial or commercial matter while performing laboratory work. If any employee feels that he or she might be under any kind of pressure as described above, the Laboratory Director must be notified immediately. Additionally, the Laboratory will not engage in any activities that may endanger the trust in its independence of judgment and integrity in relation to its environmental testing.

19.1 Ethics and Data Integrity Procedures

The Ethics and Data Integrity Policy provides an over view of the program. Written procedures that are considered part of the Ethics and Data Integrity program include:

- **Ethics and Data Integrity Policy (see Appendix A)**
- **Manual integration procedures (SOP MIS039)**
- **Implementation of Business Ethics and Data Integrity Policy (SOP MIS043)**
- **Corrective action procedures (SOP MIS016 and Section 14 of this *QAM*)**

Management reviews data integrity procedures yearly and updates these procedures as needed.

19.2 Training

Data integrity training is provided as a formal part of new employee orientation and a refresher is given annually for all employees. Employees are required to understand that any infractions of the laboratory data integrity procedures shall result in a detailed investigation that could lead to very serious consequences including immediate termination, debarment or civil/criminal prosecution. This is discussed in the Ethics and Data Integrity Policy that every employee is required to sign upon commencement of employment. Attendance for required training is monitored through a signature attendance sheet.

An agenda is provided to each trainee prior to the training class. Data integrity training emphasizes the importance of proper written narration on the part of the analyst with respect to those cases where analytical data may be useful, but are in one sense or another partially deficient. The following topics and activities are covered:

- **organizational mission and its relationship to the critical need for honesty and full disclosure in all analytical reporting;**
- **how and when to report data integrity issues;**
- **record keeping;**
- **training, including discussion regarding all data integrity procedures;**
- **data integrity training documentation;**
- **in-depth data monitoring and data integrity procedure documentation; and**
- **specific examples of breaches of ethical behavior such as improper data manipulations, adjustments of instrument time clocks, and inappropriate changes in concentrations of standards.**
- **guidelines for manual integration practices**
- **consequence of unethical or improper behavior**

When contracted technical or support personnel are used, the QA Manager or Laboratory Director are responsible for ensuring that they are trained to the laboratory's management system and data integrity procedures, competent to perform the assigned tasks, and appropriately supervised.

Topics covered are provided in writing and provided to all trainees.

19.3 Confidential Reporting of Ethics and Data Integrity Issues

The Data Integrity Plan also provides a mechanism for confidential reporting of data integrity issues in the laboratory. A primary element of the mechanism is to assure confidentiality and a receptive environment in which all employees may privately discuss ethical issues or report items of ethical concern. In instances of ethical concern, the mechanism also includes a process whereby laboratory management is to be informed of the need for any further detailed investigation.

Employees are required and encouraged to bring up to management any improper activities they detect or are suspicious of. Any incident reported is immediately investigated by the management and the person or persons involved are subject to disciplinary actions

19.4 Investigations

All investigations resulting from data integrity issues are conducted confidentially. They are documented and notifications are made to clients who received any negatively affected data that did not meet the client's data quality requirements. Procedures for investigation are included in SOP MIS043.

The Management shall also monitor the program for detecting improper, unethical or illegal action by performing internal proficiency testing (single or double blind), reviewing of analytical data post-analysis, performing electronic data audits using special software as Mint Miner® and providing an open door policy for employees to report any suspicious activity without fears.

The procedures for investigations are described in SOP MIS043.

Section 20

PERSONNEL
(TNI V1:M2 – Section 5.2)

Weck Laboratories, Inc. employs competent personnel based on education, training, experience and demonstrated skills as required. The laboratory's organization chart can be found in Appendix B.

20.1 Overview

All personnel are responsible for complying with all quality and data integrity policies and procedures that are relevant to their area of responsibility.

All personnel who are involved in activities related to sample analysis, evaluation of results or who sign test reports, must demonstrate competence in their area of responsibility. Appropriate supervision is given to any personnel in training and the trainer is accountable for the quality of the trainees work. Personnel are qualified to perform the tasks they are responsible for based on education, training, experience and demonstrated skills as required for their area of responsibility.

The laboratory provides goals with respect to education, training and skills of laboratory staff. These goals are outlined in the Job Descriptions for each laboratory position. Training needs are identified at the time of employment and when personnel are moved to a new position or new responsibilities are added to their job responsibilities. Ongoing training, as needed, is also provided to personnel in their current jobs. The effectiveness of the training must be evaluated before the training is considered complete.

Contracted personnel, when used, must meet the same competency standards and follow the same policies and procedures that laboratory employees must meet.

20.2 Job Descriptions

Job descriptions are available for all positions that manage, perform, or verify work affecting data quality, and are located in the Personnel binder and also under personnel records in the file server as electronic files. An overview of top management's responsibilities is included in Section 5 – "Management".

Job descriptions include the specific tasks, minimum education and qualifications, skills, and experience required for each position.

20.3 Training

All personnel are appropriately trained and competent in their assigned tasks before they contribute to functions that can affect data quality. It is management's

responsibility to assure personnel are trained. Training records are used to document management's approval of personnel competency. The date on which authorization and/or competence is confirmed is included.

Training records are maintained by the QA Manager and include evidence of acknowledgement that each employee has read, understood, and is committed to follow the current versions of the established Standard Operating Procedures and Analytical Method Protocols, which relates to his/her job responsibilities. The Training records show evidence of the revisions of the SOPs the employees have reviewed. Each employee demonstrates initial proficiency and demonstrates continued proficiency on a yearly basis by acceptable performance on Laboratory Control Samples (LCS), successful analysis of blind samples or by analyzing in parallel a sample analyzed by a trained or re-trained analyst. The training records of the analysts are organized by analyst and kept with personnel files. They include initial and continuing training, continuing education, participation in technical conferences or seminars and internal training activities.

20.3.1 Training for New Staff

Initial training for new employees is performed by experienced personnel with management guidance and includes the observation of the QC procedures described in this manual.

New staff members are given the New Employee Training as specified in SOP MIS035.

20.3.2 Ongoing Training

Staff members are given the following ongoing training:

All staff members are given refresher data integrity training and are required to sign off on the Ethics and Data Integrity Policy if they had not done so previously. The training is documented on a training attendance sheet that outlines what was covered during the training.

Ongoing training consists of:

- The employee attests, through signature, that they have read, understood, and agree to perform the latest version of the *Quality Assurance Manual* and any SOPs or policies that the analyst is responsible for following.
- Annually, the analyst shows continued proficiency in each method they perform by obtaining acceptable performance on Laboratory Control Samples (LCS), successful analysis of blind samples or by analyzing in parallel a sample analyzed by a trained or re-trained analyst.
- Attending training related to job function as applicable.
- Maintaining training documentation in the employees training record

The company has a policy that encourages all technical personnel to participate in technical seminars, conferences and scientific meetings involving innovative analytical technologies, new instrumentation and software applied to

environmental testing. Records of this participation are maintained in the personnel files. The management of the laboratory shall formulate the goals with respect to the education, training and skills of the laboratory personnel.

Section 21

ACCOMODATIONS AND ENVIRONMENTAL CONDITIONS
(TNI V1:M2 – Section 5.3)

21.1 Environmental

The laboratory facility is designed and organized to facilitate testing of environmental samples. Environmental conditions are monitored to ensure that conditions do not invalidate results or adversely affect the required quality of any measurement. Such environmental conditions include physical space, energy sources, lighting, temperature, workbenches, ventilation, utilities, access and entryways to the laboratory, sample receipt area(s), sample storage area(s), chemical and waste storage area(s); data handling and storage area(s), humidity, biological sterility, dust, sound and vibration levels.

The laboratory has backup power supplies to keep operating the most critical areas of the lab such as computer systems, telephones, sample storage and some laboratory equipment for short holding time samples.

If the laboratory environment is required to be controlled by a method or regulation, the adherence is monitored, controlled and recorded as per SOPs, such as is the recording of temperature during TCLP extraction and monitoring biological sterility and other environmental effects, as appropriate to the technical activities concerned.

Environmental tests are stopped when the environmental conditions jeopardize the results.

21.2 Work Areas

Work areas may include access and entryways to the laboratory, sample receipt area, sample storage area, sample process area, instrumental analysis area, chemical and waste storage area and data handling and storage area.

Access to, and use of, areas affecting the quality of the environmental tests is controlled by restriction of areas to authorized personnel only. See Section 21.4 below.

The laboratory work spaces are adequate for their use, and appropriately clean to support environmental testing and ensure an unencumbered work area.

The Laboratory is segregated into different areas for operations that are not compatible with each other. This separation prevents contamination of low levels of common laboratory solvents in the volatile organics analyses and maintains culture handling or incubation areas segregated from other areas. The access to the volatile organics laboratory, which is isolated from other areas of the laboratories and has a separate air system and microbiology laboratory is restricted to appropriate personnel only; signs to that effect are posted on the entry doors of

these areas. Electronic balances are located away from drafts and doorways, and mounted on marble slabs or special tables in areas where their use is not affected by vibration. Biological sterility is monitored using air blanks for plate counts or density plates according to the SOPs for bacteriological test methods. Biological work areas are cleaned and sterilized between uses.

For microbiology, floors and work surfaces are non-absorbent and easy to clean and disinfect. Work surfaces are adequately sealed and are cleaned periodically in order to be free from dust accumulation. Plants, food, and drink are prohibited from the laboratory work area. The company will procure to improve the condition of the facilities whenever possible and make plans for future expansions or improvements.

In order to prevent cross-contamination, samples suspected of containing high concentrations of target analytes shall be isolated from other samples. Samples or extracts designated for volatile organics analysis are stored in separate refrigerators located in volatile organics area, completely segregated from all other samples and extracts. Samples suspected of containing high concentrations of volatile organics are further isolated from other volatile organics samples and samples for volatile organic analysis in potable water are kept in designated refrigerator.

When the project requires it, travel blanks, used as storage blanks, are kept with the samples until the moment of analysis to determine whether or not cross-contamination occurred. The procedures for evaluation of storage blanks, as well as other considerations for incompatible activities as detailed in the SOP MIS036.

Adequate measures are taken to ensure good housekeeping in the laboratory and to ensure that any contamination does not adversely affect data quality.

21.3 Floor Plan

A floor plan can be found in Appendix C.

21.4 Building Security

The laboratory is kept secure during off hours with an alarm, locked doors and locked entry gate.

A Visitor's Logbook is maintained for every visitor to sign in and out. Visitors must be accompanied by laboratory personnel when in secure areas.

Signs are used to designate secure areas.

Segregated areas are only accessible to authorized personnel, with signs posted, such as the volatile organics laboratory and clean rooms.

Section 22

ENVIRONMENTAL METHODS AND METHOD VALIDATION
(TNI V1:M2 – Section 5.4 and Sections 1.4, 1.5 and 1.6 of Technical Modules TNI V1:M 3-7)

Methods and/or procedures are available for all activities associated with the analysis of the sample including preparation and testing. For purposes of this Section, "method" refers to both the sample preparation and determinative methods.

Before being put into use, a test method is confirmed by a demonstration of capability or method validation process.

All methods are published or documented. Deviations from the methods are allowed only if the deviation is documented, technically justified, authorized by management and accepted by the customer

The methods and procedures used at the laboratory are the appropriate ones for all environmental tests within its scope. These include sampling, handling, transport, storage and preparation of samples, and, where appropriate, an estimation of the measurement uncertainty as well as statistical techniques for analysis of environmental test and/or calibration data.

The methods used at the laboratory, including methods for sampling, must meet the needs of the client and are appropriate for the environmental tests it undertakes. These analytical procedures currently in use are based on the methodology approved by the regulatory agencies, such as EPA and State Agencies.

The Laboratory maintains Standard Operating Procedures (e.g., SOPs, Laboratory Method Manual) that accurately reflect all phases of current laboratory activities such as assessing data integrity, corrective actions, handling customer complaints, and all test methods. The SOPs provide all information needed to perform the different analytical tasks in accordance with regulatory requirements and in a consistent and controlled manner following the guidelines described in this QAP manual. All technical SOPs (e.g., sample preparation, analytical procedures, sample storage, sample receipt, etc.) are reviewed for accuracy and adequacy annually and whenever method procedures change, and updated as appropriate. Copies of all SOPs, both electronic and paper, are accessible to all personnel. Each SOP has an alphanumeric code that indicates the section it belongs, the number that identifies it, the revision number, the effective date and the signature of the QA Officer, Technical Director or Laboratory Director.

If other documents besides laboratory generated SOPs (i.e. equipment manuals, copies of published methods, etc.) are used as Standard Operating Procedures, they must be written in a way that they can be used as written and any changes, including the use of a selected option must be documented and included in the laboratory's SOP manual. For DoD related work, where published methods are specified as required for a project, requirements

contained within that method shall be followed and any modifications to existing method requirements will require project-specific approval by DoD personnel.

SOPs are written in a standardized format and with standardized contents, as indicated in SOP MIS048.

A current list of the Standard Operating Procedures in use is in Appendix E.

22.1 Method Selection

A reference method is a method issued by an organization generally recognized as competent to do so. (When ISO refers to a standard method, that term is equivalent to reference method.) When a laboratory is required to analyze a parameter by a specified method due to a regulatory requirement, the parameter/method combination is recognized as a reference method.

The laboratory will use methods that meet the needs of the customer. Such methods will be based on the latest edition of the method unless it does not meet the needs of the customer.

The laboratory selects methods that are appropriate to the customer needs. When the regulatory authority mandates or promulgates methods for a specific purpose, only those methods will be used.

If a method proposed by a customer is considered to be inappropriate or out-of-date, the customer is informed and the issue resolved before proceeding with analysis of any samples (see Section 7 – Review of Requests, Tenders and Contracts).

The analytical procedures currently in use are based on the methodology approved by the EPA, the California Department of Health Services, the AIHA, DoD and other regulatory agencies.

When a method is not specified by the customer, or the proposed method is inappropriate, the laboratory will select a method that is appropriate to the end use of the data:

- **If the data are to be submitted to a regulatory authority, the method(s) specified by the regulatory authority will be used.**
- **For drinking water compliance a method will be selected from those specified in 40 CFR Part 141, or the applicable state regulations.**
- **For NPDES permits, the method will be selected from those specified in 40 CFR Part 136.**
- **If the end use of the data is not regulatory or if the regulatory authority does not specify a method, the laboratory will determine the customer needs in terms of reporting level (e.g., LOD, LOQ), bias (e.g., screening versus quantitative) and the laboratory capabilities and capacity. Based on these criteria, the laboratory will select an appropriate method based on the following hierarchy:**

- **Resources from published in regional, national or international standards**
- **Methods published by other technical organizations such as ASTM, Standard Methods or AOAC**
- **Methods develop by the instrument manufacturer**
- **Laboratory –developed methods.**

In some cases, Weck Laboratories can perform analyses that are not specifically described in the guidelines cited above. In these cases, the following approach is taken:

- **Review other sources of test methods such as AOAC, ASTM, Pesticide Manual, and methods mandated by the applicable regulatory authorities to find a suitable method for the matrix and analyte in question.**
- **Review Methods published in international, regional or national standards.**
- **Review methods developed by instrument manufacturers**
- **Produce a modification of a standard test procedure for similar parameter or matrix**
- **Develop a special method in house suitable for the particular problem**

For these special situations the analytical procedure is discussed with the client and performed upon the client's approval. Whenever possible, the same QA/QC guidelines as for standard methods are used, but the laboratory may deviate from these guidelines if necessary. All communications between the laboratory and the customer are documented.
Most methods in use at the laboratory are described in the following publications:

- **Tests Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, current edition,**
- **Methods for Chemical Analysis of Water and Wastewater, EPA-600/4-79-020.**
- **Standard Methods for the Examination of Water and Wastewater, current approved edition, APHA, AWWA, WPCF.**
- **Criteria for Identification of Hazardous and Extremely Hazardous Wastes, California Code of Regulations Title 22.**
- **Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater EPA-600/4-82-057.**
- **Recommended Methods of Analysis for the Organic components required for AB1803, 5th Edition Revised April 1986.**
- **Draft Method for Total Petroleum Hydrocarbons and Total Organic Lead, LUFT Methods, California Department of Health Services.**
- **Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water - EPA 500 series.**
- **NIOSH Manual of Analytical Methods, US Department of Health and Human Services.**
- **Laboratory Methods of Analysis for Enforcement samples, SCAQMD, 1986.**
- **Stationary Source Test Methods, Air Resources Board, 1990.**
- **OSHA Analytical Methods Manual, 2nd Ed., U.S. Dept. of Labor, 1990.**

Reference methods for all analytical procedures are kept in the Laboratory Office. Copies of specific methods are also in the corresponding sectors where the analyses are performed.

22.2 Laboratory-Developed Methods

If the laboratory develops a method, the process of designing and validating the method is carefully planned and documented.

The Laboratory in some instances will develop methods for its own use; in this case this is considered a planned activity and will be assigned to qualified personnel equipped with adequate resources. All personnel involved in the method design, development and implementation will be in constant communication during all stages of development. Plans are also updated as development proceeds.

Once the method is satisfactorily developed a validation process takes place before it is implemented and used.

For multi-analyte methods, the laboratory uses a standard set of target analytes but those target analytes identified by the client on a project specific basis will be analyzed. If project-specific information is not available, then the standard list of analytes or the list published in the method is used

22.3 Method Validation

Validation is the confirmation, by examination and objective evidence, that the particular requirements for a specific intended use are fulfilled.

At a minimum, reference methods are validated by performing an initial demonstration of capability. Additional requirements are discussed for each technology.

All methods that are not reference methods are validated before use. The validation is designed so that the laboratory can demonstrate that the method is appropriate for its intended use. All records (e.g., planning, method procedure, raw data and data analysis) shall be retained while the method is in use. Based on the validation process, the laboratory will make a statement in the corresponding SOP of the intended use requirements and whether or not the validated method meets the use requirements.

Method validation and Demonstration of Capability procedures can be found in:

- **Appendix J - Chemistry**
- **Appendix K - Microbiology**
- **Appendix L - Radiochemistry**

22.4 Estimation of Analytical Uncertainty

Analytical Uncertainty: A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis.

When requested, the laboratory will provide an estimate of the analytical uncertainty as determined by the procedure described in SOP MIS047.

22.5 Control of Data

To ensure that data are protected from inadvertent changes or unintentional destruction, the laboratory uses procedures to check calculations and data transfers (both manual and automated).

Some instruments have a computerized data reduction and calculation, such as GC, GC/MS, HPLC, LC/MS, ICP, ICP-MS and automated wet chemistry analyzers. The protocols to perform these tasks are described in the corresponding SOPs and the computer programs used for data reduction are validated before use and checked periodically by manual calculations.

- **Data entry maintains integrity during the analytical process and it is kept confidential.**
- **Data storage is performed on real time as the data is collected in local hard drives of computers connected to the analytical instruments**
- **Data processing is done by the analysts using the software from the instruments**
- **Data transmission is performed directly from instruments to the LIMS by a Data Tool software**

Results for analyses that are performed manually or with instruments that do not have controlling software are entered in appropriate bench sheets or directly in LIMS by the analysis. Results are reviewed by supervisor or peer.

Additional information can be found in Section 16 – "Control of Records".

22.5.1 Computer and Electronic Data Requirements

The laboratory assures that computers, user-developed computer software, automated equipment, or microprocessors used for the acquisition, processing, recording, reporting, storage, or retrieval of environmental test data are:

- **documented in sufficient detail and validated as being adequate for use;**
- **protected for integrity and confidentiality of data entry or collection, data storage, data transmission and data processing;**
- **maintained to ensure proper functioning and are provided with the environmental and operating conditions necessary to maintain the integrity of environmental test data; and**

- **held secure including the prevention of unauthorized access to, and the unauthorized amendment of, computer records. Data archive security is addressed in Section 16 – "Control of Records" and building security is addressed in Section 21- "Accommodations and Environmental Conditions".**

  Procedures are described in SOP MIS037.

The laboratory uses spreadsheets to calculate final results from the raw data. Before reporting any results derived from these programs, the laboratory shall validate the underlying calculations and the

If any changes are made to the spreadsheet program, the laboratory revalidates the entire system before reporting results.

In addition, the algorithms all spreadsheet calculations or other programs that are used to reduce raw data to a reported value will be verified upon first use and annually thereafter to ensure that the process produces accurate results.

Data from all electronic media are backed up daily to ensure that data are not lost. The backed up copies are stored out of premises by IT Manager.

After the spreadsheet is validated, the calculations are protected from inadvertent manipulations.

Procedures for electronic backups are described in SOP MIS003.

22.5.2 Data Reduction

Some instruments have a computerized data reduction and calculation, such as GC/MS, HPLC, GC and ICP. The protocols to perform these tasks are described in the corresponding SOPs and the computer programs used for data reduction are validated before use and checked periodically by manual calculations.

Internal data review consists of a tiered or sequential system of verification, consisting of at least three tiers, with each check performed by a different person. The three tiers include a 100% review of the entire data package and completion of corresponding Data Review Checklist the analyst, then a 100% verification review by a technically qualified person, such as a supervisor or another chemist, experienced in that particular method or procedure, who checks for proper integration of peaks, identification of compounds, QC, etc. The third review is mainly an administrative one, to check for accuracy and completeness, typically performed by the Project Manager in charge of that project. The procedures used for performing the data review are detailed in the SOP MIS018.

If a discrepancy is noted in any stage of the reviewing process, the package is returned to the primary analyst for corrective action. For analyses that do not have automatic data reduction, the analyst performs the necessary calculations to obtain the final result, and then the results are reviewed as indicated above.

All information used in the calculations (e.g., raw data, calibration files, tuning records, results of standard additions, interference check results, sample response, and blank or background correction protocols) as well as sample preparation information (e.g., weight or volume of sample used, percent dry weight for solids, extract volume, dilution factor used) are recorded in order to enable reconstruction of the final result.

The results of the quality control sample analysis are reviewed, and evaluated before data are reported.

After the results are entered into the LIMS, the third tier is completed and if no discrepancies are encountered they are released for reporting.

If electronic audit trail functions are available, they must be in use at all times, and associated data must be accessible. If the instrument does not have an audit trail, the integrity of the data is documented as described in SOP MIS043 Implementation of the Business Ethics and Data Integrity Policy.

The laboratory has manual integration procedures that must be followed when integrating peaks during data reduction. The manual integration procedures are described in SOP MIS039.

The laboratory procedures for use of significant figures are described in SOP MIS012 and in each analytical method SOP.

All raw data must be retained electronically in hard drives or storage boxes if it is printed material for seven years. The storage location is the second story of the laboratory building but could be moved to another location if necessary. Records are maintained as described in Section 16 – “Control of Records”.

22.5.3 Data Review Procedures

Data review procedures are located in Section 23.4 – “Data Review”.

Section 23

CALIBRATION REQUIREMENTS
(TNI V1:M2 – Sect 5.5 and Section 1.7 of Technical Modules TNI V1:M 3-7)

23.1 General Equipment Requirements

The Laboratory is furnished with all items of sampling, measurement and test equipment required for the correct performance of the environmental tests (including sampling, preparation of samples, processing and analysis of environmental data).

All equipment and software used for testing and sampling are capable of achieving the accuracy required for complying with the specifications of the environmental test methods as specified in the laboratory SOPs.

Equipment is operated only by authorized and trained personnel (see Section 20 – "Personnel"*)*.

The laboratory has procedures for the use, maintenance, handling and storage of equipment and they are readily available to laboratory personnel.

Manuals provided by the manufacturer of the equipment provide information on use, maintenance, handling and storage of the equipment. The laboratory maintains an equipment table that includes additional information on storage location. The laboratory also has an SOP to summarize planned equipment maintenance (MIS055). These procedures ensure proper functioning of the equipment and prevent contamination or deterioration.

All equipment is calibrated or verified before being placed in use to ensure that it meets laboratory specifications and relevant standard specifications. The calibration procedures are specified in each method SOP and calibration records are as required and kept as electronic files in the corresponding folder of the computer system.

Documents detailing the receipt and specification of analytical equipment are retained. A history of the maintenance record of each system serves as an indication of the adequacy of maintenance schedules and parts inventory. As appropriate, the maintenance guidelines of the equipment manufacturer are followed. When maintenance is necessary, it is documented either in logbooks in the instrument work area or as electronic records in LIMS.

Test equipment, including hardware and software, are safeguarded from adjustments that would invalidate the test result measurements by limiting access to the equipment and using password protection where possible (see Section 22.5 – "Control of Data"*)*.

Equipment that has been subject to overloading, mishandling, given suspect results, or shown to be defective or outside specifications is taken out of service. The equipment is isolated to prevent its use or clearly labeled as being out of service until it has been shown to function properly. If it is shown that previous tests are affected, then procedures for nonconforming work are followed and results are documented (see Section 12 – "Control of Nonconforming Environmental Testing Work" and Section 14 – "Corrective Action").

Older instruments shall be replaced with newer ones or updated if possible as technology improves and efforts shall be made to provide a greater degree of automation and security in analytical instruments.

The Laboratory does not use any equipment outside the permanent control of the laboratory.

Each item of equipment and software used for testing and significant to the results is uniquely identified. Records of equipment and software are maintained. This information includes the following:

- **a) identity of the equipment and its software;**
- **b) manufacturer's name, type identification, serial number or other unique identifier;**
- **c) checks that equipment complies with specifications of applicable tests;**
- **d) current location;**
- **e) manufacturer's instructions, if available, or a reference to their location;**
- **f) dates, results and copies of reports and certificates of all calibrations, adjustments, acceptance criteria, and the due date of next calibration;**
- **g) maintenance plan where appropriate, and maintenance carried out to date; documentation on all routine and non-routine maintenance activities and reference material verifications;**
- **h) any damage, malfunction, modification or repair to the equipment;**
- **i) date received and date placed into service (if available); and**
- **j) condition when received, if available (new, used, reconditioned).**

The list of equipment that is currently in service at the laboratory can be found in Appendix H.

Glassware is cleaned to meet the sensitivity of the method. Any cleaning and storage procedures that are not specified by the method are documented in laboratory records or SOPs.

23.2 Support Equipment

Support Equipment includes, but is not limited to: balances, ovens, refrigerators, freezers, incubators, water baths, temperature measuring devices, volumetric

dispensing devices (such as Eppendorf®, or automatic dilutor/dispensing devices) and thermal/pressure sample preparation devices.

All support equipment is maintained in proper working order. Records are kept for all repair and maintenance activities, including service calls. The procedure used for calibration is described in SOP MIS031.

Lab Support equipment is also calibrated or verified annually using NIST traceable references when available, over the entire range of use. The results of such calibration must be within the specifications required in the application for which the equipment is used, if not, the equipment is either removed from service until repaired or a correction factor is applied to it, if applicable.

All raw data records are retained to document equipment performance. These records include logbooks, data sheets, or equipment computer files.

23.2.1 Support Equipment Maintenance

Regular maintenance of support equipment, such as balances and fume hoods is conducted at least annually.

Maintenance on other support equipment, such as ovens, refrigerators, and thermometers is conducted on an as needed basis.

Records of maintenance to support equipment are documented in Instrument Maintenance Logs. The logbooks are sometimes one per instrument or a logbook/record for a group of instruments that are housed in the same laboratory area and can be kept either electronically in the laboratory computer network or as hard copy.

Table 23-2 describes the maintenance performed on laboratory support equipment.

Table 23-1 Summary of Support Equipment Calibration And Maintenance

Instrument	Activity	Frequency	Documentation
Balance	1. Clean 2. Check alignment 3. Service Contract	1. Before use 2. Before use 3. Annually	Worksheet/log book Post annual service date on balance
ASTM Class 1Weights	1. Only use for the intended purpose 2. Use plastic forceps to handle 3. Keep in case 4. Re-calibrate	1. Every year if weight is used for daily checks. 2. Every 5 years if weight is used only to check working standard weights which are then used for the daily checks.	Keep certificate

Table 23-1 Summary of Support Equipment Calibration And Maintenance			
Instrument	**Activity**	**Frequency**	**Documentation**
Working Standard Weights	1. Used to check balances before their use.	Every 6 months.	Worksheet / logbook
NIST Traceable Thermometer	Accuracy determined by an accredited weights and measurement laboratory.	Every 5 years.	Keep certificate
Thermometers: 1. Glass and electronic 2. Dial thermometers 3. IR thermometer	Check at the temperature used, against a reference NIST certified thermometer	1. Annually for glass and electronic 2. Quarterly for dial and IR thermometers	Calibration factor and date of calibration on thermometer and worksheet/log book
pH electrometers	Calibration: 1. pH buffer aliquot are used only once 2. Buffers used for calibration will bracket the pH of the media, reagent, or sample tested.	Before use	Worksheet/log book
pH probe	Maintenance: Use manufacturer's specifications	As needed	Worksheet/log book
Spectrophotometer	1. Keep cells clean 2. Check wavelength settings with color standards	Annually	Post service date on instrument
Automatic or digital type pipettes	Calibrate for accuracy and precision using reagent water and analytical balance	Quarterly	Worksheet/logbook
Refrigerators, Freezers, and BOD incubators	1. Thermometers are immersed in liquid to the appropriate immersion line 2. The thermometers are graduated in increments of 1°C or less	Temperatures are recorded each day in use	Worksheet/log book

Table 23-1 Summary of Support Equipment Calibration And Maintenance

Instrument	Activity	Frequency	Documentation
Sterilizer	1. Use a maximum-temperature-registering thermometer or a continuous recording device. 2. Use spore strips or ampoules. 3. In house maintenance of autoclave or service contract. 4. Hot air ovens must maintain a stable temperature of 170°C - 180°C for at least two hours	1. Each cycle 2. One sterilizing cycle per month. 3. Once per year	Worksheet/log book
Microbiological incubators, and water baths	1. Thermometers in each unit are immersed in liquid to the appropriate immersion line 2. The thermometers will be graduated in increments of 0.5°C (0.2°C increments for tests which are incubated at 44.5°C) or less	Temperature of incubators and water baths will be recorded twice a day for each day in use with readings separated by at least four hours	Worksheet/log book
DO electrometer	Calibrate as specified in SOP	Before use	Worksheet/log book
DO probe	Maintenance as specified by manufacturer	As needed	Worksheet/log book
Conductivity Meters	Maintenance as specified by manufacturer	As needed	Worksheet/log book
Block Digesters	Verify that the temperature measured by the instrument measurement device is accurate	Daily	Worksheet/log book
Portable Field equipment	Maintenance as specified by manufacturer	As needed	Worksheet/log book

23.2.2 Support Equipment Calibration

Calibration requirements for analytical support equipment are found in Tables 23-3 and 23-4.

All support equipment is calibrated or verified annually over the entire range of use using NIST traceable references where available. The results of the calibration of

support equipment are within specifications or (1) the equipment is removed from service until repaired, or (2) records are maintained of correction factors to correct all measurements. If correction factors are used this information is clearly marked on or near the equipment.

Support equipment such as balances, ovens, refrigerators, freezers, and water baths are verified with a NIST traceable reference if available, each day prior to use, to ensure operation is within the expected range for the application for which the equipment is to be used

Volumetric dispensing devices (except Class A glassware and Glass microliter syringes) are checked for accuracy on a quarterly basis.

For microbiology analyses records for autoclaves used in the laboratory are required for the following:

- **initial performance of the autoclave functional properties (supplied by the installer);**
- **temperature demonstration of sterilization continuous monitoring device or maximum registering temperature;**
- **for every cycle, record date, contents, maximum temperature reached, pressure, time in sterilization mode, total run time, and analysts initials;**
- **quarterly check of autoclave timing device against a stopwatch; and**
- **annual maintenance checks to include a pressure check and calibration of temperature device.**

The type of calibration, frequency and acceptance criteria for laboratory support equipment, including equipment used for microbiology analyses is specified in SOP MIS031.

23.3 Analytical Equipment

23.3.1 Maintenance for Analytical Equipment

All equipment is properly maintained, inspected, and cleaned.

Maintenance of analytical instruments and other equipment may include regularly scheduled preventive maintenance or maintenance on an as-needed basis. Instrument malfunction is documented in the Instrument Maintenance logs, either in hardcopy or as electronic records, which become part of the laboratory's permanent records. A description of what was done to repair the malfunction and proof of return to control are also documented in the log.

A description of the laboratory instrumentation maintenance can be found in SOP MIS055

23.3.2 Instrument Calibration

Information on instrument calibration can be found in Appendix J (Chemistry), Appendix K (Microbiology) and Appendix L (Radiochemistry).

Initial instrument calibration and continuing instrument calibration verification are an important part of ensuring data of known and documented quality. If more stringent calibration requirements are included in a mandated method or by regulation, those calibration requirements override any requirements outlined here or in laboratory SOPs. Generally, procedures and criteria regarding instrument calibrations are provided in the SOPs corresponding to each test method.

All instruments are calibrated in accordance with the respective SOPs and/or method of analysis. The typical calibration procedure consists of an initial calibration, performed by running a series of standards and calculating the response by using either the response factors or by linear or polynomial regression analysis. This is followed by a calibration verification. All calibration procedures are thoroughly documented.

When an initial instrument calibration is not performed on the day of analysis, it is verified by analyzing CCVs standards using the following criteria, unless something different is specified in the corresponding SOPs or QAPP:

- The concentration of the CCV standard shall be from the low-calibration standard to the midpoint of the calibration range;
- The source of the CCV standard should be the same as the source for the initial calibration standard(s); and
- The baseline for evaluating the CCV is the initial calibration curve, except for the evaluation of retention times in organic chromatographic methods, which may be based on comparison with the retention times in the initial CCV.

When the method specifies to run CCVs at specific sample intervals, the count of these samples shall be of field samples only.

When a CCV fails to fall within acceptance limits then CCVs and all samples analyzed since last successful calibration verification are re-analyzed. If reanalysis is not possible, the client is notified prior to reporting data associated with a noncompliant CCV and if data are reported, appropriate qualifiers are used and if further clarification is needed this is explained in the case narrative. The exception to this is when a CCV fails with high bias, but the field samples remain not detected.

In all cases, the validity of the standards used in the initial calibration is verified using an independently prepared calibration verification solution. For all chemical determinations in which standards are involved for calibration, it is the policy of the company to use a secondary reference material (second source) obtained from a second manufacturer or lot if the lot can be demonstrated from the manufacturer as prepared independently from other lots. Traceability shall be to a national standard, when commercially available. If not commercially available, it can be prepared in-house. This secondary reference can be an LCS or other standard run to verify the integrity of the primary standard. Ideally, the secondary reference will be prepared identically to the calibration standards (i.e. if the calibration standard

is directly injected without preparation, then directly injecting the reference standard removes any biases present by any field sample preparation steps).

When project-specific or method-specific requirements do not exist:

- **The initial calibration verification shall be successfully completed prior to analyzing any samples;**
- **The use of a standard from a second lot is acceptable when only one manufacturer of the standard exists (note: manufacturer refers to the producer of the standard, not the vendor); and**
- **The concentration of the second source standard shall be at or near the midpoint of the calibration range. Acceptance criteria for the initial calibration verification must be at least as stringent as those for the continuing calibration verification.**

Specific analyses' calibrations are checked more frequently. Some instruments, such as TOX analyzers have built-in calibration features. The internal calibration of these instruments is monitored daily for accuracy.

Some calibration curves for spectrophotometric methods are very stable over a long period of time, however it is the policy of the Laboratory to perform a new initial calibration curve even if the continuing calibration check meets specified criterion, in any of the following events:

- **At least every three years**
- **When the instrument is moved to a different location**
- **If any maintenance that can affect the calibration has been performed**
- **If the analysts judges it necessary for special projects or different range of calibration**

Spectrophotometers are also subject to wavelength calibration which it shall be performed at least annually, according to the procedure described by the manufacturer in the instrument manual or other documentation.

All results are calculated based on the response curve from the initial calibration and generally not quantitated from any continuing instrument calibration verification unless otherwise required by regulation, method, or program. The results are bracketed by calibration standards which cover the entire quantitation range for each analyte. Any data reported below the lower-limit of quantitation is considered to have an increased quantitative uncertainty and consequently it is reported using defined qualifiers or flags or explained in the case narrative. The highest calibration standard is the highest concentration for which quantitative data are to be reported. Any data reported above this highest standard is considered to have an increased quantitative uncertainty and it is reported as an estimated value using the defined data qualifiers or explained in the case narrative, unless the sample can be diluted and re-run within the limits of the initial calibration curve.

The following is the criteria used for the acceptance of an initial calibration, unless specified differently in the analytical methods:

- **Use the average response factor (RF) if the percent relative standard deviation (%RSD) of the points is less than 20%. In this case, linearity through the origin is assumed.**

- **If the %RSD is greater than 20%, linearity through the origin cannot be assumed and a linear regression, a weighed linear regression or a non-linear regression can be used. The acceptance criteria for linear regression are a coefficient of correlation (r) equal or greater than 0.99 and for non-linear regression the coefficient of determination (COD) or r^2 equal or greater than 0.99. In both cases, the curve is not to be forced through the origin nor is the origin used as another point. The sample results must be within the first and last standards.**
- **It is recommended and a good practice (but not mandatory un less the SOP specifies that) to back calculate the data points in which case a deviation of less than 20% is considered acceptable (could be as great as 50% for low level points is the system is pushed to the lowest possible limits)**
- **The number of data points to construct the initial calibration curve shall be obtained from the analytical method employed. If no criteria are specified, the laboratory shall construct initial calibration curves using a minimum of five calibration points for organic analytes and three calibration points for inorganic analytes and IH samples. All reported target analytes and surrogates (if applicable) shall be included in the initial calibration. Reported results for all target analytes shall be quantified using a multipoint calibration curve; surrogates are calibrated according to each analytical method requirements, unless there are project specific requirements in which case these are followed. It is not permitted to exclude calibration points unless there is technical justification for it.**
- **The lowest standard shall be at or below the reporting limit for the method and at or below the regulatory limit/decision level if known by the laboratory.**
- **The lowest calibration standard must be above the detection limit. Noted exceptions: for turbidity analysis and for instrument technology (such as ICP or ICP/MS) with validated techniques from manufacturers or methods employing standardization with a zero point and a single point calibration standard:**

  - **Prior to the analysis of samples the zero point and single point calibration must be analyzed and the linear range of the instrument must be established by analyzing a series of standards, one of which must be at the lowest quantitation level.**
  - **Zero point and single point calibration standard must be analyzed with each analytical batch.**
  - **A standard corresponding to the lowest quantitation level must be analyzed with each analytical batch and must meet established acceptance criteria.**
  - **The linearity is verified at a frequency established by the method and/or the manufacturer.**
  - **If a sample within an analytical batch produces results above its associated single point standard then one of the following should occur:**
    - **analyze reference material at or above the sample value that meets established acceptance criteria for validating the linearity; dilute the sample such that the result falls below the single point calibration concentration (when sufficient sample volume permits);**
    - **Report the data with an appropriate data qualifier and/or explain in the case narrative.**

- § For metals analysis with a single-point calibration, a sample result may be reported up to 90% of the linear dynamic range (LDR). All samples exceeding this value must be diluted to within the LDR.

If the initial calibration fails, the analysis procedure is stopped and evaluated. For example, a second standard may be analyzed and evaluated or a new initial calibration curve may be established and verified. In all cases, the initial calibration must be acceptable before analyzing samples. If samples cannot be reanalyzed, data associated with an unacceptable initial instrument calibration must be reported with appropriate data qualifiers.

When an initial calibration is not performed on the day of the analysis, a calibration verification check standard is analyzed at the beginning and at the end of each batch. An exception to this policy is for internal standard methods (e.g., most organic methods). For these analyses, the calibration check is only analyzed at the beginning of the analytical sequence or analytical batch. The concentration of this calibration check is specified in each method SOP and whenever possible is varied within the established calibration range.

Sufficient raw data records are retained electronically as printouts to permit reconstruction of the continuing instrument calibration verification, e.g., test method, instrument, analysis date, each analyte name, concentration and response, calibration curve or response factor, or unique equations or coefficients used to convert instrument responses into concentrations. Continuing calibration verification records explicitly connect the continuing verification data to the initial instrument calibration by listing in the quantification report the initial calibration file that was used for the calculation.

When intermediate checks are needed to maintain confidence in the calibration status of the equipment, these checks shall be carried out according to each Standard Operating Procedure for the analytical method.

Where calibrations give rise to a set of correction factors, the laboratory shall have procedures to ensure that copies (e.g., in computer software) are correctly updated.

If the continuing instrument calibration verification results obtained are outside established acceptance criteria, corrective actions are performed. If routine corrective action procedures fail to produce a second consecutive (immediate) calibration verification within acceptance criteria, the following options are available:

- § Demonstrate performance after corrective action with two consecutive successful calibration verifications
- § Perform a new initial instrument calibration.

If acceptable performance has not been demonstrated, sample analyses shall not occur until a new initial calibration curve is established and verified. However, sample data associated with an unacceptable calibration verification may be reported as qualified data under the following special conditions:

- **When the acceptance criteria for the continuing calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported.**
- **When the acceptance criteria for the continuing calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level or if the samples are not for regulatory compliance and accurate values are not required by the customer.**

Section 24

MEASUREMENT TRACEABILITY
(TNI V1:M2 – Section 5.6)

Measurement quality assurance comes in part from traceability of standards to certified materials.

All equipment used affecting the quality of test results are calibrated prior to being put into service and on a continuing basis (see Section 23 – "Calibration Requirements"). These calibrations are traceable to national standards of measurement where available.

If traceability of measurements to SI units is not possible or not relevant, evidence for correlation of results through interlaboratory comparisons, proficiency testing, or independent analysis is provided.

24.1 Reference Standards

Reference standards are standards of the highest quality available at a given location, from which measurements are derived.

Reference Standards, such as ASTM Class 1 weights, are used for calibration only and for verification on unless it is shown that their performance as reference standards will not be invalidated.

Reference standards, such as ASTM Class 1 weights, are calibrated by an entity that can provide traceability to national or international standards. The following reference standards are sent out to be calibrated to a national standard as indicated in Section 23 – "Calibration Requirements":

- **Class 1 weights.**
- **NIST traceable reference thermometers.**

24.2 Reference Materials

Reference materials are substances that have concentrations that are sufficiently well established to use for calibration or as a frame of reference.

Reference materials, where commercially available, are traceable to national standards of measurement, or to Certified Reference Materials, usually by a Certificate of Analysis.

Purchased reference materials require a Certificate of Analysis where available. If a reference material cannot be purchased with a Certificate of Analysis, it is verified by analysis and comparison to a certified reference material and/or demonstration of capability for characterization.

Internal reference materials, such as working standards or intermediate stock solutions, are checked as far as is technically and economically practical against a second source independent from it an known to be of high quality

Working standards or intermediate stock solutions are checked against a second source at first time of use. When a second source is not available, a vendor certified different lot is accepted as a second source. In most cases, the analysis of an Initial Calibration Verification (ICV) standard or a Laboratory Control Sample (LCS) can be used as a second source confirmation. Working standards and intermediate stock solutions are given expiration dates when they are prepared based on method or regulatory requirements. These standards are used up or disposed of by the expiration date.

Additional working standards such as working class weights or internal thermometers are checked using the frequency summarized in SOP MIS031.

24.3 Transport and Storage of Reference Standards and Materials

The laboratory handles and transports reference standards and materials in a manner that protects the integrity of the materials. Reference standard and material integrity is protected by separation from incompatible materials and/or minimizing exposure to degrading environments or materials.

Reference standards and materials are stored according to manufacturer's recommendations, method SOP requirements and separately from samples. The frequency of preparation is specified in each method SOP and the receipt, storage and preparation of solutions is detailed in SOP MIS004.

24.4 Labeling of Reference Standards, Reagents, and Reference Materials

The laboratory has procedures for purchase, receipt and storage of standards, reagents and reference materials. Purchase procedures are described in Section 9 – "Purchasing Services and Supplies" and receipt and storage procedures are described in SOP MIS004.

Expiration dates can be extended if the reference standard or material's integrity is verified. The extended date may not be beyond the expiration date of the referenced standards used to re-verify. The verification process involves analyzing the expiring standard against a valid standard and obtaining a deviation of not more than 5%.

The reagents and chemicals used in the laboratory are obtained from reputable suppliers that have proven consistency over the years. Purity specifications are chosen based on the analysis and this is always verified by the routine analysis of solvent blanks, method blanks and check standards. In methods where the purity of reagents is not specified, analytical reagent grade are used. Reagents of lesser purity than those specified by the test method are not used. Upon receipt of reagents, the labels on the container are checked to verify that the purity of the

reagents meets the requirements of the particular test method. Such information is documented in the corresponding section of the LIMS.

The following are some of the reagents used:

- Solvents used for Gas Chromatography and GC/MS are “organic residue analysis” grade.
- Methanol used for volatile organics by GC or GC/MS is “Purge and Trap” grade.
- All inorganic chemicals are “reagent grade” or better, depending of the requirement.
- Nitric acid used for preparation of standards for ICP/MS analysis is “trace metals”.

The quality (e.g., purity) specifications for all standards and reagents (including water) are documented in SOP MIS004.

The quality of reagent water sources used for microbiological analyses is monitored for trace metals, TKN, TOC and bacteria content. The results are documented in the corresponding logbook kept at the Microbiological Lab. On daily basis, the quality of reagent water is monitored by performing method blanks and system blanks for all tests that require water and the results documented with the analytical batch. If the reagent water does not meet method specific requirements a corrective action procedure is initiated.

The concentration of titrants is verified in accordance with written laboratory procedures (SOPs) and documented in the Standardization log book kept in the Wet Chemistry section of the Laboratory.

24.4.1 Stock Standards, Reagents, Reference Materials and Media

Records for all standards, reagents, reference materials, and media include:

- the manufacturer/vendor name (or traceability to purchased stocks or neat compounds)
- the manufacturer’s Certificate of Analysis or purity (if supplied)
- the date of receipt
- recommended storage conditions

The information is recorded and the materials are given a unique identification number as described in SOP MIS004.

If the original container does not have an expiration date provided by the manufacturer or vendor it is not required to be labeled with an expiration date. If an expiration date is provided, it must be labeled with the expiration date.

In methods where the purity of reagents is not specified, analytical reagent grade is used. If the purity is specified, that is the minimum acceptable grade. Purity is verified and documented according to Section 9 – “Purchasing Services and Supplies” and to SOP MIS004.

24.4.2 Prepared Standards, Reagents, Reference Materials and Media

Records for standards, reagents, reference materials, and media preparation include:

- traceability to purchased stock or neat compounds
- reference to the method of preparation
- date of preparation
- an expiration date after which the material shall not be used (unless its reliability is verified by the laboratory)
- preparer's initials (if prepared)

This information is recorded as per SOP MIS004.

All containers of prepared standards, reagents, or materials are labeled with a unique ID and an expiration date. The unique ID is determined by the LIMS system and consists of 7 digits being the first digit the year, then two digits for the month and the last four digits are correlative numbers from 0001 to 9999. Each container must be uniquely identified even if it is the same sample in each container.

Prepared reagents are verified to meet the requirements of the test method through the analysis of blanks.

Section 25

COLLECTION OF SAMPLES
(TNI V1:M2 – Section 5.7)

Most samples processed at the laboratory are collected by clients or their representatives. When required, Weck Laboratories can provide technical assistance for sample collection and handling and can prepare and provide the necessary coolers, reagent water, sample containers, preservatives, sample labels, custody seals, COC forms, ice, and packing materials required to properly preserve, pack, and ship samples to the laboratory.

Weck Laboratories field personnel conduct sampling of wastewater and potable water for projects that require this service. Our personnel do not perform industrial hygiene sampling. Sampling procedures are described in the following SOPs: MIS002 and MIS010

In order to assure the quality of the entire analytical process, Weck Laboratories works closely with field personnel employed by the client to meet general QA criteria and if available specific criteria as per the QAPP.

The procedures to obtain subsamples, such as obtaining sample aliquots, are documented in each analytical SOP that requires it.

Where the client requires deviations, additions or exclusions from the documented sampling procedure, these are recorded in detail in the case narrative of the work order and reported with the analytical report. They are also communicated to the appropriate personnel.

In the instances that the laboratory does not perform the sampling and whenever possible, all sampling information, such as name of sampler, company that employs the sampler, sampling procedure, etc. is recorded in the sampling section of each work order and reported to the client. All other pertinent sampling information and relevant data for operations relating to sampling that forms part of the environmental testing that is undertaken is also recorded and reported with the analytical report.

25.1 Sampling Containers

The laboratory offers clean sampling containers for use by clients. The sample containers are obtained and managed as specified in SOPs MIS007 and MIS028.

25.1.1 Preparing Container Orders

Containers (containing any required preservatives) are provided to the client upon request.

Bottle orders are processed by the Project Managers as per Client's instructions and information provided for the site (whether the site is chlorinated to provide sampling containers with the correct preservation, etc.). The LIMS has a facility in the Project Management section to generate the bottle orders which is done by the PMs after entering the necessary information, such as due date, bottle type and number of bottles. The Shipping Department checks schedules daily for bottle due to be delivered and mode of delivery (FEDEX, Courier, etc) and ship accordingly. If

special instructions or required the bottle order form is printed put and brought to shipping with the special written instructions. For rush orders due in less than 48 hrs, the PM needs to verbally notify shipping to take the necessary steps to complete the order on time.

25.1.2 Sampling Containers, Preservation Requirements, Holding Times

Sampling container, preservation and holding time requirements can be found in Appendix I of this QA Manual and in Appendix 1 of SOP MIS001.

If preservation or holding time requirements are not met, the procedures in Section 12 – "Control of Nonconforming Environmental Testing Work" are followed.

25.2 Sampling Plan

The laboratory uses sampling plans provided by clients or prepared in consultation with the client. The plan must include any factors that must be controlled to ensure the validity of the test. Sampling plans and written sampling procedures are used for sampling substances, materials or products for testing. The plan and procedures are made available at the sampling location.

The laboratory's procedures for dealing with nonconformances are used when the client requests any deviations from the sampling plan or sampling procedures. The requests are documented and included in the final test report.

25.3 Sampling Records

The following relevant sampling data are recorded: sampling procedure used, the date and time of sampling, the identification of the sampler, environmental conditions (if relevant), the sampling location, and the statistics upon which the sampling procedures are based.

Section 26

HANDLING SAMPLES AND TEST ITEMS
(TNI V1:M2 – Section 5.8 and Section 1.7 of Technical Modules TNI V1:M 3-7)

26.1 Sample Receipt

When samples are received at the laboratory, chain-of-custody is reviewed, condition is documented, samples are given unique identifiers, and they are logged into the sample tracking system.

26.1.1 Chain of Custody

The chain of custody or sample submission sheets from the field are reviewed. This documentation is completed in the field and provides a written record of the handling of the samples from the time of collection until they are received at the laboratory. Section 25 – "Collection of Samples" outlines what information is needed on this record. The chain of custody form also provides information on what type of testing is being requested and can act as an order for laboratory services in the absence of a formal contract. An example chain of custody form can be found in Figure 26-1. Chain of custody and any additional records received at the time of sample submission are scanned and maintained by the laboratory in the form of electronic records.

26.1.1.1 Legal Chain of Custody

When full Legal/Evidentiary Chain of Custody protocols are required, COC records are used to establish an intact, continuous record of the physical possession, storage and disposal of sample containers, collected samples, sample aliquots, and sample extracts or digestates, The COC records account for all time periods associated with the samples. The COC records identify all individuals who physically handled individual samples. The COC forms remain with the samples during transport or shipment. If shipping containers and/or individual sample containers are submitted with sample custody seals, and any seals are not intact, the lab shall note this on the chain of custody. Other documents pertaining to the transport of the samples, such as receipts from common carriers are kept as part of the documentation.
When evidentiary samples, subsamples, digestates or extracts are transferred to another party they are subject to the requirements of legal chain of custody. These samples are kept in a locked area or refrigerator with the key in possession of the designated sample custodian

26.2 Sample Acceptance

Procedures for opening shipping containers and examining samples are provided in SOP MIS001.

The laboratory has a sample acceptance policy that is made available to sample collection personnel. An example is provided in Figure 26-2. It emphasizes the need for use of water resistant ink, providing proper documentation (to include sample ID, location, date and time of collection, collector's name, preservation type, sample type and any special remarks about the sample), labeling of sample containers to include a unique sample ID, use of appropriate containers, adherence to holding times, and sample volume requirements. In addition the laboratory has nonconformance/corrective action procedures to handle samples that don't meet the requirements above or show signs of damage, contamination or inadequate preservation. Data will be appropriately qualified where samples are reported that do not meet sample acceptance requirements.

If any of the requirements for the sample acceptance policy are not met, the client is notified immediately by the Project Manager or Lab Supervisor, and the irregularity is documented:

- If the client acknowledges the irregularity and instructs the laboratory to continue with analysis; the decision to proceed is documented either on the COC , LIMS or other lab receipt documents and samples accepted and if needed the data is qualified in the final report
- If the client does not acknowledge the irregularity the samples are rejected; also the client may agree that samples need to be rejected.
- If the irregularity is noted in samples submitted for bacteriological analysis for compliance purposes, the samples are rejected without exception.

When a request for a new project is received involving multiple samples or tests that have a short holding time the Management is notified. The Management staff with the assistance of the appropriate technical personnel evaluates the project and calculates the resources needed to complete it within the turnaround time required and the holding times, taking into consideration the volume of work in house and/or expected.

If it is determined that the new project will not affect the proper completion of jobs already in house and that the laboratory has the resources (personnel, equipment and facilities) necessary to accommodate the new project, this is accepted.

If the Management or any of the technical staff involved thinks that the new job will create problems in terms of reduced quality of work, completion out of specified or required time, or any other detrimental situation, the new project is not accepted and the client notified. If there are alternatives, such as postponement, modification of sampling schedules or partial subcontracting to another lab in order to accommodate the project, this is proposed to the client.

26.2.1 Preservation Checks

The preservation verification is detailed in SOP MIS001; the following common preservation checks are performed and documented upon receipt:

26.2.1.1 *Thermal preservation:*

a) For temperature preservation, the temperature must be within ± 2°C of the required temperature unless otherwise stated. For samples that require preservation at 4°C, the acceptable range is from just above freezing to 6°C.

b) Samples that are delivered to the lab the same day as they are collected are likely not to have reached a fully chilled temperature. This is acceptable if the samples were received on ice and the chilling process has begun.

c) Record on the receipt form if ice is present and the temperature.

26.2.1.2 *Chlorine checks:*

d) Laboratories that receive samples from potable water supplies (including source water) that have a demonstrated history of acceptable preservation may check a sample from each client at a frequency of once per month if:

i) the laboratory can show that the received sample containers are from their laboratory;

ii) sufficient sodium thiosulfate was in each container before sample collection to neutralize at minimum 5 mg/l of chlorine for drinking water and 15 mg/l of chlorine for wastewater samples;

iii) one container from each batch of laboratory prepared containers or lot of purchased ready-to-use containers is checked to ensure efficacy of the sodium thiosulfate to 5 mg/l chlorine or 15 mg/l chlorine as appropriate and the check is documented;

iv) chlorine residual is checked in the field and actual concentration is documented with sample submission.

26.2.1.3 *pH checks:*

e) The pH of samples requiring acid/base preservation is checked upon sample receipt or upon initiation of analysis, except for volatile organic analysis.

26.3 Sample Identification

Samples, including subsamples, extracts and digestates, are uniquely identified in a permanent chronological record in the LIMS database to prevent mix-up and to document receipt of all sample containers.

Samples are assigned sequential numbers that reference more detailed information kept in the LIMS. The sample identification number contains seven digits such as "YMDD###"

Where:
Y correspond to the last digit of the current year

M	corresponds to the month using a letter, for example "A" being January, "B", February and so forth
DD	Corresponds to the two numerical digits for the month
###	A three digit subsequent number from 001 to 999 automatically assigned by the system

The detailed description of the sample identification is listed in SOP MIS001

The following information is included in the sample receipt screen of the LIMS:

- Client or project name
- Date and time of receipt at lab
- Unique laboratory identification number
- Signature or initials of person making the entries

In addition, the following information is maintained and linked to the log-in record:

- Date and time of sampling linked to the date and time of laboratory receipt.
- Unique field identification number linked to the laboratory sample ID
- Analyses requested (including applicable approved method numbers) linked to the laboratory sample ID.
- Comments regarding rejection (if any).

All documentation received regarding the sample, such as memos or chain of custody, are scanned and retained as electronic copies in the computer system.

26.4 Sample Aliquots / Subsampling

In order for analysis results to be representative of the sample collected in the field, the laboratory has subsampling procedures. These procedures are described in SOP MIS026.

26.5 Sample Storage

Storage conditions are monitored for any required criteria, verified, and the verification recorded in logbooks.

Samples that require thermal preservation are stored under refrigeration that is +/-2°C of the specified preservation temperature unless regulatory or method specific criteria require something different. For samples with a specified storage temperature of 4°C, storage at a temperature above the freezing point of water to 6°C is acceptable.

Samples are held secure, as required. Samples are accessible only to laboratory personnel.

Samples are stored apart from standards, reagents, food or potentially contaminating sources, and such that cross-contamination is minimized. All

portions of samples, including extracts, digestates, leachates, or any product of the sample is maintained according to the required conditions.

Samples for volatile organic analyses are stored in segregated refrigerators kept in the volatile organics laboratory completely segregated from other samples.

Sample storage is described in Section 2.11 of SOP MIS001

26.6 Sample Disposal

Samples are retained for a minimum of thirty days from report date unless otherwise instructed by the client or if the samples are part of litigation or have been received under legal/evidentiary requirements, in which case the disposal of the physical sample is accomplished with the concurrence of the affected legal authority.

After the retention period samples are either returned to the client or properly disposed of according to Federal, State and local regulations.
Procedures are described in SOP MIS051 for the disposal of samples, digestates, leachates, and extracts.

26.7 Sample Transport

Samples that are transported under the responsibility of the laboratory, where necessary, are done so safely and according to storage conditions. This includes moving bottles within the laboratory. Specific safety operations are addressed outside of this document.

Sample shipping procedures are described in SOP MIS007.

ADDRESS:	PHONE: FAX: EMAIL:
PROJECT MANAGER	SAMPLER

- Same Day Rush 1
- 24 Hour Rush 100
- 48-72 Hour Rush
- 4 - 5 Day Rush 30
- Rush Extractions
- 10 - 15 Business D
- QA/QC Data Pack

Charges will apply for weeken

Method of Shipment:

COMMENTS

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Attacked	Y / N
Preserved at Lab	Y / N

SAMPLE
AQ=Aqu
NA= No
SL = Slu
DW = D
WW = W
RW = R
GW = G
SO = So
SW = So
OL = Oi
OT = Ot

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION

COC v

Figure 26-2

Example Sample Acceptance Policy

- **Proper, full, and complete documentation, including the sample identification, the location, date and time of collection, collector's name, preservation type, sample type and any special remarks concerning the sample. This information must be fully documented in the chain of custody record. See Figure 26-1.**
- **Unique identification of samples using durable labels completed in indelible ink on all sample containers.**
- **Use of appropriate sample containers and preservatives as per table in SOP MIS001 – Appendix 1.**
- **All samples have adequate holding time to be analyzed (SOP MIS001 - Appendix 1).**
- **If no previous special arrangements were made, parameters that are "field" analysis (i.e. pH, residual chlorine, etc.) will be analyzed within 24 hours from arrival at the laboratory. Samples that arrive at the laboratory after 4 PM on Friday or on the weekend will be analyzed no later than the next business day after receipt (Monday unless a holiday).**
- **Adequate sample size for all analysis requested.**
- **Special instructions and additional information required to perform the analysis properly (i.e., time, flow rate, etc.).**
- **Procedures that are used when samples show signs of damage or contamination.**
- **Samples received at the required temperature (usually $\leq$ 6 ^{o}C, but above freezing) or with evidence of chilling process started (received "on ice") if they were collected the same day as received at the lab.**

Section 27

QUALITY ASSURANCE FOR ENVIRONMENTAL TESTING *(TNI V1:M1, V1:M2 – Section 5.9 and Section 1.7 of Technical Modules TNI V1:M 3-7)*

Weck Laboratories, Inc. has procedures for monitoring the validity of the testing it performs. The qualities of test results are recorded in a computerized database contained within the LIMS system and in such a way that trends are detectable, and where practicable, are statistically evaluated. To evaluate the quality of test results, the laboratory utilizes the following:

a) Use of certified reference materials or cultures and/or internal quality control using secondary reference materials
b) Control charting
c) Participation in proficiency testing programs, interlaboratory comparisons and round robin programs
d) Replicate testing using same or different methods
e) Retesting of retained samples
f) Correlation of results for different characteristics of a sample (for example, total phosphate should be greater than or equal to orthophosphate).
g) Confirmation analyses comparison to historical data

In addition to procedures for calibration, the laboratory monitors quality control measurements such as blanks, laboratory control samples (LCS), matrix spikes (MS), duplicates, surrogates and internal standards to assess precision and accuracy. Proficiency Testing samples are also analyzed to assess laboratory performance.

Quality control samples are processed in the same manner as field samples. They are analyzed and reported with their associated field samples. Quality control data are analyzed and, when found to be outside pre-defined criteria, action is taken to correct the problem and to prevent incorrect results from being reported. Data associated with quality control data outside of criteria and still deemed reportable will be qualified so the end user of the data may make a determination of the usability of the data - see Section 28 – "Reporting of Results".

For additional guidance on batch-specific QC samples, refer to the Quality Assurance Matrix contained in the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP).

27.1 Essential Quality Control Procedures

The quality control procedures specified in test methods are followed by laboratory personnel. The most stringent of control procedures is used in cases where multiple controls are offered. If it is not clear which is the most stringent, that mandated by test method or regulation is followed.

For test methods that do not provide acceptance criteria for an essential quality control element or where no regulatory criteria exist, acceptance criteria are developed following the criteria established for another similar method or similar technology. In some specialized projects, the client may set criteria and this should be stated. These limits can be found in the analytical methods SOPs and also in LIMS.

Written procedures to monitor routine quality controls including acceptance criteria are located in the test method SOPs and in LIMS, except where noted, and include such procedures as:

- **use of laboratory control samples and blanks to serve as positive and negative controls for chemistry methods;**
- **use of laboratory control samples to monitor test variability of laboratory results;**
- **use of calibrations, continuing calibrations, certified reference materials and/or PT samples to monitor accuracy of the test method;**
- **measures to monitor test method capability, such as limit of detection, limit of quantitation, and/or range of test applicability, such as linearity;**
- **use of regression analysis, internal/external standards, or statistical analysis to reduce raw data to final results;**
- **use of reagents and standards of appropriate quality and use of second source materials as appropriate;**
- **procedures to ensure the selectivity of the test method for its intended use;**
- **measures to assure constant and consistent test conditions, such as temperature, humidity, rotation speed, etc., when required by test method;**
- **use of sterility checks for equipment, media and dilution water for microbiology; and**
- **use of positive and negative culture controls for microbiology.**
- **For Radiochemistry: Measures to monitor test method capability, such as Minimum Detectable Activity.**

27.2 Internal Quality Control Practices

Analytical data generated with QC samples that fall within all prescribed acceptance limits indicate the test method is deemed to be in control.

QC samples that fall outside QC limits indicate the test method are deemed to be out of control (nonconforming) and that corrective action is required and/or that the data are qualified (see Section 12 – "Control of Nonconforming Environmental Testing Work" and Section 14 - "Corrective Actions").

Detailed QC procedures and QC limits are included in test method standard operating procedures (SOPs), or where unspecified in the SOPs, are detailed in LIMS.

All QC measures are assessed and evaluated on an on-going basis, so that trends are detected.

27.2.1 General Controls

The following general controls are used:

27.2.1.1 Positive and Negative Controls such as:

a) Blanks (negative)
b) Laboratory control sample (positive)
c) Sterility checks and control cultures (positive and negative).

27.2.1.2 Selectivity is assured through:

a) absolute and relative retention times in chromatographic analyses;

b) two-column confirmation when using non-specific detectors;

c) use of acceptance criteria for mass-spectral tuning (found in test method SOPs);

d) use of the correct method according to its scope assessed during method validation; and

e) use of reference cultures (positive and negative) from a recognized manufacturer (where applicable).

27.2.1.3 Consistency, Variability, Repeatability, and Accuracy are assured through:

a) proper installation and operation of instruments according to manufacturer's recommendations or according to the processes used during method validation;

b) monitoring and controlling environmental conditions (temperature, access, proximity to potential contaminants);

c) selection and use of reagents and standards of appropriate quality; and

d) cleaning glassware appropriate to the level required by the analysis as demonstrated with method blanks (SOP MIS028).

e) For microbiology, glassware care includes use of borosilicate glassware, use of detergents designed for laboratory use, testing each day for alkaline or acid residue with bromothymol blue, and conduct of the Inhibitory Residue test when the detergent is changed or annually, whichever is more frequent.

f) following SOPs and documenting any deviation, assessing for impact, and treating data appropriately;

g) testing to define the variability and/or repeatability of the laboratory results, such as replicates;

h) use of measures to assure the accuracy of the test method, including calibration and/or continuing calibrations, use of certified reference materials, proficiency test samples, or other measures; and

i) use of duplicate plate counts on positive samples (microbiology only).

27.2.1.4 Test Method Capability (also see Section 22 – "Environmental Methods and Method Validation") is assured through:

a) establishment of the limit of detection "minimum detectable activity" for Radiochemistry work;

b) establishment of the limit of quantitation or reporting level; and/or

c) establishment of the range of applicability such as linearity.

27.2.1.5 Data reduction is assured to be accurate by:

a) selection of appropriate formulae to reduce raw data to final results such as regression;

b) following specific procedures for data reduction such as manual integration procedures;

c) periodic review of data reduction processes to assure applicability;

d) microbiological calculations, data reduction, and statistical interpretations specified by each test method; and

e) for Radiochemistry work, results reported with its measurement uncertainty. Reports indicate whether the uncertainty is combined standard or expanded uncertainty.

27.2.1.6 Sample Specific controls are used to evaluate the effect of sample matrix on the performance of the selected analytical method (not a measure of laboratory performance):

Examples:

- Matrix Spike and Matrix Spike Duplicate (MS/MSD)
- Surrogate Spikes
- Sample Duplicates

27.2.1.7 The following tables summarize the key elements of a quality control system for a laboratory performing chemistry and microbiology testing.

Table 27-1 Essential Quality Control Elements for Chemistry			
Item	**Frequency**	**Acceptance Criteria**	**Corrective action**
Negative Control (Method Blank)	**1/batch**	**Method specific or reporting limit**	**Qualify data and take corrective action**
Positive Control (Laboratory Control Sample)	**1/batch**	**Method specific or determined by laboratory**	**Reprocess, reanalyze, or qualify data.**
Matrix Spike; Matrix Spike Duplicates ***Note : Samples are designed as data quality indicators for a specific sample using the designated method. These controls alone are not used to judge a laboratory's performance.***	**Per method requirement**	**Method specific or determined by laboratory**	**Corrective action and qualify data.**
Surrogate spikes ***See note above.***	**Per method requirement**	**Method specific or determined by laboratory**	**Corrective action and qualify data**
Matrix Duplicates ***See note above.***	**Per method requirement**	**Method specific or determined by laboratory**	**Corrective action and qualify data**
Continuing Calibration Verification	**Per method requirement**	**Method specific or determined by the laboratory**	**Reanalyze standard immediately; Corrective action**
Initial calibration Verification	**Start of each analytical run**	**Method specific or determined by laboratory**	**Reanalyze standard immediately; Corrective action**

Table 27-2 Essential Quality Control Requirements for Microbiology – All Methods			
Item	**Frequency**	**Acceptance Criteria**	**Corrective Action[2]**
Sterility check	**Each lot of media prior to first use**	**No growth**	**Investigate cause**
Sterility check containers	**One container (bottle) for each lot or batch sterilized (NSGM)**	**No growth**	**Investigate cause**
Sterility check dilution water	**One per batch of dilution water (NSGM)**	**No growth**	**Investigate cause**
Positive control[1]	**pure culture of target organisms/ each lot or batch**	**Positive reaction**	**Investigate cause** **If necessary reject the**

Table 27-2 Essential Quality Control Requirements for Microbiology – All Methods			
Item	**Frequency**	**Acceptance Criteria**	**Corrective Action[2]**
	of medium (prior to first use of medium)		medium
Negative control[1]	Pure culture of non-target organisms/each lot or batch of medium (prior to first use of medium)	Negative reaction	Investigate cause If necessary reject the medium
Duplicate colony counts (For numeric results only)	Monthly on one positive sample for each month performed.	Same analyst <5% difference between counts Two analysts <10% difference between counts	Investigate cause Qualify data
1) Microorganisms may be single use preparations or cultures maintained by documented procedures that demonstrate the continued purity and viability of the organism. 2) Corrective Action may include the need to retrain. 3) NSGM: Non-selective growth media			

Table 27-3 Essential Quality Control Requirements for Microbiology – Filtration Methods Only			
Item	**Frequency**	**Acceptance Criteria**	**Corrective Action**
Sterility check	Each lot of media prior to first use. Also done on containers, reagents and materials prior to first use. Use NSGM for containers, reagents and materials.	No growth	Investigate cause
Method blank	Beg/end of each run Select one: - 1 for every 10 samples Done as part of the test, use method media.	No growth	Investigate cause Qualify data
Sterility check filters	One filter for each new lot of membrane filters (NSGM)	No growth	Investigate cause
Target organism verification (D.3.4.b)	Method specific	Confirmation of reaction	Investigate cause

Table 27-4 Essential Quality Control Requirements for Microbiology – Pour Plate Methods Only			
Item	**Frequency**	**Acceptance Criteria**	**Corrective action**
Method Blank	Minimum of one plate per batch Done as part of test, use method media	Less than 8 cfu/plate	Investigate cause, qualify/ reject data

Table 27-5 Stock Cultures		
Item	**Frequency**	**Handling**
Reference cultures	Single use	Preserved and handled per mfg. specifications
Reference culture Reference stock	Culture stocks to make working stocks	Preserved and not refrozen Handling per mfg specs
Working stocks	Not transferred more than five times. Not sub-cultured to replace reference stocks	

Table 27-6 Essential Quality Control Elements for Radiochemistry			
Item	**Frequency**	**Acceptance Criteria**	**Corrective action**
Negative Control (Method Blank)	1/batch	Method specific or reporting limit	Qualify data and take corrective action
Positive Control (Laboratory Control Sample)	1/batch	Method specific or determined by laboratory	Reprocess, reanalyze, or qualify data.
Matrix Duplicates *Note : Samples are designed as data quality indicators for a specific sample using the designated method. These controls alone are not used to judge a laboratory's performance.*	Per method requirement	Method specific or determined by laboratory	Corrective action and qualify data

27.2.2 Specific Controls

27.2.2.1 Method Blanks

Method blanks are processed along with and under the same conditions as the associated samples to include all steps in the method. A method blank must be analyzed at a minimum of one per preparation batch. When no separate preparation method is used the batch is defined as the environmental samples that are analyzed with the same method and personnel, using the same lots of reagents, not to exceed the analysis of twenty environmental samples, not including method blanks, LCS, matrix spikes and matrix duplicates. The matrix of the method blank must be similar to the associated samples and be free from any analytes of interest. Method blanks are not required for some analyses such as pH, conductivity, flash point and temperature.

The method blank is used to assess the preparation batch for possible contamination during the preparation and processing steps. The method blank is processed along with and under the same conditions as the associated samples to include all steps of the analytical procedure.

Contaminated blanks are identified according to the acceptance limits in the test method SOPs or laboratory documentation.

Blanks are prepared and analyzed in the following situations, or whenever there is a need to obtain further information:

- **A blank is extracted for every batch and type of matrix for analysis of semi-volatile organics by GC, GC/MS or HPLC.**
- **A blank is carried through all the digestion procedures for analysis of metals by AA, ICP or ICP-MS for every batch of samples and type of matrix for each instrument used.**
- **A blank is carried through the leaching procedures (TCLP, EP TOX, and WET) using the same extraction fluid, bottles and agitators as the samples.**
- **System/Reagent blanks are analyzed at the beginning of the day prior to calibration, after a high level standard, after changing matrix and after samples that are known or suspected to be very concentrated.**
- **Reagent blanks are analyzed for all wet chemistry determinations involving titrations or spectrophotometry and their value are subtracted from the reading of the samples, if appropriate.**
- **Blanks for mobility procedures (TCLP, ZHE, EP TOX, and WET) are analyzed by the appropriate method.**
- **Additional field and trip blanks are prepared and analyzed where required or whenever requested by the client**

Sometimes the blanks may show detectable amounts of target analytes. In these cases the source of the contamination must be investigated and measures taken to correct, minimize or eliminate the problem if:

- **The blank contamination is at or above the reporting limit and exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated sample batch or**
- **The blank contamination exceeds the concentration present in the samples and is greater than 1/10 of the specified regulatory limit.**
- **The blank contamination otherwise affects the sample results as per the test method requirements or the individual project data quality objectives.**
- **For DoD samples, in addition to the above, the method blank will be considered contaminated for a particular target analyte if it concentrations exceeds ½ the reporting limit unless is a common laboratory contaminant such as acetone, methylene chloride, MTBE, zinc and aluminum, among others.**

If the method blank is contaminated as described above, then the affected samples shall be reprocessed in a subsequent preparation

batch, qualified or voided, except when sample results are unaffected by the blank contamination (non-detects or other analytes) in which case the results are reported unqualified. If insufficient sample volume remains for reprocessing, the results shall be reported with appropriate data qualifiers.

27.2.2.2 Laboratory Control Samples

Laboratory Control Samples (LCS) are also known as LFBs or Blank Spikes, are prepared from analyte free water or other clean matrix, and spiked with verified and known amounts of analytes for the purpose of establishing precision or bias measurements.

Laboratory control samples are analyzed at a frequency mandated by method, regulation, or client request, whichever is more stringent. The standard frequency of LCS preparation and analysis is one per analytical batch or as otherwise stated in a laboratory SOP. Exceptions would be for those analytes where no spiking solution is available, such as TSS, TDS, Total Volatile Solids, Total Solids, pH, color, odor, temperature, dissolved oxygen or turbidity. When no separate preparation method is used the batch is defined as the environmental samples that are analyzed with the same method and personnel, using the same lots of reagents, not to exceed the analysis of twenty environmental samples, not including method blanks, LCS, matrix spikes and matrix duplicates.

The LCS is a quality system matrix, known to be free of analytes of interest, spiked with known and verified concentrations of analytes. The matrix spike (Sect. 27.2.2.3) may be used in place of this control as long as the acceptance criteria are as stringent as for the LCS. Alternatively the LCS may consist of a media containing known and verified concentrations of analytes or as Certified Reference Material (CRM). All analyte concentrations shall be within the calibration range of the methods.

The analytes to be spiked in the LCS are specified in the test method SOP. In some cases a client may specify a list of analytes for spiking and the request is handled using the laboratory's nonconformance procedures.

In the absence of specified spiking components the laboratory shall spike per the following:

- **For those components that interfere with an accurate assessment such as spiking simultaneously with technical chlordane, toxaphene and PCBs, the spike should be chosen that represents the chemistries and elution patterns of the components to be reported.**
- **For those test methods that have extremely long lists of analytes, a representative number may be chosen. The analytes selected should be representative of all analytes reported. The following criteria shall be used for determining the minimum number of analytes to be**

spiked. However, the laboratory shall insure that all targeted components are included in the spike mixture over a 2-year period:

a) For methods that include 1-10 targets, spike all components.
b) For methods that include 11-20 targets, spike at least 10 compounds or 80% of the total, whichever is greater.
c) For methods with more than 20 targets, spike at least 16 components.

The results of laboratory control samples (LCS) are calculated in percent recovery or other appropriate statistical technique that allows comparison to established acceptance criteria. The calculation used is as follows:

$$\%R = \frac{AV}{TV} \times 100$$

Where
AV = Analyzed Value
TV = True Value

The individual LCS is compared to the acceptance criteria as published in the mandated test method, or where there are no established criteria, the laboratory establishes limits as described below. If found to be outside of these criteria, there is an indication that the analytical system is "out of control". Any affected samples associated with an out of control LCS shall be reprocessed for re-analysis or the results reported with appropriate data qualifying codes. Note: Samples that are not detected (ND) may be reported with an LCS that failed with high bias, but any qualifier may only be used for two consecutive batches before the problem must be corrected.

Where there are no established criteria, internal criteria are generated based on recoveries of past LCSs.
To determine these criteria, at least 30 data points generated under the same analytical process are used and the upper and lower acceptance limits are calculated as the "Mean + 3 SD" and "Mean – 3 SD" respectively, where SD is the standard deviation. These statistically derived limits must:

- **Meet the limits specified by the project or as stated in the method, if available;**
- **Should be updated on an annual basis, or as stated in the method, and re-established after major changes in the analytical process (e.g., new instrumentation);**
- **Should not exclude failed LCS recovery data and statistical outliers from the calculation, unless there is a documented and scientifically valid reason.**

Control charts generated from the LIMS are used to detect trends and prevent out-of-control conditions. Control limits are continually monitored for shifts in mean recovery, changes in standard deviation, and development of trends.

If a large number of analytes are in the LCS, it becomes statistically likely that a few will be outside control limits. This may not indicate that the system is out of control, therefore corrective action may not be necessary. Upper and lower marginal exceedance (ME) limits can be established to determine when corrective action is necessary. A ME is defined as being beyond the LCS control limit (3 standard deviations), but within the ME limits. ME limit is 4 standard deviations around the mean. The number of allowable marginal exceedances is based on the number of analytes in the LCS. If more analytes exceed the LCS control limits than is allowed, or if any one analyte exceeds the ME limits, the LCS fails and corrective action is necessary. This marginal exceedance approach is relevant for methods with long lists of analytes. It will not apply to target analyte lists with fewer than 11 analytes. Certain projects, such as DoD work do not allow any target analyte to exceed its LCS control limits, even marginally and if this happens the batch is considered not acceptable .

The number of allowable marginal exceedances is as follows:

1) >90 analytes in LCS, 5 analytes allowed in ME of the LCS control limit;
2) 71-90 analytes in LCS, 4 analytes allowed in ME of the LCS control limit;
3) 51-70 analytes in LCS, 3 analytes allowed in ME of the LCS control limit;
4) 31-50 analytes in LCS, 2 analytes allowed in ME of the LCS control limit;
5) 11-30 analytes in LCS, 1 analytes allowed in ME of the LCS control limit;
6) <11 analytes in LCS, no analytes allowed in ME of the LCS control limit;

Marginal exceedances must be random. If the same analyte exceeds the LCS control limit repeatedly (i.e. 2 out of 3 consecutive LCS), it is an indication of a systemic problem. The source of the error must be located and corrective action taken.

The procedure to monitor the application of marginal exceedance allowance to the LCS to ensure random behavior consist of establishing a data base with all exceedances and compare the analytes affected on quarterly basis to verify is not the same analyte having the problem.

27.2.2.3 Matrix Spikes and Matrix Spike Duplicates

Matrix Spikes and Matrix Spike Duplicates (MS/MSD) are environmental samples fortified with a known amount of analyte to help assess the effect of the matrix on method performance. These controls alone are not used to judge laboratory performance. The information from these controls is sample/matrix specific and would not normally be used to determine the validity of the entire batch

The frequency of the analysis of matrix specific samples is determined as part of a systematic planning process (e.g., Data Quality Objectives) or as specified by the required mandated test method or SOP and it is at a minimum, one per batch of 20 samples or less, per matrix type.

The components to be spiked are the ones specified by the mandated test method or laboratory SOP. Any permit specified analytes, as specified by regulation or client requested analytes shall also be included. Matrix spikes are not performed for analytes for which spiking solutions are not available such as, solids determinations (total suspended, total dissolved, total volatile), pH, color, odor, temperature, dissolved oxygen, BOD, COD or turbidity. If there are no specified components, the following guideline is used:

§ For those components that interfere with an accurate assessment such as spiking simultaneously with technical chlordane, toxaphene and PCBs, the spike should be chosen that represents the chemistries and elution patterns of the components to be reported.

§ For those test methods that have extremely long lists of analytes, a representative number may be chosen using the following criteria for choosing the number of analytes to be spiked, but alternating them in order to ensure that all targeted components are included in the spike mixture over a 2 year period.
    i. For methods that include 1-10 targets, spike all components;
    ii. For methods that include 11-20 targets, spike at least 10 components or 80% of the total, whichever is greater;
    iii. For methods with more than 20 targets, spike at least 16 components.

Some project may require MS/MSD to be performed on their samples (i.e. DoD) in which case these are used for the entire batch if it also contains samples from other clients.

The requirements for MS/MSD are not applicable to all methods (e.g., asbestos, certain air-testing samples, classic chemistry, and industrial hygiene samples). Additional MS/MSDs may be required on a project-specific basis.

The calculations of percent recoveries and relative percent difference (RPD) are performed by the following procedures:

$$\%R = \frac{AV}{TV} \times 100$$

Where

AV = Spike Result – Sample Result

TV = True Value

$$RPD = \frac{|S - D|}{\frac{(S + D)}{2}} \times 100$$

***Where*:**

S=Sample Concentration
D=Duplicate Concentration

Where there are no established criteria, the laboratory uses the mean plus or minus three standard deviations as the control limits for MS/MSD as described in section 27.2.2.2. Some projects may have specific criteria such as DoD work that require that the results of all MS/MSDs must be evaluated using the same acceptance criteria used for the LCS.

For MS/MSD results outside established criteria corrective action is documented or the data are reported with appropriate data qualifying codes. Only the data from the spiked sample is qualified. Poor performance in a matrix spike generally indicates a problem with the sample composition, and not the laboratory analysis and is reported to the client whose sample was used for the spike with the appropriate data qualifiers or in the case narrative to assist in data assessment.

The corrective action for organics may be to evaluate the LCS for comparison and note in the narrative that there may be a matrix interference present. The data to be qualified is only that of the parent sample.

27.2.2.4 Surrogate Spikes

Surrogate spikes are substances with chemical properties and behaviors similar to the analytes of interest used to assess method performance in individual samples. Surrogates are added to all samples (in test methods where surrogate use is appropriate) prior to sample preparation or extraction.

Surrogate recovery results are compared to the acceptance criteria as published in the mandated test method or laboratory SOP, specified in the project by the client or lab generated if there are no established criteria. Acceptance limits generated at the laboratory are established based on a minimum of 30 valid data points by calculating the mean and standard deviation, the upper limit is set at "mean + 3SD" and the lower limit at "Mean – 3SD".

Surrogate results outside the acceptance criteria are evaluated for the effect indicated for the individual sample results. A corrective action is initiated which is guided by the data quality objectives or other site specific requirements. Results reported from analyses with surrogate

recoveries outside the acceptance criteria include appropriate data qualifiers

The recovery for a surrogate is calculated using the following equation:

$$\% \text{Recovery} = \frac{\textit{ConcentrationFound}}{\textit{ConcentrationAdded}}\, x100\%$$

Where:

Concentration found = Result obtained after analysis
Concentration added = Amount of surrogate spiked

27.3 Proficiency Test Samples or Interlaboratory Comparisons

27.3.1 Compliance to Accreditation Requirements

The laboratory analyzes at least two TNI-compliant PT samples per calendar year for each accreditation Fields of Proficiency Testing (FoPT) for which the laboratory is accredited. An exception is made for analytes where there is no PT available from any PTPA approved PT provider at least twice per year. In these cases the lab will run the PTs in the minimum time frame the PTs are available and not at all if they are not available.

For DoD related work, PT samples are obtained from a Proficiency Testing Oversight Body (PTOB)/Proficiency Testing Provider Accreditor (PTPA)-approved PT Provider.

Additional analytes or experimental analytes are analyzed based on specific regulatory program requirements and special client requests at the stipulated frequency such as perchlorate and hexavalent chromium for California ELAP certification and NDMA for certain client requests performed once a year.

The successive PTs are analyzed at least five months apart and no more than 7 months apart unless the PT is being used for corrective action to maintain or reinstate accreditation, in which case the dates of successive PT samples for the same accreditation FoPT is at least fifteen days apart.

The goal for PT results is obtaining 100% of all analytes within acceptable limits. When there are results out of the acceptance range, corrective action is initiated to prevent the error from reoccurring. A report with the documentation of the corrective action is also filed.

The following are the proficiency testing programs in which the laboratory currently participates on regular basis:

- Drinking water analysis: WS Studies
- Wastewater analysis: WP studies
- Hazardous waste and soil
- Bacteriological Performance Evaluation Study.

- **Radiochemistry**

27.3.2 PT Sample Handling, Analysis and Reporting

The laboratory does not share PT samples with other laboratories, does not communicate with other laboratories regarding current PT sample results, and does not attempt to obtain the assigned value of any PT sample from the PT provider.

Proficiency Testing (PT) samples are treated as typical samples in the normal production process where possible, including the same analysts, preparation, calibration, quality control and acceptance criteria, sequence of analytical steps, number of replicates, and sample log-in. PT samples are not analyzed multiple times unless routine environmental samples are analyzed multiple times. Where PT samples present special problems in the analysis process, they will be treated as laboratory samples where clients have special requests.

The type, composition, concentration and frequency of quality control samples analyzed with the PT samples are the same as with typical samples.

Prior to the closing date of a study, laboratory personnel do not:

- **Subcontract analysis of a PT sample to another laboratory being run for accreditation purposes.**
- **Knowingly receive and analyze a PT for another laboratory being run for accreditation purposes.**
- **Communicate with an individual from another laboratory concerning the analysis of the PT sample.**
- **Attempt to find out the assigned value of a PT from the PT Provider.**

The laboratory's procedure for handling low level PT samples is explained in SOP MIS015.

The laboratory institutes corrective action procedures for failed PT samples following the guidelines in Section 14 – "Corrective Action" and SOP MIS015.

Retention of PT records is similar to that maintained for regular environmental samples. In addition the lab maintains a copy of the online data entry summary when the PT results are submitted online.

27.4 Data Review

The laboratory reviews all data generated in the laboratory for compliance with method, laboratory and, where appropriate, client requirements.

Initially, the analyst reviews data for acceptability of quality control measures and accuracy of the final result(s).

After the initial review, a second reviewer, a technically qualified person, such as a supervisor or another chemist, experienced in that particular method or procedure considers all manual transfers and calculations of data in detail and spot checks all electronic transfers of data.

Final reports are compared to raw data either directly or through several reviewed steps.

Internal data review consists of a tiered or sequential system of verification, consisting of at least three tiers, with each check performed by a different person. The three tiers include a 100% review of the entire data package and completion of corresponding Data Review Checklist the analyst, then a verification review by a technically qualified person, such as a supervisor or another chemist, experienced in that particular method or procedure, who checks for proper integration of peaks, identification of compounds, QC, data qualifiers, electronic transfer of data (if not performed automatically), etc. The third review is mainly an administrative one, to check for accuracy and completeness, typically performed by the Project Manager in charge of that project. The procedures used for performing the data review are detailed in the SOP MIS018.

If a discrepancy is noted in any stage of the reviewing process, the package is returned to the primary analyst for corrective action. For analyses that do not have automatic data reduction, the analyst performs the necessary calculations to obtain the final result, and then the results are reviewed as indicated above.

All information used in the calculations (e.g., raw data, calibration files, tuning records, results of standard additions, interference check results, sample response, and blank or background correction protocols) as well as sample preparation information (e.g., weight or volume of sample used, percent dry weight for solids, extract volume, dilution factor used) are recorded in order to enable reconstruction of the final result.

Section 28

REPORTING THE RESULTS
(TNI V1:M2 – Section 5.10)

The result of each test performed is reported accurately, clearly, unambiguously, and objectively and complies with all specific instructions contained in the test method.

Laboratory results are reported in a test report or "Certificate of Analysis" that includes all the information requested by the client and necessary for the interpretation of the test results and all information required by the method used. This report could be either as a hard copy or an electronic data transfer or other electronic format.

Data are reported without qualification if they are greater than the lowest calibration standard, lower than the highest calibration standard, and without compromised sample or method integrity.

28.1 Test Reports

The report format has been designed to accommodate each type of test performed and to minimize the potential for misunderstanding or misuse.

The laboratory does not issue multiple reports for the same samples where there is different information on each report unless required to meet regulatory needs and approved by the Quality Manager.

Each test report generated contains the following information:

a) a title, such as "Certificate of Analysis";

b) the name, address and phone number of the laboratory and name of the contact person (project Manager);

c) unique identification of the test report, such as a serial number, on each page and a pagination system that ensures that each page is recognized as part of the test report and a clear identification of the end of the report, such as 3 of 10;

d) the name and address of the client;

e) the identification of the method used;

f) a description of, the condition of, and unambiguous identification of the sample(s) tested, including the client identification code and client project name and number if available;

g) the date of sample receipt when it is critical to the validity and application of the results, date and time of sample collection, dates the tests were performed,

the time of sample preparation and analysis if the required holding time for either activity is less than or equal to 72 hours;

h) reference to the sampling plan and procedures used by the laboratory where these are relevant to the validity or application of the results;

i) the test results, units of measurement, an indication of when results are reported on any basis other than as received (e.g. dry weight), failures identified (Data Qualifiers list - Appendix G);

j) the name, function, and signature or an equivalent electronic identification of the person authorizing the test report, and the date of issue;

k) where relevant, a statement to the effect that the results relate only to the samples;

l) Any non-accredited tests or parameters shall be clearly identified as such to the client when claims of accreditation to this Standard are made in the analytical report or in the supporting electronic or hardcopy deliverables; and

m) A statement that the report shall not be reproduced except in full without written approval of the laboratory.

Exceptions to this standard approach for reporting are allowed with the approval of the QA Manager and should be documented; for DoD related work, both date and time of preparation and analysis are considered essential information, regardless of the length of the holding time, and shall be included as part of the laboratory report. If the time of the sample collection is not provided, the laboratory must assume the most conservative time of day (i.e., earliest).

28.2 Supplemental Test Report Information

When necessary for interpretation of the results or when requested by the client, test reports include the following additional information:

a) deviations from, additions to, or exclusions from the test method, information on specific test conditions, such as environmental conditions, and any non-standard conditions that may have affected the quality of the results, and any information on the use and definitions of data qualifiers;

b) a statement of compliance/non-compliance when requirements of the management system are not met, including identification of test results that did not meet the laboratory and regulatory sample acceptance requirements, such as holding time, preservation, etc.;

c) where applicable and when requested by the client, a statement on the estimated uncertainty of the measurement;

d) where appropriate and needed, opinions and interpretations. When opinions and interpretations are included, the basis upon which the opinions and interpretations are documented. Opinions and interpretations are clearly marked as such in the test report.

e) additional information which may be required by specific methods or client;

f) qualification of results with values outside the calibration range as appropriate.

In addition to the items above, for test reports that contain the results of sampling, the following is provided when necessary for the interpretation of the results and if the information is available:

a) the date and time of sampling;

b) unambiguous identification of the material sampled;

c) the locations of the sampling;

d) a reference to the sampling plan and procedures used;

e) details of any environmental conditions during sampling that may affect the interpretations of the test results;

f) any standard or other specification for the sampling method or procedure, and deviations, additions to or exclusions from the specification concerned.

28.3 Environmental Testing Obtained from Subcontractors

Test results obtained from tests performed by subcontractors are clearly identified on the test report by subcontractor name and/or accreditation number.

The subcontractors report their results in writing or electronically. A copy of the subcontractors report is made available to the client if requested.

28.4 Electronic Transmission of Results

All test results transmitted by telephone, fax, telex, e-mail, or other electronic means comply with the requirements of the TNI Standard and associated procedures to protect the confidentiality and proprietary rights of the client (see Section 22- "Environmental Methods and Method Validation").

28.4.1 Electronic Data Deliverables

The IT Manager and Project Manager coordinate report generation using Promium Element DataSystem LIMS with assistance from the Office Assistant. The reporting requirements and the process to generate reports are described in Standard Operating Procedure MIS053. However, since each client may require their own format, SOP MIS053 generally addresses how to verify the EDD to insure its accuracy and agreement with the final report. Weck Laboratories, Inc. makes a concerted effort, whenever possible, to reduce the amount of hand entering of data to avoid transcription errors. Results from the instruments are electronically processed into the LIMS using Promium's Data Tool or various other electronic means (typically Microsoft Excel).

28.5 Amendments to Test Reports

Material amendments to a test report after it has been issued are made only in the form of another document or data transfer. All supplemental reports meet all the requirements for the initial report and the requirements of this *Quality Manual*.

Amended test reports include the statement, "Supplement to Certificate of Analysis, identification number' or an equivalent form of wording to assure they can be differentiated from other test reports.

When it is necessary to issue a complete new report, the new report is uniquely identified and contains a reference to the original that it replaces.

Appendix A

Ethics and Data Integrity Policy

Weck Laboratories, Inc. has developed a proactive program for prevention and detection of improper, unethical or illegal actions. A main component of this program is the periodic training and communications that the employees receive from management about the ethics policy and the utmost importance of an honest and ethical behavior in all activities performed at the laboratory.

Proper ethical conduct in the laboratory is strictly enforced. The Company's Code of Ethics is presented to current and prospective employees in both the QA manual and the Employee Handbook.

The Data Integrity Plan, which includes the description of the data integrity procedures, serves to combine the elements currently in place and document further procedures to ensure our compliance with requirements in the TNI standard and from other regulatory agencies.

These procedures include the following elements:

- **data Integrity training**
- **signed data integrity documentation for all laboratory employees**
- **in-depth, periodic monitoring of data integrity**
- **data integrity procedure documentation.**

The data integrity procedures are signed and dated by senior management. These procedures and the associated implementation records are properly maintained and made available for assessor review. The data integrity procedures are annually reviewed and updated if necessary by management.

The Data Integrity Plan also provides a mechanism for confidential reporting of data integrity issues in the laboratory. A primary element of the mechanism is to assure confidentiality and a receptive environment in which all employees may privately discuss ethical issues or report items of ethical concern. In instances of ethical concern, the mechanism also includes a process whereby laboratory management is to be informed of the need for any further detailed investigation.

Each employee is required to understand and sign a Data Integrity Agreement, contained in the Data Integrity Plan document. The Laboratory Ethics seminar that is presented as a refresher to current employees on an annual basis and as part of the hiring process for new employees include elements describing examples of improper and illegal actions, how to identify appropriate and inappropriate laboratory and instrument manipulation practices, guidance for manual integration practices and consequences of unethical or improper behavior.

Punishment for improper, illegal or unethical activities range from suspension to termination, depending on the degree and nature of the unethical activity.

Employees are required and encouraged to bring up to management any improper activities they detect or are suspicious of. Any incident reported is immediately investigated by the management and the person or persons involved are subject to disciplinary actions.
The Management shall also monitor the program for detecting improper, unethical or illegal action by performing internal proficiency testing (single or double blind), reviewing of analytical data post-analysis, performing electronic data audits using special software as Mint Miner® and providing an open door policy for employees to report any suspicious activity without fears.

In order to assist the laboratory technical personnel in performing their duties without detrimental influences, it is the policy of the Company that the laboratory be impartial and that it and its personnel are free from any undue commercial, financial and other pressures which might influence or adversely affect their normal performance having an impact on the quality of the work they produce or their technical judgment. By this policy all laboratory personnel dedicated to technical activities should not be influenced by, or involved in any financial or commercial matter while performing laboratory work. If any employee feels that he or she might be under any kind of pressure as described above, the Laboratory Director must be notified immediately. Additionally, the Laboratory will not engage in any activities that may endanger the trust in its independence of judgment and integrity in relation to its environmental testing.

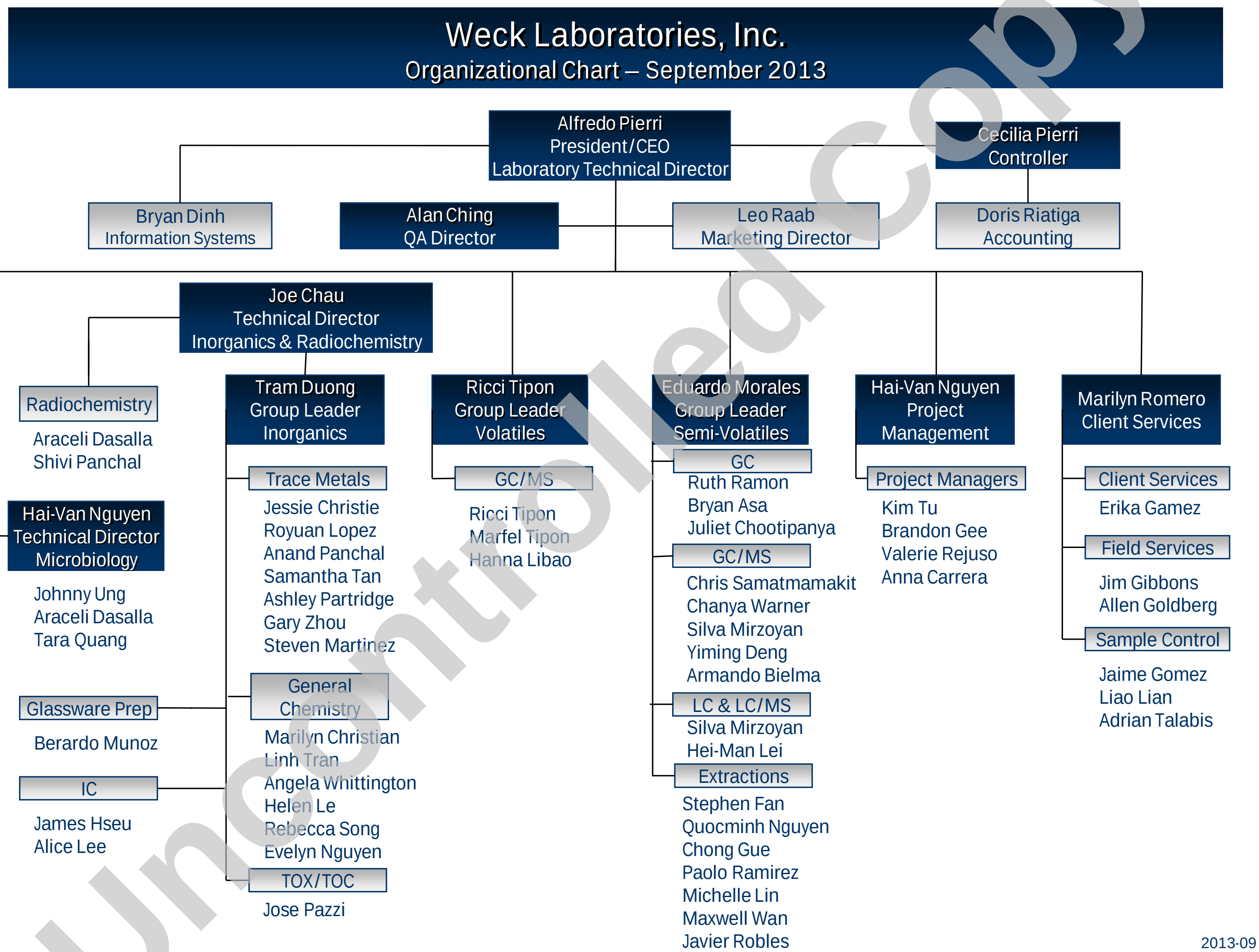
CODE OF ETHICS

Weck Laboratories, Inc. is committed to ensuring the integrity of our data and meeting the quality needs of our clients. We pledge to manage our business according to the following principals:

- **To produce results that are technically sound and legally defensible;**
- **To assert competency only for work for which adequate equipment and personnel are available;**
- **To present services in a confidential, honest, and forthright manner;**
- **To have a clear understanding with the client as to the extent and kind of services to be rendered;**
- **To provide employees with guidelines and an understanding of the ethical and quality standards required in this industry;**
- **To operate facilities in a manner that protects the environment and the health and safety of employees and the public;**
- **To obey all pertinent federal, state, and local laws and regulations;**
- **To continually improve product and service quality;**
- **To treat employees equitably, acknowledge their scientific contributions, and provide them with opportunities for professional growth and development;**
- **To recognize and respond to community concerns; and**
- **To deal openly, honestly, and fairly in all business and financial matters with employees, clients and the public.**

Appendix B

Laboratory Organization Chart and Resumes of Key Personnel



RESUMES OF KEY PERSONNEL

Name	Position
Alfredo Pierri	President – Laboratory Director
Alan Ching	Director of QA - QA Officer
Joe Chau	Technical Director Inorganics/Radiochemistry and Safety Officer
Hai-Van Nguyen	Technical Director Microbiology - Senior Project Manager
Ricci Tipon	Technical Director Volatile Organics
Marilyn Romero	Customer Service Manager
Tram Duong	Inorganic Section Group Leader
Eduardo Morales	Organic Section Group Leader

ALFREDO E. PIERRI

Title

President, Laboratory Director

Education

M.S. (equiv.) - University of Buenos Aires, Argentina, 1978. Organic Chemistry

- University of California, Los Angeles
Certificate in Hazardous Materials Control and Management, 1991 - 1993

Affiliations

American Chemical Society, member
American Council of Independent Laboratories (ACIL), member
The NELAC Institute, member
AOAC, member

Professional Experience

Jan/1987 to Present	**Weck Laboratories, Inc., City of Industry, CA** **Full Service Environmental Testing laboratory**
Sep/1984 to Dec/1986	**SCS Engineers, Long Beach, CA** **Environmental Testing laboratory**
Jul/1979 to Aug/1984	**Argentina Atomic Energy Commission, Buenos Aires** **Government Agency – Research and Development**

Mr. Pierri has extensive experience in analytical chemistry. Most of his work in this field has been in the application and development of instrumental methods of analysis for organic analytes using GC, GC/MS, HPLC, IR and UV-Visible spectrometry. He has also worked in Spectrometric techniques for metals analysis such as Atomic Absorption with flame and graphite furnace and Inductively Coupled Plasma with Optical Emission and Mass Spectrometry.

Since 1984 he has been working exclusively in the environmental field obtaining in 1993 the certification as Registered Environmental Assessor (REA-04975) from the California Environmental Protection Agency.

As Laboratory Director, Mr. Pierri is responsible for all laboratory operations including the supervision of the overall performance of the laboratory, revision of analytical reports and Quality Assurance Program, provision of technical assistance and direction to laboratory personnel and consulting with clients about technical and regulatory issues.

Mr. Pierri is well acquainted in all aspects of environmental regulations at Federal and State level, providing consulting services and guidance to clients in regulatory compliance and chemical treatment issues as well as understanding and interpreting analytical data.

Other relevant experience and projects in which Mr. Pierri has participated are as follows:

- **For over 22 years provided Project Management for large environmental monitoring projects for wastewater treatment plants, desalination plants, groundwater studies, potable water compliance monitoring and unregulated contaminants studies managed by the EPA such as ICR, UCMR 1 and UCMR 2. These projects required dealing with significant technical issues, regulatory compliance and innovative analytical methods.**
- **Characterization of wastes to be classified as hazardous as per State of California and Federal Regulations.**
- **Developing of analytical methods for emerging contaminants in water using GC/MS, LC/MS and other analytical techniques and writing the operating procedures.**
- **Identification and selection of new laboratory equipment for the laboratory**
- **Determination of contamination in soil and groundwater due to leaking underground storage tanks.**
- **Design and implementation of a Quality Assurance Program based on NELAC requirements for the laboratory, writing of the QA manual and training of laboratory personnel.**
- **Developing and implementation of an Ethics Training Program for the Laboratory, writing the documentation and training course for laboratory employees.**
- **Interpretation of analytical data and compliance with regulations for drinking water for different potable water purveyors in Southern California.**
- **Compliance for wastewater discharges with local regulatory agencies and NPDES permits.**
- **Consulting services to industrial clients on pre-treatment of effluents in order to minimize organic matter and solids and reduce costs in taxes imposed by POTWs.**
- **Identification of unknown materials by chemical and physical methods.**
- **Implementation of a LIMS and use of personal computers for data acquisition, handling, and reporting.**
- **Teaching of Analytical Organic Chemistry at University Level for MS program.**

Participation in Seminars and Conferences

Over the years, Mr. Pierri has participated in innumerable conferences and technical meeting involving environmental testing, environmental policy and remediation.

He has been speaker in several conferences and technical meetings related to environmental monitoring in general and emergent contaminants in particular.

ALAN CHING

Title

Director of Quality Assurance/QA Manager

Education

B.S. - Chu Hai College, Hong Kong, 1985
Chemistry
Shangai University of Technology, China
Analytical Chemistry Courses 1978 - 1981

M.S. - California Polytechnic University, Pomona
Analytical Chemistry, 1997

Professional Experience

Oct/1990 to Present	**Weck Laboratories, Inc., City of Industry, CA** **Full Service Environmental Testing laboratory**
Jan/1985 to Jun/1989	**Dinippon Ink and Chemical, Sheng Zheng, China** **Chemical Manufacturing Company**

Mr. Ching' primary experience is in the organic analysis field although he has performed as bench chemist inorganic and metal analyses as well. At Weck Labs, he has hands on experience in GC, GC/MS, HPLC and organic extractions.
Mr. Ching has developed many analytical procedures for volatile organic compounds, pesticides, herbicide and semivolatile organic analysis.
As lab supervisor, Mr. Ching has provided training and technical advice to bench chemists in the organic section.
Mr. Ching has also served in the past as QA Manager being instrumental in developing the QA/QC program, obtaining accreditation under NELAC for the laboratory, writing the QA Manual and monitoring its implementation.
Mr. Ching also provides technical support to clients in the areas of Quality Assurance, analytical chemistry and regulatory compliance.

Other relevant experience and projects in which Mr. Ching has participated are as follows:

- **Project Management for ICR, UCMR 1 and UCMR 2 analysis, including method development, interaction with Utilities and reporting to the EPA.**

- **Analysis of environmental samples for metals, and other elements by atomic absorption and ICP spectrometry using flame, hydride generation, cold vapor and graphite furnace.**

- **Hazardous waste characterization by different analytical techniques.**

- **Maintenance and troubleshooting of GC, GC/MS and HPLC instrumentation.**
- **Separation and detection of four different arsenic compounds using ion exchange chromatography and UV detection. (Master's degree project).**
- **Development of new methods for UCMR testing and other emergent contaminants**
- **Developing a comprehensive QA/QC program for the Laboratory in compliance with NELAC and ISO 17025.**

Participation in Seminars and Conferences

Mr. Ching regularly attends many technical meeting regarding technical and regulatory issues. He has participated in NELAC conferences and other meeting related to Quality Assurance and regulatory compliance issues.

JOE CHAU

Title

Technical Director Inorganic

Education

B.S. - California Polytechnic University, Pomona, CA, 1988
Electrical Engineering

B.S. - California Polytechnic University, Pomona, CA, 1988
Chemistry, Industrial Option

- University of California, Irvine
Certificate in Hazardous Materials Control and Management, 1991

Professional Experience

Sep/1989 to Present	**Weck Laboratories, Inc., City of Industry, CA** **Full Service Environmental Testing laboratory**
Sep/1988 to Sep/1989	**Lights of America, Walnut, CA** **Electrical Engineering**

Mr. Chau has extensive experience in environmental analysis, especially for inorganic and physical parameters.
He has been working as analytical chemist for inorganic and wet chemistry determinations, metal analyses by Flame and Graphite furnace AA, ICP, ICP-MS and Cold vapor AA and AF.
Mr. Chau has been instrumental in developing analytical methods for trace metal analyses in a variety of matrices, including brines and sea water. He has also developed for the laboratory especially methods for physical parameters, metal speciation and non-routine determinations.
As lab supervisor, Mr. Chau has provided guidance, technical advice and training to bench chemists and other lab personnel and has managed lab operations to improve logistics such as sample receiving and project management

Mr. Chau is an expert in spectroscopic analysis and provides advice to clients about technical and QA/QC issues.

Other relevant experience and projects in which Mr. Chau has participated are as follows:

- **Coordination of monitoring projects that requires large number of analysis on short turnaround time for metals.**

- **Supervision of lab personnel for the Inorganic Section**

- **Development of analytical procedures for the determination of environmental samples by ICP-MS in particularly difficult matrices**

- **Develop of methods by atomic fluorescence and amalgamation for ultra trace level analysis of mercury.**
- **Design of a clean room and develop protocols for its operation for analysis of trace metals in ambient waters and ultra trace levels of mercury**
- **Maintenance and troubleshooting of spectroscopy instrumentation.**
- **Design and improvement of sample digestion procedures for metal analysis to reduce contamination and improve recoveries.**
- **Development of analytical methods for speciation analysis of metals, including the use of hyphenated analytical techniques.**

Participation in Seminars and Conferences

During his time at Weck Laboratories, Mr. Chau has participated in many technical and user meetings provided by spectroscopy equipment manufacturers, such as Perkin Elmer, Thermo and Agilent.
He routinely participates in technical conferences about environmental analysis, where technical issues, new techniques and regulatory subjects are discussed; they include NEMC, NELAC and Pittcon, among others.

HAI-VAN NGUYEN

Title

Senior Project Manager – Technical Director Microbiology

Education

B.S. - California Polytechnic University, Pomona, CA, 2000
Biology, Minor in Chemistry

University of California, Irvine, CA, 2008
Environmental management Certificate Program

Professional Experience

Apr/2000 to Present **Weck Laboratories, Inc., City of Industry, CA**
Full Service Environmental Testing laboratory

Ms. Nguyen has extensive experience in the environmental laboratory. She has been a bench chemist for inorganic, bacteriological testing, HPLC, GC and GC/MS, which has given her a well rounded view of the operation of the environmental laboratory in all its aspects. Other important tasks completed include assisting the QA Manager in preparing SOPs and updating the program.
As Technical Director for Microbiology she oversees the department and provides training to analysts.
Ms. Nguyen is also very well versed in compliance regulations for potable water and wastewater programs, as well as interpretation of analytical data.
In her position as Senior Project Manager, she has managed many large environmental projects for potable water, wastewater and groundwater investigations, proving consulting to clients and interacting with regulatory agencies.

Other relevant experience and projects in which Ms. Nguyen has participated are as follows:

- **Managing testing projects for large clients.**
- **Assisting the QA Manger in supervising and designing QA/QC operations.**
- **Writing and upgrading of SOPs.**
- **Evaluation and reviewing analytical data for inorganic analysis, HPLC, GC, GC/MS and wet chemistry methods.**
- **Reviewing analytical data for microbiological determinations and providing technical support to analysts.**

Participation in Seminars and Conferences

Ms. Nguyen regularly participates in technical seminars and meeting regarding regulatory compliance issues.

RICCI TIPON

Title

Group Leader – Technical Director GC/MS volatiles

Education

B.S. - University of the Philippines at Los Banos, 1986
Microbiology

Professional Experience

Aug/1996 to Present	**Weck Laboratories, Inc., City of Industry, CA** **Full Service Environmental Testing laboratory**
Apr/1996 to Aug/1996	**RCH Laboratories, Dominguez, CA** **Wastewater testing Laboratory**
Jul/1992 to Apr/1996	**LVD Phils, Inc., Philippines** **Pharmaceutical Manufacturing Company**

**Ms. Tipon has extensive experience in the analysis of volatile organic compounds by GC/MS using purge and trap as the front end. She provides troubleshooting and maintenance of instruments, training of analysts and develops and improves analytical methods used for volatile organic constituents in potable water, wastewater, groundwater and soil.
Ms. Tipon has also experience in the analysis of semivolatile organics by GC and GC/MS and helps in performing secondary data review of analytical batches for these techniques.
As a microbiologist, Ms. Tipon provides consulting to lab personnel in the Microbiology department.**

Other relevant experience and projects in which Ms. Tipon has participated are as follows:

- **Microbiological determinations in environmental samples**
- **Review data packages generated by GC/MS for volatile and semivolatile organics**
- **Development of analytical methods for trace level contaminants in water by Purge and Trap and GC/MS**
- **GC/MS troubleshooting and maintenance**
- **Analysis of water, wastewater, soil and hazardous waste samples by GC/MS for volatile organics**
- **Analysis of air samples by GC/MS.**

MARILYN ROMERO

Title

Customer Service Manager - Project Coordinator

Education

Mt. San Antonio College, Walnut, CA. AA, Liberal Arts, 1991

Certification

Grade II Water Treatment Operator CA DHS

Professional Experience

Mar/1985 to Present	**Weck Laboratories, Inc., City of Industry, CA** **Full Service Environmental Testing laboratory**

Ms. Romero has extensive experience in customer service providing assistance to large and medium size environmental testing projects with logistic support and report preparation. She has also successfully provided Project Management to a large number of potable water and wastewater testing projects.
Ms. Romero is also very knowledgeable about environmental regulations, especially in the field of potable water testing.

Other relevant experience and projects in which Ms. Romero has participated are as follows:

- **Sample log-in including verification of proper containers, storage conditions, holding times and documentation. Sample custodian**
- **Preparation of analytical reports using LIMS and other computer programs.**
- **Customer support for environmental analysis.**
- **Archival and retrieval of analytical results and related documentation.**
- **Project Management**

TRAM DUONG

Title

Group Leader – Inorganic Section

Education

B.S. - University of Southern California, 1998
Nursing Minor Biology

Professional Experience

Jul/2000 to Present **Weck Laboratories, Inc., City of Industry, CA**
Full Service Environmental Testing laboratory

Ms. Duong is responsible for the supervision of the section performing metal analyses (ICP, ICP-MS, and CVAA) and wet chemistry determinations. She performs training of personnel, troubleshooting and maintenance of equipment and data review.
As a bench chemist, Ms. Duong became very familiar with the operation of all instrumentation within her section and has been instrumental in selecting and setting up new lab equipment.
Ms. Duong duties also involve scheduling daily tasks and performing data reviews. She also assists the Technical Director with tasks related to the section and interacts with the QA Manager.

Other relevant experience and projects in which Ms. Duong has participated are as follows:

- **Developing analytical methods by ICP and ICP-MS for environmental samples.**
- **Improving analytical methods by optimizing conditions for different analytical methods.**
- **Writing Standard Operating Procedures for newly developed methods and recertifying current SOPs.**
- **ICP and ICP-MS troubleshooting and maintenance**

Participation in Seminars and Conferences

Mr. Duong regularly attends user meetings and technical seminars for subjects related with his field.

EDUARDO MORALES

Title

Group Leader – GC/MS semivolatiles

Education

B.S. - California State University, Los Angeles, 2001
Biochemistry

Professional Experience

Jul/1999 to Present **Weck Laboratories, Inc., City of Industry, CA**
Full Service Environmental Testing laboratory

Mr. Morales is responsible for the operation and maintenance of GC, GC/MS and extraction equipment used for semivolatile organic analysis. Over the years he has developed many methods for emergent contaminant testing using non-routine GC/MS techniques such as MS/MS, CI and PTV.
Mr. Morales also provides training for new analysts in the field of GC and GC/MS and has been involved in the decisions for purchasing new instruments for the section. He also provides secondary reviews on data packages produced in his section.

Other relevant experience and projects in which Mr. Morales has participated are as follows:

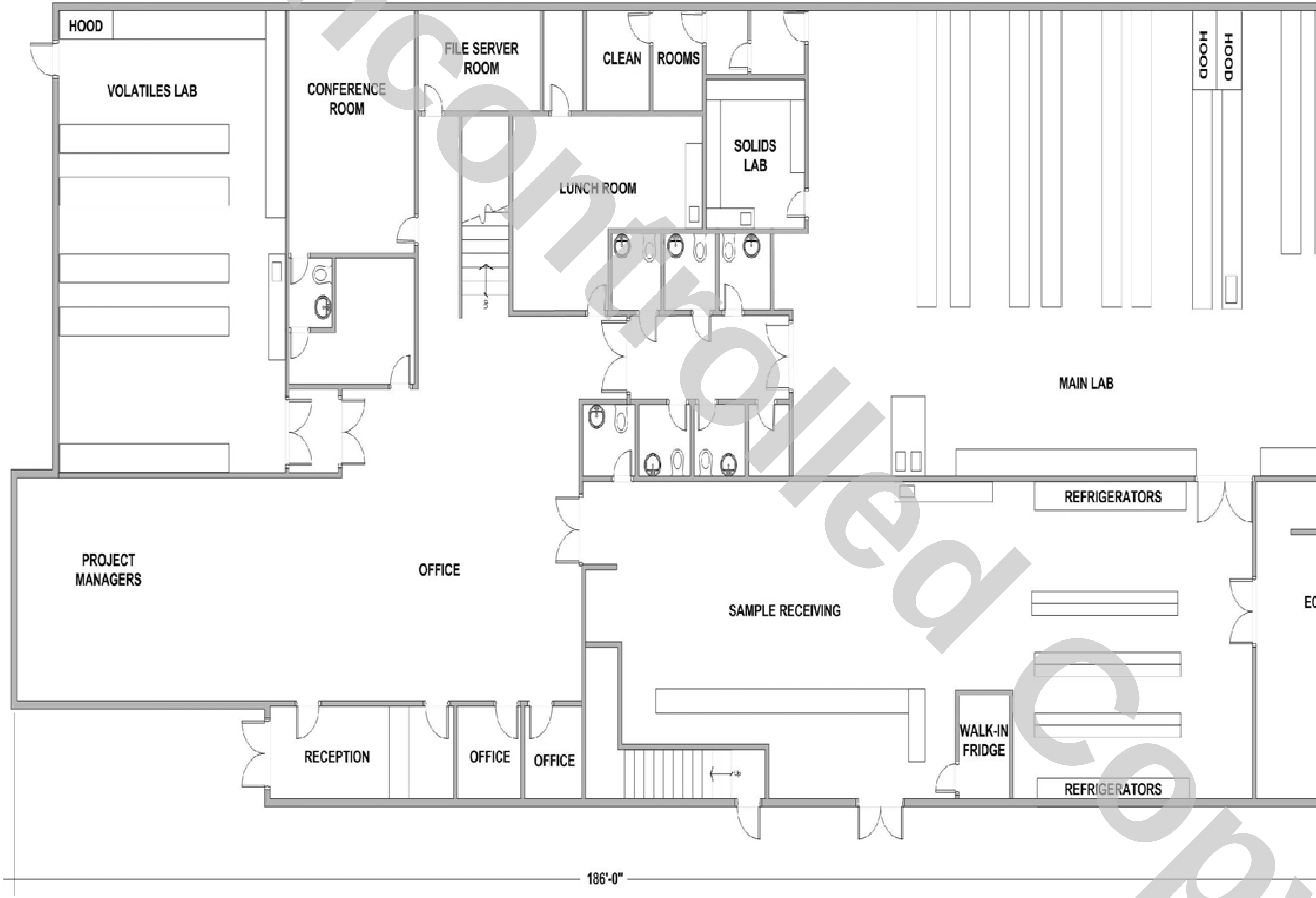
- **Developing of methods for ultra trace level analysis of NDMA and other nitrosamines by Liquid-Liquid and Solid Phase extractions coupled with GC/MS in various forms.**
- **Improving GC/MS analytical methods by optimizing conditions.**
- **Writing Standard Operating Procedures for newly developed methods.**
- **GC/MS troubleshooting and maintenance**
- **Developing of methods for emergent contaminants and low level pesticides.**

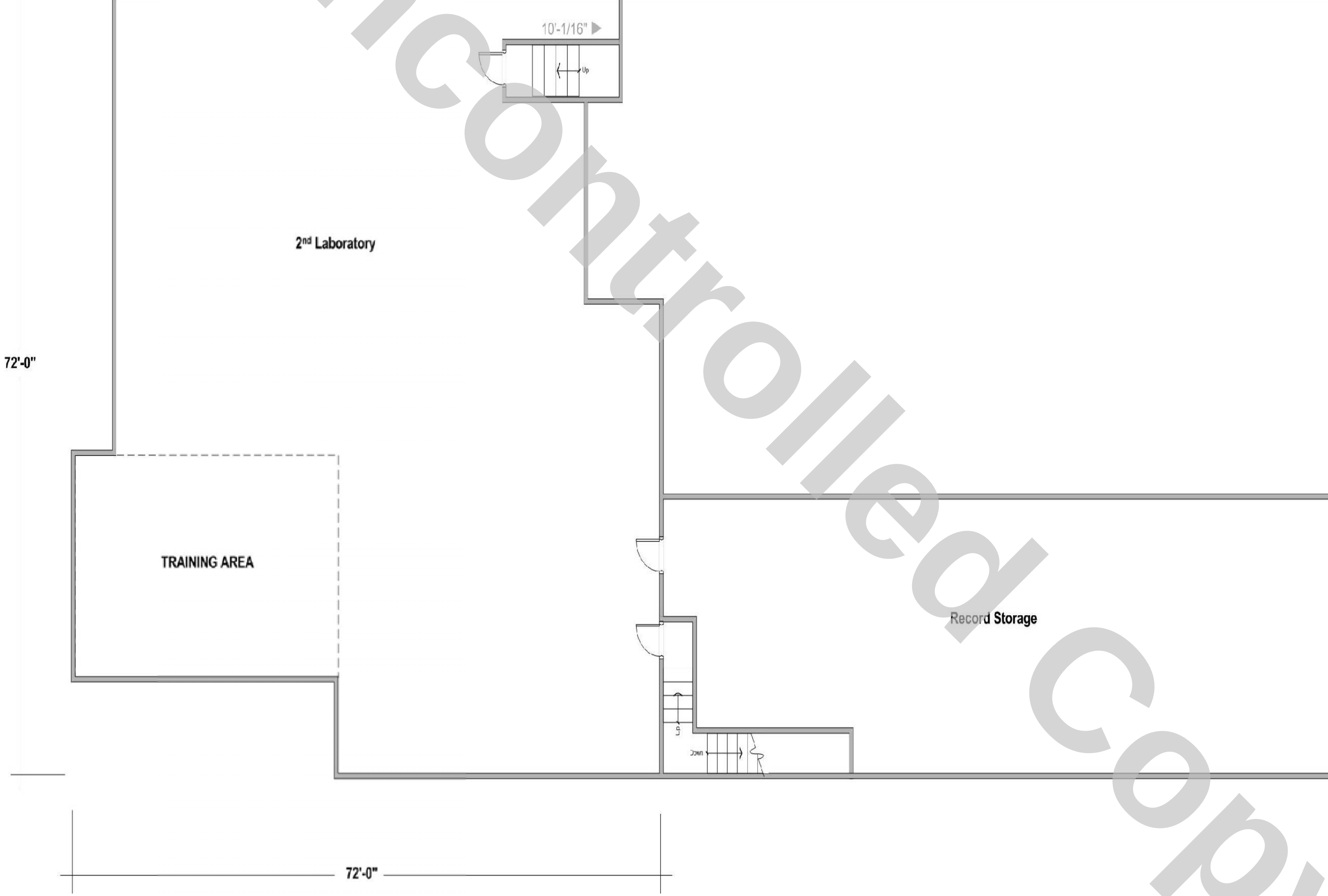
Participation in Seminars and Conferences

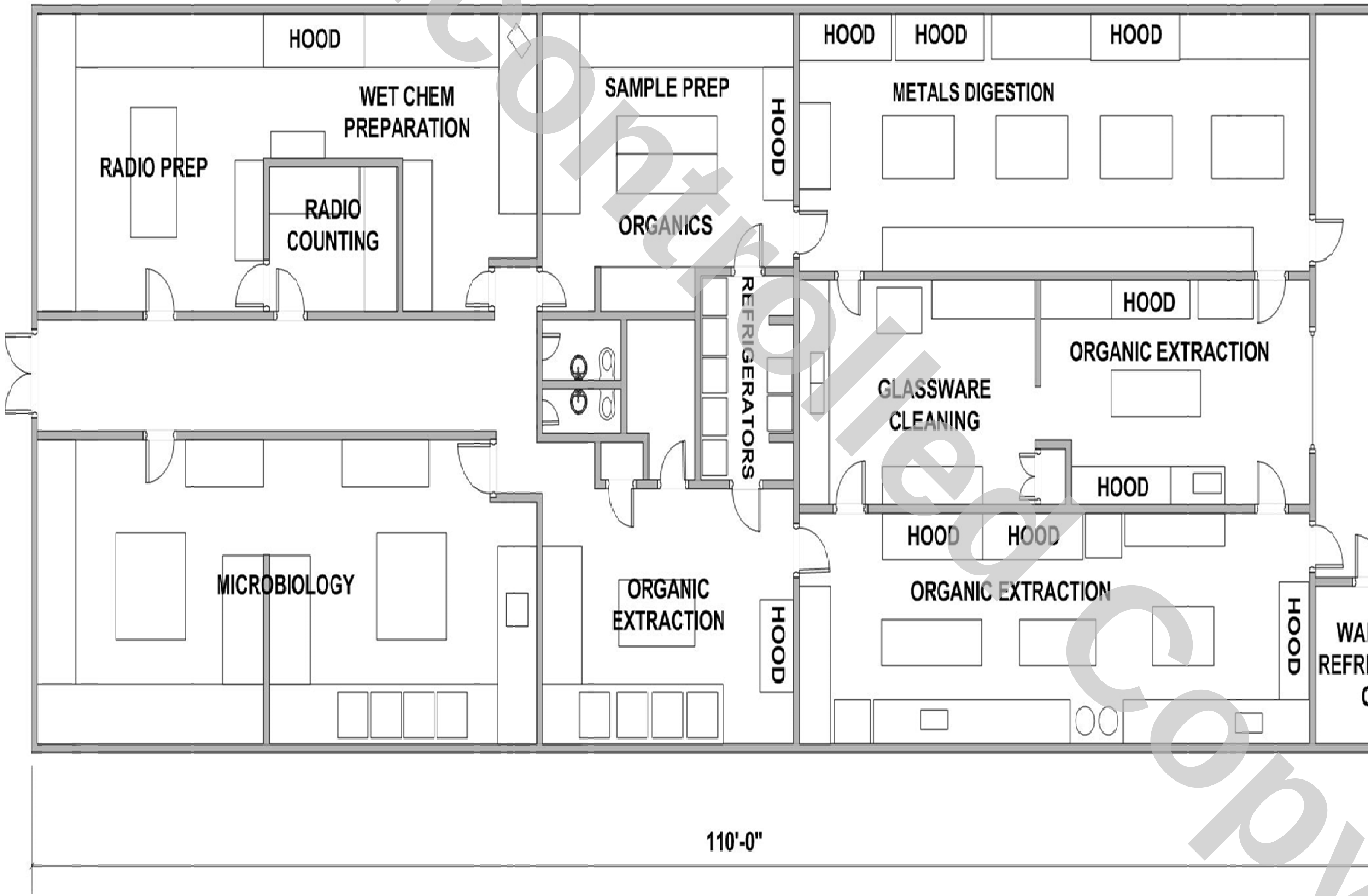
Mr. Morales regularly attends user meetings and technical seminars for subjects related with his field.

Appendix C

Laboratory Floor Plan


HOOD
VOLATILES LAB
CONFERENCE ROOM
FILE SERVER ROOM
CLEAN
ROOMS
SOLIDS LAB
LUNCH ROOM
HOOD
HOOD
MAIN LAB
REFRIGERATORS
PROJECT MANAGERS
OFFICE
SAMPLE RECEIVING
WALK-IN FRIDGE
REFRIGERATORS
RECEPTION
OFFICE
OFFICE
186'-0"


10'-1/16"
Up
2nd Laboratory
72'-0"
TRAINING AREA
Record Storage
Down
72'-0"


HOOD
WET CHEM
PREPARATION
RADIO PREP
RADIO
COUNTING
SAMPLE PREP
HOOD
ORGANICS
HOOD
HOOD
HOOD
METALS DIGESTION
REFRIGERATORS
HOOD
ORGANIC EXTRACTION
GLASSWARE
CLEANING
HOOD
HOOD
HOOD
ORGANIC EXTRACTION
MICROBIOLOGY
ORGANIC
EXTRACTION
HOOD
HOOD
WA
REFR
110'-0"

Appendix D

QC Acceptance Limits

The Acceptance Limits for QC determinations are in some cases mandatory limits and in other cases the limits are updated periodically from past results. This process is performed though the LIMS. For current acceptance limits please refer to the LIMS.

Appendix E

List of Standard Operating Procedures (SOPs)

Administration - Miscellaneous and Administrative SOPs

File Name	Rev No	Rev Date	Method	Title
MIS001	19	Dec-12	General	Sample Receiving, Log in, Storage and Disposal
MIS002	5	Mar-09	Sampling	Industrial Wastewater Sampling Instructions
MIS003	4	Dec-10	General	Back Up and Restoration Systems
MIS004	5	Apr-08	General	Chemicals, Standards and consumable materials, Receipt, Storage and Preparation of Solutions
MIS005	4	Dec-10	General	Procedures for Start Up and Shut Down the File Servers
MIS007	3	Mar-10	General	Sample Container Management and Shipping
MIS008	4	Aug-11	General	Waste Management and Laboratory Disposal Practices
MIS009	4	Jul-11	General	Receiving and Handling Foreign Soil Samples
MIS010	2	Mar-08	Sampling	Sampling Instructions for Protected Groundwater Supplies and Water Supplies with Treatment
MIS011	4	Mar-08	General	Preparation, Approval, Distribution, & Revision of standard Operating Procedures
MIS012	2	Mar-08	General	Significant Figures and Rounding
MIS013	2	Mar-08	General	Generation and Utilization of Control Charts
MIS014	6	Mar-12	General	Performing Internal Audits
MIS015	6	Sep-11	General	Handling and Analysis of Proficiency Testing (PT) Samples
MIS016	5	Mar-12	General	Corrective Action Procedures
MIS017	3	Apr-08	General	Maintenance, Utilization and Review of Laboratory Logbooks
MIS018	5	Jun-09	General	Internal Laboratory Data Verification and Review
MIS019	3	Apr-08	General	Resolution of Customer Complaints
MIS020	3	Apr-08	General	Calibration and Verification of Analytical Balances
MIS021	3	Apr-08	General	Calibration and Maintenance of Mechanical Pipettes
MIS022	3	Dec-10	General	LIMS Security Systems
MIS024	2	Apr-08	General	DI Water Quality Checks
MIS025	5	Jul-12	General	Control of Data and Manual Data Entry
MIS026	3	May-09	General	Taking Representative Samples and Sub-samples in the Laboratory.
MIS028	4	Mar-09	General	Standard Cleaning Protocols for Containers and Labware
MIS029	3	Apr-08	General	Calibration and Verification of Thermometers
MIS030	5	Jun-11	General	Performing Managerial Reviews
MIS031	7	Sep-11	General	Calibration and Verification of Lab Support Equipment
MIS032	3	Mar-09	General	Calculation of Method Detection Limits (MDL) and Reporting Limits (RL)
MIS033	2	Apr-08	General	Rejection/acceptance Criteria for Special Analyses
MIS034	5	Sep-11	General	Performing Initial Demonstration of Capability (IDC)
MIS035	5	Jun-11	General	New Employee Training
MIS036	3	Apr-09	General	Use of Areas of Incompatible Activities
MIS037	4	Jul-11	General	Computers and Electronic Data Requirements
MIS038	2	Apr-08	General	Chain of Custody Procedures for Legal and Evidentiary Custody of Samples
MIS039	2	Apr-08	General	Proper Raw Data Handling and Manual Integration Procedures
MIS040	3	Jun-08	General	Archival System for Instrument Raw Data

MIS041	3	Jun-11	General	Procedures for Subcontracting Client Samples
MIS042	5	Jun-11	General	Outside Support Services and Supplies
MIS043	4	Oct-11	General	Implementation of the Business Ethics and Data Integrity Policy
MIS044	4	Jul-11	General	Control of Nonconforming Environmental Testing
MIS045	4	Mar-09	General	Control of Records and Documents
MIS046	3	Mar-09	General	Training of Laboratory Personnel
MIS047	4	Mar-12	General	Estimating the Uncertainty of Measurements
MIS048	4	Apr-09	General	Development and Maintenance of Test Method SOPs
MIS049	2	Apr-08	General	Health and Safety Training Procedures
MIS050	1	Oct-08	General	Disaster Procedures
MIS051	2	May-12	General	Sample Disposal
MIS052	2	Mar-10	General	Acceptance criteria for analyte confirmation
MIS053	2	Apr-12	General	Project Management, Reports Generation and Electronic Data Transfer
MIS055	1	May-12	General	Preventive Maintenance of Laboratory Analytical Instruments
MIS056	1	Oct-12	General	Compiling Level II, III and IV Data Packages
MIS057	1	Jul-13	General	Operating an company vehicle

Inorganic Department - Microbiology SOPs

File Name	Rev. No	Rev Date	Method	Title
MIC003	8	Feb-09	SM9223	Analysis of Total Coliform and E. Coli in Water by P/A Colilert™ and Enumeration by the Quanti-Tray® method, SM9223
MIC004	6	Feb-09	SM9215B/SimPlate	Analysis of Heterotrophic Plate Count by Pour Plate and SimPlate Methods, SM 9215B
MIC005	8	Jan-10	SM9221	Analysis of Total and Fecal Coliform in Water by Multiple Tube Fermentation Technique, SM9221
MIC006	5	May-09	QAQC	Quality Assurance for Microbiological Tests
MIC007	2	Jul-09	QAQC	Using New Methods or Test Kits for Microbiological Determinations
MIC008	3	Jul-09	QAQC	Verification of Support Equipment Used for Microbiological Determinations
MIC009	2	Apr-09	Enterolert	Bacteriological Analysis of Ambient Water Samples for Enterococci by Enterolert Presence/Absence and Quanti-Tray® Method
MIC010	1	Apr-09	Disposal	Disposal of Material Used for Microbiological Determinations
MIC011	1	Feb-10	SM9230B	Analysis of Fecal Streptococcus and Enterococcus in Water and Solid Samples by Multiple Tube Fermentation Technique, SM9230B
MIC012	1	Mar-11	SM9222BD	Analysis of Total and Fecal Coliform in Water by Membrane Filtration Technique, SM9222B and D
MIC013	1	Mar-11	1600	Analysis of *E. coli* in Water by Membrane Filtration Technique, EPA 1600
MIC014	1	Mar-11	1600	Analysis of Enterococci in Water by Membrane Filtration Technique, EPA 1600
MIC015	2	Feb-12	BAM	Detection of Salmonella by FDA-Bacteriological Analytical Manual (BAM) Method 8th Edition
MIC016	2	Dec-11	API 20E	Speciation of Bacteria belonging to the Family Enterobacteriaceae, using API 20 E Identification system from BioMerieux, INC
MIC017	1	Dec-11	AOAC997.02	Enumeration of Yeast and Mold in Food Samples by 3M Petrifilm Plating Method, AOAC 997.02
MIC018	1	Dec-11	BAM Ch 3	Aerobic Plate Count by FDA Bacteriological Analytical Manual (BAM) Ch.3

MIC019	1	Jan-12	SM9217B	Determination of Assimilable Organic Carbon (AOC) by SM 9217B Mod.
MIC020	1	Feb-12	BAM Ch1	Sampling and Preparation of Sample Homogenate for Microbiological Determinations
MIC021	1	Feb-12	AOAC992.30	Confirmation of Total Coliform and E. Coli in Food Matrices by AOAC Official Method 992.30

Inorganic Department - Metals SOPs

File Name	Rev No	Rev Date	Method	Title
MET001	7	Jan-13	1311	Toxicity Characteristic Leaching Procedure (TCLP)
MET005	7	Jan-13	3010A	Acid Digestion of Aqueous Samples and Extracts for Total Metals by ICP and ICP-MS, EPA Method 3010A Modified
MET007	5	Sep-08	3050B	Acid Digestion of Sediments, Sludges and Soils, EPA Method 3050B
MET009	3	Sep-08	3050B Mod	Acid Digestion of Sediments, Sludges, Soils and Wipes, EPA Method 3050 Modified.
MET010	7	Sep-08	7471	Analysis of Mercury in Solid Matrices by Cold Vapor Atomic Absorption, EPA 7471A/B
MET011	5	Sep-08	245.1	Analysis of Hg in water by manual cold vapor technique EPA method 245.1
MET015	2	Jul-12	1420	Determination of Lead in Suspended Particulate Matter Collected from Ambient Air (Title 40 CFR Part 50, Appendix G)
MET017	8	Dec-09	6010	Analysis of Trace Metal in Water and Solid Matrices by ICP-AES, EPA Method 6010
MET018	10	Jul-10	200.8	Analysis of Trace Metals in Water by ICP-MS, EPA Method 200.8
MET019	8	Aug-12	6020	Analysis of Trace Metal in Water and Solid Matrices by ICP-MS, EPA Method 6020A
MET020	5	Sep-08	200.2	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, EPA Method 200.2
MET021	3	Sep-08	WET	Waste Extraction Test Procedure, Title 22 Part 66261.126 Appendix ll
MET023	3	May-12	As-ICPMS	Analysis of Arsenic by Hydride Generation-ICPMS, EPA Method 200.8 Modified
MET024	3	May-12	Se-ICPMS	Analysis of Selenium by Hydride Generation-ICPMS, EPA Method 200.8 Modified
MET025	5	Dec-08	200.7	Analysis of Trace Metals in Water by ICP-AES, EPA Method 200.7
MET031	3	Sep-08	7470	Analysis of Mercury in Aqueous Samples and Liquid Waste by Cold Vapor Atomic Absorption, EPA 7470A
MET034	2	Jun-12	1631	Analysis of Low Level Mercury by CVAFS with Gold Amalgamation, EPA Method 1631E
MET035	1	May-07	245.7	Analysis of Low Level Mercury by CVAFS, EPA Method 245.7
MET036	1	Jan-10	1640	Determination of Trace Elements in Saline Waters by Direct Injection and Preconcentration and ICP-MS - EPA Method 1640
MET037	1	Jun-08	3500FeB	Determination of Ferrous Iron by the Phenantrloline Colorimetric Method, SM3500-Fe B
MET038	1	Oct-08	1638	Analysis of Trace Elements in Ambient Waters by ICP-MS - EPA Method 1638
MET039	1	May-09	SM2330B	Determination of Corrosivity (Langlier Index) in Water, SM 2330B

MET040	1	Aug-10	1312	Synthetic Precipitation Leaching Procedure (SPLP), EPA Method 1312
MET041	1	Jul-11	3051A	Microwave Assisted Acid Digestion of Sediments, Sludge, Soils, and Oils, EPA Method 3051A
MET042	2	Feb-12	CPSC	Analysis of Lead and Heavy Metals in Consumer Products by Microwave Assisted Digestion and ICP-OES – CPSC Methods E1001-08.1, E1002-08.1 and E1003-09
MET043	1	Dec-11	200.8UCMR	Analysis of Trace Metal in Water and Aqueous Matrices by ICP/MS under UCMR 3 Program , EPA Method 200.8
MET044	1	May-12	LC-ICPMS	Determination of Arsenic and Selenium Species by HPLC/ICP-MS
MET045	1	Jul-12	CARB12	Determination of Inorganic Lead Emissions from Stationary Sources. Method 12
MET046	1	Jul-12	CARB436	Determination of Multiple Metals Emissions from Stationary Sources, CARB Method 436
MET047	1	Jan-13	3005A	Acid digestion of waters for total recoverable and dissolved metals for ICP (EPA 6010) and ICP/MS (EPA 6020)

Radio Chemistry Department - RadChem SOPs

File Name	Rev. No	Rev Date	Method	Title
RAD001	2	Nov-07	900.0	Determination of Gross Alpha and Gross Beta Radioactivity in Drinking Water, EPA Method 900.0
RAD002	1	Jul-05	SM7110C	Determination of Gross Alpha Radioactivity in Water by Coprecipitation, SM 7110C
RAD003	2	Apr-08	903.0	Determination of Alpha-emitting Radium Isotopes in Water, EPA Method 903.0
RAD004	1	Oct-05	All	Quality Control for Radiochemical Analysis
RAD005	1	Apr-06	All	The Procedure for Monitoring Radiation Measurement Instrumentation for Radioactive Contamination
RAD006	1	Apr-06	All	The Procedure for Handling, Storing and Establishing Expiration Dates for Reference Standards
RAD007	1	Jul-06	RA-05	Radiochemical Determination of Radium-228 in Water Samples, EPA Method Ra-05
RAD008	2	May-08	904	Radiochemical Determination of Radium-228 in Water Samples, EPA Method 904.0
RAD009	2	Feb-11	200.8	Spectrometric Determination of Uranium in Water Samples for Radiological Compliance, EPA Method 200.8
RAD010	1	Aug-08	SM7500Rn	Radiochemical Determination of Radon-222 in water samples, SM7500-Rn

Inorganic Department - Wet Chemistry SOPs

File Name	Rev No	Rev Date	Method	Title
WET001	11	Dec-09	300	Analysis of Anions by Ion Chromatography, EPA 300.0
WET004	10	Aug-12	SM5210B	Biological Oxygen Demand (BOD) Test, SM 5210B

WET008	3	May-12	SM5540D	Non-ionic Surfactants as CTAS (Cobalt Thiocyanate Active Substances) SM 5540D
WET009	8	Oct-08	SM2120B	Analysis of Color in Water, SM 2120B
WET010	2	Oct-08	SM4500CNM	Analysis of Thiocyanate in Wastewater by SM 4500-CN M
WET013	3	Oct-08	140.1	Analysis of Odor in Drinking Water, EPA Method 140.1/SM 2150
WET018	4	Oct-08	SM4500CN G	Analysis of Cyanide Amenable to Chlorination in Water - Manual Colorimetric, SM 4500CN-G
WET021	7	Oct-08	1010	Ignitability by Pensky Marten Closed Cup Method, EPA Method 1010
WET022	4	Oct-09	SM2320B	Determination of Alkalinity by the Titrimetric Method, SM 2320B
WET024	5	Nov-09	SM2310B	Analysis of Acidity as $CaCO_3$, SM 2310B
WET027	3	Nov-09	3060A	Alkaline Digestion for Analysis of Hexavalent Chromium in Solid Matrices, EPA Method 3060
WET028	5	Jan-08	SM4500 H B	pH (Electrometric), SM 4500-H+ B
WET029	4	Dec-08	SM3500 Cr D	Analysis of Hexavalent Chromium in Water - Manual Colorimetric, SM 3500-Cr D
WET032	5	Sep-12	SM4500 S2 D	Analysis of Dissolved Sulfide - Methylene Blue Method, SM 4500-S= D)
WET033	4	Dec-08	9030/9034	Analysis of Acid-Soluble and Acid-Insoluble Sulfides, EPA Method 9030B
WET038	4	Jun-10	SM4500Cl G	Analysis of Total Residual Chlorine by Colorimetry with DPD, SM 4500Cl G
WET039	7	Jan-08	SM2510B	Determination of Specific Conductance, SM 2510B
WET041	8	May-11	SM2540C	Filterable Residue (TDS) by Gravimetric analysis, SM 2540C
WET042	7	Dec-08	SM2540D	Determination of Non-filterable Residue (TSS) by Gravimetry, SM 2540D
WET043	5	Dec-09	SM5540C	Determination of Methylene Blue Active Substances (MBAS) by Spectrophotometry, SM 5540C
WET044	2	Dec-08	253B	Analysis of Thiosulfate and Sulfite by Iodometric Titration, LACSD Procedure 253B
WET046	3	Dec-08	SM2540B	Determination of Total Residue (TS) by Gravimetry, SM 2540B
WET047	4	Jun-08	160.4	Determination of Volatile Residue (VS) by Gravimetry, EPA Method 160.4
WET048	4	Dec-08	SM2540F	Determination of Settleable Residue (SS) by Volumetric Imhoff Cone, SM 2540F
WET050	6	May-10	410.4	Determination of Chemical Oxygen Demand in Water by Colorimetry, EPA Method 410.4
WET055	7	Nov-09	1664	Determination of Oil & Grease (HEM and SGT-HEM) by Solid Phase Extraction and Gravimetry, EPA Method 1664A
WET056	5	May-09	180.1	Determination of Turbidity by Nephelometric Method, EPA Method 180.1
WET059	3	May-12	USPerox	Analysis of Hydrogen Peroxide in Water by the US Peroxide Method
WET062	3	Dec-08	9065M	Analysis of Total Recoverable Phenolics in Solid Matrices, EPA Method 420.1 Modified
WET064	3	Mar-10	9045C	Determination of pH in Soil and Solid Matrices, EPA Method 9045C
WET065	3	May-09	9040B	Determination of pH in Liquid Waste and Multiphase Waste, EPA Method 9040B
WET069	2	May-09	SM2340B/ EPA 200.7	Determination of Hardness by Calculation, SM 2340B/EPA 200.7/Langlier Index
WET070	3	May-12	SM4500ClO2 D	Analysis of Chlorine Dioxide by Colorimetric Method with DPD, SM 4500-ClO2 D
WET072	3	Nov-09	SM4500 O G	Determination of Dissolved Oxygen by Membrane Electrode Method, SM 4500-O G
WET073	3	Mar-10	SM4500SO3 B	Analysis of Sulfite by Iodometric Method, SM4500SO_3^{2-} B

WET074	3	Jun-12	9010/9014	Distillation and Analysis of Total and Amenable Cyanide in Waste and Solid Matrices ,EPA Method 9010B/9014
WET075	2	Nov-09	CCR ch10	Determination of Ignitability in Waste, CCR Chapter 10, Article 3
WET077	2	Mar-10	CCR ch10	Determination of Corrosivity in Waste, CCR Chapter 10, Article 3
WET078	3	May-11	SM5910B	Determination of UV Absorbing Constituents (UV-254), SM 5910B
WET079	2	Dec-09	7196	Analysis of Hexavalent Chromium by Manual Spectrophotometric, EPA Method 7196A
WET080	4	Apr-10	365.3	Analysis of Total Phosphorus and Ortho Phosphate in Water by Manual Colorimetric Method, EPA Method 365.3
WET082	1	May-00	E 203-75	Water by Karl Fischer ASTM E-203-75
WET084	3	Apr-13	353.2	Analysis of Nitrate and Nitrite by Automated Colorimetry and Segmented Flow Analysis, EPA Method 353.2
WET086	2	May-10	350.1	Analysis of Ammonia in Water by Automated Colorimetry, EPA Method 350.1
WET087	2	May-09	365.1	Analysis of Total Phosphorus in Water by Acid Persulfate Digestion and Automated Colorimetry, EPA Method 365.1
WET088	2	May-09	365.1	Analysis of Orthophosphate in Water by Automated Colorimetry, EPA Method 365.1
WET089	3	Jun-12	351.2	Analysis of Total Kjeldahl Nitrogen (TKN) in Water by Heating Block Digestion and Automated Colorimetry, EPA Method 351.2
WET091	2	May-12	335.4	Analysis of Total Cyanide in Water by Midi-Distillation and Automated Colorimetry, EPA Method 335.4
WET093	2	May-12	SM10200H	Analysis of Chlorophyll-a and Pheophytin-a, SM 10200-H
WET094	2	Oct-10	SM5710B	Determination of Trihalomethane Formation Potential (THMFP), SM 5710B
WET095	2	Jan-09	415.3	Determination of TOC and SUVA in Drinking Water, EPA Method 415.3
WET096	2	Jan-09	D6646-03	Analysis of the Accelerated Hydrogen Sulfide Breakthrough Capacity of Granular and Pelletized Activated Carbon, ASTM D6646-03
WET097	2	Jan-09	D2862	Standard Test Method for Particle Size distribution of Granular Activated Carbon, ASTM D2862-82
WET098	2	Jan-09	D2867	Standard Test Method for Moisture in Activated Carbon, ASTM D2867-83
WET099	2	Jan-09	D2866	Standard Test Method for Total Ash in Activated Carbon, ASTM D2866-83
WET100	2	Jan-09	D3802	Standard Test Method for Ball-Pan Hardness of Activated Carbon, ASTM D3802-79
WET101	2	Jan-09	D5029	Standard Test Methods for Water Solubles in Activated Carbon, ASTM D5029-98
WET102	2	Jan-09	D5832	Standard Test Methods for Volatile Matter Content of Activated Carbon, ASTM D5832-98
WET103	2	Jan-09	USFilter	Standard Test Methods for Contact pH Test Method
WET104	2	Jan-09	D93	Standard Method for Test for Flash Point by Pensky-Martens Closed Cup Tester, ASTM D93-73
WET105	1	Sep-07	420.4	Determination of Total Recoverable Phenolics in Water by Semi-Automated Colorimetry, EPA Method 420.4
WET106	2	Dec-10	160.4	Total, Fixed, and Volatile solids in solid and semisolid samples
WET107	1	Apr-10	SM 5220C	COD Titrimetric method
WET108	1	May-11	160.3M	Total Residue (TS) and Moisture Content by Gravimetric Method, Dried at 103-105ºC
WET109	1	Jun-11	SM10300C	Analysis of Dry and Ash-Free Weight (DAFW) by SM1030C (Section 5)

WET110	1	Jan-13	9056A	Analysis of Anions in Soil and Solid Matrices by Water Extraction and Ion Chromatography, EPA 9056A
WET111	1	Sep-12	9071M	Lipids in tissue, EPA 9071M
WET112	2	Jan-13	ASTMD7511	Total Cyanide by Segmented Flow Injection Analysis, In-Line Ultraviolet Digestion and Amperometric Detection
WET113	1	Dec-12	OIA1677	Available Cyanide by Ligand Exchange and Flow Injection Analysis
WET114	1	Mar-13	350.1/351.2	Analysis of Ammonia and TKN by Gas Diffussion Segmented Flow Analysis (SFA) and Colorimetric Detection, EPA Methods 350.1 and 351.2

Organic Department - Organics SOPs

File Name	Rev. No	Rev Date	Method	Title
ORG003	9	Aug-12	SM5310C	Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC) by UV-Persulfate oxidation, SM 5310C
ORG004	10	Aug-13	SM5320B	Determination of Total Organic Halides (TOX) in Water by Adsorption-Pyrolysis-Titrimetric Method, SM 5320B
ORG005	7	Mar-08	8315A	Analysis of Ketones and Aldehydes by HPLC, EPA Method 8315
ORG006	7	Apr-08	8318	Analysis of N-Methylcarbamates by HPLC, EPA Method 8318
ORG007	1	Sep-92	9076	Analysis of Total Halogens and Total Extractable Organic Halides in Solid matrices, EPA Method 9076
ORG008	6	Oct-12	551.1	Analysis of Chlorination Disinfection Byproducts (DBPs) in Drinking water by Liquid-Liquid Extraction and GC/ECD, EPA Method 551.1
ORG009	12	Feb-11	8260B	Determination of Volatile Organic Compounds in Groundwater and Soil by GC/MS, EPA 8260B
ORG011	5	Jun-09	8330A	Analysis of Explosive Residues by HPLC
ORG013	6	Oct-10	8015B-GRO	Analysis of Volatile Petroleum Hydrocarbons (VPH, C6 to C10) in Soil and Water samples by P&T and GC/FID, EPA Method 8015
ORG014	4	Sep-01	8021A	Determination of Aromatic and Halogenated Volatiles by GC/PID and GC/ELCD, EPA Method 8021A
ORG015	7	Jan-10	8141A	Analysis of Organophosphorus Pesticides in Water and Solid Matrices by GC/NPD, EPA Method 8141A
ORG016	8	Jan-10	8081A	Analysis of Organochlorine Pesticides in Water and Solid Matrices by GC/ECD, EPA Method 8081A
ORG017	6	Sep-08	549.2	Analysis of Diquat and Paraquat by Solid Phase Extraction and HPLC-UV, EPA Method 549.2
ORG020	6	Apr-08	547	Analysis of Glyphosate by HPLC-Fluorescence, EPA Method 547
ORG022	5	Jun-10	508	Analysis of Organochlorine Pesticides and PCBs in Drinking Water by LL Extraction and GC-ECD, EPA Method 508
ORG023	6	Oct-10	8015B-DRO	Analysis of Diesel Range Organics in soil and water samples by GC-FID, EPA Method 8015
ORG025	3	Sep-12	EPA 24	Determination of Volatile Organic Content (VOC) in Paints and Related Coatings, EPA Method 24
ORG026	10	Apr-12	524.2	Determination of Volatile Organic Compounds in Water by GC/MS, EPA Method 524.2
ORG028	6	Mar-11	531.1	Analysis of N-Methylcarbamates in Water by Direct Aqueous Injection HPLC with Post Column Derivatization, EPA Method 531.1
ORG029	6	Oct-08	8151A	Analysis of Chlorinated Acid Herbicides in Water and Solid Matrices by GC-ECD, EPA Method 8151

ORG030	6	Jan-10	504.1	Analysis of EDB, DBCP and 123TCP in Water by Microextraction and GC/ECD, EPA 504.1
ORG032	1	Mar-94	N1003	Analysis of Halogenated Hydrocarbons in Charcoal Tubes, NIOSH Method 1003
ORG033	5	Apr-08	632	Analysis of Diuron by HPLC-UV, EPA Method 632
ORG034	1	Jun-94	OSHA57	Analysis of 4,4-Methylenedianiline (MDA) in Air Filters, OSHA Method 57
ORG036	11	Jan-10	8270C	Analysis of Semi-Volatile Organic Compounds in Water and Solid Matrices by GC/MS, EPA Method 8270C
ORG037	5	Mar-01	548.1	Analysis of Endothall in Drinking Water by Solid Phase Extraction and GC/MS, EPA Method 548.1
ORG039	8	Apr-04	525.2	Analysis of Semi-volatile Organic Compounds in Drinking Water by Solid Phase Extraction and GC/MS, EPA Method 525.2
ORG040	5	Feb-01	625	Analysis of Semivolatile Organics in Wastewater by LL Extraction and GC/MS, EPA Method 625
ORG041	3	Apr-00	601/602	Analysis of Purgeable Halocarbons and Aromatics in Waste Water by GC-ELCD and GC-PID, EPA Method 601/602
ORG042	11	Jun-10	314	Analysis of Perchlorate in Water and Solid Matrices by Ion Chromatography, EPA Method 314.0
ORG043	5	May-10	8270M	Determination of 1,4 Dioxane in Water and Soil by L-L Extraction and Isotopic Dilution GC/MS, EPA Method 8270M
ORG045	5	Mar-10	3600	Cleanup Procedures for Organic Analyses, EPA Method 3600
ORG046	3	Feb-02	3500	Sample Preparation and Extraction for Hazardous Waste Samples, EPA Method 3500B
ORG047	3	Feb-02	3510	Separatory Funnel Liquid-Liquid Extraction, EPA Method 3510B
ORG048	3	Feb-02	3550	Ultrasonic Extraction, EPA Method 3550B
ORG049	2	Feb-02	3580	Waste Dilution Procedure, EPA Method 3580A
ORG050	3	Mar-02	5030	Purge-and-Trap Extraction Procedure, EPA 5030B
ORG056	2	Feb-02	3520	Continuous Liquid-Liquid Extraction Procedure, EPA Method 3520C
ORG058	5	Mar-02	8082	Analysis of Polychlorinated Biphenyl's (PCBs) in Liquid and Solid Matrices by GC-ECD, EPA Method 8082
ORG059	2	May-12	1666	Determination of Volatile Organic Compounds Specific to the Pharmaceutical Industry by Isotope Dilution GC/MS, EPA Method 1666
ORG060	4	Apr-12	624	Analysis of Volatile Organic Compounds in Wastewater by GC/MS, EPA Method 624
ORG062	7	May-10	9020B	Determination of Total Organic Halides in Water by Adsorption-Pyrolysis-Titrimetric Method, EPA Method 9020B
ORG063	3	Jul-02	9020M	Determination of Total Halogens and Total Extractable Organic Halides in Solid and Oil Matrices, EPA Method 9020B Modified
ORG064	3	Mar-02	608	Analysis of Organochlorine Pesticides and PCBs in Wastewater by GC-ECD, EPA Method 608.
ORG065	13	Oct-09	1625M	Determination of Ultra Low Levels of N-Nitrosodimethylamine (NDMA) by Continuous L-L Extraction and Isotopic Dilution GC/MS. EPA Method 1625C Mod
ORG066	3	Apr-12	8270SIM	Determination of Low Levels of PAHs in Water and Solid Matrices by GC/MS in SIM Mode, EPA Method 8270C-SIM
ORG067	4	May-12	5035	Determination of Volatile Organic Compounds in Soil by Closed-System Purge and Trap and GC/MS, EPA 5035/8260
ORG069	6	May-08	7199	Analysis of Hexavalent Chromium by Ion Chromatography, EPA Method 7199

ORG071	3	Apr-08	8015B - Alc	Analysis of Alcohols by GC-FID, EPA Method 8015B
ORG072	2	Mar-02	515.3	Analysis of Chlorinated Acid Herbicides in Water by Microextraction and GC-ECD, EPA Method 515.3
ORG073	3	Sep-01	505	Analysis of Chlorinated Pesticides and PCBs in Drinking Water by Microextraction and GC-ECD, EPA Method 505
ORG074	3	Mar-10		Identification of Target Analytes via Retention Time
ORG075	2	Mar-01	552.2	Analysis of Haloacetic Acids by Microextraction and GC-ECD, EPA 552.2
ORG076	2	031/2002	maint	Instrument Maintenance for Organic Analysis
ORG077	4	May-08	218.6	Analysis of Hexavalent Chromium in Water by Ion Chromatography, EPA 218.6
ORG078	2	May-12	524.2M	Analysis of tert-butyl alcohol (TBA) in drinking water by EPA 524.2M
ORG079	2	Jun-11	LUFT GC/MS	Analysis of Volatile Gasoline Range Petroleum Hydrocarbons (C_6 to C_{10}) and BTEX-MTBE in soil and water samples by Purge and Trap and GC/MS, LUFT Method
ORG080	1	Jan-02	528	Analysis of Phenols in Drinking Water by SPE and GC/MS, EPA Method 528
ORG081	1	Jan-02	526	Analysis of Selected SVOA in Drinking Water by SPE and GC/MS, EPA Method 526
ORG083	2	Jan-10	TCP-PT	Analysis of Low Levels of 1,2,3-Trichloropropane by Purge and Trap and GC/MS SIM mode, SRL Method
ORG085	2	Aug-07	556	Analysis of Aldehydes by Microextraction and GC-ECD, EPA Method 556
ORG086	1	Jul-02	3535	Solid Phase Extraction Procedures - Manual and Automated, EPA Method 3535
ORG087	3	Jul-11	300.1	Analysis of Low Levels of Oxyhalides by Ion chromatography, EPA Method 300.1
ORG088	2	May-08	532	Analysis of Diuron and Linuron in Water by SPE and HPLC-UV, EPA Method 532
ORG090	2	Aug-12	8270SIM	Determination of Low Levels of Phenols compounds in Water and Solid Matrices by GC/MS in SIM Mode, EPA Method 8270C-SIM
ORG091	3	Jun-08	326	Analysis of Low Level Chlorite, Chlorate and Bromate by Ion Chromatography and Post-column derivatization, EPA Method 326
ORG092	2	Jan-08	OSHA 20M	Analysis of Hydrazine by HPLC, OSHA Method 20M (Modified)
ORG094	2	May-09	8316	Analysis of Acrylamide by HPLC, EPA Method 8316
ORG095	1	Sep-05	1614M	Analysis of PBDEs by isotopic dilution GC/MS-EI, EPA Method 1614 Modified
ORG096	1	Nov-06	orgtin	Determination of Low Levels Organotins by GC-MS.
ORG097	2	Apr-10	332	Analysis of Low Level Perchlorate by IC-MS/MS, EPA Method 332.0
ORG099	3	Apr-10	331	Analysis of Low Level Perchlorate by LC-MS/MS, EPA Method 331.0
ORG100	2	Mar-08	535	Analysis of Chloroacetanilide/acetamide Herbicides by LC/MS, EPA Method 535
ORG101	1	Mar-06	521	Analysis of Nitrosamines by SPE-GC/MS/MS EPA Method 521
ORG102	2	Mar-08	527	Analysis of Pesticides and Flame Retardants by SPE-GC/MS EPA Method 527
ORG103	2	Nov-08	529	Analysis of Explosives by SPE-GC/MS EPA Method 529
ORG104	1	May-06	9056	Analysis of Iodide by Ion Chromatography, EPA Method 9056
ORG107	1	Oct-06	6850	Analysis of Perchlorate at Low Levels in water and soil matrices by LC-MS/MS, EPA Method 6850
ORG108	1	Jan-07	556M	Analysis of Aldehydes in Solid/Soil by GC-ECD, EPA Method 556 Modified
ORG109	1	Sep-07	1671	Analysis of Triethanolamine by Direct Injection and GC-FID

ORG110	1	Dec-07	D7065	Analysis of Alkyl Phenols and Alkyl Phenol Ethoxylates by L-L extraction and GC/MS full scan and SIM, ASTM Method D7065
ORG111	2	Mar-09	1694M	Analysis of Pharmaceuticals, Personal Care Products and Endocrine Disruptive Compounds LC-MS/MS.
ORG113	1	May-08	632M	Determination of Diuron in solid matrices
ORG114	1	Jun-08	IC/MS/MS	Analysis of 4-Chlorobenzenesulfonic acid (pCBSA) by IC/MS/MS
ORG115	1	Aug-09	525.2	Determination of organophosphorous pesticides in drinking water by liquid-solid extraction and capillary column GC/MS, via EPA Method 525.2
ORG116	1	Aug-08	8316M	Analysis of Acrylamide by LC/MS/MS
ORG117	1	Dec-11	GCMS CI	Analysis of Pyrethroid Pesticides in Water and Soil/Sediment by Extraction and GC/MS in NCI mode and SIM
ORG118	2	Apr-11	537	Analysis of Perfluorinated Compounds in Water by LC-MS/MS
ORG119	1	Aug-09	607M	Analysis of NDMA and DMN and Bromacil by EPA Method 607 modified
ORG120	1	May-09	SM6040D	Analysis of MIB and Geosmin by on line SPME and GC/MS/MS, SM6040D
ORG121	1	Dec-10	LC/MS-MS	Analysis of Bicine by LC/MS-MS
ORG122	1	May-11	8270M-QQQ	Analysis of Low Level Pesticides by Tandem GC/MS/MS
ORG123	1	Nov-10	8270M-QQQ	Screening for PCB congeners by Tandem GC/MS/MS
ORG124	1	Jul-11	522	Determination of 1,4-Dioxane in Drinking Water by SPE and GC/MS SIM
ORG125	1	Jul-11	524.3	Determination of Volatile Organics in Water by Purge & Trap and GC/MS
ORG126	1	Sep-11	539	Determination of Hormones in water by SPE and LC/MS/MS
ORG127	2	Apr-12	1613M	Analysis of 2,3,7,8-TCDD in Drinking Water by Tandem GC/MS/MS, EPA Method 1613 Modified
ORG128	1	May-09	Algal Toxins	Analysis of Algal Toxins in Water by LC/MS/MS
ORG129	1	May-09	Melamine	Analysis of Melamine in Water by LC/MS
ORG130	1	Dec-11	218.7	Analysis of Hexavalent Chromium in Drinking Water by IC with Post-Column Derivatization and UV Detection
ORG131	1	Aug-12	SM5310B	Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC) by Combustion, SM 5310B
ORG132	2	Nov-12	9060M	Total Organic Carbon (TOC) and Inorganic Carbon (IC) in Soil and Solid Matrices by Dry Combustion and NIR detection, EPA Method 9060 modified
ORG133	1	Nov-12	USP<643>	Total Organic Carbon (TOC) for Equipment Cleaning Validation by Direct Swab Combustion, USP <467>
ORG134	1	Dec-12	LCMS	Analysis of nicotine by LC/MS/MS
ORG135	1	Jan-13	RSK175	Analysis Hydrocarbons and COS in water by Headspace and GC-FID/TCD by Method RSK-175
ORG136	1	Mar-13	8270M-QQQ	Determination of Low Levels of PAHs in Water by SPE and tamdem GC/MS/MS, EPA Method 8270 Modified-QQQ
ORG137	1	Aug-13	524.4	Determination of Volatile Organics in Water by Purge & Trap using nitrogen as purge gas and GC/MS

Updated 09/30/13

Appendix F

Laboratory Accreditation / Certification / Recognition

Weck Laboratories, Inc. maintains the following certifications and accreditations with numerous state and national entities:

Organization	Certificate Number
NELAP (CA Accrediting Body)	**04229CA**
State of California ELAP	**1132**
USEPA – UCMR 2 Accreditation	**CA00211**
State of Nevada	**CA211-2004-41**
State of Hawaii	**N/A**
State of New Jersey	**CA015**
Guam Environmental Protection Agency	**09-007r**
Los Angeles County Sanitation Districts	**10143**
South Coast Air Quality Management District	**93LA107**

The certificates and parameter lists (which may differ) for each organization may be found in the company web page at http://www.wecklabs.com/Resources/Certifications.aspx

If accreditation is terminated or suspended, the laboratory will immediately cease to use the certificate number reference in any way and inform clients impacted by the change.

Appendix G

Data Qualifiers

Qualifier	Description
B	Blank contamination. The analyte was found in the associated blank as well as in the sample.
B-01	This analyte was found in the method blank, which was possibly contaminated in the lab during preparation. The reporting limit was raised due to the contamination.
B-04	Analyte was found in the travel blank, which was possibly contaminated in the lab during preparation. The batch was accepted since this analyte was not detected for all the samples in the batch.
B-06	This analyte was found in the method blank, which was possibly contaminated during sample preparation. The batch was accepted since this analyte was either not detected or more than 10 times of the blank value for all the samples in the batch.
B-07	This analyte was found in the method blank at levels above the MDL but below the reporting limit.
B-08	Analyte is found in the method blank, which was possibly contaminated during sample preparation.
B-field	No field blank was either received or specified in this batch. Therefore, samples were analyzed without field blank.
BOD-01	The sample dilutions set-up for the BOD analysis did not meet the oxygen depletion criterion of at least 2 mg/l, therefore the reported result is an estimated value only.
BOD-02	The sample dilutions set up for the BOD analysis did not meet the criterion of a residual dissolved oxygen of at least 1 mg/l, therefore the reported result is an estimated value only.
BOD-03	The sample dilutions set-up for the BOD analysis did not meet the final DO reading with a value of equal or greater than 1 mg/l, therefore the reported result is an estimated value only.
BR	Analyte was found in the method blank, which was possibly contaminated in the lab during preparation. The reporting limit was raised to account for the contamination.
BS-01	The recovery of this analyte in the BS/LCS was over the control limit due to a possible contamination. The batch was accepted based on another acceptable BS and/or MS and MSD that meet the BS criteria.
BS-03	The recovery of this analyte in the BS/LCS was outside the control limits. The sample result was accepted based on another acceptable BS/LCS and/or MS and MSD that meet BS criteria.

BS-04	The recovery of this analyte in LCS or LCSD was outside control limit. Sample was accepted based on the remaining LCS, LCSD or LCS-LL.
BS-H	The recovery of this analyte in the BS/LCS was over the control limit. Sample result is suspect.
BS-L	The recovery of this analyte in the BS/LCS was below the control limit. Sample result is suspect.
CN-1	See case narrative for an explanation of results.
CN-2	See Case Narrative
COD_Cl	COD result is analyzed with chloride correction.
DI_WET	On Deionized Water W.E.T extract (STLC).
DryWt	The result is in dry weight basis.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate (CLP E-flag).
E-01	The concentration indicated for this analyte is an estimated value above the calibration range.
FILT	The sample was filtered prior to analysis.
FP	Formation Potential
GB-Ad	Adjusted Gross Beta equal to total Gross Beta activity minus Potassium-40 activity
HC-02	Hydrocarbon pattern present in the requested fuel quantitation range but does not resemble the pattern of the requested fuel.
I-03	Low internal standard recovery possibly due to matrix interference or leak in system. The result is suspect.
I-05	Low internal standard recovery possibly due to matrix interference. The result is suspect.
J	Detected but below the Reporting Limit; therefore, result is an estimated concentration.
J-01	No J value detected.
K-40	Potassium-40 calculated based on the concentration of total potassium in mg/L multiplied by the factor 0.82 to convert to activity in pCi/L.
M	Sample result is matrix suspect.
M-01	Result is not valid due to high sample background
M-02	Due to the nature of matrix interferences, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
M-03	Due to insufficient sample volume, sample was diluted prior to preparation. The MDL and MRL were raised due to the dilution.
M-04	Due to the nature of matrix interferences, sample extract was diluted prior to analysis. The MDL and MRL were raised due to the dilution.
M-05	Due to the nature of matrix interferences, sample was diluted prior to analysis. The MDL and MRL were raised due to the dilution.

M-06	Due to the high concentration of analyte inherent in the sample, sample was diluted prior to preparation. The MDL and MRL were raised due to this dilution.
M-07	Due to high concentration of solid particles in the sample, a smaller volume was used for analysis. The MDL and RL were raised due to this dilution.
MIC-2	Result is suspect due to QC failure.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
MS-03	Multiple analyses indicate the percent recovery is out of acceptance limits due to a possible matrix effect.
MS-04	Visual evaluation of the sample indicates the RPD or QC spike is above the control limit due to a non-homogeneous sample matrix.
MS-05	The spike recovery and/or RPD were outside acceptance limits for the MS and/or MSD due to possible matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
MS-06	Due to noted non-homogeneity of the QC sample matrix, the MS/MSD did not provide reliable results for accuracy and precision. Sample results for the QC batch were accepted based on LCS/LCSD percent recoveries and RPD values.
MS-07	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
MS-08	Due to the nature of matrix interferences, sample was diluted prior to analysis. The MS/MSD could not be quantitated due to the dilution. The batch was accepted based on acceptable LCS recovery.
MS-09	The recoveries of MS/MSD are not valid due to high sample background
MS-10	Due to insufficient sample, LCS/LCSD were analyzed in place of MS/MSD.
MS-11	The QC limits for MS/MSD are not applicable due to positive sample background.
MS-4X	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
MS-BG	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to sample background. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
O-02	This result was analyzed outside of the EPA recommended holding time.
O-04	This analysis was performed outside the EPA recommended holding time.

O-05	The extraction for this analyte was performed outside of the EPA recommended holding time.
O-07	Sample date and/or time not provided by client. Therefore, default date and/or time has been entered. The analysis may be outside of recommended holding time.
O-08	The original extraction and/or analysis of this sample yielded QC recoveries outside acceptance criteria. It was re-extracted/re-analyzed after the recommended maximum hold time.
O-09	This sample was received with the EPA recommended holding time expired.
O-10	The original analysis of this sample yielded QC recoveries outside acceptance criteria. It was re-analyzed after the recommended maximum hold time.
O-11	The sample was originally analyzed within holding time. However, it required a dilution and the re-analysis was performed after the recommended holding time had expired.
O-12	The sample was originally analyzed within holding time. However, it was reanalyzed without dilution that exceeded the recommended holding time.
O-14	This analysis was requested by the client after the holding time was exceeded.
O-15	The sample was received with the recommended holding time nearly expired. It was analyzed as soon as possible but the maximum holding time was slightly exceeded.
O-21	This sample was analyzed 1 hour past the EPA recommended holding time.
O-22	This sample was analyzed 2 hours past the EPA recommended holding time.
O-25	This sample was received unpreserved and with the recommended holding time for preservation of 48 hours expired.
P-01	Low recovery due to preservative. Sample data accepted based on passing LCS result.
P-2	Sample received without proper preservation and was preserved at the lab upon receiving.
P-3	The sample was preserved with ascorbic acid, but the pH was >2 possibly due to no, or insufficient preservation with HCl. The sample was not analyzed within 24 hours, as required by method for sample with pH>2.
P-5	Due to the nature of the sample matrix a 1:10 dilution was necessary to perform a corrosivity measurement.
Q	One or more quality control criteria failed.
Q-01	The recovery of this analyte in QC sample was outside control limits. Sample was justified as ND based on the low level standard at or below the reporting limit.
Q-02	Low recovery of this analyte in the QC sample. The analysis of the low level standard produced acceptable recovery indicating that the sample result might be accurately reported as Not Detected.

Q-08	High bias in the QC sample does not affect sample result since analyte was not detected or below the reporting limit.
Q-09	This analyte bias high in QC sample. A fresh spiking solution is going to be prepared.
Q-10	This analyte has high bias in QC sample, the result is suspect.
Q-11	This analyte is low in QC sample, the result is suspect.
Q-12	The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on the percent recoveries and/or other acceptable QC data.
Q-H-1	High bias, data was accepted since sample was not detected.
Q-L-03	This analyte is low in QC sample. Sample data is accepted based on acceptable CCVs.
Q-R-01	Analyses are not controlled on RPD values from sample concentrations less than the reporting limit. QC batch accepted based on LCS and/or LCSD QC results.
QR-03	The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.
QR-04	The RPD value for the MS/MSD was outside of QC acceptance limits however both recoveries were acceptable. The QC batch was accepted based on acceptable results for the recoveries and RPD for the LCS and LCSD.
QR-BS	The RPD value for the BS/BSD (LCS/LCSD) was outside of QC acceptance limits however both recoveries were acceptable. The QC batch was accepted based on acceptable results for the recoveries of the BS (LCS) and BSD (LCSD).
R-01	The Reporting Limit for this analyte has been raised to account for matrix interference.
R-02	Elevated Reporting Limits due to limited sample volume.
R-03	The RPD is not applicable for result below the reporting limit (either ND or J value).
R-04	Due to foaming, the sample was diluted prior to analysis. The reporting limits were raised due to the dilution.
R-05	The sample was diluted due to the presence of high levels of non-target analytes resulting in elevated reporting limits.
R-06	Sample was diluted prior to extraction due to high sample concentration, reporting limit was raised due to the dilution.
R-MS	Results reported using MS/MS as the primary detector.
RAD-1	Gross Alpha: DLR (Detection Limits for Purposes of Reporting) = 3 pCi/L, and MCL (Maximum contaminant Level) = 15 pCi/L.
RAD-2	Gross Beta: DLR (Detection Limits for Purposes of Reporting) = 4 pCi/L, and MCL (Maximum contaminant Level) = 50 pCi/L.

RAD-3	The elevated counting error and MDA was caused by smaller sample aliquot used for analysis due to matrix effect (high TDS).
S-01	The surrogate recovery could not be calculated due to sample dilution required from high analyte concentration and/or matrix interferences.
S-02	The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample extract.
S-03	High surrogate recovery for this sample is possibly due to a sample matrix effect. The data was accepted since all target analytes were not detected.
S-04	The surrogate recovery for this sample is outside of established control limits due to possible sample matrix effect.
S-05	Surrogate recovery was below acceptance limit possibly due to matrix effect. Sample data was justified as acceptable since all target analytes were still not-detected or below the reporting limits when adjusted accordingly to surrogate recovery.
S-06	The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
S-07	Surrogate recovery out of acceptance limits for this sample is possibly due to sample matrix effect, confirmed by re-extracting and/or re-analyzing the sample.
S-08	No surrogate recovery, possibly surrogate spiking was missed.
S-09	Wrong amount spiked, quantification is not accurate
S-10	Surrogate recovery outside method QC limits due to extraction related problems
S-11	Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate.
S-AC	Acid surrogate recovery outside of control limits due to a possible matrix effect. The data was accepted based on valid recovery of remaining two acid surrogates.
S-BLK	Surrogate recovery outside of control limits for Method Blank. The data was accepted since all target analytes were not detected
S-BN	Base/Neutral surrogate recovery outside of control limits due to a possible matrix effect. The data was accepted based on valid recovery of remaining two base/neutral surrogates.
S-BS	Surrogate recovery outside of control limits for LCS. The data was accepted based on valid recovery of the target analytes.
S-DUP	Duplicate analysis confirmed surrogate failure due to matrix effects.
S-GC	Surrogate recovery outside of control limits due to a possible matrix effect. The data was accepted based on valid recovery of the remaining surrogate.
S-HI	High surrogate recovery was confirmed as a matrix effect by a second analysis.

S-LOW	Low surrogate recovery confirmed as a matrix effect by a second analysis.
S-MS	Surrogate recovery outside of control limits for MS/MSD. The data was accepted based on valid recovery of the target analytes.
S-MS1	Surrogate recovery outside of acceptance window confirmed as matrix effect by analysis of MS/MSD on this sample.
S_ABC	Analysis subcontracted to Aquatic Bioassay & Consulting Laboratories, Inc., non NELAP certified, but is ELAP certified (ELAP Certificate 1907)
S_AIR	Analysis subcontracted to Air Technology Laboratories, Inc., NELAP Certificate # E87847
S_Associat	Analysis subcontracted to Associated Laboratories, NELAP Certificate 04232CA.
S_BIO	Analysis subcontracted to Biovir Laboratories, NELAC Certificate #05234CA, ELAP Certificate #1795.
S_CAL	Analysis subcontracted to Caltest Analytical Laboratory, NELAP Certificate 01103CA, ELAP Certificate 1664
S_CEL	Analysis subcontracted to Calscience Environmental Laboratories, NELAP Certificate 03220CA, and ELAP Certificate 1230.
S_COL	Analysis subcontracted to Columbia Analytical Services, NELAP Accredited.
S_CRG	Analysis subcontracted to CRG Marine Laboratories Inc. Non-NELAP certified, ELAP Certificate 2261.
S_EMS	Analysis subcontracted to EMS Laboratories, non NELAP certified, but is ELAP certified (ELAP Certificate 1119)
S_EMSL	Analysis subcontracted to EMSL Analytical, Inc., non NELAP certified, but is ELAP certified (ELAP Certificate 1620).
S_FAL	Analysis subcontracted to Frontier Analytical Laboratory, NELAP Certificate 02113CA
S_FGL	Analysis subcontracted to FGL Laboratories, NELAC Certificate 01110CA
S_MAX	Analysis subcontracted to Maxxam Analytics INC., NELAP Certificate 02106A
S_MIC	Analysis subcontracted to Michelson Laboratories, non NELAP certified, but is ELAP certified (ELAP Certificate 1198)
S_NCL	Analysis subcontracted to North Coast Laboratories, ELAP Certificate 1247
S_PAR	Analysis subcontracted to Paradigm Analytical, NELAP Certificate E87634, and ELAP Certificate 2451.
S_PTS	Analysis subcontracted to PTS Laboratories, Inc.
S_RSE	Analysis subcontracted to Radiation Safety Engineering, Inc., Nevada certified.
S_TRU	Analysis subcontracted to Truesdail Laboratories, ELAP Certificate 1237
S_Zymax	Analysis subcontracted to Zymax Forensics.
SeeAtt	See Attachment
Supp	This result has been revised from the original report.

T-AgBaH	The sample was treated with Silver, Barium and H+ cartridges to minimize chloride and sulfates interferences prior to analysis.
T-AgBaHRP	The sample was treated with Silver, Barium, H+, and Organics cartridges to minimize chloride, sulfates, and organic interferences prior to analysis.
T-AgH	The sample was treated with silver and H+ cartridges to minimize chloride interferences prior to analysis.
T-BaH	The sample was treated with Ba and H cartridges to reduce sulfates background interferences.
TIC	Tentatively Identified Compound using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.
U-01	The sample was received without the proper preservation.
U-02	The sample was received at the lab without proper preservation. However, the sample was then preserved at the lab.

Appendix H

Laboratory Equipment

Name	Location	Description (Brand/Model)	Serial Number	Date in Service
AA01	Bldg. 1 - Wet Chem	Lachat model 8500 + FIAS auto analyzer with four simultaneous channels and autosampler	FIA 050300000107 A/S A81010-1197 Pump A82000-1412	Apr-05
AA02	Bldg. 1 - Wet Chem	Automated Titration-ISE instrument Man-Tech Associates, model PC Titrate with autosampler	Titrat MS-0C6-683 Interface MS0C6-415 Buret MS-0C6-691 A/S 190AG026 RiseA MS-0D6-280 RiseB MS-0L3-595	Jun-06
AA03	Bldg. 1 - Wet Chem	Seal Analytical model AQ2+ discrete spectrophotometric analyzer	090655	Oct-07
AC01	Bldg. 2 - Glassware Prep	Market Forge autoclave Sterimatic model STM-EL	097825	Nov-04
AC02	Bldg. 2 - Glassware Prep	Market Forge autoclave Sterimatic model STM	022193	Jan-11
AIRGEN01	Bldg. 1 - GC Section	Zero air generator Matheson Tri-Gas model Chrysalis	14621	Sep-04
BAL01	Bldg. 2 - Wet Chem	Analytical Balance Mettler Toledo Model AG104	1115473812	Jan-03
BAL02	Bldg. 2 - Wet Chem	Top Loader balance Denver Instruments	P2K2112009	Jan-08
BAL03	Bldg. 1 - Solids Lab	Sartorius Top loader balance model BP310S	11406244	Jan-10
BAL04	Bldg. 2 - Organic Sample Prep	To loader balance Mettler Toledo model PR503	1120110503	Jan-03
BAL05	Bldg. 2 - Wet Chem	Top loader Balance Shimadzu model UW420H	D447200490	Jan-08
BAL07	Bldg. 1 - Solids Lab	Sartorius Analytical balance model LA120S	81104431	Jan-03
BAL08	Bldg. 1 - Solids Lab	Sartorius analytical balance model 1712 MP8	3412034	Jan-99
CENT01	Bldg. 2 - Organic Sample Prep	Standalone centrifuge IEC model UV	2998M	Jan-99
CENT02	Bldg. 2 - Organic Sample Prep	Centrifuge Eppendorf Model 5810	00815	Jul-09
CENT03	Bldg. 2 - Radiochemistry	Bench Top centrifuge Fisher model Centrific 225	202U0047	Jan-05
CHILL03	Bldg. 1 - Equipment Room	Water chiller recirculator Nesslab model CTF150	197197115	Oct-05
CHILL04	Bldg. 2 - Organic Sample Prep	Recirculating chiller Thermo Nesslab model Merlin M150	102192053	Jan-06
CHILL05	Bldg. 2 - Inorganic Sample Prep	Recirculating chiller Nesslab model CTF-25	198160029	Jan-08
CN01	Bldg. 2 – Wet Chem	O-I Analytical FS3100 automated cyanide analyzer with autosampler	Dispenser #371828-1 Detector #246831862 UV-Digester #245814911	Jan-13
COMP01	Bldg. 1 - Equipment Room	Air Compressor Ingersoll Rand Model SS3-E	0610180412	Jan-06
COMP02	Bldg. 1 - Equipment Room	Air Compressor Gast	LR22132	Jan-99

Name	Location	Description (Brand/Model)	Serial Number	Date in Service
CONC01	Bldg. 2 - Organic Sample Prep	Automated solvent blow-down apparatus Horizon model Dry-Vap with 6 positions	1040	Mar-06
CONC02	Bldg. 2 - Organic Sample Prep	Turbo Vap solvent blow-down apparatus with 50 positions	TV0840N14820	Oct-08
CONC03	Bldg. 2 - Inorganic Sample Prep	Horizon Technologies Evaporator for Oil and Grease model Speed Vap III	06-0311	Jan-07
CONC04	Bldg. 2 - Organic Sample Prep	Organomation nitrogen blowdown OASYS SPE area	16978	Jan-05
CONC05	Bldg. 2 - Organic Sample Prep	Organomation Nitrogen Evaporator OA-SYS model N-Evap III	52006	Jan-07
CONC06	Bldg. 2 - Organic Sample Prep	Organomation K-D concentrator water bath model OA-SYS ROT-X-TRACT-LC	50553	Jan-01
CONC07	Bldg. 2 - Organic Sample Prep	Organomation Nitrogen Evaporator Model OA-SYS N-Evap III	50839	Jan-99
DIGE01	Bldg. 2 - Inorganic Sample Prep	Block digester for trace metal sample preparation Environmental Express	No S/N	Jan-99
DIGE02	Bldg. 2 - Inorganic Sample Prep	Block digester for trace metals SCP Science model DigiPrep MS	Unit: MSX0206370244 KPX0509241380	Jan-99
DIGE03	Bldg. 2 - Inorganic Sample Prep	Seal Analytical Block digester for TKN/Total P model 3Ds	Digester 4744A12621 Cont 4744A12616	Feb-08
DIST01	Bldg. 1 - Wet Chem	Andrews Glass Midi distillation system for CN	A3Z0002	Jan-99
DIST02	Bldg. 1 - Wet Chem	Andrews Glass Midi distillation system for CN	No S/N	Jan-02
DIST03	Bldg. 1 - Wet Chem	Andrews Glass Midi distillation system for NH4	18M0292	Oct-05
DIST04	Bldg. 1 - Wet Chem	Andrews Glass Midi distillation system for NH4	16T0012	Oct-05
DIST05	Bldg. 2 - Inorganic Sample Prep	Sub boiling Acid Distillation system Milestone model Subpur	0603219	Jan-10
DIST06	Bldg. 2 - Organic Sample Prep	Glas-Col heating Mantle for solvent distillation Model TM114	159279A	Jan-10
ELGEN01	Bldg. 1 - Equipment Room	Electrical generator Honda model Power Boss	1013675619	Jul-06
FP01	Bldg. 2 - Wet Chem	Koehler Flash point tester Pensky-Martens model KJ6200	R07002113	Jan-99
FURN01	Bldg. 1 - Equipment Room	Muffle furnace Barnstead model 48000	1285051004472	Nov-05
GC02	Bldg. 1 - VOC Section	Gas Chromatograph, Hewlett-Packard 5890A with FID/PID in series with Tekmar 2016 autosampler and Tekmar 2000 Purge and Trap and Whatman hydrogen generator	GC 2443A04516 P&T 39150010 A/S 88172010 H2 75340187A	Jul-92
GC03	Bldg. 1 - GC Section	Gas chromatographs Agilent 6890 with autosampler FID and ECD and 7683 autosampler	US00022351 A/S CN43820815	Jul-02
GC04	Bldg. 1 - GC Section	Gas chromatograph Hewlett Packard model 5890A with 7683 autosampler and FID/TCD detectors.	GC 2643A12306 A/S 3120A28203	Jan-99
GC05	Bldg. 1 - GC Section	Agilent Gas chromatograph model 6890 with dual ECD and 7683 autosampler	GC US00020904 A/S US94309801	Jan-99
GC06	Bldg. 1 - GC Section	Gas chromatograph Varian 3800 with 8400 autosampler and dual ECDs and TSD detectors	GC 07952 A/S 00572	Jul-01

Name	Location	Description (Brand/Model)	Serial Number	Date in Service
GC07	Bldg. 1 - GC Section	GG Agilent model 6890N with autosampler and dual ECD detectors and 7683B autosampler	CN10439023 A/S CN43820815	Oct-04
GC08	Bldg. 1 - VOC Section	Gas Chromatograph Hewlett Packard 5890 Series II GC with Tekmar 7050 Headspace autosampler and TCD/FID detectors	GC 3140A38787 A/S 91123001	Jul-12
GC08	Bldg. 1 - GC Section	GG Agilent model 7890B with autosampler and dual ECD detectors and 7693A autosampler	GC US13203004 A/S CN1316027 A/SCN13160010	Jun-13
GCMS02	Bldg. 1 - VOC Section	GC/MS system, Hewlett-Packard 5890 series II/5972 MSD with Archon autosampler and O-I Eclipse 4460 Purge and Trap	GC 3434A01692 MS 3336A57733 P&T D543466417P A/S 13055	Apr-06
GCMS03	Bldg. 1 - VOC Section	GC/MS system, Hewlett-Packard 5890 series II/5972 MSD with Aquatek 70 autosampler and Tekmar 3000 Purge and Trap	GC 3310A48667 MS 3307A00414 P&T 962680098 A/S 00203007	May-95
GCMS04	Bldg. 1 - VOC Section	GC/MS system, Agilent 6890/5973 with Tekmar Solatek autosampler and Tekmar 3100 Purge & Trap	GC US00010707 MS US72810788 P&T US02120004 A/S US02120005	Jun-02
GCMS06	Bldg. 1 - GC Section	GC/MS system, Agilent 6890/5973N Turbo with EI and CI capabilities	GC US0003804 MS US03970025 A/S US73903518	Jan-99
GCMS07	Bldg. 1 - GC Section	GC/MS system ThermoFinnigan Model Trace/DSQ II with AS2000 autosampler and EI, CI and PTV	GC 20025308 MS MS100008 A/S 20022938	Nov-02
GCMS08	Bldg. 1 - VOC Section	GC/MS system, Agilent 6890/5973 with Archon autosampler and Tekmar 3100 Purge and Trap	GC CN10422005 MS US43146861 P&T 00217007 A/S 12012	Oct-04
GCMS09	Bldg. 1 - GC Section	GC/MS (Ion Trap) system, Varian 3800/4000 with EI and CI and LVI	GC 12003 MS 00174 A/S 02982	Apr-05
GCMS10	Bldg. 1 - GC Section	GC/MS (Ion Trap) system, Varian 3800/4000 with EI and CI and LVI and Combi-Pal robotic autosampler	GC 12227 MS 00200 CTC 5888	Oct-08
GCMS11	Bldg. 1 - GC Section	GC/MS system, Agilent 7890/5975 Turbo with EI and PTV injection	GC US10736015 MS US73326961 A/S CN73445154	Oct-07
GCMS12	Bldg. 1 - VOC Section	GC/MS system, Agilent 6890/5973 with Archon autosampler and Tekmar 3000 Purge and Trap	GC US00032416 MS US93123032 P&T 93250014 A/S 13752	Mar-08
GCMS13	Bldg. 1 - GC Section	GC/MS/MS Triple Quadrupole system, Agilent 7000B with EI, CI and backflush and 7693 autosampler	GC CN10111086 MS US10196201 A/S CN10150023 A/S CN10160152	Jun-10
GCMS14	Bldg. 1 - VOC Section	GC/MS system Agilent 6890N/5975 with Tekmar Velocity XPT Purge and Trap and Archon autosampler	GC CN10517104 MS US54421710 P&T US04329005 A/S No S/N	Jul-10
GCMS15	Bldg. 1 - GC Section	GC/MS/MS Triple Quadrupole system, Agilent 7000B with EI, CI and backflush and 7693 autosampler	GC CN11221016 MS US11196602 A/S CN11130088 A/S CN11180126	Dec-12

Name	Location	Description (Brand/Model)	Serial Number	Date in Service
GCMS16	Bldg. 1 - GC Section	GC/MS system Agilent Technologies 7890B/5977 with 7693A autosampler	GC US13233012 MS US1323M207 A/S CN13150088 A/S CN13200108	Jun-13
GPC01	Bldg. 2 - Organic Sample Prep	Automated GPC cleanup system LC Tech Model Ultra with solvent delivery system model LC1122	GPC 52000 Solvent Deli 015408 Chiller: 00278677 UV Det: DS00005558	Dec-09
H2GEN01	Bldg. 1 - GC Section	Hydrogen generator Hogen model 600	GC36D0910000557	Sep-10
H2GEN02	Bldg. 1 - GC Section	Hydrogen generator Matheson Tri-Gas model Chrysalis II 500	TNM040815160	Feb-09
H2GEN03	Bldg. 1 - GC Section	Hydrogen generator Parker Balstom Model 200	LR91932	Aug-13
HG01	Bldg. 1 - Metals Section	Mercury analyzer CETAC model M-6000A with autosampler	Hg 080002MAS A/S 0800053ASX	Jul-03
HG02	Bldg. 1 - Clean Room	Low Level Mercury Analyzer Leeman Labs model Hydra AF Gold +	AFG+6001	Feb-06
HOTP01	Bldg. 2 - Radiochemistry	Barnstead Hot Plate model HPA2245M Type 2200	1065051005617	Jan-11
HOTP02	Bldg. 2 - Radiochemistry	Corning Hot Plate model PC101	No S/N	Jan-99
HOTP03	Bldg. 2 - Radiochemistry	Barnstead Hot Plate model Cimarec	1313060458023	Jan-09
HOTP04	Bldg. 2 - Radiochemistry	Heidolph Hot Plate Model MR Standard	505-20000-01-0	Jan-05
HOTP05	Bldg. 2 - Radiochemistry	Corning Hot Plate Model PC-420D	133510251500	Jan-10
HOTP06	Bldg. 2 - Radiochemistry	Thermoline Hot Plate Model Cimarec 3	1073971148034	Jan-99
HOTP07	Bldg. 2 - Radiochemistry	Cole Palmer Hot Plate Model 51450-72	1714070607065	Jan-05
HOTP08	Bldg. 2 - Radiochemistry	Barnstead Hot Plate Model Cimarec	1313060453867	Jan-09
HOTP09	Bldg. 2 - Radiochemistry	Barnstead Hot Plate Model Cimarec	1313060453870	Jan-09
HOTP10	Bldg. 2 - Radiochemistry	Corning Magnetic Stirrer Model Scholar 171	023104310241	Jan-05
HOTP11	Bldg. 2 - Radiochemistry	Fisher magnetic stirrer model automixer	411N0279	Jan-05
HOTP12	Bldg. 2 - Microbiology	Hot plate stirrer Corning model PC-620D	133810292306	Jan-10
HOTP13	Bldg. 2 - Microbiology	Hot plate stirrer Corning model PC-620D	013806332160	Jan-10
HOTP14	Bldg. 2 - Inorganic Sample Prep	Hot Plate PMC	No S/N	Jan-99
HOTP15	Bldg. 2 - Microbiology	Fisher Scientific magnetic stirrer model 120S	1685051006025	Jan-10

Name	Location	Description (Brand/Model)	Serial Number	Date in Service
ICP01	Bldg. 1 - Metals Section	ICP Spectrometer Perkin Elmer model Optima 5300DV with ESI FAST autosampler and Polyscience recirculating chiller	ICP 077C8032502 A/S FST04-080108 CHILL 108600599	Apr-08
ICPMS01	Bldg. 1 - Clean Room	ICP-MS Spectrometer Perkin Elmer model ELAN DRC-II with ESI SC Fast autosampler option with Preconcentration column On-line and Nesslab Merlin M33 recirculating chiller	MS Q1370301 A/S FST04-070908 Chiller 105145007	Feb-03
ICPMS02	Bldg. 1 - Metals Section	ICP-MS Spectrometer Agilent 7500ce with Cetac autosampler model ASX 520 and Polyscience recirculator chiller	MS JP51201842 A/S 040705A520 Chiller 107800695	Jan-07
ICPMS03	Clean Room	ICP-MS Spectrometer Perkin Elmer model Nexion 300S with ESI SeaFast3 system preconcentration-hydride and SC-4DX autosampler and Nesslab chiller		Mar-12
INC03	Bldg. 2 - Microbiology	Fisher Scientific Incubator model 650D	101N0006	Aug-01
INC04	Bldg. 2 - Microbiology	VWR Incubator model 1545	0101703	May-04
INC05	Bldg. 2 - Microbiology	VWR Incubator model 1535	08-00800	Aug-04
INC06	Bldg. 2 - Microbiology	Incubator VWR Double door Model 1555	1000402	May-05
INC07	Bldg. 2 - Microbiology	Precision low temp incubator for BOD model 815	600111548	Dec-01
INC11	Bldg. 2 - Microbiology	Lab line Incubator model 120	0402-0845	Jan-11
INC12	Bldg. 2 - Microbiology	VWR Incubator model 1915	06016006	Apr-11
ISCO01	Field	Composite water sampling equipment Teledyne ISCO model 2910	197J01248	Jan-99
ISCO02	Field	Composite water sampling equipment Teledyne ISCO model 2910	No S/N	Jan-99
ISCO03	Field	Composite water sampling equipment Teledyne ISCO model 3700	195K01248	Jan-99
ISCO04	Field	Composite water sampling equipment Teledyne ISCO model 6700	195H01872	Jan-99
ISCO05	Field	Composite water sampling equipment Teledyne ISCO model GLS	209A00127	Jan-05
ISCO06	Field	Composite water sampling equipment Teledyne ISCO model GLS	209A00128	Jan-99
ISCO07	Field	Composite water sampling equipment Teledyne ISCO model GLS	209B01683	Jan-99
ISCO08	Field	Composite water sampling equipment Teledyne ISCO model GLS	207L00574	Jan-99
ISCO09	Field	Composite water sampling equipment Teledyne ISCO model GLS	205B01683	Jan-99
ISCO10	Field	Flow meter ISCO model 4250	197J00181	Jan-99

Name	Location	Description (Brand/Model)	Serial Number	Date in Service
LC01	Bldg. 1 - LC Section	Liquid Chromatograph system Dionex DX500 with GP40 gradient pump, Pickering PCX5200 post-column reaction systems, Pickering column heater model CHX650 and Shimadzu fluorescence detector RF551	Pump 96100057 A/S 072/01162 P/C 0399205 Det 10028S	Dec-00
LC02	Bldg. 1 - LC Section	Liquid Chromatograph system Dionex DX500 with GP-40 gradient pump, AD-20 UV-VIS detector, Autosampler AS3500 and column heater Timberline 101	Pump 98070264 A/S 106/06479 Det 97080547 HTR 0110309C3	Feb-02
LC03	Bldg. 1 - LC Section	Ion Chromatograph Dionex with GP-40 gradient pump, post-column derivatization and Shimadzu SP10AVi UV-Vis detector and AS40 autosampler. (formerly IC02)	Pump 95040456 A/S 00030208 Det C20873300048	Jan-99
LC04	Bldg. 1 - LC Section	Ion chromatograph Dionex DX-120 with isocratic pump and AS40 conductivity detector (formerly IC04)	IC 99110573 AS 05030579	Dec-99
LC05	Bldg. 1 - LC Section	Ion Chromatograph system Dionex DX-600 with gradient pump, PC10 post column derivatization, ED-50 electrochemical detector, AS3500 autosampler, PDA100 Photodiode array detector and auxiliary pump. (formerly IC05)	Pump 00110546 PDA 00080053 ED50 00110094 A/S 118/09555 Aux Pump 893745	Jan-05
LC06	Bldg. 1 - LC Section	Ion Chromatograph Dionex ICS-2000 with conductivity detector and reagent generation system and AS40 autosampler	IC 091000908 A/S 98060834	Jun-09
LC07	Bldg. 1 - Metals Section	Liquid Chromatograph system Shimadzu Sil-10ADVP with dual pumps, autosampler and controller	Cont C21013550000US A/S C21053850554US PMP C20963502897 PMP C20963502722	Nov-08
LC08	Bldg. 1 - LC Section	Ion Chromatograph system Dionex model ICS 5000 dual channel with conductivity detector and ASI autosampler and AXP supplemental pumps	DC5 1011254 DP5 10120142 EG5 10120034 AS1 10120206 AXP Z0041645	Dec-10
LCMS01	Bldg. 1 - LC Section	LC/MS/MS Varian 1200L Triple Quadrupole with positive and negative ESI, APCI and MS/MS capabilities	MS 03055 Pumps 04130/31 A/S 50061	Apr-05
LCMS02	Bldg. 1 - LC Section	Triple Quadrupole LC/MS/MS system model 4000Q trap with ESI and APCI with Shimadzu LC model Prominence and Shimadzu UV-Vis detector SPD-10AVvp	MS 21616080401 UVVIS C21003750176 Oven L20214650322 A/S L20354655309 CBM20 L20234557542 Pump L20104652350 Pump L20104652553 Degas SSI3-0889	Jun-08
LL01	Bldg. 2 - Organic Sample Prep	Organomation 8 Position Continuous accelerated L-L extractor/conc. model Rot-X-Tract LC 14169	Module 1 17283 Module 2 50552	Jun-00
MIC01	Bldg. 2 - Microbiology	Quantitray sealer IDEXX model 2X	03275	May-04
MIC02	Bldg. 2 - Microbiology	Laboratory microscope Reichert Scientific Model 410 Microstar IV	BE317748	Jul-10
MIC03	Bldg. 2 - Microbiology	Bacti-cinerator IV Tyco Healthcare	K0414877	Aug-04

Name	Location	Description (Brand/Model)	Serial Number	Date in Service
MIC04	Bldg. 2 - Microbiology	UV Light for Microbiology Sprectroline Model EA-160 with cabinet model CM-10	Light 1714731 Cabinet 864363	Oct-08
MIC05	Bldg. 2 - Microbiology	Laminar flow hood for microbiology Baker Company model Sterilgard II	61800	Jan-10
MIC06	Bldg. 2 - Microbiology	Peristaltic pump Wheaton model Unispense	E95-1039	Jan-11
MIC07	Bldg. 2 - Microbiology	Darkfield colony counter Quebec model 3330	No S/N	Jan-99
MIX01	Bldg. 1 - Equipment Room	SPEX laboratory Mixer model 8000	No S/N	Jan-99
MIX02	Bldg. 1 - Equipment Room	Waring Laboratory Blender	No S/N	Jan-08
MIX03	Bldg. 2 - Radiochemistry	Laboratory Mixer Jung Ang Model Hi-Tec	No S/N	Jan-99
MW01	Bldg. 2 - Inorganic Sample Prep	Microwave digestion system CEM model MARS 907501	MD4344	Jun-11
N2GEN01	Bldg. 1 - LC Section	Nitrogen generator Dominick Hunter Model G4510W	000646	Apr-05
N2GEN02	Bldg. 1 - LC Section	Parker Balston Nitrogen generator with compressor model LCMS5000	Comp H5/13/2008-3968417-33 N2gen LCMS-1091	Jun-08
OVEN01	Bldg. 1 - Solids Lab	Fisher Scientific Isotemp oven	15790603436	Jan-05
OVEN02	Bldg. 1 - Solids Lab	Fisher Scientific Isotemp oven	603N0053	Jan-05
OVEN03	Bldg. 2 - Radiochemistry	Fisher Scientific Isotemp oven model 650G	158006242965	Mar-06
OVEN04	Bldg. 2 - Glassware Prep	High Temperature Oven Duke Model E101-E	20JBJB0103	Feb-02
OVEN08	Bldg. 2 - Organic Sample Prep	Precision Laboratory oven	605051093	Jan-06
OVEN09	Bldg. 2 - Wet Chem	Precision Laboratory oven	No S/N	Jan-99
PH01	Bldg. 2 - Microbiology	Fisher Accumet pH/ISE/mV meter model 50	C0013507	Jan-99
PH02	Bldg. 2 - Radiochemistry	pH/mV meter Corning model Scholar 425	01348	Jan-99
PH03	Bldg. 2 - Microbiology	Fisher Accumet portable pH/mV meter model AP62	No S/N	Jan-99
PH05	Bldg. 2 - Radiochemistry	Portable TDS Meter TDSTestrII+	1298618	Jan-09
RAD01	Bldg. 2 - Radiochemistry	Gas flow Alpha + Beta Counter Protean model MPC 9604 4 positions	0512258	May-05
RAD02	Bldg. 2 - Radiochemistry	Gas flow Alpha + Beta Counter Protean model MPC 9604 4 positions	07003108	Jan-07
RAD03	Bldg. 2 - Radiochemistry	Beckman Liquid Scintillation apparatus model LS6500	7069164	Jul-08
SHAKE01	Bldg. 2 - Inorganic Sample Prep	TCLP rotary extractors for leaching procedures Environmental Express	No S/N	Jan-99
SHAKE02	Bldg. 2 - Inorganic Sample Prep	TCLP rotary extractors for leaching procedures Associated Design	1049	Jan-99

Name	Location	Description (Brand/Model)	Serial Number	Date in Service
SHAKE03	Bldg. 2 - Organic Sample Prep	Zero Headspace apparatus for TCLP extractions for Volatiles model 3745	No S/N	Jan-99
SHAKE04	Bldg. 2 - Organic Sample Prep	Zero Headspace apparatus for TCLP extractions for Volatiles model 3745	No S/N	Jan-99
SHAKE05	Bldg. 2 - Organic Sample Prep	Glas-Col Separatory funnel shaker 4-positions	377944	Jul-02
SHAKE06	Bldg. 2 - Organic Sample Prep	Shaker for sieve testing WS Tyler model RX-29	24286	Jan-05
SHAKE07	Bldg. 2 - Inorganic Sample Prep	Bench Top shaker for STLC leaching Procedure Eberbach	No S/N	Jan-99
SOILEX01	Bldg. 2 - Organic Sample Prep	Ultrasonic Extractor Sonics & Materials model Vibracell VC600-2 with 2 probes models CV17 and V1A	Cont 10402 Probe1 V53813L Probe2 V8195	Jan-99
SOILEX02	Bldg. 2 - Organic Sample Prep	Accelerated Solvent Extraction Dionex model ASE 200 for solids with solvent delivery system	ASE 40507 SOL 2030099	Mar-04
SONIC01	Bldg. 1 - GC Section	Ultrasonic cleaner Branson Model 2510	RLB060606522D	Feb-07
SONIC02	Bldg. 2 - Organic Sample Prep	Ultrasonic cleaner Fisher Scientific Model FS20	RSA031070533A	Jan-10
SPE00	Bldg. 2 - Organic Sample Prep	Solid phase disk extraction system Horizon Technologies Controller for 4790 extractors	01-0332	May-03
SPE01	Bldg. 2 - Organic Sample Prep	Horizon Tech. 4790 SPE extractor	02-0345	May-03
SPE02	Bldg. 2 - Organic Sample Prep	Horizon Tech. 4790 SPE extractor	03-0381	May-03
SPE03	Bldg. 2 - Organic Sample Prep	Horizon Tech. 4790 SPE extractor	03-0377	May-03
SPE04	Bldg. 2 - Organic Sample Prep	Horizon Tech. 4790 SPE extractor	01-0244	May-03
SPE05	Bldg. 2 - Organic Sample Prep	Horizon Tech. 4790 SPE extractor	02-0344	May-03
SPE06	Bldg. 2 - Organic Sample Prep	Horizon Tech. 4790 SPE extractor	01-0245	May-03
SPE07	Bldg. 2 - Organic Sample Prep	Caliper/Dionex model Autotrace automated 6 positions cartridge SPE extractor	AT0745N0059	Oct-08
SPE08	Bldg. 2 - Organic Sample Prep	Caliper/Dionex model Autotrace automated 6 positions cartridge SPE extractor	AT0837N0030	Oct-08
SPE09	Bldg. 2 - Organic Sample Prep	Caliper/Dionex model Autotrace automated 6 positions cartridge SPE extractor	AT0839N0033	Oct-08
SPE10	Bldg. 2 - Organic Sample Prep	Caliper/Dionex model Autotrace automated 6 positions cartridge SPE extractor	09090663	Oct-08
SPE11	Bldg. 2 - Organic Sample Prep	Automated SPE extractor for Oil and Grease with 3 positions Horizon Technologies Model 3000 XL	Extractor 06-2049 Cont 09-1087	May-06
SPE12	Bldg. 2 - Organic Sample Prep	Supelco SPE manifold model Visiprep 24	No S/N	Jan-07
SPE13	Bldg. 2 - Organic Sample Prep	Thermo Scientific Autotrace 280 SPE automated 6 positions cartridge SPE extractor	12120708	Feb-13
TOC01	Bldg. 1 - Wet Chem	Total organic carbon (TOC) Tekmar-Dorhman Phoenix 8000 with autosampler.	US02267004	Oct-02

Name	Location	Description (Brand/Model)	Serial Number	Date in Service
TOC02	Bldg. 1 - Wet Chem	Total organic carbon (TOC) Shimadzu Combustion model TOC-L with solids module SSM-5000A and autosampler	TOC-L F54214900325 A/S H571114900359 SSM H52514900057	Jul-12
TOX01	Bldg. 1 - Wet Chem	Total organic halides (TOX) Mitsubishi TX-10.	TOX A7M41083 ABC A7B30013	Sep-03
TRUCK01	Field	Pickup truck for field sampling Toyota Tacoma, model 2006	5TETX22N76Z259560	Jun-06
TRUCK02	Field	Pickup truck for field sampling Toyota Tacoma, model 2010	5TETX22N99Z603152	Aug-09
TURB01	Bldg. 1 - Wet Chem	HF Scientific Turbidity meter model Micro 100	611039	Nov-00
UVVIS02	Bldg. 1 - Wet Chem	UV-Visible Spectrophotometer Hach model DR4000U	No S/N	Feb-04
WAPU01	Bldg. 2 - Organic Sample Prep	Water purification system Millipore model Milli-Q with UV and RO	MilliQ FOBN21415B RO F9SM17017B Tank FOAN25329	Mar-00
WAPU03	Bldg. 2 - Wet Chem	Water purification system Millipore model Milli-Q	FOJA53493D	Jan-09
WAPU06	Bldg. 1 - GC Section	Water purification Unit Barnstead model E-Pure	0606670680	Jan-07
WB02	Bldg. 2 - Microbiology	Blue M water batch incubator model MW-1120A-1	M5-16873	Nov-99
WB04	Bldg. 2 - Organic Sample Prep	Blue M water batch incubator	MW-5871	Jan-04
WB05	Bldg. 1 - Wet Chem	Water bath Labline Model Magnestir	1077	Jan-99
WB06	Bldg. 2 - Microbiology	Fisher Isotemp water batch incubator model 120	87-07	Jan-11
WB08	Bldg. 2 - Microbiology	Precision water bath Incubator model 265	601061695	Aug-11
WASH01	Bldg. 2 - Glassware Prep	Laboratory glassware washing machine Miele	44/74349180	Oct-11

Updated 9/30/13

Appendix I

Summary of Sampling Container, Preservation and Holding Time Requirements

				Preservative (chill all [8], unless noted)					
Test Name	**Matrix**	**Bottle Type**	**Bottle size**	**Unchlorinated Water (Raw)**	**Chlorinated Water (Treated)**	**Soil/Solid**	**Holding Time until start of analysis**	**Analytical Technique**	**Analytical Method**
1,2,3-TCP	Water	Amber Glass	2 x 40 mL	HCl	Ascorbic/HCl		14 days	GC/MS Isot. Dil.	EPA 524.2SIM
1,4-Dioxane	Water	Amber Glass	2 x 1 L (*)	None	None		7 days	GC/MS Isot. Dil.	EPA 8270M
Acrolein/Acrylonitrile	Water	Glass	2 x 40 mL	None	Thiosulfate		3 Days	GC/MS	EPA 624/8260B
Alcohols	Water	Glass	1 x 40 mL	None	None		14 days	Dir. Inj./FID	EPA 8015B
Aldehydes	Water	Amber Glass	2 x 40 mL	$CuSO_4$	$NH_4Cl/CuSO_4$		7 Days	GC/ECD	EPA 556
Aldehydes	Water	Glass	1 L (*)	None	None		3 days	HPLC-UV	EPA 8315
Aldehydes[1]	Soil/Solid	Glass	4 oz			None	3 days	HPLC-UV	EPA 8315
Alkalinity, Total	Water	Poly	250 mL		None		14 Days	Titration	SM2320B
Anions by IC (F^-, Cl^-, SO_4^{2-})	Water	Poly	250 mL	None	None		28 days	IC	EPA 300.0
Anions by IC (NO_2^-, NO_3^-, PO_4^{3-})	Water	Poly	250 mL	None	None		48 hours	IC	EPA 300.0
Arsenic speciation	Water	Poly	250 mL	EDTA/acetic acid	EDTA/acetic acid		14 Days	Resin-ICP/MS	EPA 200.8
Asbestos-Sub	Water	Poly	1 L	None	None		48 Hours	TEM	EPA 100.1/.2-Sub
Bacteria-Coliform - solid/sludge/soil	Soil/solid	Glass-Sterile	4 oz			None	N/A	MTF	SM 9221B
Bacteria-Coliform - Wastewater	Water	Poly-Sterile	125 mL	Thiosulfate	Thiosulfate		6 hours	MTF	SM 9221B
Bacteria-Coliform - Drinking Water	Water	Poly-Sterile	125 mL	Thiosulfate	Thiosulfate		24 Hours	Colilert P/A or enumeration	SM 9223B
Bacteria-Enterococcus - Wastewater	Water	Poly-Sterile	125 mL	Thiosulfate	Thiosulfate		6 Hours	Enumeration Quantitray	Enterolert
Bacteria-Heterotrophic Plate Count	Water	Poly-Sterile	125 mL	Thiosulfate	Thiosulfate		24 Hours	Pour Plate Method	SM 9215B
BOD	Water	Poly	1 L	None	None		48 Hours	DO Probe	SM 5210B
BOD, Carbonaceous	Water	Poly	1 L	None	None		48 Hours	DO Probe	SM 5210
Bromate	Water	Amber Glass	40 mL	EDA	EDA		28 Days	IC	EPA 300.1
Bromate- Low Level	Water	Amber Glass	40 mL	EDA	EDA		28 Days	IC	EPA 326
Bromide	Water	Poly	250 mL	None[7]	None[7]		28 Days	IC	EPA 300.0

Test Name	Matrix	Bottle Type	Bottle size	Preservative (chill all (8), unless noted) Unchlorinated Water (Raw)	Chlorinated Water (Treated)	Soil/Solid	Holding Time until start of analysis	Analytical Technique	Analytical Method
Bromide-Low Level	Water	Amber Glass	40 mL	None	None		28 Days	IC	EPA 300.1
Carbamates	Water	Amber Glass	1 x 40 mL	MCAA	MCAA/thiosulfate		28 Days	HPLC	EPA 531.1
COD	Water	Poly	250 mL	H_2SO_4	H_2SO_4		28 Days	Colorimetric	EPA 410.4
Chloral Hydrate	Water	Glass	2 x 60 mL	Sulfite/buffer	Sulfite/buffer		14 days	GC/ECD	EPA 551.1
Chlorate	Water	Amber Glass	40 mL	EDA	EDA		28 Days	IC	EPA 300.1
Chloride	Water	Poly	250 mL	None(7)	None(7)		28 Days	IC	EPA 300.0
Chlorine Dioxide	Water	Amber Glass	250 mL	None	None		24 Hours	Colorimetric	SM 4500CLO2D
Chlorine Residual	Water	Amber Glass	250 mL	None	None		15 Minutes(2)	Colorimetric	SM 4500CL-G
Chlorite	Water	Amber Glass	40 mL	EDA	EDA		14 Days	IC	EPA 300.1
Chlorophyll-a	Water	Amber Poly	2 x 1 L	None			48 Hours	Spectrophotometric	SM 10200H
Chromium, Hexavalent	Water	Poly	250 mL	$(NH_4)_2SO_4$ buffer pH 9.3-9.7	$(NH_4)_2SO_4$ buffer pH 9.3-9.7		24 Hours	Spectrophotometric	SM3500CR-D
Chromium, Hexavalent	Water	Poly	250 mL	$(NH_4)_2SO_4$ buffer pH 9.3-9.7	$(NH_4)_2SO_4$ buffer pH 9.3-9.7		24 Hours	IC	EPA 7199
Chromium, Hexavalent	Soil/solid	Glass	4 oz	None	None		30 days	Spectrophotometric	EPA 3060/7196
Chromium, Hexavalent (low-level)	Water	Poly	250 mL	$(NH_4)_2SO_4$ buffer pH 9.3-9.7	$(NH_4)_2SO_4$ buffer pH 9.3-9.7		24 Hours (DW) 28 days (WW)	IC	EPA 218.6
Chromium, Hexavalent (low-level)	Soil/solid	Glass	4 oz	None	None		30 days	IC	EPA 3060/7199
Color	Water	Glass	500 mL	None	None		48 Hours	Visual	SM2120B
Conductivity (Specific Conductance)	Water	Poly	250 mL	None	None		28 Days	Electrometric	SM2510B
Cyanide	Water	Poly	500 mL	NaOH	NaOH/ascorbic		14 Days	FIA-Colorimetric	EPA 335.2/335.4
Dioxin-Sub	Water	Glass	2 x 1 L	None	None		1 year	HR GC/ MS	EPA 1613/8290
Dioxin-Sub	Soil/Solid	Glass	4 oz	None	None		1 year	HR GC/ MS	EPA 8280/8290
Diquat/Paraquat	Water	Amber poly	1 L	None	Thiosulfate		7 Days	HPLC	EPA 549.2
Disinfection by-products	Water	Glass	2 x 60 mL	Sulfite/buffer	Sulfite/buffer		14 days	GC/ECD	EPA 551.1
Diuron	Water	Amber Glass	1 L (*)	None	None		7 days	HPLC/UV	EPA 632

				Preservative (chill all [8], unless noted)					
Test Name	Matrix	Bottle Type	Bottle size	Unchlorinated Water (Raw)	Chlorinated Water (Treated)	Soil/Solid	Holding Time until start of analysis	Analytical Technique	Analytical Method
Diuron-UCMR	Water	Amber Glass	1 L (*)	$CuSO_4$/Trizma	$CuSO_4$/Trizma		14 days	HPLC/UV	EPA 532
EDB and DBCP	Water	Glass	2 x 40 mL	None	Thiosulfate		14 Days	GC/ECD	EPA 504.1
Endothall	Water	Amber Glass	250 mL	None	None		7 days	GCMS	EPA 548.1
Ethanol	Water	Glass	1 x 40 mL	None	None		14 Days	Dir. Inj./FID	EPA 8015B
Explosives	Water	Amber Glass	1 L (*)	None	Thiosulfate		7 days	HPLC/UV	EPA 8330A
Explosives	Soil/Solid	Amber Glass	4 oz	None	None		14 days	HPLC/UV	EPA 8330A
Fluoride	Water	Poly	250 mL	None[7]	None[7]		28 Days	IC	EPA 300.0
General Minerals (excluding metals)	Water	Poly	1 L	None	None		Various	Wet Chem methods	various
General Minerals (metals only)	Water	Poly	250 mL	HNO_3[3]	HNO_3[3]		6 Months	ICP-AES	EPA 200.7
General Physical (Color, Odor, Turbidity	Water	Glass	500 mL	None	None		24 Hours	Wet Chem methods	various
Glyphosate	Water	Amber Glass	1 x 40 mL	None	Thiosulfate		14 Days	HPLC	EPA 547
HAAs	Water	Amber Glass	250 mL (*)	NH_4Cl	NH_4Cl		14 days	GC/ECD	EPA 552.2
HAAs-Formation Potential	Water	Amber Glass	1 L	None	None		14 days	GC/ECD	SM 5710B/EPA 552.2
Herbicides-DW	Water	Amber Glass	250 mL (*)	None	Thiosulfate		14 days	GC/ECD	EPA 515.3
Herbicides-GW	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 Days	GC/ECD	EPA 8151A
Herbicides-Soil	Soil/solid	Glass	4 oz	None	None		14 Days	GC/ECD	EPA 8151A
Mercury	Water	Glass jar	250 mL	HNO_3	HNO_3		28 Days	Cold Vapor AAS	EPA 245.1/7470
Mercury in soil/solid/sludge	Soil/Solid	Glass jar	4 oz.	None	None		28 Days	Cold Vapor AAS	SW 7471
Metals	Water	Poly	250 mL	HNO_3[3]	HNO_3[3]		6 Months	ICP/MS or ICP-AES	EPA 200.8/200.7
Metals	Soil/solid	Glass/Poly	4 oz	None	None		6 Months	ICP/MS or ICP-AES	EPA 6010B/6020
Methanol	Water	Glass	1 x 40 mL	None	None		14 Days	Dir. Inj./FID	EPA 8015B
NDMA	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 days	GC/MS/CI SIM	EPA1625M
Nitrate	Water	Poly	250 mL	None	None		48 Hours	IC or FIA	EPA 300.0/353.2
Nitrite	Water	Poly	250 mL	None	None		48 Hours	IC or FIA	EPA 300.0/353.2

Test Name	Matrix	Bottle Type	Bottle size	Preservative (chill all (8), unless noted) Unchlorinated Water (Raw)	Chlorinated Water (Treated)	Soil/Solid	Holding Time until start of analysis	Analytical Technique	Analytical Method
Nitrite+Nitrate as N	Water	Poly	250 mL	H_2SO_4	H_2SO_4		28 Days	FIA-Colorimetric	EPA353.2
Nitrogen, Total Kjeldahl (TKN)	Water	Poly	250 mL	H_2SO_4	H_2SO_4		28 Days	FIA-Colorimetric	EPA 351.2
Nitrogen-Ammonia	Water	Poly	250 mL	H_2SO_4	H_2SO_4		28 Days	FIA-Colorimetric	EPA 350.1
Nitrogen-Ammonia in ww with distillation	Water	Poly	250 mL	H_2SO_4	H_2SO_4		28 Days	FIA-Colorimetric	EPA 350.1
Nitrosamines	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		14 days	GC/MS/CI SIM	EPA 521
Odor	Water	Glass	500 mL	None	None		24 Hours	Odor	SM 2150B
Oil and Grease	Water	Glass	1 L	HCl	HCl		28 Days	Gravimetric	EPA1664
Organotins (tributyltin)	Water	Glass	1 L (*)	None	None		7 Days	GC/MS	GC/MS
Oxygen, Dissolved	Water	Glass	BOD bottle	None	None		15 Minutes(2)	O_2 Probe	SM 4500-OG
PBDEs	Water	Amber Glass	2 x 1 L (*)	None	None		14 days	GC/MS SIM	EPA 1614M
Perchlorate	Water	Poly	250 mL	None(7)	None(7)		28 Days	IC	EPA 314
Perchlorate - Low Level by LC/MS/MS	Water	Poly Sterile	125 mL	Sterile field filtration	Sterile field filtration		28 Days	LC/MS/MS	EPA 331/332
Perchlorate in soils	Soil	Glass jar	4 oz	None	None		28 Days	IC	EPA 314M
PCBs - GW	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 Days	GC/ECD	EPA 8082
Pesticides-Organophosphorus	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 Days	GC/NPD	EPA8141
Pesticides-Chlorinated (DW)	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 days	GC/ECD	EPA 508
Pesticides-Chlorinated WW/GW	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 Days	GC/ECD	EPA 608/8081
Pesticides- N/P -DW	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		14 days	GC/ NPD	EPA 507/8141
Pesticides- All & PCBs Soil/solid	Soil/solid	Glass jar	4 oz	None	None		14 days	GC/ ECD or NPD	EPA 8081/8141/8082
pH	Water	Poly	250 mL	None	None		15 Minutes(2)	Electrometric	SM4500H
Phenolics	Water	Amber Glass	500 mL	H_2SO_4	H_2SO_4		28 Days	Spectrophotometric	EPA 420.1
Phosphate, Ortho	Water	Poly	250 mL	None	None		48 hours	FIA-Colorimetric	EPA 365.1
Phosphate, Total	Water	Poly	250 mL	H_2SO_4	H_2SO_4		28 Days	FIA-Colorimetric	EPA 365.1
Polynuclear Aromatics (PNAs) Low level	Water	Amber Glass	2 x 1 L	None	Thiosulfate		7 Days	GC/MS SIM mode	EPA 625/8270SIM

				Preservative (chill all (8), unless noted)					
Test Name	**Matrix**	**Bottle Type**	**Bottle size**	**Unchlorinated Water (Raw)**	**Chlorinated Water (Treated)**	**Soil/Solid**	**Holding Time until start of analysis**	**Analytical Technique**	**Analytical Method**
Polynuclear Aromatics (PNAs) Low level	soil/solid	Glass jar	4 oz	None	None		14 Days	GC/MS SIM Mode	EPA 625/8270SIM
PPCP Alkyl Phenols	Water	Amber Glass	1 L (*)	H_2SO_4	H_2SO_4		28 Days	GC/MS SIM	In-house
PPCP Hormones, Morphine, Pharma-Neg, Pharma-Pos	Water	Amber Glass	2 x 1 L (*)	Sodium azide, Ascorbic acid	Sodium azide, Ascorbic acid		28 Days	LC/MS/MS	EPA 1694M
Radiological-Gross Alpha	Water	Poly	1 L	None(5)	None(5)		6 Months	GPC	EPA 900.0
Radiological-Gross Alpha high TDS	Water	Poly	1 L	None(5)	None(5)		6 Months	Coprecipitation-GPC	SM7110C
Radiological-Gross Beta	Water	Poly	1 L	None(5)	None(5)		6 Months	GPC	EPA 900.0
Radiological-Radium 226-Sub	Water	Poly	2 x 1 L	HNO_3	HNO_3		6 Months		EPA 903.0/903.1 Sub
Radiological-Radium 228-Sub	Water	A-Poly	2 x 1 L	HNO_3	HNO_3		6 Months		RA-05 Sub
Radiological-Radon 222-Sub	Water	Glass	2 x 40 mL	None	None		4 Days (DW), 8 Days (WW)	LSC	SM7500-RN
Radiological-Strontium 90-Sub	Water	Poly	1 L	HNO_3	HNO_3		6 Months		EPA 905.0 sub
Radiological-Tritium-Sub	Water	Amber Glass	2x125 mL	None	None		6 Months	LSC	EPA 906.0 sub
Radiological-Uranium-Sub	Water	Poly	250 mL	HNO_3	HNO_3		6 Months	ICP-MS	EPA 200.8
Semivolatile Organics (BNA) - GW or WW	Water	Amber Glass	2 x 1 L	None	Thiosulfate		7 Days	GC/MS	EPA 625/8270C
Semivolatile Organics (BNA) - Soil/Solid	Soil/solid	Glass jar	4 oz	None	None		14 Days	GC/MS	EPA 8270C
Silica by ICP	Water	Poly	250 mL	None	None		28 Days	ICP	EPA 200.7
SOCs - Drinking Water	Water	Amber Glass	2 x 1 L	HCl	Sulfite/HCl		14 days	GC/MS	EPA 525.2
SOCs - Special Analytes	Water	Amber Glass	2 x 1 L	HCl	Asc., EDTA, Diazol. Urea, Buffer		14 days	GCMS	EPA 526

				Preservative (chill all [8], unless noted)					
Test Name	**Matrix**	**Bottle Type**	**Bottle size**	**Unchlorinated Water (Raw)**	**Chlorinated Water (Treated)**	**Soil/Solid**	**Holding Time until start of analysis**	**Analytical Technique**	**Analytical Method**
SOCs - Phenolics	Water	Amber Glass	2 x 1 L	HCl	Sulfite/HCl		14 days	GCMS	EPA 528
Solids, Settleable	Water	Poly	1 L	None	None		48 Hours	Gravimetric	EPA 160.5
Solids, TDS	Water	Poly	500 mL	None	None		7 Days	Gravimetric	SM2540C
Solids, Total	Water	Poly	500 mL	None	None		7 Days	Gravimetric	SM2540B
Solids, TSS	Water	Poly	500 mL	None	None		7 Days	Gravimetric	EPA 160.2
Solids, TVS	Water	Poly	500 mL	None	None		7 Days	Gravimetric	EPA 160.4
Solids, VSS	Water	Poly	500 mL	None	None		7 Days	Gravimetric	SM 2540E
Sulfate	Water	Poly	250 mL	None	None		28 Days	IC	EPA 300.0
Sulfide, Dissolved	Water	Poly	250 mL	ZnAc/NaOH	ZnAc/NaOH		7 Days	Colorimetric	SM4500S2D
Surfactants (MBAS)	Water	Poly	500 mL	None	None		48 Hours	Colorimetric	SM5540C
t-Butyl Alcohol	Water	Glass	2 x 40 mL	none	None		14 Days	GC/MS	EPA 524.2
THMs	Water	Amber Glass	2 x 40 mL	Thiosulfate	Thiosulfate		14 Days	GC/MS	EPA 524.2
THMs-Formation Potential	Water	Amber Glass	1 L	None	None		14 Days	GC/MS	SM5710/EPA 524.2
Total Organic Carbon	Water	Amber Glass	250 mL	H_3PO_4	H_3PO_4		28 Days	UV-Persulfate	SM5310C
Total Organic Halides	Water	Amber Glass	500 mL	H_2SO_4	Sulfite/H_2SO_4		14 Days	Pyrolysis/ Coulometric	SM5320B/EPA 9020
Turbidity	Water	Poly	250 mL	None	None		48 Hours	Nephelometric	EPA 180.1
UCMR2-PBDEs	Water	Amber Glass	2 x 1 L	Ascorbic, EDTA, Citrate	Ascorbic, EDTA, Citrate		14 days	GCMS	EPA 527
UCMR2-Explosives	Water	Amber Glass	2 x 1 L	CuSO4/Trizma Buffer	CuSO4/Trizma Buffer		14 days	GCMS	EPA 529
UCMR2-Acetanilide Degradates	Water	Amber Glass	2 x 500 mL	NH_4Cl	NH_4Cl		14 days	LC/MS/MS	EPA 535
UCMR2-Acetamide Pesticides	Water	Amber Glass	2 x 1 L	Sulfite/HCl	Sulfite/HCl		14 days	GCMS	EPA 525.2
UCMR2-Nitrosamines	Water	Amber Glass	1 x 1 L	Thiosulfate	Thiosulfate		14 days	GCMS	EPA 521
UV254	Water	Amber Glass	250 mL	None	None		48 Hours	Spectrophotometric	SM 5910B
Volatile Organics-DW	Water	Glass	3 x 40 mL	HCl	Ascorbic/HCl		14 Days	GC/MS	EPA 524.2
Volatile Organics-Aromatics only	Water	Glass	2 x 40 mL	HCl	Thiosulfate/HCl		14 Days	P&T/PID	EPA 602

				Preservative (chill all [8], unless noted)					
Test Name	**Matrix**	**Bottle Type**	**Bottle size**	**Unchlorinated Water (Raw)**	**Chlorinated Water (Treated)**	**Soil/Solid**	**Holding Time until start of analysis**	**Analytical Technique**	**Analytical Method**
Volatile Organics-WW/GW	Water	Glass	2 x 40 mL	HCl	Thiosulfate/HCl		14 Days	GC/MS	EPA 624/8260B
Volatile Organics-Soil/Solid	Soil/solid	Glass Jar/other[6]	4 oz/other[6]	None	None		14 Days	GC/MS	EPA 8260B
Gasoline -TPH	Water	Glass	2 x 40 mL	HCl	Thiosulfate/HCl		14 Days	P&T/FID	EPA 8015B
Gasoline -TPH soil/solid	Soil/solid	Glass Jar/other[6]	4 oz/other[6]	None	None		14 Days	P&T/FID	EPA 8015B
Diesel/Oil-TPH	Water	Amber Glass	1 L (*)	HCl	Thiosulfate/HCl		7 Days	GC/FID	EPA 8015B
Diesel/Oil-TPH	Soil/Solid	Glass jar	4 oz	None	None		14 Days	GC/FID	EPA 8015B

Notes:
(1): Formaldehyde and acetaldehyde only.
(2): This is field test; if requested to be performed at the lab it will be done ASAP.
(3): Samples can be received unpreserved and preserved at the lab at least 24 hours before analysis.
(4): Al,Sb,As,Ba,Be,B,Cd,Ca,Na,Mg,K,Cr,Co,Cu,Fe,Pb,Li,Mn,Mo,Ni,Se,Ag,Sr,Tl,Ti,V,Zn
(5): Preserve at the lab with Nitric acid to pH <2 and wait 24 hours before analysis starts.
(6): No headspace required or preferably EPA Method 5035 sample collection. Consult the laboratory for special requirements.
(7): No cooling required.
(8): Chill samples to $\leq$ 6ºC, but above freezing.
(*): Needs extra bottles for QA/QC for certain projects.

Effective as of 7/15/11

Appendix J

Chemistry

J.1 Method Validation

Reference methods are validated by determining the LOD and/or LOQ by procedures outlined below, and determining precision and bias by using the demonstration of capability procedures.

Non-standard methods, laboratory-designed/developed methods, standard methods used outside their intended scope are validated prior to their use. The validation shall be as extensive as is necessary to meet the needs of the given application or field of application using quality control procedures and acceptance criteria that are consistent with those of similar standard methods or technology. At a minimum, quality control procedures must address:

- Calibration;
- Interferences/contamination (method blanks, calibration blanks);
- Analyte identification;
- Selectivity;
- Sensitivity (LOD and/or LOQ);
- Precision and Bias.

Based on the intended use, the laboratory establishes quality control acceptance criteria for precision, accuracy, selectivity (if applicable). In addition, the action level (compliance level, project decision level, etc.) is used to establish the LOQ and/or LOD.

a) Limit of Detection (LOD)

The Limit of Detection (LOD) is the laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in their facility.

LODs are not required for any component for which spiking solutions or quality control samples are not available, such as temperature and pH, or, when test results are not to be reported to the LOD (versus the limit of quantitation or working range of instrument calibration). Where an LOD study is not performed, the laboratory may not report a value below the Limit of Quantitation.

The laboratory will select methods with LODs that are expected to meet the intended data use.

LODs are determined in samples that represent the quality system matrices to be evaluated. All sample processing/preparation steps and all determinative steps are used to validate the method for all targeted analytes. The representative quality system matrix will be free from the target analytes of interest or interfering analytes that impact the LOD.

When the method or applicable regulation specifies a LOD study, only the specified method will be used. The laboratory will document the process used to derive the LOD and will retain all the supporting data.

When providing compliance data under 40-CFR Part 136 or equivalent delegated state programs, the laboratory follows 40 CFR Part 136, Appendix B, and uses the method detection limit (MDL) derived from the procedure as the LOD. The procedures are described in SOP MIS032.

The laboratory uses the procedure described in SOP MIS032 to determine the LOD for the method:

Once the LOD has been determined the validity of the LOD is verified by a detection (value above zero) for each target analyte in a quality control sample of a representative quality system matrix. The concentration of the analytes in the sample will be no more than 3 times the derived LOD unless the test contains multiple analytes. In the latter case, the concentration of the target analytes will be no greater than 4 times the LOD. This verification will be performed on each instrument that is used for the test.

LODs are performed/repeated:

- **before reporting the LOD for a given analyte**
- **any time there is a change that affects how the method is performed or**
- **when there is a change in instrumentation that affects the sensitivity of the analysis.**

LODs are verified annually for each quality system matrix/technology/analyte combination and quarterly for DoD related work.

b) <u>Limit of Quantitation</u>

The Limit of Quantitation (LOQ) is an estimate of the minimum amount of a substance that can be reported with a specified degree of confidence.

If an LOD study is not performed, concentration values less than the Limit of Quantitation are not reported but are appropriately flagged.

LOQs are not required for components or properties for which spiking solutions or QC samples are not available. These include temperature, pH, etc.

An LOQ study includes all sample processing and analysis steps in the analytical method. The study is performed in each quality system matrix for which the test will be performed. The procedure is documented and all supporting data are retained. The resulting LOQ will be above the LOD (if determined).

The LOQ is determined by the procedure specified in SOP MIS032 and it must be above the LOD is one has been determined for that particular analyte/method/matrix and must be above or equal to the lowest calibration point if a multi-point calibration curve is used.

The laboratory will verify the LOQ by the analysis of a QC sample containing the analytes of concern at a concentration of 1 to 2 times the derived (claimed) LOQ. The LOQ is considered verified if recovery of each analyte is within the laboratory's acceptance limits, or the client's data quality objectives.

The LOQ will be verified annually (quarterly for DoD related work) for each quality system matrix, technology and analyte unless the LOD was determined or verified.

c) Precision and Bias

Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. Precision is usually expressed as standard deviation, variance, or range, in either absolute or relative terms.

Bias is the systematic error that contributes to the difference between the mean of a significant number of test results and the accepted reference value.

Precision and bias using non-reference, modified reference or laboratory-developed methods are established using the procedure outlined below and compared to the criteria established by the client (when requested), the method, or the laboratory.

Precision and bias are determined by processing samples through all phases of the method (sample preparation, cleanup, analysis, etc.) and are evaluated across the analytical calibration range of the method. This study is performed for all quality system matrices for which the test is to be used.

Precision is determined by the demonstration of capability procedure described below.

Precision is assessed through the calculation of relative percent differences (RPD) and relative standard deviations (RSD) for replicate samples. For analyses that have detectable levels of analytes (for example inorganic analyses), laboratory precision is usually assessed through the analysis of a sample/sample duplicate pair and field duplicate pairs. For analyses that frequently show no detectable levels of analytes (e.g., organic analyses), the precision is usually determined through the analysis of matrix spike/matrix spike duplicates (MS/MSD) and field duplicate samples.

d) Selectivity

Selectivity is the capability of a test method or instrument to respond to a target substance or constituent in the presence of non-target substances (EPA-QAD).

The laboratory evaluates selectivity through procedures defined in the test method SOPs.

Absolute retention time and relative retention time aid in the identification of components in chromatographic analyses and to evaluate the effectiveness of a

column to separate constituents. Acceptance criteria for retention time windows are documented in the corresponding method SOP or in the SOP ORG074.

A confirmation shall be performed to verify the compound identification when positive results are detected on a sample from a location that has not been previously tested by the laboratory. Such confirmations shall be performed on organic tests such as pesticides, herbicides, or acid extractable or when recommended by the analytical test method except when the analysis involves the use of a mass spectrometer. Confirmation is required unless stipulated in writing by the client. The confirmation is documented in the bench sheets and/or the LIMS.

When reporting data for methods that require analyte confirmation using a secondary column or detector, project-specific reporting requirements shall be followed. If project-specific requirements have not been specified, the reporting requirements in the method are followed. If the method does not include reporting requirements, the results from the primary column or detector are reported, unless there is a scientifically valid and documented reason for not doing so.

Results that are unconfirmed, or for which confirmation was not performed, shall be identified in the test report, using appropriate data qualifier flags, and explained in the narrative. The laboratory shall use method-specified acceptance criteria for analyte confirmation. If method-specific criteria do not exist, the analyte confirmation is performed as specified in SOP MIS052.

Other procedures for evaluating selectivity are described in the analytical methods, which may include mass spectral tuning, ICP inter-element interference checks, sample blanks, spectrochemical absorption or fluorescence profiles, co-precipitation evaluations, and electrode response factors. Acceptance criteria for mass spectral tuning are contained in the corresponding analytical method SOPs.

J.2 Demonstration of Capability

Demonstration of Capability (DOC): A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision.

Before reporting any data with a given method, a satisfactory DOC is performed. Thereafter, each analyst demonstrates continuing proficiency through the procedures outlined in Ongoing Demonstration of Capability.

The laboratory has several methods that meet the requirements of EL-V1M4-2009, Section 1.6.1, paragraph 3 of the TNI Standard (methods that have been in use at the laboratory for over one year prior to applying for accreditation and there has been no significant changes in instrument type, personnel or test method) and is demonstrating capability through the use of on-going DOCs (see below). Records to indicate that the requirements of the cited paragraph have been met are available for review.

a) Initial Demonstration of Capability (IDOC)

An IDOC is performed:

- **Before using any method**
- **Each time there is a change in instrument type, personnel or method and**
- **If the laboratory or analysts has not performed the method in a twelve-month period.**

The IDOC(s) for each analyst is documented electronically as spreadsheets in the QC\IDCs folder under each analytical method with different tabs for different analysts. The document identifies the analyst(s) involved in preparation and/or analysis; matrix; analyte(s), class of analyte(s), or measured parameter(s); the method(s) performed; the laboratory-specific SOP used for analysis (including revision number); the date(s) of analysis; and a summary of the results used to calculate the mean recovery and standard deviations.

All raw data, preparation records, and calculations for each IDOC are retained and are available for review.

For new methods that need to be implemented, a validation procedure is documented before they are used in the laboratory. Appropriate method validation techniques include the following:

- **Testing of reference standards or reference materials;**
- **Comparison of results to those achieved using other validated, standard methods**
- **Interlaboratory comparisons.**

When the above techniques are not feasible, the following options are used:

- **Systematic assessment of factors that could influence the result; and/or**
- **Assessment of the precision and bias of the result based on the science of the method and practical experience.**

When the method specifies a procedure to be followed, only those procedures will be used. If no procedures are specified the laboratory uses its own procedure, which is documented in SOP MIS034.

b) <u>Ongoing Demonstration of Capability</u>

After the demonstration of capability is completed, on-going proficiency is maintained and demonstrated at least annually. Each analyst is expected to consistently meet the QC requirements of the method, the laboratory SOP, client requirements and/or the TNI Standard. Ongoing DOCS are documented in spreadsheets under each department in the QC\IDC folder of the computer system and all records related to the demonstration are retained.

The laboratory uses any of the following procedures to demonstrate ongoing DOC:

a) acceptable performance of a blind sample (single blind to the analyst). This can be PT sample or other blind sample prepared by QA personnel or obtained from external source. Successful analysis of a blind performance sample on a similar method using the same technology (e.g., GC/MS volatiles by purge and trap for Methods 524.2, 624 or 8260) would only require documentation for one of the test.;
b) another initial DOC; perform this as per SOP MIS034
c) at least four (4) consecutive laboratory control samples with acceptable levels of precision and accuracy, as specified by the method or using lab generated acceptance limits. The laboratory shall tabulate or be able to readily retrieve four (4) consecutive passing laboratory control samples (LCS) for each method for each analyst each year; The four LCSs used for demonstration of ongoing capability must be obtained within a period of no more than 3 months and the date of the last one used as demonstration of ongoing capability.
d) a documented process of analyst review using quality control (QC) samples. QC samples can be reviewed to identify patterns for individuals or groups of analysts and determine if corrective action or retraining is necessary; or
e) if a) through d) are not technically feasible, then analysis of real-world samples with results within predefined acceptance criteria (as defined by the laboratory or method) shall be performed.

J.3 Calibration

Section 23.2.2 includes information on calibration of support equipment. This Section covers calibration of analytical equipment.

Initial instrument calibration and continuing instrument calibration verification are an important part of ensuring data of known and documented quality. If more stringent calibration requirements are included in a mandated method or by regulation, those calibration requirements override any requirements outlined here or in laboratory SOPs. Generally, procedures and criteria regarding instrument calibrations are provided in the SOPs for each analytical method.

J.3.1 Initial Instrument Calibration

- **Records:**

Initial instrument calibration includes calculations, integrations, acceptance criteria, and associated statistics. All instruments are calibrated in accordance with the respective SOPs and/or method of analysis. The typical calibration procedure consists of an initial calibration, performed by running a series of standards and calculating the response by using either the response factors or by linear or polynomial regression analysis. This is followed by a calibration verification. All calibration procedures are thoroughly documented.

Sufficient raw data records are collected to allow reconstruction of the initial instrument calibration. These include, at a minimum, calibration date, test method, instrument, analysis date, analyte names, analysts signature or initials,

concentration and response, calibration curve or response factor, or unique equation or coefficient used to reduce instrument responses to concentration. Calibration date and expiration date (when recalibration is due) is documented for equipment requiring calibration, where practicable (see Section 23.1).

- **Number of Standards and Concentrations:**

  If the reference or mandated method does not specify the number of calibration standards to use, the minimum number is three, not including blanks or a zero standard.

  For instrumentation where single point calibration is recommended by manufacturer's instructions, such as with some ICP and ICP/MS technologies (with a zero and single point calibration), the following apply:

  a) **For single point plus zero blank calibrations, the zero point and the single point standard are analyzed prior to the analysis of samples, and the linear range of the instrument established by analyzing a series of standards, one of which is at the lowest quantitation level.**
  b) **Zero blank and single point calibration standards are analyzed with each analytical batch for methods where they are specified.**
  c) **A standard corresponding to the limit of quantitation is analyzed with each analytical batch and must meet established acceptance criteria when using single point plus zero blank calibrations.**
  d) **The linearity of single point plus zero blank calibrations is verified at a frequency established by the method or the manufacturer.**

  The lowest calibration standard is the lowest concentration for which quantitative results can be reported without qualification. The lowest calibration standard is at or below the Limit of Quantitation (LOQ) and is greater than the Limit of Detection. Results that are less than the LOQ are considered to have increased uncertainty, and are either reported with a qualifier code or explained in the case narrative.

  The highest calibration standard is the highest concentration for which quantitative results can be reported. Data reported exceeding the highest calibration standard without dilutions is considered to have increased uncertainty and are reported with a qualifier code or reanalyzed and explained in the case narrative.

- **Evaluation, Verification and Corrective Action**

  All initial instrument calibrations are verified with a standard obtained from a second source or lot if the lot can be demonstrated from the manufacturer as prepared independently from other lots. Traceability shall be to a national standard, when commercially available. If not commercially available, it can be prepared in-house.

The following is the criteria used for the acceptance of an initial calibration, unless specified differently in the analytical methods, the criteria used are appropriate to the calibration technique:

- **Use the average response factor (RF) if the percent relative standard deviation (%RSD) of the points is less than 20%. In this case, linearity through the origin is assumed.**
- **If the %RSD is greater than 20%, linearity through the origin cannot be assumed and a linear regression, a weighed linear regression or a non-linear regression can be used. The acceptance criteria for linear regression are a coefficient of correlation (r) equal or greater than 0.99 and for non-linear regression the coefficient of determination (COD) must be equal or greater than 0.98. In both cases, the curve is not to be forced through the origin nor is the origin used as another point. The sample results must be within the first and last standards.**
- **The number of data points to construct the initial calibration curve shall be obtained from the analytical method employed. If no criteria are specified, the laboratory shall construct initial calibration curves using a minimum of five calibration points for organic analytes and three calibration points for inorganic analytes and IH samples. All reported target analytes and surrogates (if applicable) shall be included in the initial calibration. Reported results for all target analytes shall be quantified using a multipoint calibration curve; surrogates are calibrated according to each analytical method requirements, unless there are project specific requirements in which case these are followed. It is not permitted to exclude calibration points unless there is technical justification for it.**
- **The lowest standard shall be at or below the reporting limit for the method and at or below the regulatory limit/decision level if known by the laboratory.**
- **The lowest calibration standard must be above the detection limit. Noted exceptions: for turbidity analysis and for instrument technology (such as ICP or ICP/MS) with validated techniques from manufacturers or methods employing standardization with a zero point and a single point calibration standard:**
  - **Prior to the analysis of samples the zero point and single point calibration must be analyzed and the linear range of the instrument must be established by analyzing a series of standards, one of which must be at the lowest quantitation level.**
  - **Zero point and single point calibration standard must be analyzed with each analytical batch.**
  - **A standard corresponding to the lowest quantitation level must be analyzed with each analytical batch and must meet established acceptance criteria.**
  - **The linearity is verified at a frequency established by the method and/or the manufacturer.**
  - **If a sample within an analytical batch produces results above its associated single point standard then one of the following should occur:**
    - **analyze reference material at or above the sample value that meets established acceptance criteria for validating the linearity; dilute the sample such that the result falls below the**

single point calibration concentration (when sufficient sample volume permits);
- § Report the data with an appropriate data qualifier and/or explain in the case narrative.
- § For metals analysis with a single-point calibration, a sample result may be reported up to 90% of the linear dynamic range (LDR). All samples exceeding this value must be diluted to within the LDR.

Where appropriate, the laboratory has manual integration procedures (SOP MIS039) that are adhered to when evaluating calibration data.

Any samples that are analyzed after an unacceptable initial calibration are re-analyzed or the data are reported with qualifiers, appropriate to the scope of the unacceptable condition (see Section 12 – "Control of Nonconforming Environmental Testing").

Quantitation is always determined from the initial calibration unless the test method or applicable regulations require quantitation from the continuing instrument calibration verification.

Corrective actions are performed when the initial calibration results are outside acceptance criteria. Calibration points are not dropped from the middle of the curve unless the cause is determined and documented. If the cause cannot be determined, the calibration curve is re-prepared. If the low or high calibration point is dropped from the curve, the working curve is adjusted and sample results outside the curve are qualified.

Specific analyses' calibrations are checked more frequently. Some instruments, such as TOX analyzers have built-in calibration features. The internal calibration of these instruments is monitored daily for accuracy.

Some calibration curves for spectrophotometric methods are very stable over a long period of time, however it is the policy of the Laboratory to perform a new initial calibration curve even if the continuing calibration check meets specified criterion, in any of the following events:
- At least every three years
- When the instrument is moved to a different location
- If any maintenance that can affect the calibration has been performed
- If the analysts judges it necessary for special projects or different range of calibration

Spectrophotometers are also subject to wavelength calibration which it shall be performed at least annually, according to the procedure described by the manufacturer in the instrument manual or other documentation.

J.3.2 Continuing Instrument Calibration

- Records

The calculations and associated statistics for continuing instrument calibration are included or referenced in the test method SOP.

Sufficient raw data records are retained to allow reconstruction of the continuing instrument calibration verification. Continuing instrument calibration verification records connect the continuing verification date to the initial instrument calibration.

Where appropriate, the laboratory has manual integration procedures (SOP MIS039) that are adhered to when evaluating calibration data.

- Frequency

  Calibration is verified for each compound, element, or other discrete chemical species. For multi-component analytes, such as aroclors, chlordane, toxaphene, or total petroleum hydrocarbons, a representative chemically related substance or mixture is used.

  Calibration verifications are performed:

  - at the beginning and end of each analytical batch, except for instances when an internal standard is used. For methods employing internal standards, one verification is performed at the beginning of the analytical batch. Some methods have more frequent CCV requirements (see specific SOPs). Many inorganic methods require the CCV to be analyzed after every 10 samples.
  - whenever it is expected that the analytical system may be out of calibration or might not meet verification acceptance criteria.
  - when the time period for calibration or the most recent calibration verification has expired.
  - for all analytical systems that have a calibration verification requirement. Requirements can be found in the method SOPs. Many inorganic methods require the CCV to be analyzed after every 10 samples.

- Evaluation, Verification and Corrective Actions

  The validity of the initial calibration is verified prior to sample analysis by use of a continuing instrument calibration verification (CCV) standard.

  The acceptance criteria, unless something different is specified in the corresponding SOPs or QAPP, is the following:

  - The concentration of the CCV standard shall be from the low-calibration standard to the midpoint of the calibration range;
  - The source of the CCV standard should be the same as the source for the initial calibration standard(s); and
  - The baseline for evaluating the CCV is the initial calibration curve, except for the evaluation of retention times in organic chromatographic methods, which may be based on comparison with the retention times in the initial CCV.
  - The actual acceptance ranges for CCVs are specified in each method SOP

When the method specifies that CCVs shall be run at specific sample intervals, the count of these samples shall be of field samples only.

When a CCV fails to fall within acceptance limits then CCVs and all samples analyzed since last successful calibration verification are re-analyzed. If reanalysis is not possible, the client is notified prior to reporting data associated with a noncompliant CCV and if data are reported, appropriate qualifiers are used and if further clarification is needed this is explained in the case narrative. The exception to this is when a CCV fails with high bias, but the field samples remain not detected.

Corrective action is initiated for CCV results that are outside of acceptance criteria (see Section 12 – "Control of Nonconforming Environmental Testing").

J.3.3 Unacceptable Continuing Instrument Calibration Verifications

If routine corrective action for continuing instrument calibration verification fails to produce a second consecutive (immediate) calibration verification within acceptance criteria, then a new calibration is performed or acceptable performance is demonstrated after corrective action with two consecutive calibration verifications.

For any samples analyzed on a system with an unacceptable calibration, some results may be useable if qualified and under the following conditions:

a) If the acceptance criteria are exceeded high (high bias) and the associated samples are below detection, then those sample results that are non-detects may be reported as non-detects.

b) If the acceptance criteria are exceeded low (low bias) and there are samples that exceed the maximum regulatory limit, then those exceeding the regulatory limit may be reported.

Appendix K

Microbiology

K.1 Method Validation

Microbiological methods are validated according to the following:

a) Accuracy – The methods are validated for accuracy by using at least one (1) known pure reference culture at the anticipated environmental conditions, and compare the method results to that of a reference method.
b) Precision – Is validated by performing at least ten (10) replicate analyses with both the proposed and reference method, using the target microorganisms of choice. The results shall show that the methods are not statistically different.
c) Selectivity (sensitivity) – By verifying all responses in at least ten (10) samples using mixed cultures that include the target organism(s), and at varying concentrations (microbial identification testing or equivalent processes may be used). Calculate the number of false positive and false negative results.

The laboratory will compare the results of these tests with the data quality objectives stated by the client. The data from the above tests must be equal to or better than the stated DQOs. A statement comparing the client DQOs against the above-mentioned QC measures will be included in the validation records.

The laboratory will confirm the validation by participating in a proficiency test program with acceptable results and retain the records of the validation for five years past the date of last use of the method.

K.2 Demonstration of Capability (DOC)

Demonstration of Capability: A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision.

Before reporting any data with a given method, a satisfactory initial DOC (IDOC) is performed. Thereafter, each analyst will demonstrate continuing proficiency through the procedures outlined in Ongoing Demonstration of Capability.

The laboratory has several methods that meet the requirements of EL-V1M5-2009, Section 1.6.1, paragraph 3 of the TNI Standard and is demonstrating capability through the use on-going DOCs (see below). Records to indicate that the requirements of the cited paragraph have been met are available for review. The methods are: Total Coliforms and E. Coli by SM9223B, Total Coliforms by SM9221B, Fecal Coliforms by SM9221E and Heterotrophic Plate Count by SM9215B.

a) <u>Initial Demonstration of Capability (IDOC)</u>

An IDOC is performed:

- before using any method;

- each time there is a change in instrument type, personnel or method; and
- if the laboratory or analysts has not performed the method in a twelve-month period.

The IDOC(s) for each analyst is documented electronically in the QC\IDC folder of the computer system. The document identifies the analyst(s) involved in preparation and/or analysis; matrix; analyte(s), class of analyte(s), or measured parameter(s); the method(s) performed; the laboratory-specific SOP used for analysis (including revision number); the date(s) of analysis; and a summary of the results used to calculate the mean recovery and standard deviations.

All raw data, preparation records, and calculations for each DOC are retained and are available for review.

When methods specify a procedure to be followed, only those procedures will be used. If no procedures are specified the laboratory uses its own procedure, which is documented in the corresponding SOP.

The procedure for IDOC for Microbiological methods is as follows:

a) The target organism(s) is diluted in a volume of clean quality system matrix (a sample in which no target organisms or interferences are present at concentrations that will impact the results of a specific method). This matrix shall be sterile phosphate or sterile peptone solution unless specified by the manufacturer. Prepare at least four (4) aliquots at the concentration specified, or if unspecified, to the countable range for plate methods or working range for most probable number (MPN) type methods.
b) At least four (4) aliquots shall be prepared and analyzed according to the method either concurrently or over a period of days.
c) Using all of the results, convert these results to logarithmic values, then calculate the mean recovery and standard deviation of the log converted results in the appropriate reporting units for each organism of interest. When it is not possible to determine mean and standard deviations, such as for presence/absence, the laboratory shall assess performance against established and documented criteria.
d) For qualitative tests, acceptable performance in a blind study, either internally or externally generated, may be used to meet this Standard, provided that the study consists of a minimum of a blank, a negative culture, and a positive culture for each target organism or metabolite (e.g. b-glucuronidase in E. coli.).
e) Compare the information from c) above to the corresponding acceptance criteria for precision and accuracy in the method (if applicable) or in laboratory-generated acceptance criteria (if there are not established mandatory criteria). If all parameters meet the acceptance criteria, the analysis of actual samples may begin. If any one of the parameters does not meet the acceptance criteria, the performance is unacceptable for that parameter.
f) When one or more of the tested parameters fail at least one of the acceptance criteria, the analyst shall proceed according to i) or ii) below.
    i) Locate and correct the source of the problem and repeat the initial DOC for all parameters of interest beginning with b) above.

ii) Repeat the initial DOC for all parameters that failed to meet criteria.

g) Repeated failure, however, confirms a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all organisms of interest beginning with b).

The organisms used *Escherichia coli* for positive total coliform and fecal coliform bacteria source, *Enterobacter aerogenes* for positive total coliform and negative fecal coliform bacteria and *Pseudomonas aeruginosa* for negative total coliform and negative fecal coliform bacteria

For enumeration, since it is hard to determine the amount of bacteria in the source, a senior chemist or the Microbiology Technical Director makes a serial dilution of bacteria source and run it side by side with the chemist performing the IDOC; the results from the senior chemist are used as True Value.

For Heterotrophic Plate Count (HPC) real samples are used to perform IDOCs. The chemist performing the IDOC runs the samples side by side with a senior chemist or supervisor and record their findings in comparison to result of the senior chemist.

b) <u>Ongoing Demonstration of Capability</u>

After the demonstration of capability is completed, on-going proficiency is maintained and demonstrated at least annually. Each analyst is expected to consistently meet the QC requirements of the method, the laboratory SOP, client requirements and/or the TNI standard. Ongoing DOCS are documented as electronic files in spreadsheets located in the folder QC\IDC of the computer system, and all records related to the demonstration are retained.

The laboratory uses the following procedure to demonstrate ongoing DOC:

a) Performing another initial demonstration of capability
b) Analysis of one sample or clean matrix that is fortified with a known quantity of the target organism, with results meeting the laboratory acceptance criteria for accuracy and, where applicable to the testing technique, also meeting the observational details expected for the presumptive, confirmed and completed phases defined in the method.
c) Analysis of one sample in duplicate for each target organism and test, with results meeting the laboratory acceptance criterion for precision.
d) Acceptable results for one-single-blind proficiency test sample for target organisms in each field of accreditation.
e) Performance of an alternate adequate procedure for the field of accreditation, the procedure and acceptance criteria being documented in the laboratory's quality system.
f) A documented process of analyst review using QC samples. QC samples can be reviewed to identify patterns for individuals or groups of analysts and determine if corrective action or retraining is necessary; or
g) if a) through f) are not technically feasible, then analysis of real-world samples with results within predefined acceptance criteria (as defined by the laboratory or method) shall be performed.

K.3 Calibration

Section 23.2.2 includes information on calibration of support equipment. This section covers calibration of analytical equipment.

The laboratory has methods that describe how the support equipment such as conductivity meters, oxygen meters, pH meters, hygrometers, and other similar equipment are calibrated and verified. These are found in logbooks or as electronic records.

The laboratory is not currently using continuous monitors but if these monitors are used in the future they will be verified at least once per month. If the verification fails, an initial calibration is performed and verified. If the instrument is taken off-line, an initial calibration and verification is performed before returning to service.

K.3.1 Specific Equipment Requirements

- **Autoclave**

  The laboratory initially evaluates the performance of each autoclave before first use by establishing its functional properties and performance by the procedures described in SOP MIS031.

  Autoclaves meet specified manufacturer's temperature tolerances. Pressure cookers shall not be used for sterilization of growth media.

  With each use:

  - **The laboratory ensures that the sterilization temperature is reached by u**sing a maximum registering thermometer.
  - **The laboratory records date, contents, maximum temperature reached, pressure, time in sterilization mode, total run time (may be recorded as time in and time out) and analyst's initials.**
  - **Temperature sensitive tape is used with the contents of each autoclave run to indicate that the autoclave contents have been processed.**

  On a monthly basis, when the autoclave is in use, the laboratory verifies that the autoclave is effectively sterilizing the contents by using BT Sure Biological indicator, Geobacillus stearothermophilus, for steam sterilization at 121°C, kills in a normal cycle time as lactose based media.
  The autoclave mechanical timing device is checked quarterly against a stopwatch and the actual time elapsed documented.

  Autoclave maintenance, which is performed internally, is performed annually. The activities include a pressure check and verification of temperature device.

- **Volumetric Equipment**

Equipment with movable parts such as automatic dispensers, dispensers/diluters, and mechanical hand pipettes are verified for accuracy quarterly.

Equipment such as filter funnels, bottles, non-Class A glassware, and other containers with volumetric markings (including sample analysis vessels) are verified once per lot prior to first use. The volume of the disposable volumetric equipment, such as sample bottles, and disposable pipettes are checked once per lot. The verification is either volumetric or gravimetric depending on the volume measured, acceptance range is 5%.

- UV instruments Used for Sanitization

  UV instruments for sanitation are not used in the lab. If put in operation they will tested quarterly for effectiveness by using uvcide strips.

  Bulbs would be replaced when the output is less than 70% of original for light tests or if count reduction is less than 99% for a plate containing 200 to 300 organisms.

- Water Baths and Incubators
  The laboratory initially establishes the uniformity of temperature distribution in incubators and water baths by placing calibrated thermometer in different areas of the water batch or incubator.

  On each day of use, the temperature of incubators and water baths is recorded twice a day, at least four hours apart.

- Ovens Used for Sterilization

  Ovens are not currently used at the laboratory for sterilization. If they were used, they would be checked for sterilization effectiveness monthly with the appropriate biological indicator. Records would be maintained for each cycle that include date, cycle time, temperature, contents and analyst's initials

Appendix L

Radiochemistry

L.1 Method Validation

Reference methods are validated by determining the minimum detectable activity as outlined below, and precision and bias using an initial demonstration of capability.

The laboratory will compare the results of these tests with the data quality objectives stated by the client. The data from the above tests must be equal to or better than the stated DQOs. A statement comparing the client DQOs against the above-mentioned QC measures will be included in the validation records.

The laboratory will confirm the validation by participating in a proficiency test program with acceptable results and retain the records of the validation for five years past the date of last use of the method.

a) Detectable Activity

1. Minimum Detectable Activity (MDA)

The laboratory will determine the MDA of a method by a procedure that reflects instrument limitations and the intended data use. When the method requires a specific procedure for determining the MDA, only that procedure will be used.

MDAs are determined in samples that represent the quality system matrices to be evaluated. All sample processing/preparation steps and all determinative steps are used to validate the method for all targeted analytes. The representative quality system matrix will be free from the target analytes of interest or interfering analytes that impacts the MDA.

For all quality systems (except drinking water), the MDA represents the estimate of the smallest true activity (or activity concentration) of an analyte that ensure a 95% probability of detection.

For the Safe Drinking Water Act (SDWA) (drinking water quality system matrix), the MDA (SDWA “detection limit”), the MDA is equal to the concentration of analyte that can be counted with a precision of 100% at the 95% confidence level (1.96σ where σ is the standard deviation of the net counting rate of the sample). The SDWA detection limit (MDA) is equivalent to the concentration at which the relative standard deviation of the measurement due to counting statistics is 1/1.96. The laboratory shall ensure that the determined MDA meets (or is lower than) the published detection limits published in 40 CFR Part 141.25.

b) Precision and Bias

Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. Precision is usually expressed as standard deviation, variance, or range, in either absolute or relative terms.
BIAS is the systematic error that contributes to the difference between the mean of a significant number of test results and the accepted reference value.

Precision and bias for non-reference, modified reference or laboratory-developed methods are established using the procedure outlined below and compared to the criteria established by the client (when requested), the method, or the laboratory.
Precision and bias are determined by processing samples through all phases of the method (sample preparation, cleanup, analysis, etc.). This study is performed for all quality system matrices for which the test is to be used.

The following is the procedure use to evaluate precision and bias:

1. **Analyze QC samples in triplicate containing the analytes of concern at or near the MDA, at a level near ten (10) times the MDA, and at a mid-range concentration.**
2. **Process these samples on different days as three (3) sets of samples through the entire measurement system for each analyte of interest.**
3. **Each day one QC sample at each concentration is analyzed. A separate method blank shall be subjected to the analytical method along with the QC samples on each of the three (3) days.**
4. **For each analyte, calculate the mean recovery for each day, for each level over days, and for all nine (9) samples. Calculate the relative standard deviation for each of the separate means obtained.**
   The precision value that is determined is compared against uncertainly estimates. The precision at each testing level must be statistically greater than the maximum combined standard uncertainty of measurement at the testing level.

c) <u>Measurement of Uncertainty</u>

The laboratory will report the measurement uncertainly of all radioactive tests. The report will explain the uncertainty and will include:

- **An indication of whether the uncertainty is the combined standard uncertainty (“one sigma”) or an expanded uncertainty; and**

- **If expanded, an indication of the coverage factor (k) and optionally the approximate level of confidence.**

The laboratory uses the a procedure to determine the uncertainly consistent with ISO Guide 98: 1995, Guide to the Expression of Uncertainty in Measurement (GUM), and The recommendations of Chapter 19 of the Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP) Volume I (EPA 402-B-04-001A), Volume II (EPA 402-B-04-001B), Volume III (EPA 402-B-04-001C), July 2004.

d) **Selectivity**

The laboratory will evaluate selectivity using the checks established in the method.

L.2 Demonstration of Capability (DOC)

Demonstration of Capability: A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision.

Before reporting any data with a given method, a satisfactory initial DOC (IDOC) is performed. Thereafter, each analyst will demonstrate continuing proficiency through the procedures outlined in Ongoing Demonstration of Capability.

The laboratory has several methods that meet the requirements of EL-V1M4-2009, section 1.6.1 paragraph 3 of the TNI standard and is demonstrating capability through the use on-going DOCs (see below). Records to indicate that the requirements of the cited paragraph have been met are available for review. The methods are: EPA 900.0, SM7110C, EPA 20.8 and SM7500-Rn.

a) **Initial Demonstration of Capability (IDOC)**

An IDOC is performed:

- Before using any method,
- Each time there is a change in instrument type, personnel or method, and
- If the laboratory or analysts has not performed the method in a twelve-month period.

The IDOC(s) for each analyst is documented <Where?>. The document identifies the analyst(s) involved in preparation and/or analysis; matrix; analyte(s), class of analyte(s), or measured parameter(s); the method(s) performed; the laboratory-specific SOP used for analysis (including revision number); the date(s) of analysis; and a summary of the results used to calculate the mean recovery and standard deviations.

All raw data, preparation records, and calculations for each DOC are retained and are available for review.

When methods specify a procedure to be followed, only those procedures will be used. If no procedures are specified the laboratory uses its own procedure, as follows:

a) The analyte(s) will be diluted in a volume of clean quality system matrix (a sample in which no target analytes or interferences are present at concentrations that will impact the results of a specific method) sufficient to prepare four (4) aliquots at a laboratory specified concentration. Where gamma-ray spectrometry is used to identify and quantify more than one analyte, the laboratory control sample shall contain gamma-emitting radionuclides that represent the low (e.g., 241Am), medium (e.g., 137Cs)

and high (e.g., 60Co) energy range of the analyzed gamma-ray spectra. As indicated by these examples, the nuclides need not exactly bracket the calibrated energy range or the range over which nuclides are identified and quantified.

b) **At least four (4) aliquots shall be prepared and analyzed according to the method either concurrently or over a period of days.**
c) **Using all of the results, calculate the mean recovery in the appropriate reporting units and the standard deviations of the population sample (in the same units) for each parameter of interest. When it is not possible to determine mean and standard deviations, such as for presence/absence and logarithmic values, the laboratory shall assess performance against established and documented criteria.**
d) **Compare the information from (c) above to the corresponding acceptance criteria for precision and accuracy in the method (if applicable) or in laboratory-generated acceptance criteria (if there are not established mandatory criteria). If all parameters meet the acceptance criteria, the analysis of actual samples may begin. If any one of the parameters does not meet the acceptance criteria, the performance is unacceptable for that parameter.**
e) **When one or more of the tested parameters fail at least one of the acceptance criteria, the analyst shall proceed according to i) or ii) below.**
   i) **Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with b) above.**
   ii) **Beginning with b) above, repeat the test for all parameters that failed to meet criteria.**
f) **Repeated failure, however, confirms a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with b).**
g) **When an analyte not currently found on the laboratory's list of accredited analytes is added to an existing accredited method, an initial DOC shall be performed for that analyte. When analytes are added to gamma-ray spectrometry and quantified this is not required.**

b) **<u>Ongoing Demonstration of Capability</u>**

After the demonstration of capability is completed, on-going proficiency is maintained and demonstrated at least annually. Each analyst is expected to consistently meet the QC requirements of the method, the laboratory SOP, client requirements and/or the TNI standard. Ongoing DOCS are documented in the QC\IDC folder of the network computer system, and all records related to the demonstration are retained.

The laboratory uses the following procedure to demonstrate ongoing DOC:

a) **Performing another initial demonstration of capability**
b) **Acceptable results for one-single-blind proficiency test sample (may be applied to similar methods using the same technology).**
c) **Having at least four (4) consecutive laboratory control samples with acceptable levels of precision and accuracy. The laboratory shall determine the acceptable limits for precision and accuracy prior to analysis. The**

laboratory shall tabulate or be able to readily retrieve four (4) consecutive passing LCS for each method for each analyst each year;

d) Performance of an alternate adequate procedure for the field of accreditation, the procedure and acceptance criteria being documented in the laboratory's quality system.

f) A documented process of analyst review using QC samples. QC samples can be reviewed to identify patterns for individuals or groups of analysts and determine if corrective action or retraining is necessary; or

g) if a) through f) are not technically feasible, then analysis of real-world samples with results within a predefined acceptance criteria (as defined by the laboratory or method) shall be performed.

L.3 Calibration

Section 23.2.2 includes information on calibration of support equipment. This section covers calibration of analytical equipment.

The calibration of the radiation counting equipment is performed as specified in the methods SOPS and following instrument manufacturer's instructions.

LABORATORY QUALITY ASSURANCE MANUAL

(LQAM)

Rev. 26

March 5, 2014

Quality Assurance Manager: Bahar Amiri

The Laboratory Quality Assurance Manual is effective as of the date of the signature of the Quality Assurance Manager

EUROFINS AIR TOXICS, INC.
180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630
(800) 985-5955
atl@eurofinsus.com

LABORATORY QUALITY ASSURANCE MANUAL

Approvals

Robert Mitzel, President	3/5/14 Date
Heidi Hayes, Technical Director	3-5-14 Date
Sepideh Saeed, Laboratory Director	3-5-14 Date
Bahar Amiri, Quality Assurance Manager	3-5-14 Date

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1. INTRODUCTION

The purpose of the Laboratory Quality Assurance Manual is to provide a framework to outline the quality systems at Eurofins Air Toxics, Inc.

1.1 Our Unique Promise of Value

Eurofins Air Toxics is the global leader in the The NELAC Institute (TNI) National Environmental Laboratory Accreditation Program (NELAP) for accredited vapor-phase environmental analytical laboratory services, and is also ISO/IEC 17025:2005 accredited for environmental chamber chemical emissions testing and associated analytical laboratory services.

Eurofins Air Toxics supports public and private sectors, including engineering and consulting firms, manufacturers, industry, government, retailers and others by offering a wide variety of certified air methods as well as emissions testing of consumer and building products and materials. Eurofins Air Toxics provides unmatched quality, capacity, and technical expertise to deliver an outstanding service experience to clients worldwide.

1.2 Mission Statement

Eurofins Air Toxics, Inc. is an analytical and environmental laboratory specializing in the analysis of vapor-phase contaminants and air quality parameters. Our business is guided by four key principles:

1) Providing unmatched data integrity
2) Establishing long-term relationships
3) Delivering quality client service
4) Exceeding client expectations

1.3 Quality Policy

The Executive Management Group recognizes quality as a key element of the laboratory's standard of service. This group supports the laboratory's commitment to quality as defined by NELAP and ISO 17025.

The Quality Policy Statement gives employees clear requirements for producing analytical data that is scientifically valid, legally defensible, accurate, impartial, and of known and documented quality, through strict adherence to the Quality Policy Statement. The Quality Assurance Officer wrote the Quality Policy Statement with final approval from the Technical Director. The policy cannot be revised without the Technical Director and Quality Assurance Officer's approvals. Employees are trained on the components of the Quality Policy Statement during their orientation. All employees sign the statement as agreement to implement the policy in all aspects of their work. The statement is as follows:

We strive to provide the highest quality data achievable by:

- Describing clearly and accurately all activities performed; documenting "real time" as the task is carried out; understanding that it is never acceptable to "back date" entries; and should additional information be required at a later date, the actual date and by whom the notation is made must be documented.
- Providing accountability and traceability for each sample analyzed through proper sample handling, labeling, preparation, instrument calibration/ qualification, analysis, and reporting; establishing an audit trail that identifies date, time, analyst, instrument used, instrument conditions, quality control samples (where appropriate and/or required by the method), and associated standard material.
- Emphasizing a total quality management process and commitment to continuous improvement that provides accuracy; strict compliance with agency regulations and client requirements, giving the highest degree of confidence; and understanding that meeting the requirements of the next employee in the work-flow process is just as important as meeting the needs of the external client.
- Providing thorough documentation and explanation to qualify reported data that may not meet all requirements and specifications but is still of use to the client, and understanding this occurs only after discussion with the client on the data limitations and acceptability of this approach.
- Responding immediately to indications of questionable data, out-of-specification occurrences, equipment malfunctions, and other types of laboratory problems with investigation and applicable corrective action; and documenting these activities completely, including the reasons for the decisions made.
- Providing a work environment that ensures accessibility to all levels of management and encourages questions and expressions of concern to management regarding quality issues.

We each take personal responsibility to provide this quality product while meeting the company's high standards of integrity and ethics, understanding that improprieties, such as failure to conduct the required test, manipulation of test procedures or data, or inaccurate documentation, will not be tolerated. Intentional misrepresentation of activities performed is considered fraud and is grounds for termination.

1.4 Statement of Values

At Eurofins Air Toxics, we strive to be the BEST in everything that we do. Our very existence is based on our continued ability to provide innovative, dependable, and cost-effective environmental services to our clients. We CARE about our clients as well as our co-workers and manage our daily activities to build relationships based on mutual TRUST, HONESTY, and RESPECT. We are LEADERS in our field and accept the risks associated with building new frontiers in our professional lives. Our strength comes from our TEAMS for through them we can achieve our goals.

1.5 Certifications, Accreditations, and Registration

Accreditation/Certification is the process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications and/or standards. It is the one generally accepted method by which a laboratory such as ours can demonstrate its capability of generating acceptable, professional, quality test results in those areas in which it claims competence. To this end, we have actively sought accreditation by organizations offering it in areas relevant to our technical expertise. We strive to ensure that the facility, equipment, procedures, records, and methods used by Eurofins Air Toxics laboratory in the testing of environmental samples are in compliance with the requirements of these standards.

Appendix C lists accreditations held by Eurofins Air Toxics, Inc. in support of environmental and product testing work. Current copies of all scopes of accreditation are kept on file in the Quality Assurance Department.

2. ORGANIZATION AND PERSONNEL

2.1 Organizational Structure

Eurofins Air Toxics' management organization includes six core areas: Operations, Information Technology (IT), Client Services, Research, Sales and Marketing, and Finance and Administration. The management staff includes executives, directors, managers, and group leaders. Each operating area is lead by a manager and/or a group leader. In the absence of a member of the laboratory and operational management team, deputies are appointed as follows:

Position	Deputy
President	Technical Director or appointee
Technical Director	Quality Assurance Manager or appointee
Quality Assurance Manager	Technical Director or appointee
Laboratory Director	Technical Director or appointee
Vice President of VOC Materials Testing	Technical Director or appointee
Managers/Group Leaders	Laboratory Director

Eurofins Air Toxics' senior executives and managers are committed to following and assuring compliance with the TNI Standard as defined in this Laboratory Quality Assurance Manual (LQAM). Each manager is responsible for implementing and maintaining systems as they affect their teams and for participating in their respective role in the management systems as outlined in the LQAM.

An Organizational Chart is presented in Appendix D of this manual. This organizational structure is created in a way to avoid any potential for conflicts of interest or undue pressure that might influence the technical judgment of analytical personnel.

2.2 Management Responsibilities

Management and/or supervisor is defined as group leaders, managers, and directors, and positions above those. The following is a list of management responsibilities:

- Personnel hiring and training
- Supervision of personnel
- Ensuring quality of data produced
- Resources allocation
- Directing daily work operations, including scheduling of work
- Maintaining awareness of technical development and regulatory requirements
- Assessing laboratory capacity and workload
- Contributing to the continuous improvement of the laboratory operation
- Providing resources to ensure a safe work environment

- Providing resources to ensure a work environment free of undue pressures
- Communicating problems and concerns to senior and executive management to enlist a higher level of support for corrections and continuous improvement, ensuring compliance with the requirements of NELAP and ISO 17025
- Ensuring that corrective actions are carried out in an appropriate and agreed upon time frame

The Technical Director ensures that the laboratory's policies and objectives for quality of testing services are documented in this quality manual. The Technical Director must assure that the manual is communicated to, and understood and implemented by all personnel concerned.

2.3 Overview of the Quality Assurance Program

The Quality Assurance (QA) Department is responsible for developing planned activities the purpose of which is to provide assurance to all levels of management that a quality program is in place within the laboratory, and that it is functioning in an effective manner that is consistent with the requirements of NELAP and ISO 17025. Although Eurofins Air Toxics is a wholly owned subsidiary of Eurofins Scientific, the Quality Assurance and quality systems described in this manual are specific to Eurofins Air Toxics.

2.3.1 Quality Assurance Manager

The Quality Assurance Manager ensures that the quality system is followed at all times. The QA Manager reports directly to the Technical Director in order to maintain independence from business operating units and facilitate communications regarding quality-related issues. The QA Manager has no direct supervisory responsibility for the generation of technical data to avoid any conflict of interest in administrating the QA program. The QA Manager has the final authority to stop work that compromises the laboratory's integrity or data quality. The situation must be investigated and appropriate corrective action must be put in place before the QA Manager will authorize the resumption of work. The specific duties of the QA Manager are communicated in job description format.

2.4 Quality Assurance Responsibilities

The Quality Assurance team is responsible for implementing and maintaining Quality Assurance procedures throughout the laboratory. This is accomplished via coordination and dissemination of internal and external assessment information, review of Standard Operating Procedures (SOPs) to document variances taken to published methods, monitoring of the Quality Assurance Manual to ensure consistency with actual practices, maintenance of an ongoing Corrective Action Program with quarterly reports to the senior management team, a leadership role in employee training, data review, and other quality control-related programs.

The QA team is free from any commercial, financial, or production pressures when making assessments or decisions regarding the quality of work produced or effectiveness of the quality systems.

2.5 Communication of Quality Issues to Management

Communication between the Quality Assurance (QA) team and other management teams occurs on a regular basis (typically via bi-weekly status meetings). Information regarding outstanding corrective action items, upcoming assessments, assessment results, and/or general observations are discussed and documented via a database of agenda notes. The QA databases along with the Laboratory Information Management System (LIMS) database are used to compile a Quarterly Quality Assurance Status Report, which is distributed to the senior management team for review.

2.6 Personnel Qualifications and Responsibilities

Full resumes and specific position descriptions for all personnel are located in Human Resources (HR) Department files. In addition, department managers have copies of position descriptions for their staff.

2.6.1 Executive Team

President: Provides leadership that ensures the founding mission and core values of the company are put into practice. The President leads programs relating to the development of long-range strategy, quality systems, financial infrastructure and sales. The President also provides day-to-day leadership and management of programs for overseeing the processes and resources necessary for establishing long-range service objectives, plans, and policies in cooperation with the Board of Directors. The President is responsible for the measurement and effectiveness of both internal and external processes by providing accurate and timely feedback on the operating condition of the company. In addition, the President directs the definition and operation of the laboratory production by fostering a success-oriented and accountable environment within the company.

Technical Director: Provides oversight for the quality systems and technical performance of the laboratory, and manages technical support, the project management team, and the QA Manager. The Technical Director is responsible for developing products and solutions to meet client and industry needs, and also oversees the validation process of current and new products to ensure quality objectives are met and documented as defined.

Laboratory Director: Responsible for managing the operations of the laboratory, profit/loss relating to operations, laboratory efficiency improvement in software and instrument automation, and serves as the primary interface between finance, HR, IT, and sales/marketing. The Laboratory Director has the overall responsibility of ensuring customer satisfaction goals are met while elevating the skill and training of key technical staff as well as assuring that state-of-the-art instrumentation and capital assets are in place to meet global customer needs.

Vice President of VOC Materials Testing: Responsible for the promotion and demonstration of expertise in chamber testing, product emissions, and indoor air quality (IAQ), providing scientific leadership in these areas. Represents Eurofins Air Toxics on technical committees and at technical conferences and trade shows as they relate to the promotion and demonstration of expertise in chamber emissions testing and IAQ. Has the overall responsibility for establishing and maintaining a strategy and business plan for the emissions and product testing markets in the U.S.

2.6.2 Management Team:

Laboratory management and personnel are free from any commercial, financial, or production pressures when making technical judgments or decisions regarding the quality of work produced.

Information Technology Manager: Oversees all aspects of software engineering and development, database administration, and network administration. The IT manager is instrumental in designing and implementing model work-flow processes, defining user requirements, and proposing software design and implementation to satisfy long-term company business goals. This role provides established policies and procedures to ensure continuous database and server environment integrity and reliability.

Quality Assurance Manager: Responsible for overseeing the quality systems in the laboratory. Key to the Quality Assurance role is a focus on continuous improvement through effective monitoring of systems and evaluation of non-compliance and corrective actions. To support the quality systems, the Quality Assurance Manager leads the internal and external audit programs, negotiates audit resolution, and oversees the effectiveness of the Corrective Action Report (CAR) program. The QA Manager is tasked with providing timely feedback to front-line managers and bench staff regarding quality programs and also a big-picture assessment to senior management. Additionally, the QA Manager ensures required documentation and certifications are current and accurate, including regulatory accreditations, the LQAM, and SOPs.

Managers/Group Leaders: Responsible for day-to-day operations of the laboratory or specific departments. The Group Leaders oversee technical operations, sample analysis, data entry, report generation, provision of resources, and other related areas. In addition, they are responsible for employee management and review. Group Leaders report directly to the Laboratory Director. Managerial decisions are made by the Laboratory Director in their absence.

2.6.3 Laboratory Staff and Responsibilities

It is the primary responsibility of laboratory staff to produce quality data within the framework of each individual method and within the parameters of the laboratory's quality control guidelines. It is also the responsibility of staff to identify existing problems or inefficiencies, and to improve the processes of the laboratory whenever possible. Duties for these personnel typically include:

- Sample preparations
- Performance of analytical tests
- Calibrations, operation, and maintenance of instruments
- Standard and reagent preparation
- Sample storage
- Data entry
- Data package preparation

2.7 Training

The experience and training received by personnel is of great importance to Eurofins Air Toxics' clients and regulatory agencies. Accurate training documentation is the responsibility of both employees and their supervisors. On a routine basis, the supervisor reviews and signs training documentation to verify that it is complete and current.

Each laboratory analyst being trained to perform a new analysis is required to perform an initial Demonstration of Capability (DOC) and meet the requirements for accuracy and precision before working independently on the test methods. Typically this is accomplished by the successful analysis of at least four aliquots of a laboratory quality control sample. However, there are certain tests that are not required by the mandated test method or regulation to perform the above procedure (e.g., PM10). In this case, the analyst's proficiency demonstration is satisfied by documentation of having read, understood, and agreed to follow the SOP, specific department or method forms and procedures, and observation by scientist or senior analyst.

Management personnel are responsible for planning ongoing professional growth and development activities for an employee through on-the-job training and/or internal and external training courses so that an employee can maintain a current skill set to match job responsibilities.

An annual performance review based on job accountabilities, objective measures, and pre-defined standards is completed by management personnel for each employee. This assessment is documented and maintained. Input is obtained from other managerial personnel as needed.

2.7.1 New Hire Training

New employees learn about personnel and safety policies as well as business strategies through a formal process administered by our Human Resources Department and the Safety Committee. All new employees are also required to attend the Quality Assurance Orientation course. Completion of this course is documented in the employee's Training Record. The course outline includes:

- Introduction to QA
- Definitions of SOPs and LQAM
- How to use CARS
- Logbook protocol
- Chain-of-custody procedures

- Training Documentation
- Overview of Eurofins Air Toxics classes including Ethics and Integrity courses
- Overall Training Record organization and upkeep

New employee training continues with review and signing of the Eurofins Air Toxics Ethics Policy (Form F1.56), a review of the Quality Assurance Manual, and signing of the Quality Policy. Upon completion of those, employees move on to analytical method training if required for their position. Other non-testing training materials may be required by the departments.

In general, the laboratory staff reviews the department's SOPs and/or the regulatory method as well as the instrument manual. The employee will then observe while an experienced analyst prepares samples and operates the instrument. Training includes sample handling and preparation, documentation protocols, calibration procedures, QC requirements, data management, data reporting and troubleshooting.

2.7.2 Ongoing Training

After successful completion of the initial Demonstration of Capability, all laboratory staff must demonstrate continued proficiency. Whenever there is a change in test method, instrument method type, and/or personnel a new DOC must be performed. At least once per year, each analyst must demonstrate continued proficiency on assigned technical methods. The QA Department notifies personnel via e-mail whenever a new SOP is generated or a current SOP is updated. Employees responsible for that method or procedure must read the new or updated SOP within 30 days and document the review in the LIMS SOP Tracker module. In addition, the Laboratory Quality Assurance Manual and the Chemical Hygiene Plan must be annually reviewed by all employees.

Employees are re-trained if an issue or investigation warrants that it is a necessary corrective action. Management provides direction as to when employee re-training is required, and to the extent of the re-training.

2.8 Employee Safety

Laboratory staff may, on occasion, be exposed to handling of solvents, compressed gases, calibration standards, or other hazards. Eurofins Air Toxics designates an assigned Safety Officer and several staff members who comprise the Safety Committee. Some members are 40-hour OSHA-trained and respirator-fitted.

Employee education in the safe handling and disposal of these materials is accomplished as follows:

- Each new employee is given a safety tour of the facility within the first two days of employment. Documentation of this orientation appears in the employee's Training Record.
- The Safety Committee meets frequently to discuss safety concerns and ways of improving safety in the work place.
- The Safety Committee schedules ongoing safety training throughout the year.
- If special precautions must be taken to perform a method, a safety section is included in the method SOP or in a stand-alone SOP which discusses protocols and other measures for risk reduction through exposure prevention.
- Safety Data Sheets (SDSs), formerly Material Safety Data Sheets (MSDS), are maintained for each chemical used on-site. The SDSs are accessible to personnel in the library area immediately outside the standards room and/or electronically through the chemical inventory database (CISpro) at all times. SDSs are also accessible on the Internet from product vendors.
- The Safety Committee members are assigned to duties that include hazardous waste disposal, incident or spill management, scheduling staff training, safety site assessments, Chemical Hygiene Plan review, and the overall leadership of the Safety Program.

2.9 Client Services/Project Management Responsibilities

The Project Management group is responsible for organizing and managing client projects. Clients are assigned a Project Manager who serves as their primary contact. It is the Project Manager's responsibility to act as client advocate by communicating client requirements to laboratory personnel and ensuring that clients provide complete information needed by the laboratory to meet those requirements. All client verbal and electronic communications are documented by the project managers in the LIMS Contacts module. In addition to information management, project management responsibilities include:

- Coordinating and preparing proposals in conjunction with technical staff, including review of project-specific documents and negotiations of variance requests

- Documentation of project requirements
- Coordinating and communicating turnaround-time (TAT) requirements
- Scheduling sample submissions, sample containers, and sample pickup via Eurofins Air Toxics courier service
- Informing clients of deviation from their contract

2.10 Confidentiality

Strict confidentiality is maintained in all of Eurofins Air Toxics dealings with clients. All employees are required to protect company data, including client names and/or test results from disclosure to any third party. This policy is presented to employees in SOP #99 and during their orientation period.

Clients are promptly notified if their data is subpoenaed or requested by a regulatory or legal body.

In order to ensure the confidentiality of our systems and procedures within the laboratory, it is Eurofins Air Toxics' policy to restrict the distribution of our internal procedures to clients. Clients are, however, permitted to review the laboratory's procedures while on-site as part of an audit or visit. Based on this policy, the laboratory requests that any document viewed is not shared or made available to any third parties without the permission of Eurofins Air Toxics.

2.11 Operational Integrity

All employees sign an Employee Ethics Statement on their first day of employment. Employees responsible for generating, handling, or reviewing laboratory data understand that Eurofins Air Toxics' mission is to perform all work with the highest level of integrity. Shortcuts or generating results to suit a client's purpose, rather than adhering to good scientific practices, is not considered acceptable under any circumstances. Any violation of the laboratory ethics policy results in a detailed investigation that could lead to termination. Examples of violations of data integrity are listed below:

- Knowingly recording inaccurate data
- Fabrication of data without performing the work needed to generate the information; this includes creating any type of fictitious data or documentation
- Time travel or adjusting clocks on computerized systems to make it appear that data was acquired at some time other than the actual time

- Manipulation of data for the express purpose of passing systems suitability or quality control criteria
- Selective use of data generated, or not using data that was legitimately generated to impact the outcome of a test
- Executing significant deviations from approved test methods and procedures without prior approval from Eurofins Air Toxics management and/or the client

If an issue does arise which could compromise data integrity, personnel are instructed to perform the following activities:

- Clearly document the situation and maintain all data generated. There is a big difference between poor judgment and fraud. Fraud usually involves intent to conceal an action taken. Therefore, the more documentation that is maintained the less likely an action is considered fraudulent if further scrutinized. All documentation of the inquiry and subsequent disciplinary actions will be maintained by both the Technical Director and the Human Resources Department for at least five years.
- When out-of-specification results or quality control-type issues are detected, all supporting data and relative background information must be documented and presented for management review. Problem resolution and client contact, as applicable, must also be documented.
- Any questionable situations and decisions must be reviewed with a supervisor.
- Questionable or uncomfortable issues are brought directly to QA Manager or a member of the QA Department as part the QA "open door" policy. If an employee desires to remain anonymous, he or she is encouraged to report to the designated laboratory staff ombudsman. The designated ombudsman will meet separately with management and the employee involved, ensuring anonymity.

3. BUILDINGS AND FACILITIES

3.1 Facility

The Eurofins Air Toxics laboratory occupies approximately 35,000 square feet of space in Folsom, California, including 7,000 square feet of office space. The single-story building is custom-designed to suit the specifications of an air laboratory. Design criteria included floor plans to accommodate segregation of conflicting tests and provide an environment that is conducive for cross-functional work teams. The main instrumentation laboratory is based on an "open" concept in which walls were removed to promote a sense of community and teamwork. Wide hallways with alcoves were designed to encourage congregation and discussion. The number of private offices was minimized so that barriers between management and staff are absent. Elements of the quality system are evident throughout the facility design. The facility's map is provided in Appendix F.

3.2 Security

Security at Eurofins Air Toxics is maintained through a controlled access system. Representatives of State, Federal, and private entities have access to the laboratory facility and records during normal business hours. Guests and employees must enter/exit through Sample Receiving or the reception area. All visitors must sign in and out upon arrival and departure. After work hours, the building is secured and linked to a commercial security agency. The security system is equipped with perimeter alarms, motion sensors, and speakers that monitor background sounds. Heat-activated fire alarms are monitored by an outside agency. A fire alarm also activates the security system. Security and controlled access protocols are described in SOP #30.

4. DOCUMENT CONTROL

4.1 Controlled Documents at Eurofins Air Toxics

It is Eurofins Air Toxics' policy to restrict the distribution of internal procedures to clients, and we discourage the distribution of company confidential documents outside of the facility. Clients are permitted to review our procedures while on-site as part of an audit or visit. Any documents that are distributed are only done so with the approval of QA.

4.1.1 Quality Policy Manual and Company Policies

Eurofins Air Toxics' Quality policies and Quality Systems must comply with all State and Federal requirements for those programs for which the laboratory maintains accreditation.

All Eurofins Air Toxics employees are required to read the Quality Assurance Manual within 30 days of release of the latest version and maintain current documentation in their Training Record binders. The Quality Assurance Manual is available to all employees electronically on a shared server located at O:\QA\LQAM. A hard copy is also available in the QA department.

4.1.2 Laboratory Standard Operating Procedures (SOPs)

The SOPs at Eurofins Air Toxics detail the work processes used on a regular basis that are to be conducted and followed within the organization. They document the way activities are to be performed to facilitate consistent conformance to technical and quality system requirements and to support data quality. These SOPs can be administrative or technical. All employees should maintain a record of review of the most current SOPs.

4.1.3 Work Instructions (at the department level)

The intent of these procedures or documents is to define in greater detail the specific "how to". The level of detail in these documents must be sufficient so any appropriately trained person can perform the task accurately.

4.1.4 Logbooks, Forms, and Instructions

The intent of these documents is to provide documented evidence to support Eurofins Air Toxics quality systems and operations. They are used as part of regular laboratory operations to record necessary information.

4.2 Document Approval, Issue, Control, and Maintenance

The Quality Assurance Department is responsible for the approval, issue, control, and maintenance of all documents that are part of the laboratory's quality systems including, but not limited to, the Quality Assurance Manual (LQAM), Standard Operating Procedures (SOPs), Logbooks, Forms and Instructions, Certificates of Analysis (C of As), and calibration and training documents.

All documents issued to personnel in the laboratory as part of the quality system shall be reviewed and approved for use by Technical Director, Laboratory Director, and Quality Assurance Manager prior to use.

The LQAM and SOPs are reviewed to ensure they remain accurate and current. The frequency of review is either annual at the least or as needed, depending on the procedure. Upon generation of new or updated documents, all copies of obsolete documents are removed from the laboratory and its computer network, then archived or destroyed as appropriate. Pertinent staff members are notified of the updates. A new revision number is assigned to the LQAM or SOP at every review.

All technical changes must have the approval of the Technical Director, the Laboratory Director or Vice President of VOC Materials Testing, and the Quality Assurance Manager.

Detailed instructions regarding document control and how to write SOPs are available in SOPs #46 and #119.

4.3 Laboratory Logbooks and Forms

Procedures are in place to ensure that all data is traceable, authentic, complete, and retrievable. Logbooks, forms, and instructions are created and distributed by the Quality Assurance Department as needed. Used logbooks are returned to QA for archival. The QA Department maintains a master index to uniquely number and identify each logbook and form distributed. Logbooks can contain blank or preformatted pages. They are bound and uniquely identified, and have sequentially pre-numbered pages.

4.4 Archival and Storage of Documents

The majority of documents at Eurofins Air Toxics are stored electronically. Documents which remain in hard-copy format include chain-of-custody forms (COCs), Data Review Checklists, scanned packets (run logs, spectral defenses, manual integrations, etc.), FedEx/UPS air and freight bills, and most logbooks. All other hard-copy documentation is stored in its specific workorder folder. The hard-copy workorder folder is placed in a bar-coded storage box for long-term storage. Bar codes are maintained in an inventory log. An off-site company archives the boxes using the bar-coding system. The storage company provides one-day retrieval service upon request.

Used logbooks are returned to Quality Assurance for archival and remain in the QA Department for no less than five years.

5. SAMPLE HANDLING

5.1 Sample Collection

It is the responsibility of the client to submit representative and/or homogeneous and properly preserved samples of the system from which they are collected. In all cases, field sampling personnel are ultimately responsible for having expertise and knowledge in air sampling methodology or product/materials collection protocols sufficient to ensure that the defensibility of the data will not be compromised due to deficiencies in the field sampling, handling, or transportation. General information regarding the proper use of sampling media provided by Eurofins Air Toxics is available as a resource for field personnel. The laboratory provides sample containers, chain-of-custody forms, sampling labels, chemical ice packs (if appropriate), shipping containers, custody seals (per client request), and a copy of the Sample Acceptance Policy.

Air sampling media provided by a qualified vendor or prepared by the laboratory for field use is certified for cleanliness. The laboratory's media cleaning process is typically verified using batch certification protocols. Individually certified canisters are also available per specific client request.

5.2 Sample Receipt and Entry

5.2.1 Sample Receipt

Samples can be received at the laboratory during normal laboratory operating hours. Receipt occurs in one of three ways:

- Commercial courier
- Eurofins Air Toxics courier service
- Personal delivery

Upon arrival at the laboratory, samples are received and inspected following Eurofins Air Toxics' Sample Acceptance Policy as outlined in SOP #50. This SOP establishes specific guidelines for sample acceptance, which are generally accepted practices under U.S. Environmental Protection Agency (USEPA), Department of Defense (DoD), ISO, and NELAP protocols.

5.2.2 Sample Entry

As soon as is practical after sample receipt, the samples are entered into LIMS. Samples awaiting log-in are stored in temporary holding areas, at appropriate storage conditions to maintain sample integrity.

At the time of entry, the LIMS system assigns a unique laboratory sample number to each sample. This number is sequentially assigned, then a label is generated and is attached to the sample container.

A sample acknowledgment in the form of a Sample Receipt Confirmation prints from LIMS for each sample delivery group (SDG), which is the same number as the workorder. This notification is sent to the client to confirm sample receipt and entry.

5.2.3 Sample Rejection Policy

Any time a sample is received in a condition that does not meet the method requirements, if there is doubt about the suitability of items received, if items do not conform to the description provided, or the testing required is not clear or specified, the condition of the sample is clearly documented on a Sample Discrepancy Report (SDR). The SDR is delivered to the Project Manager for review and communicated to the client as needed. Directions on next steps, which may include canceling the sample or proceeding with qualifiers and/or narrative, are documented on the SDR. Details are outlined in SOP#50.

5.3 Sample Identification and Tracking

A sample label is generated for each sample, and in addition to the assigned Eurofins Air Toxics' sample number the following information is printed on the label: workorder number, laboratory sample ID, and, if needed, a sample release date. For canister analysis, the label is not affixed directly to the canister but attached with a tag.

To ensure traceability of results, the unique sample number assigned is used to identify the sample in all laboratory data documentation, including logbooks, instrument printouts, and final reports.

5.4 Sample Storage

After entry into LIMS, samples are placed in an assigned and identified storage location until needed for analysis. Room temperature, refrigerated, and freezer storage are available, and samples are stored in accordance with regulatory, method, or client directions. The LIMS system is used to assign storage locations for bar-coded media, which promotes orderly storage of samples. Sample storage locations for sorbent and condensate samples requiring refrigeration are monitored for accurate temperature control.

When a canister, bag, or product sample is scheduled for analysis, the analyst obtains custody of the sample by scanning the canister tag or sticker bar code as well as the bar-coded destination location of each individual sample. The scanned information is electronically transmitted to LIMS to reflect the custody of canister and bag samples at all times. All other media samples are logged into the Internal Extractable Sample Tracking Logbook and the pertinent storage area.

5.5 Sample Return/Disposal

Samples are released for disposal upon satisfactory completion of analysis unless prior contractual arrangements have been made. Product samples are held for a minimum of 30 days after satisfactory completion of the analysis, unless otherwise specified by the customer. The release of samples is electronically documented in the LIMS tracking system via scanning of the canisters and bags. This ensures verification of completion of all analyses including all samples in each workorder. Samples are released following the procedures outlined in SOP #63.

Sample disposal varies based on the sampling media. Whole air samples are vented through a charcoal scrubber, while liquid samples are disposed of according to procedures noted in SOP #24.

5.6 Chain of Custody

Samples received by the laboratory must be documented using a chain-of-custody (COC) form and relinquished following standard EPA-approved guidelines, including the following:

- Unique sample name or number
- Location, date, and time of collection
- Canister number (if applicable)
- Collector's name
- Preservation type (if applicable)
- Matrix or product type
- Any special remarks

Additional information may be required depending on the requested analysis.

A copy of the signed COC will be e-mailed to the client in conjunction with the Sample Receipt Confirmation.

Once a sample is received by the laboratory, the internal chain-of-custody procedure is followed.

Disclaimer: *Eurofins Air Toxics assumes no real or implied responsibility or liability for client-related field sampling and shipping activities. It is the responsibility of the individual client to ensure that referenced methodologies are followed with respect to sample collection and shipment to the laboratory. Air sampling media and equipment should only* *be used by experienced field engineers. It is the ultimate responsibility of the client to be knowledgeable both in sample preservation requirements as well as relevant State, Federal, and international shipping requirements. Any time a chemical substance is collected using Eurofins Air Toxics media, the client bears sole responsibility for understanding and abiding by the laws involving shipment of potentially hazardous substances by common carrier.*

6. TECHNICAL REQUIREMENTS – TRACEABILITY OF MEASUREMENTS

6.1 Reagents and Solvents

The reliability of Eurofins Air Toxics' analytical results can be directly affected by the quality of reagents used in the laboratory. Procedures are in place to control labeling, storing, and evaluation of these materials. All purchased supplies, reagents, solvents, and standards are verified as acceptable and meeting criteria for analysis prior to use. The Eurofins Air Toxics' Chemical Hygiene Plan (CHP) provides safety information in regard to the storage and handling of laboratory chemicals. All reagent certificates and Safety Data Sheets (SDSs) are retained by the laboratory (see section 2.8).

6.2 Calibration Standards

Written calibration procedures are required, where applicable, for all instruments and equipment used in the laboratory. The source and accuracy of standards used for calibration purposes are integral to obtaining quality data. Requirements for calibration are provided in each analytical method including specifications for the standard used. Calibration measurements made by the laboratory must be traceable to national standard of measurement (e.g., NIST) where available. Certificates of Analysis are maintained for each material, as applicable.

Standards are usually purchased from commercial suppliers either as neat (pure) compounds or as solutions with certified concentrations. The accuracy and quality of these purchased standards are documented on the C of A, and hard-copy certificates are maintained on file in the laboratory. Upon receipt at Eurofins Air Toxics, material is labeled with a date of receipt and stored appropriately.

Stock standard solutions are recorded in the proper standard logbook and are assigned a unique standard code number. When a working standard is prepared, the compound(s), standard code number, date prepared, analyst, expiration date, and solvent are noted in the working standard logbook. All working standards are kept in containers and at temperatures that will not alter their integrity. All containers are clearly labeled with concentrations, unique standard code number, and expiration date. Standards are not to be used in the laboratory past their expiration date.

6.3 Equipment and Instrumentation

The laboratory is equipped with all equipment and instrumentation required for testing the scope of work it supports. All equipment and instrumentation is maintained in proper working order. Eurofins Air Toxics' major equipment capabilities are summarized in the table below:

Major Instrumentation

Number	Instrumentation
24	GC-MS
7	Gas Chromatographs with various detectors (TCD, PID, FID, SCD, ECD)
2	HPLC-UV
11	Air Concentrators
7	Automated Thermal Desorption Units
3	Liquid Auto-samplers
1	Extractors
60	119 L Dynamic Environmental Chambers
1	Micro-chamber/Thermal Extractor
1	Air Generator
1	Industrial Air Compressor
1	Air Humidification System

6.3.1 General Requirements

- Equipment and instrumentation are assigned a unique identifier designation to identify them within the data documentation.
- An equipment logbook is established in conjunction with installation and is readily available to document all incidents that pertain to the equipment and instruments as they occur.
- All test, measuring, and inspection of laboratory systems, equipment, and instruments used at Eurofins Air Toxics are routinely calibrated and maintained in accordance with applicable Standard Operating Procedures.
- A member of the technical group, or another designated individual, performs routinely scheduled maintenance and calibration of laboratory equipment as required by laboratory procedures. These activities are documented.

- If appropriate standards or expertise for calibration or maintenance are not available in-house, the operation is conducted by an outside service firm.
- All equipment taken out of service is tagged accordingly.

6.3.2 Standard Operating Procedures

Information regarding operation, maintenance, and calibration of equipment and instrumentation are found in respective SOPs. The procedures include a routine schedule for preventative maintenance and calibration as applicable, along with acceptance criteria and remedial action to be taken in the event of failure. These procedures are maintained in the document control system and reviewed on a regular basis to verify they remain current and accurate. Equipment manuals are also available to provide additional information with regard to operations and maintenance.

6.3.3 Maintenance

- Equipment maintenance is performed as either a preventative or corrective operation.
- Preventative maintenance procedures and schedules for each piece of equipment are assigned where applicable. Preventative maintenance operations are performed by an analyst, scientist, senior scientist, or contracted manufacturer's representative or service firm personnel. Documentation is maintained for the procedures performed as part of the preventative maintenance operation. It is the responsibility of Group Leaders to ensure that a preventative maintenance schedule is addressed by a procedure where appropriate and is followed.
- A supply of commonly needed replacement parts is maintained by the laboratory.

6.3.4 Calibration

- Calibration is the establishment of, under specified conditions, the relationship between the values/response indicated by a measuring instrument or system and the corresponding known/certified values associated with the standard used. Some types of calibrations are performed within a set of frequency (e.g., daily), while others provide intermediate checks to ensure that the instrument response has not changed significantly.

- All measuring and testing equipment having an effect on the accuracy, precision, or validity of calibrations and tests are calibrated and/or verified on an ongoing and routine basis. Methods for calibration of instruments and equipment vary widely with the nature of the device and the direction given by analytical procedures, department procedures, or manufacturer recommendations. Frequency of calibration can also depend on additional factors, including robustness of the instrument or equipment and the frequency of use.
- Calibration information is recorded in a logbook that is associated with the instrument/equipment and/or a calibration certificate is maintained and/or data printouts are generated to document the activity.
- Calibration measurements are traceable to national standard of measurement (e.g., NIST) where available. Physical standards, such as NIST-certified weights or thermometers are re-certified on a routine basis. Calibration certificates are maintained on file, where applicable, to indicate the traceability to national standard of measurement.
- Calibration failures are documented in the logbook for the instrument and/or within the data printouts from the instrument.
- After repair, adjustments, or relocation that could affect instrument response, calibration/verification activities are performed, as applicable, before the unit is returned to service.
- Analytical data is not reported from instrumentation or equipment that fails to meet calibration requirements.

6.4 Computerized Systems and Computer Software

6.4.1 Computer Usage

Eurofins Air Toxics provides computer equipment for employees to use as a tool in performing their work. Computer equipment is the property of Eurofins Air Toxics and is to be used in accordance with defined terms and conditions. The laboratory’s goal is to provide standard hardware and software that meets the needs of the user.

6.4.1.1 Physical security of computer systems: It is company policy to protect computer hardware, software, and data documentation from misuse, theft, unauthorized access, and environmental hazards. All of the laboratory servers are housed in a locked office, which maintains favorable environmental conditions to allow for optimal server performance. Access to the laboratory's networks is granted by the Systems Administrator or Information Technology (IT) Manager. Network access is tightly controlled for the entire company. Users maintain individual network accounts and are allowed to access specific areas of the network based on the privileges assigned to them. A user is granted access to only those areas needed to fulfill his or her job function.

6.4.1.2 Passwords: All software used to reduce sample data or generate sample reports is password-protected; users are granted rights to these systems based on a "read/write/none" privilege system. The following procedures apply regardless of what system(s) is being utilized:

- Passwords must be kept confidential.
- Users must log-out of a system when not in use to prevent unauthorized access.
- Forgotten passwords can only be reset by the IT Department or by an appropriate System Administrator.
- Network passwords automatically expire every 90 days. The computer prompts a user to change the password when the expiration date nears.

6.4.1.3 Computer viruses: Eurofins Air Toxics continuously monitors its computer network for computer viruses. Anti-virus software is employed to detect viruses on the Windows network. Employees must report any virus concerns to the IT department as soon as possible. Employees who share files between their home computer and the laboratory should install anti-virus software on their home computer. If an employee does not have such software, the laboratory can suggest various no-cost anti-virus software products.

6.4.1.4 Internet and e-mail System: The e-mail system is used primarily for Eurofins Air Toxics business purposes. The Employee Handbook provides additional information in regard to system usage. Employee access to the Internet is restricted to those employees who have a business need for it. All employees have access to e-mail. All Internet and e-mail activity is subject to monitoring. All messages created, sent, or received over the Internet are property of Eurofins Air Toxics and can be regarded as public information. E-mail and Website filtering software is utilized.

6.4.1.5 Software Policy:

Eurofins Air Toxics' Software Policy is as follows:

- Copyright laws protect software, and Eurofins Air Toxics' intent is to abide by all software agreements.
- Software purchases must be formally requested and approved by management, IT Department, and/or validation personnel, as necessary.
- All software is used in accordance with applicable license agreements.
- Employees are not to install any software on computer(s) unless authorized by the IT Department.
- Employees must not give software to outsiders (e.g., clients, contractors, etc.), unless approval is granted by management.
- Users must not make copies of any licensed software or related documentation without permission. Any user that illegally reproduces software is subject to civil and criminal penalties including fines and imprisonment.

6.4.1.6 Computer system backup, data restoration, and data archival: All data systems are backed up on a daily, weekly, and monthly basis using a modified "grandfather-father-son" (GFS) rotation protocol. Specifically, these backups are conducted on the servers responsible for all laboratory production data files and databases (i.e., Project Management files, analytical data, audit trails, Quality Assurance documents, etc.). A daily incremental backup is scheduled to run each night Monday through Saturday. The daily incremental backup is limited to files modified the same day. On Sunday, a weekly full backup of all files on each server is completed. At the end of each month, a full backup of each data system is conducted. This monthly backup tape is then placed in permanent storage. The permanent historical backup tapes are stored in an off-site data storage facility. Data is not removed from the server until at least three permanent monthly backup tapes have been created. This ensures that no archived data will be lost due to corruption of the magnetic tape. A more comprehensive description of the laboratory's electronic data archiving system can be found in SOP #55.

6.4.1.8 Remote access to computer systems: With special permissions, employees are able to remotely connect to the laboratory computer network through a VPN system. When logging in, users are authenticated with their Windows account and password.

6.4.2 System and software verification: Before each new computer system or significant modification of an existing system is implemented in the laboratory, the following requirements must be met:

- Required documents – Describe the required system functionality and specification (e.g., Software Development Change Control, Change Control Log, IT Logic New Rule or Rule Update)
- Design documents – System overview, screen design, report layout, data description, system configuration, file structure, and module design
- Testing documentation for system development/verification – structural testing of the internal mechanisms and user testing of the installation and system qualification.

7. PURCHASING EQUIPMENT AND SUPPLIES

7.1 Procurement

The primary materials procured by the laboratory are analytical instrumentation and software, media and reagents including standards, carrier gases and cryogens, miscellaneous laboratory supplies, computer hardware and software, and service contracts.

Control of the purchase of these items and services is maintained using a standard purchase order system described in SOP #105 and outlined below:

- Purchase requests must be approved by a director or manager.
- An assigned purchase order (PO) number is entered along with the date, vendor, and requester.
- An evaluation of the supplier is conducted to determine whether it has been deemed a qualified vendor.
- Requires that upon receipt or delivery of services the product is inspected by the purchasing agent and compared to the packing slip and/or request for services.
- Each PO is matched with invoices prior to payment to insure that purchased items or services were delivered as expected.

Purchasing documents are maintained by the Accounting Department, calibration certificates are maintained by the Quality Assurance Department, and Certificates of Analysis for reagents and media are maintained by laboratory personnel.

7.2 Supplier Evaluation

Suppliers and vendors are evaluated in accordance with SOP #105 to assure that the quality of the products purchased meet the quality expectations of Eurofins Air Toxics, Inc. and do not interfere in the quality of testing. A laboratory database is maintained with a list of approved vendors.

8. ANALYTICAL METHODS

8.1 SCOPE OF TESTING

Soil vapor, landfill gas, indoor and outdoor ambient air, source (stack) emissions, and other types of air-phase samples are analyzed in accordance with official published methods or validated in-house methods. Method modifications made by Eurofins Air Toxics, Inc. are detailed in a summary of modifications table in the method SOP. Measurement and analysis of volatile organic compound (VOC) emissions from products using environmental chambers are performed in accordance with the relevant ASTM, EPA, and ISO methods. Specific operational and assessment parameters required for product compliance to voluntary and regulatory labels and testing are outlined in documents such as CDPH/EHLB SM V1.1 (CA 01350), ANSI/BIFMA M7.1, and AgBB.

The methods used by Eurofins Air Toxics are approved by a broad range of regulatory agencies.

A list of methods covered under the laboratory's NELAP accreditation can be found in the table in section 8.2.

Eurofins Air Toxics specializes in and has expertise with the following types of projects:

- Vapor Intrusion investigations
- Environmental assessments
- Remediation system monitoring (soil vapor extraction)
- Landfill gas characterization
- Source emissions testing
- Soil vapor surveys
- Ambient air monitoring
- Indoor air quality (IAQ)
- Material emissions using environmental chambers

Appendix E contains summaries for each commonly performed analytical procedure in the laboratory. Each summary contains the following information:

- A brief method description
- Laboratory variances to method compendium or other regulatory reference methodologies
- Tables containing analyte lists, Reporting Limits (RLs), Limits of Quantitation (LOQs), and quality control (QC) acceptance criteria
- A table of calibration and QC procedures

This Quality Assurance Manual references methods in a general manner; specific procedures used by the laboratory can be found in the method-specific SOPs.

8.2 Analytical Test Methods

Eurofins Air Toxics' NELAP-certified analytical methods, parameters, instrumentation, sampling media, holding times, and SOP numbers are summarized in the table below:

Method	Parameter	Type	Sampling Container	Holding Time in days	Eurofins Air Toxics SOP #
TO-14A/TO-3	BTEX/TPH	GC/FID/PID	Summa Canister Tedlar Bag	30 3	43
TO-4A/TO-10A	Pesticides/PCBs	GC/ECD	PUF	7	26
TO-11A	Aldehydes/ Ketones	HPLC/UV	DNPH Cartridge	14	11
TO-12	Non-methane Organic Carbon (NMOC)	GC/FID	Summa Canister Tedlar Bag	30 3	36
TO-13A	PAHs/ Semi-volatiles	GC/MS	XAD/PUF	7	3/10
TO-14A/TO-15	VOCs	GC/MS	Summa Canister Tedlar Bag	30 3	6/38/83/114
TO-17	VOCs	GC/MS	Sorbent Tube	30	5/109/110/ 112/122
ASTM D-1946	Fixed Gases, CH_4, C_2+	GC/TCD/FID	Summa Canister Tedlar Bag	30 3	08
ASTM D-1945	Fixed & Natural Gases	GC/TCD/FID	Summa Canister Tedlar Bag	30 3	54
ASTM D-5504	Sulfur Gases	GC/SCD	Tedlar Bag	24 hours	13
PM10/TSP	Particulate Matter	Mass	Quartz Filter	14	66

8.3 Method Validation

As part of the initial test method evaluation for new standard methods, analytical runs must be performed the same way an analyst would perform an initial Demonstration of Capability (DOC) to evaluate precision and bias along with a Method Detection Limit (MDL) study as applicable.

Non-standard methods, including laboratory-developed methods, standard methods outside their intended scope or application, and requested changes to existing instrumentation will follow a planned process explained in detail in SOP #107 and outlined below:

- Measurement Quality Objectives (MQOs) – should be clearly outlined prior to validation.

- Development of Test Plan – Technical Director and assigned personnel are responsible for the development of such plan.
- Validation – Implementation of the test plan with documentation of all results will be reviewed by the Technical Director.
- Review and Approval – Review of performance against the MQOs, supporting documents, and written procedures is performed by the Technical Director. After approval, the QA Manager reviews for completeness and finalizes the method for production.

8.4 Procedural Deviations

Eurofins Air Toxics communicates and addresses procedural deviations in the following ways:

- Modifications to standard methods made by Eurofins Air Toxics are detailed in a summary of modifications table in the analytical method SOP. The modification table is also included in the laboratory narrative of the final data report.
- Differences between a project request and laboratory standard protocol are documented in a variance table created by the laboratory's project chemist for submission with the proposal to the client. Agreement is documented by the client's initials and date in the approval column or with written documentation from the client that all variances have been approved.
- If a sample received did not meet the established criteria for quality testing, the Sample Receiving Department will issue a Sample Discrepancy Report (SDR), and the Project Manager will communicate the discrepancy to the client. If the client still wants the sample to be processed, the discrepancy will be narrated in the final report.
- Other analytical procedural deviations that are within allowable variations established for every method and listed in the method SOPs are discussed with the client, and if accepted the sample results will be reported with a narrative of the deviation and the affected result will be flagged accordingly.
- Analytical procedural deviations that are not within allowable variations and directly affect the sample result will require the initiation of a Corrective Action Report request.

The Corrective Action Program is explained in detail in section 12 of this Quality Manual.

9. INTERNAL QUALITY CONTROL CHECKS

9.1 Laboratory Quality Control Samples and Acceptance Criteria

9.1.1 Blanks: For the whole air methods for which no sample preparation step is required, a blank is a designated sample designed to monitor for contamination originating from the analytical system. The Laboratory Blank is comprised of clean, humidified air or nitrogen. A Laboratory Blank is analyzed after any applicable standards and prior to the analysis of project samples. A blank is also analyzed in the event saturation-level concentrations are incurred to demonstrate that contamination does not exist. The blank and the field samples are treated with the same internal standards and surrogate standards and carried through the entire analytical procedure. For methods requiring a sample preparation step (e.g., TO-11A and TO-13A), a Laboratory Blank is prepared using un-sampled media and extracted alongside the batch of field samples. Ideally, blanks demonstrate that no artifacts were introduced during the preparation and/or analysis process. The specific acceptance criterion for each test is given in the analytical method and is usually based on the required Reporting Limit (RL).

9.1.2 Surrogates: Surrogates are organic compounds that are chemically similar to the analytes of interest but are not naturally occurring in environmental samples. For GC-MS methods and some GC methods, the recovery of the surrogate standard is used to monitor for unusual matrix effects and gross sample processing errors, and to provide a measure of recovery for every sample matrix. When required by the analytical method, surrogates are spiked into all the field and QC samples to monitor analytical efficiency by measuring recovery on an individual sample basis. The percent recovery is determined and compared to the acceptance criteria. Acceptance criteria limits are set as required by the method or based on a statistical determination from laboratory data.

9.1.3 Matrix Spikes: Matrix spikes are not required QC for whole air samples collected in Summa canisters. Accurately spiking target compounds into an evacuated canister prior to deployment in the field for sample collection or post-sample collection is neither practical nor technically appropriate. Therefore, matrix spiking is performed only on samples submitted as part of a sampling train, such as condensates, or on extractable samples, provided they are submitted in duplicate for matrix spike and in triplicate for the matrix spike duplicate. It is the responsibility of the client to provide additional samples to fulfill any method requirements regarding matrix spikes. When applicable, matrix and matrix duplicate spiking is performed using a subset of target analytes. Recoveries and demonstrated reproducibility values that do not meet the acceptance criteria are flagged and explained in the laboratory narrative.

9.1.4 Laboratory Control Samples: Laboratory control samples (LCS) are samples of known composition that are analyzed with each batch of samples to demonstrate laboratory accuracy. The LCS is prepared by fortifying clean matrix with known target concentrations. In the case of non-extracted batches, the LCS is generally analyzed daily prior to sample analysis, but could also serve as an end check standard. Percent recovery is calculated and compared to acceptance criteria, which are set as required by the method or based on a statistical determination from laboratory data.

9.1.5 Sample Duplicates and Laboratory Control Sample Duplicates: A duplicate is a second aliquot of a sample that is treated identically to the original to determine precision of the test. To compare the values for each compound, the relative percent difference (RPD) is calculated by dividing the difference between the numbers by their average. Precision for analytes that are not typically found in environmental samples is determined by analyzing a pair of Laboratory Control Samples (LCS), and comparing the RPD for the spiked compounds. The acceptance criteria are described as a maximum for the RPD value as required by the method or based on a statistical determination from laboratory data.

9.1.6 Internal Standards: Internal standards (IS) are organic compounds that are chemically similar to the analytes of interest but are not naturally occurring in environmental samples. For extractable methods and when required by the method, IS are added to every field and QC sample typically after extractions but prior to analysis. For all GC-MS methods an IS blend is introduced into each standard and blank to monitor the stability of the analytical system. Comparison of the peak area of the IS is used for quantitation of target analytes. The IS peak area and retention time also provide a check for changes in the instrument response and chromatographic performance. The acceptance criteria are stipulated in the analytical method.

9.1.7 Second Source Check: A second source check is analyzed using either the Laboratory Control Sample (LCS) and/or an Initial Calibration Verification (ICV). The second source is a standard that is made from a solution or neat compound purchased from a different vendor than that used for the calibration standards. For some organic custom mixes, the same vendor but a different lot and preparation is used. This ensures that potential problems with a vendor supply would be evident in the analysis. Some areas of the laboratory use continuing calibration verification standards as a second source from the initial calibration.

9.2 Quality Control Sample Frequency and Corrective Action

Each analytical method defines the frequency for required quality control (QC) samples. A summary is provided in Appendix E. The corrective action required when a QC result fails to meet acceptance criteria is also given. If the method reference requires the use of specific limits, the laboratory uses the published limits that are documented as part of the analytical method. Many methods require that each laboratory determine their own acceptance criteria based on statistics from performance of the method. In these cases, the limits are available to the analyst and are entered into the laboratory computerized QC system described in SOP #48. Statistically determined acceptance criteria are frequently subject to change as the laboratory recalculates its control limits. Due to their dynamic nature, acceptance criteria are not included in this manual.

9.3 Quality Control Charts

Quality control (QC) results entered into the computer are used to generate control charts that are plotted via computer and can be accessed at any time by all analysts and by the Quality Assurance Department. The system charts results from surrogates and laboratory control samples. These charts provide a graphical method for monitoring precision and bias over time. The computerized quality control system is used to report QC data to clients and to collect data for assessment of precision and accuracy statistical limits.

9.4 Measurement Uncertainty

As stated in ISO 17025, “All uncertainty components which are of importance in a given situation shall be taken into account using appropriate methods of analysis” (5.4.6.3).

This means the laboratory must determine the uncertainty contribution of all steps in the testing process such as equipment, calibration, standards, reagents, preparation, etc. Since, in most methods, the laboratory control sample (LCS) goes through the entire process of preparation to analysis, all factors that would contribute to uncertainty is evident through the LCS results. As such, LCSs are performed with every batch of samples where appropriate for the method.

Measurement uncertainty is calculated as two times the standard deviation of the LCS recoveries for the group and date range of data points selected for all applicable methods. This is reported as a percentage. Reports for uncertainty shall be generated and submitted to the Quality Assurance Department for review on an annual basis. At this point, it is not necessary to apply or report the uncertainty determination with sample results. When a client requests the measurement uncertainty it is applied by multiplying the determined analyte concentration by the uncertainty percentage.

10. ASSURING QUALITY OF TEST RESULTS

10.1 Data Management

At a minimum, data management is initiated when Eurofins Air Toxics receives samples from the client. More often, the process begins with client communication of their needs and requirements for a specific project and/or testing. The Project Managers are responsible for entering this information into the client services modules of LIMS. Upon receipt of the samples, a unique tracking number is generated based on this information in the project profile. At this point, computer technology becomes an integral part of tracking the samples through laboratory operations.

10.2 Data documentation

Analytical data generated in the laboratory is collected through the associated data system or is manually documented in bound logbooks. Analysts review data as it is generated to determine that the instruments and systems are performing within specifications. If any problems are observed during an analytical run or the testing process, corrective action is taken and documented.

Procedures are in place to ensure that all data is traceable, authentic, and complete. The following general requirements outline the Eurofins Air Toxics' system for logbooks, notebooks, and documentation recording:

- Observations, data, and calculations are recorded at the time they are made and are identifiable to the specific task.
- Entries are legible, signed, and dated.
- Errors are corrected in a manner that does not obliterate the original entry, initialed, and dated.
- Blank pages or substantial portions of pages which are left blank are crossed out to eliminate the possibility of data entry at a later date.

- Logbook pages and instrument printouts are signed and dated to indicate completion.
- At periodic intervals the Quality Assurance Department checks equipment/instrument logbook entries and temperature recordings for completeness, legibility, and conformance to procedures.
- At a minimum, the following is recorded as part of data documentation:
  - Date of analysis/operation
  - Initials/date of analyst performing test/operation
  - Identification of client sample(s) and material(s) analyzed
  - Materials, reagents, and standards used to perform the test/operation
  - Method used to perform test/operation
  - Equipment/instrumentation used to perform test/operation
  - Deviations, planned or unplanned, from the analytical method
  - Signature/date of person reviewing data documentation
- For computer-generated data, the following information is recorded:
  - Samples(s) analyzed/operations performed
  - Date of analysis/operation
  - Unique instrument identification
  - Name or initial/date of person operating the instrument
  - Name or initial/date of person reviewing data
  - Any manual notation, interpretations, or integrations made on instrument printouts are signed, dated, and reviewed.

10.3 Data Calculations

Most instruments either include or are connected to a data system programmed to perform calculations needed to reduce the raw data to a reportable form. All calculations are maintained in the instrument manuals and/or as part of the analytical method.

In many cases, data from the local instrument system are uploaded directly to LIMS for review and reporting. This direct upload eliminates the need to re-type data and any associated source of transcription errors from the analytical scheme.

Some instruments report data that require application of additional factors before the data is in final form. Analysts input these additional factors into the laboratory sample management system, where final calculations are performed.

10.4 Reporting Limits

It is important to ascertain the Limit of Quantitation (LOQ) that can be achieved by a given method, particularly when the method is commonly used to determine trace levels of analyte. The USEPA has established one method for determining Method Detection Limits (MDLs) from which LOQs can be extrapolated, which is summarized in the laboratory procedures.

MDLs are verified or determined annually on each instrument and are the basis for the LOQ used in the default reporting format. Because MDLs change each time they are re-evaluated, they are not included in this manual but are available at the laboratory and available to clients upon request.

For DoD-certified methods and compounds, quarterly evaluation of the LOQ and determination of Limit of Detection (LOD) is performed. The LOQ evaluation entails the calculation of precision and accuracy at the LOQ or Reporting Limit. The LOD for each compound is determined by analyzing a calibration standard or set of standards between the MDL and LOQ. The LOD is assigned the concentration at which the peak meets the signal-to-noise criteria.

The Reporting Limit used to determine whether a result is significant and reported as detectable is dependent upon agency and client requirements. A variety of formats are available and include use of the MDL, LOD, LOQ, method-specified limits, and project-specific limits.

10.5 Data Review

Final review and verification of the data is performed by a trained analyst or scientist using the sample results and quality control information entered into the laboratory sample management system. Another tool used for data review involves the use of proprietary in-house data validation software to review every data point generated and to alert the reviewer when manual integrations occur. The software is also programmed to report each analyte that does not meet acceptance criteria in the quality control and/or sample(s).

After determining that all necessary requirements for valid data are met, the reviewer electronically approves the data by updating the “Report Approved By” status with their initials. This action applies the electronic signature of the Technical Director. The computer is programmed with a list of approved reviewers for each test, and the system is password-protected to ensure that only qualified individuals verify the data.

10.6 Data Qualification

Data qualifiers are used to provide additional information about the results reported. The most typical use for data qualifiers is for results that fall below the quantitation limit. The data systems used to generate and report results are programmed to flag values in this range as estimated.

Other qualifiers are applied to advise data users of any validation issues associated with the data. The laboratory makes every effort to meet all of the requirements for generation of data. Occasionally, data is generated that does not meet all the method requirements due to sample matrix or other analytical problems. If the test cannot be repeated, or re-analysis would not yield more useable data, qualified data is reported. Qualifiers can be in the form of comments on the analytical report or flags applied to the results.

10.7 Data Reporting

When each analysis is completed, reviewed, and verified, a report is generated. The client receives a copy of the report containing the results of the analysis, plus comments added by the analyst when necessary. The report contains the electronic signature of the Technical Director. Copies of the reports and associated supporting raw data are retained in the Eurofins Air Toxics' archives.

Eurofins Air Toxics offers a variety of data levels and formats, from a basic report of sample and QC results only (Level II) to a comprehensive data package including all supporting quality control information and raw sample data (Level IV). The client directs the selection of report type. Various electronic formats are also available, formatted to client-specific file structure and sent via e-mail, direct upload, Website access, or commercial courier.

Client confidentiality of Eurofins Air Toxics' Web data is ensured by the use of a secured firewall Internet environment coupled with the use of a user ID and password to gain log-in access to the system.

If amendments to a final report are required due to omissions, errors, or additional requests, a workorder reissue is initiated. All reissues receive a unique workorder number to distinguish them from the original issue. Reissued reports require a reason for the reissue and date of the reissue in the laboratory narrative. The laboratory maintains all supporting documentation for the revision including corrections, additions, or deletions relative to the original report.

10.7.1 Reporting the Results

Analytical reports are printed with a cover page that summarizes all samples in that group. This page lists the Eurofins Air Toxics' assigned sample number and the corresponding client description. The cover page identifies the laboratory contact person's name and the laboratory's phone number in case there is a question about the report. Within this package, each page is uniquely identified and paginated. Analytical test results which meet all the requirements of NELAP and ISO 17025 are noted as so in the footer of the summary cover page.

10.8 Data Storage, Security, and Archival

Eurofins Air Toxics has documented procedures and instructions for the identification, collection, access, filing, storage, maintenance, and disposal of data records. Records are in the form of hard-copy paper records, electronic data files, magnetic tape, and CD-ROMs.

Eurofins Air Toxics maintains records to demonstrate conformance to specified requirements and the effective operation of its quality systems. Records are stored and maintained in such a way that they are readily retrievable in facilities that provide a suitable environment to minimize deterioration or damage and prevent loss. Retention time for the records is in accordance with NELAP's minimum five-year requirement and/or specific procedures or instructions.

The laboratory maintains all documentation necessary for historical reconstruction of data, as follows:

- Analysis reports
- Data logbooks
- Instrument printouts
- Correspondence and client files
- Instrument and equipment logbooks
- Quality Assurance records
- Corporate documents
- Electronic records

11. AUDITS AND INSPECTIONS

11.1 Internal Quality Assurance Audits

Internal audits are performed by trained Quality Assurance personnel following a schedule planned yearly by the Quality Assurance Manager or at any time by the request of management. The audits cover all quality systems including but not limited to documentation practices, training, and adherence to current SOPs and methodology.

The following areas are identified to be audited by Quality Assurance:

a. Operations
b. Support Services
c. Sample Receiving and Login
d. Project Management and Sales
e. Information Technology (IT)
f. Quality Assurance

A written report with findings, observations, and/or recommendations is presented to the audited personnel, the team leaders, and management by the auditor. Responses to findings and observations are then submitted to the Quality Assurance Department within 30 days.

All audit notes, documentation, and reports are scanned and filed on the QA network drive.

11.2 Management Review System

A review of the laboratory's systems is performed by senior management on a biannual basis to evaluate effectiveness, identify areas requiring improvement, and establish timelines and accountability in addressing agreed-upon action items. This review includes internal assessment of the quality program and laboratory operations and external assessment through client feedback and audits. Four types of reports are generated by management or designated personnel:

11.2.1 **Quality Assurance Status Report:** Summarizes the results of internal and external assessments, the numbers and types of Corrective Action Reports (CARs) generated, status of any outstanding CARs, a summary of client inquiries received, proficiency tests (PT) results, and the number and types of reissued sample reports.

11.2.2 **Production Status Report:** Summarizes performance against key metrics such as turnaround time, details changes in sample mix and sample numbers, and outlines resource needs.

11.2.3 **Client Assessment Report:** Summarizes feedback from clients based on daily communication with project management and sales team as well as feedback collected by a third party as part of our Client Satisfaction Index (CSI) determination.

11.2.4 **Safety Assessment Report:** Outlines the safety incidents and "near misses" for the quarter and lists site assessment deficiencies.

The reports and records of the meetings are stored on a secure drive with management-only access for a minimum of five years.

11.3 Client Audits and Agency Inspections

Clients may audit our facility as assurance that their objectives are being met and that the laboratory is compliant with all applicable regulations, data quality, and project requirements.

Client audits can range from a laboratory tour to an intensive inspection of technical operations, procedures, regulatory compliance, and/or review of specific projects. Clients can only review data that pertains to their projects, and a non-disclosure agreement must be signed as per SOP #99.

Inspections can be performed by investigators or auditors from the USEPA, DoD, state and other regulatory agencies, third party accreditors (ACLASS), or regulatory agencies outside of the U.S.

The Quality Assurance Department is assigned the responsibility of hosting and working with agency and client representatives.

The Quality Assurance role includes:

- Escorting the investigator(s)
- Ensuring all questions are answered promptly and accurately
- Making note of all unresolved issues
- Informing management of the audit status and outcome
- Responding to the audit report
- Ensuring that appropriate corrective action is completed

11.4 Proficiency Testing Program

11.4.1 Proficiency Testing Samples (TNI/DoD)

Proficiency testing (PT) samples are used to measure analytical accuracy, precision, and report completeness. To be accredited under TNI and DoD-ELAP, the laboratory contracts with an outside approved PT sample provider in each field of testing (FOT). Testing is limited by availability of samples that meet NELAP and DoD-ELAP criteria (noted below). The provider must be a NIST-accredited PT provider. It may be necessary to participate in more than one proficiency testing program to be evaluated for multiple interdependent analyte groups. Currently, Eurofins Air Toxics participates in PT programs for EPA Method TO-15, which is ISO 17025 compliant, TO-13A, TO-17 VI, formaldehyde and emissions testing. In each calendar year, the laboratory will complete a minimum of one PT sample for each analyte or interdependent analyte group.

The following policies apply to laboratory PT sample analysis and reporting:

- The samples shall be analyzed and reported to the PT provider within 45 calendar days of receipt or the specific deadline specified by the PT provider.
- The PT sample is received and logged into an electronic sample receiving database in the same fashion as field samples.
- The laboratory must follow the PT provider's instructions for preparing the PT sample.
- The laboratory management and bench chemist ensure that the PT samples are prepared, analyzed, and reported in the same fashion as field samples using the same staff, equipment, and methods.
- Initial and continuing calibrations for the PT sample are analyzed at the same frequency of field samples.
- The PT sample cannot undergo duplicate or replicate analyses that would not ordinarily be performed on field samples. The PT sample result cannot be derived from averaging the results of multiple analyses unless specifically called for in the reference method.
- The PT sample can only be analyzed on equipment leased or owned by the company and handled only by bona fide employees of the company.
- The analysis of PT samples by temporary or contract employees is explicitly forbidden.

- The laboratory shall not subcontract any PT sample or portion.
- The laboratory shall not knowingly receive any PT sample or portion from another laboratory.
- The laboratory shall not communicate in any fashion with another laboratory concerning the PT sample or results.
- The laboratory shall not attempt to obtain the PT sample result prior to reporting.
- The PT sample reporting forms provided by the sample provider will be used to report the results and will be maintained in the laboratory's record system.
- The laboratory shall maintain copies of all written, printed, and electronic records relating the analysis or reporting of the PT sample for a period of five years or as required by the applicable regulatory program.
- A CAR will be generated any time an analyte result fails the PT assessment. A copy of the PT results will be sent to the accrediting agency, and associated corrective action summary will be sent upon request.
- The laboratory authorizes provider to release any PT assessment information to the accrediting agency.
- The QA Manager must sign the PT results form and, by so doing, attests that the sample was analyzed and reported in the same fashion as a field sample and followed the PT provider instructions for preparation.
- The laboratory must notify its primary accrediting agency and any other agencies under reciprocity that it has enrolled with a particular PT provider.
- The laboratory must notify its primary accrediting agency and any other agencies under reciprocity in the event it wishes to change PT providers.
- For each analyte or interdependent analyte group for which proficiency is not available, the certified laboratory will establish, maintain, and document the accuracy and reliability of its procedures through a system of internal quality management.
- Results of any failed PT samples are summarized in the Quarterly QA Status Report.

11.4.2 Proficiency Testing Samples (Non-NELAP/DoD)

Occasionally proficiency testing (PT) samples are submitted along with field samples by private clients. The laboratory processes and reports the samples in the same fashion as field samples. When the client notifies the laboratory that one or more analytes appear to have failed, the report is processed through the normal Client Inquiry Corrective Action Process. The QA Manager will carry out an assessment and investigation into the circumstances surrounding the proficiency results, including aspects relating to how the client prepared the sample for submission. The outcome of the assessment will be documented as a CAR and maintained on file for a period of five years. Results of any failed external PT samples are summarized in the Quarterly QA Status Report.

12. CORRECTIVE AND PREVENTIVE ACTION

12.1 Laboratory Investigations and Corrective Action

The Quality Assurance (QA) Department manages the Corrective Action Program and maintains the Corrective Action tracking database using the c.Support software program. A Corrective Action Report is initiated any time sample results are affected by non-conformance with established SOPs or program requirements, any time an external assessment results in a finding, any time there is a failed proficiency evaluation sample, and when a client inquiry results in a quality finding. The expectation is that any CAR should be resolved within 30 days.

The client is notified if there is an issue that could potentially affect the quality of sample results. The communication with the clients is recorded.

The software program tracks all parts of the CAR system: root cause investigation, immediate corrective action, long-term corrective action, and preventive action. It also tracks client communications regarding the incident. The QA Manager reviews all opened CARs for completeness and resolution.

Detailed information about the CAR process is described in SOP #61.

13. SERVICE TO CLIENTS

The Project Management System is defined in SOP #1. The following are brief descriptions of the elements comprising project management systems.

13.1 Review of Work Requests, Tenders, and Contracts

Eurofins Air Toxics places great importance on understanding client requirements for a project. The laboratory ensures, to the best of our ability, that client and project requirements are outlined and understood prior to acceptance of the project, including required laboratory accreditations and nonstandard work requests. All inconsistencies are discussed and addressed with both the client and the technical laboratory staff before the project is initiated and samples arrive. This is achieved in various ways, including the review of client work plans, Request for Proposals (RFPs) project Quality Assurance Project Plans (QAPPs), requested analytical methods and protocols, business contracts, and quality agreements. A key client contact is assigned to oversee each project. Communication between the client and Eurofins Air Toxics technical staff is coordinated through the Project Managers. The Project Management group relays any project changes or modifications to the technical group. They also relay issues encountered by the laboratory back to the client.

13.2 Timely Delivery

Evaluating laboratory capacity, assignment of resources, and ability to perform specific projects is a joint responsibility between the Technical Director and the Laboratory Director. Eurofins Air Toxics recognizes that one of the most important aspects of the services offered is turnaround time.

To ensure timely delivery, many analysts are cross-trained to perform a variety of tests, and there is redundant equipment available in the laboratory creating operation flexibility for routine work. Larger projects are reviewed against capacity estimates before a bid is submitted in order to meet a client's schedule.

Management regularly monitors the status of turnaround time including those projects that have exceeded a current turnaround time. Proactive communication regarding potentially missed deadlines is expected from the laboratory management to the Project Managers to keep the client informed of report delivery status.

Any changes to the established timeline by the client or the laboratory must be communicated to the client or laboratory as soon as possible. Upon communication of changes, a new timeline is established and agreed upon by both parties.

13.3 Subcontracting

Occasionally, Eurofins Air Toxics subcontracts analyses to other laboratories if the requested testing is not routinely performed in our laboratory. Testing is only subcontracted with the client's knowledge and approval. Subcontract laboratories are selected based on their qualifications. If tests require a specific agency certification, only an appropriately certified laboratory will be used.

LABORATORY QUALITY ASSURANCE MANUAL

(LQAM)

Appendix A

Terms and Definitions

(nine total pages including this cover)

Current as of March 5, 2014

TERMS AND DEFINITIONS

Accuracy: The degree of agreement between an observed value and an accepted reference value.

Active sampling: The process of collecting a sample using pump or vacuum source to pull a known volume of vapor through a sorbent cartridge, filter, or liquid impinger.

Ambient air: Outdoor air (also can include indoor air).

Analyte: The substance or component for which a sample is analyzed to determine its presence or quantity.

APH (air-phase hydrocarbons): Aliphatic and aromatic fractions identified in vapor-phase samples.

Approved: The determination by a state or federal accrediting agency that a certified laboratory may analyze for an analyte under the specified method.

Assessment: The process of inspecting, testing, and documenting findings for purposes of certification or to determine compliance.

ASTM International (formerly known as American Society for Testing and Materials)**:** Organization which develops international voluntary consensus-based standards.

Bag: An air-sampling container consisting of inert polymeric material.

Batch: A group of analytical samples (≤ 20) of the same matrix processed together, including extraction, concentration, and analysis using the same process, staff, and reagents.

BFB (4-Bromofluorobenzene): Compound used to verify that the mass spectrometer meets the tuning requirements of the method. Also can be used as an internal standard or surrogate.

Blank samples: Negative control samples used to assess potential contamination from sampling procedures or analytical processes. They can be field blanks or laboratory blanks.

BTEX: Benzene, toluene, ethylbenzene, and xylenes

Canister: A stainless steel spherical air-sampling device consisting of Summa polished or glass-lined internal walls and a leak-tight on/off valve.

Certificate of Analysis (C of A): An authenticated document, issued by an appropriate authority, that assures a regulated product has met its product specification and quality.

Chain of Custody (COC): The chronological documentation of the custody of an environmental sample from the time it is taken until it is disposed.

Contamination: The effect caused by the introduction of a target analyte from an outside source into the test system.

Continuing Calibration Verification (CCV): A component of Quality Control used to verify instrument linearity with respect to the Initial Calibration (ICAL). A CCV is analyzed at the beginning of every analytical sequence and then periodically depending on the method. Certain methods also include a CCV in every analytical sequence as an End Check.

Control charts: Statistical tools for monitoring the performance of a particular task on a continuing basis. The control chart is prepared for each test parameter after 20 determinations have been performed. The mean is plotted with the warning limits being $\pm 2s$ and the control limits being $\pm 3s$ (s = Standard deviation).

Corrective action: An action taken to eliminate the cause(s) of an existing nonconformity, defect, or other undesirable situation in order to prevent recurrence.

Corrective Action Report: See NCCAR.

Data reduction: A qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data are of acceptable quality.

Demonstration of Capability: A procedure to establish the ability of the analyst to generate analytical results by a specific method and meet measurement quality objectives.

Detection Limit (DL): The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99% confidence.

%Difference (%D): A measure of precision between the expected value and the actual value, typically used to measure performance of the daily CCV RRF as compared to the Initial Calibration average RRF.

DoD: U.S. Department of Defense

Duplicate sample: A sample collected for checking the preciseness of the sampling process. Duplicate samples are collected at the same time and from the same source as the study samples.

Equipment Blank: A sample that is known not to contain the target analyte, used to check the cleanliness of sampling devices. It is collected in a sampling container from a clean sample collection device and returned to the laboratory as a sample.

Field Blank: A sample that is known not to contain the target analyte, used to check for analytical artifacts or contamination introduced by sampling and analytical procedures. It is taken to the sampling site and exposed to sampling conditions, then returned to the laboratory and treated as an environmental sample.

Field Duplicate: A sample collected at the same time from the same source but submitted and analyzed as a separate sample.

GC (gas chromatograph): Analytical instrumentation used to resolve complex mixtures into individual peaks for identification and quantitation. Separation is achieved as chemicals are retained at varying rates by the column phase.

Holding time: The maximum time that a sample may be held prior to preparation or analysis.

HPLC (high-pressure liquid chromatography): A form of liquid chromatography used to separate compounds that are dissolved in solution (also known as high-performance liquid chromatography).

Impinger: A glass vessel used to contain collection solution through which a stream of air is bubbled for sampling purposes.

Initial Calibration (ICAL): Demonstration of a linear response to different concentrations of calibration standards within a defined range.

Initial Calibration Verification (ICV): Verifies the Initial Calibration using a different source standard from the one used for Initial Calibration.

Initial Demonstration of Analytical Capability: The procedure described in USEPA 40 CFR 136 Appendix A, used to determine a laboratory's accuracy and precision in applying an analytical method.

Instrument Blank: A sample that is known not to contain the target analyte, processed through the instrumental steps of the measurement process and used to determine the absence of instrument contamination prior to analysis of field samples.

Instrument Detection Limit (IDL): The concentration of the analyte that produces a signal greater than five times the signal-to-noise ratio of the instrument.

Interference: The effect on the final result caused by the sample matrix.

Internal Standard (IS): A measured amount of a certain compound added after preparation or extraction of a sample.

Ketones: Any of a class of organic compounds characterized by a carbonyl group attached to two carbon atoms.

Key Personnel: The laboratory director, technical director, quality assurance manager, and team leader, all of whom meet the requirements of the NELAP rule.

Laboratory Control Sample (LCS): An independent second source reference standard that goes through the same pretreatment and preparation procedures as the samples. It validates the accuracy of the Initial Calibration.

Laboratory Duplicate: An aliquot of the same sample that is prepared and analyzed at the same time.

Laboratory Information Management System (LIMS): A laboratory's electronic data system that collects, analyzes, stores, and archives records and documents.

Limit of Detection (LOD): The smallest concentration of a substance that must be present in a sample in order to be detected at the DL with 99% confidence.

Limit of Quantitation (LOQ): The smallest concentration that produces a quantitative result with known and recorded precision and bias.

Matrix: The component or substrate (e.g., surface water, drinking water, air, liquid waste) which contains the analyte(s) of interest.

Matrix Spike (MS): A sample prepared to determine the effect of the matrix on a method's recovery efficiency by adding a known amount of the target analyte to a specified amount of matrix sample for which an independent estimate of the target analyte concentration is available. It is used to evaluate accuracy.

Matrix Spike Duplicate (MSD): Duplicate of the matrix spike sample. Results are compared with MS to determine precision.

Mass spectrometer (MS): Analytical instrumentation used to identify and quantify chemicals utilizing spectral fragmentation patterns based on chemical structures.

Measurement uncertainty: Measurement uncertainty is the estimation of potential errors in a measurement process and is expressed as $\pm$ 2X(*s*) of the historical mean of LCS recoveries.

Method Detection Limit (MDL): The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero as determined from analysis of a sample containing the analyte in a given matrix (40 CFR Part 136, Appendix B, July 1995).

NCCAR (Non-conformance/Corrective Action Report): A report that identifies, communicates, tracks, and resolves a non-conformance.

NIST: National Institute of Standards and Technology

NMOC: Non-methane organic compounds

OSHA: Occupational Safety and Health Administration

PAHs (polycyclic aromatic hydrocarbons): Hydrocarbons made up of fused aromatic ring molecules.

Passive sampling: Sample collection conducted without the use of mechanical pumps or vacuums. Collection relies on principle of diffusion.

PCBs (polychlorinated biphenyls): Biphenyl compounds with chlorine atoms positioned on the benzene rings.

ppbv: parts per billion by volume

ppmv: parts per million by volume

Practical Quantitation Limit (PQL): A synonym for the standard of lowest concentration contained in the Initial Calibration. It is the smallest concentration of the analyte that can be reported with a specific degree of confidence.

Precision: The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. Precision is usually expressed as standard deviation, variance or a range, in either absolute or relative terms.

Preservation: The temperature control or the addition of a substance to maintain the chemical or biological integrity of the target analyte.

Proficiency Testing (PT): A means to evaluate a laboratory's performance under controlled conditions relative to a given set of criteria, through analysis of unknown samples provided by an external source.

Proficiency Test (PT) sample: A sample, the composition of which is unknown to the laboratory and is provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria.

Quality Assurance (QA): An integrated system of activities involving planning, quality control, reporting, and quality assessment and improvement to ensure that the product meets defined standards of quality with a stated level of confidence.

Quality Assurance Project Plan (QAPP): An orderly assemblage of detailed procedures designed to produce data of sufficient quality to meet the data quality objectives for a specific data collection activity.

Quality Control (QC): A procedure or set of procedures intended to ensure that a product or performed service adheres to a defined set of quality criteria.

%R: %Recovery

Relative Percent Difference (RPD): A measure of precision between two measurements calculated by dividing the absolute value of the difference between the measurements by their average and expressed as a percentage.

Reporting Limit (RL): The smallest concentration of an analyte that can be measured with a stated probability of significance. All Initial Calibrations contain a standard at the Reporting Limit. The Reporting Limit is never less than the Practical Quantitation Limit (PQL).

Reporting Limit verification: A re-quantification of the lowest concentration data point of an Initial Calibration to test the percent recovery of each component. Analyte recovery should be between 50–150% to verify detection limit accuracy.

Relative Standard Deviation (RSD): A measure of precision often used to evaluate linearity of an Initial Calibration. The relative response factor is calculated at each calibration level, and the RSD is calculated by dividing the standard deviation by the average value.

RRF: Relative Response Factor

RT: Retention Time

Safety Data Sheet (SDS): A technical document that contains information on the chemical make-up, use, storage, handling, emergency procedures, and potential health effects related to a hazardous material (formerly Material Safety Data Sheets).

Selectivity: The capability of a method or instrument to respond to the target analyte in the presence of other substances or things.

Semivolatile compound (SVOC): An organic compound which has a boiling point higher than water and which may vaporize when exposed to temperatures above room temperature.

Sensitivity: The capability of a method or instrument to discriminate between measurement responses representing different levels of a target analyte.

Soil vapor (also referred to as "soil gas"): Vapor-phase volatile compounds that migrate or evaporate from contaminated soil.

Soil vapor extraction (SVE): A physical treatment process for in situ remediation of volatile contaminants in vadose zone (unsaturated) soils.

Standard Operating Procedure (SOP): A written document that details the steps of an operation, analysis, or action, the techniques and procedures for which are thoroughly prescribed and accepted as the procedure for performing certain routine or repetitive tasks.

Surrogate: A substance unlikely to be found in the environment that has properties which mimic the target analyte and that is added to a sample to check for analytical efficiency.

Target analyte: The analyte that a test is designed to detect or quantify.

Technical employee: A designated individual who performs the analytical method and associated techniques.

TIC: Tentatively Identified Compound

TNMOC: Total non-methane organic compounds

TPH: Total petroleum hydrocarbons

TRH: Total recoverable hydrocarbons, which are differentiated from total petroleum hydrocarbons (TPH) in that non-fuel-related peaks are subtracted from the TPH result but are included in TRH.

Trip Blank: A sample known not to contain the target analyte, which is carried to the sampling site and transported to the laboratory for analysis without having been exposed to the sampling procedures.

TVH: Total volatile hydrocarbons

Vapor intrusion (VI): The process by which vapors originating from contaminated soil or groundwater migrate through the subsurface into nearby buildings, potentially impacting indoor air quality.

VPH: Volatile Petroleum Hydrocarbons

CHAMBERS
TERMS AND DEFINITIONS

Air change rate: The flow rate of clean air into the chamber divided by the chamber volume. Also, the ratio of volume of clean, conditioned air brought into the emission test chamber or building space per unit time to the chamber or building space volume.

Air flow rate: Air volume entering the emission test chamber per unit time.

Air velocity: Air speed over the surface of the test specimen.

Aldehydes: Formaldehyde, acetaldehyde, and other carbonyl compounds detectable by derivatization with DNPH and analysis by HPLC.

Area specific flow rate: Ratio of the inlet air flow rate to the nominal surface area of the product or the product test specimen.

Background concentration: VOC concentrations in emission test chamber in the absence of a product test specimen.

CREL: Non-cancer chronic reference exposure level developed by Cal/EPA OEHHA. These are inhalation concentrations to which the general population, including sensitive individuals, may be exposed for long periods (10 years or more) without the likelihood of serious adverse systemic effects other than cancer.

Emission factor: Mass of VOC emitted per unit time from a specific unit area of product surface. Other unit measures such as product mass or length may be used as appropriate.

Emission rate: Mass of VOC emitted by an entire product or test specimen per unit time.

Emission test chamber: Non-contaminating, inert enclosure of defined volume with controlled environmental conditions for inlet air flow rate, temperature, and humidity used for determination of VOC emissions from product test specimens.

Loading factor: Ratio of the exposed surface area of the product or the test specimen to the volume of the building space or the emission test chamber.

Manufacturer's identification number: Unique product identifier from which a manufacturer is able to determine the product name, product category or subcategory, manufacturing location, date of manufacture, production line, and/or other pertinent identifying information for the product.

Product category: General group of similar products intended for a particular application and performance, such as VCT, laminated wood flooring, broadloom carpet, sheet vinyl flooring, plywood, OSB, interior paint, etc.

Product subcategory: Group of products within a product category having similar chemistry, construction, weight, formulation, and manufacturing process and which may have a similar VOC emissions profile.

Representative product sample: A product sample that is representative of the product manufactured and produced under typical operating conditions.

Sampling interval: Time over which a single air sample is collected.

Sampling period: Established time for collection of air sample from emission test chamber.

Specific emission rate: Emission rate normalized to the area, mass, or length of a product (i.e., equivalent to emission factor).

Test specimen: Portion of representative sample prepared for emission testing in an emission test chamber following a defined procedure.

TVOC: Sum of the concentrations of all identified and unidentified VOCs between and including n-hexane through n-hexadecane (i.e., C_6 – C_{16}) as measured by the GC/MS TIC method and expressed as a toluene equivalent value.

Ventilation rate: Same as air change rate.

Volatile organic compounds (VOCs): Carbon-containing compounds (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate) with vapor pressures at standard conditions approximately ranging between those for n-pentane through n-heptadecane. For the purposes of this method, formaldehyde and acetaldehyde are considered to be VOCs.

Zero time: Time establishing the beginning of an emission test.

LABORATORY QUALITY ASSURANCE MANUAL

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Appendix B

Procedure Cross-Reference List

(Three total pages including this cover)

Current as of March 5, 2014

Procedure Cross-Reference List

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Appendix C

Certifications and Accreditations

(Two total pages including this cover)

Current as of March 5, 2014

Certifying Agency	Air Toxics Certificate #	Basis of Certification/Approval	Location of Certificate and Parameter List
Arizona DHS	AZ0775	Onsite assessment (annual), LQAM and SOP	Laboratory internal network: O:\QA\Certifications
California DPH (Primary NELAP)	12282CA	Onsite assessment (biennial) LQAM, SOP and WP PTs	Laboratory internal network: O:\QA\Certifications
New York State DOH	11291	LQAM, Secondary NELAP	Laboratory internal network: O:\QA\Certifications
Oregon DHS (Primary NELAP)	CA300005	Onsite assessment (biennial) LQAM and SOP Review	Laboratory internal network: O:\QA\Certifications
Texas CEQ	T104704434-13-6	LQAM, Secondary NELAP	Laboratory internal network: O:\QA\Certifications
State of Utah DOH	CA009332013-4	LQAM, WP PT, Secondary NELAP	Laboratory internal network: O:\QA\Certifications
Washington DOE	C935-13	PT, Secondary NELAP	Laboratory internal network: O:\QA\Certifications
DoD-ELAP_ ISO/IEC 17025:2005	ADE-1451	DOD QSM for Environmental Laboratories v.4.2 Onsite assessment (biennial)	Laboratory internal network: O:\QA\Certifications
Virginia DCLS	2612	Secondary NELAP	Laboratory internal network: O:\QA\Certifications
New Jersey DEP	CA016	LQAM, SOPs, Secondary NELAP	Laboratory internal network: O:\QA\Certifications

All latest certificates and licenses are posted by the laboratory entrance.

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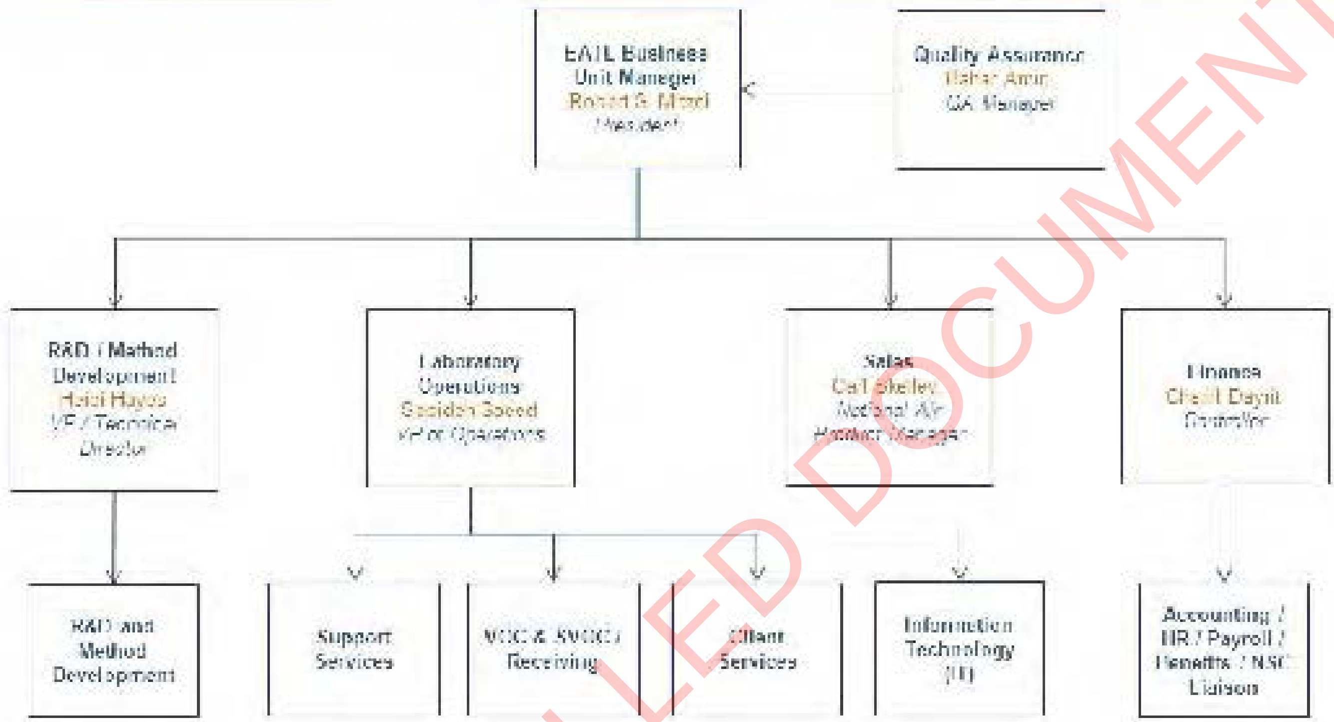
Appendix D

Organizational Charts

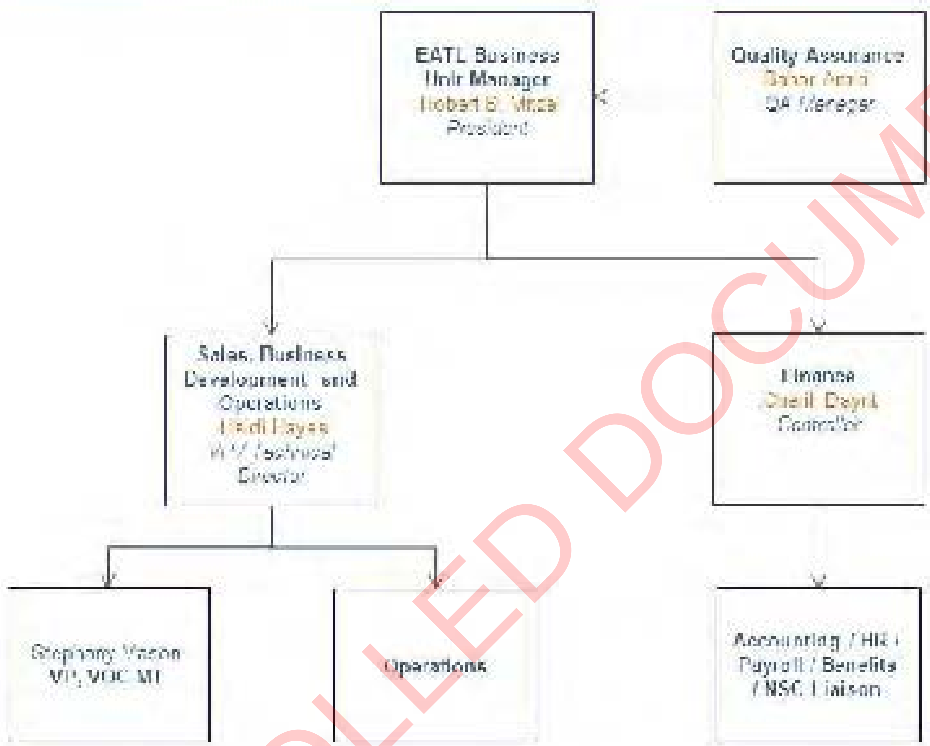
(four total pages including this cover)

Current as of March 5, 2014

Organization Chart – Eurofins Air Toxics, Inc.



Organization Chart – Product Testing



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Appendix E

Analytical Methods

(seventy-seven total pages including this cover)

Current as of March 5, 2014

ANALYTICAL METHODS

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ANALYTICAL METHODS

Section 1.0

Method: Modified EPA TO-17 VOCs and SVOCs – General Applications

Eurofins Air Toxics SOP #5 Revision 15 Effective Date: December 23, 2013 Methods Manual Summary

Description: This method is an alternative to the canister-based sampling and analysis methods that are presented in EPA Compendium Methods TO-14A and TO-15. Sorbent sampling is also amenable to efficient collection and measurement of semi-volatile compounds that are prone to condensing on the surface of the canister. Thermal desorption gas chromatograph/mass spectrometer (GC/MS) can be applied to matrices beyond ambient air such as soil gas and materials emissions by carefully selecting the appropriate sorbent and sampling parameters. Single bed sorbents such as Tenax TA and Carbopack B can be utilized to collect a specific volatility range while multi-bed sorbent tubes are effective in collecting a wide volatility range. (See Air Toxics' TO-17 VI method for the multi-bed tube application.)

Samples are collected by drawing a measured volume of air through the sorbent tubes. Collection is performed using a low flow vacuum pump or a volumetric syringe attached to the outlet side of the tube. Analysis is accomplished by heating the sorbent tube and sweeping the desorbed compounds onto a secondary "cold" trap for water management and analyte refocusing. The secondary trap is heated for efficient transfer of compounds onto the gas chromatograph (GC) for separation followed by detection using mass spectrometry (MS).

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, the laboratory reports these non-standard compounds with partial validation. Validation includes a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification is analyzed, and no method detection limit study is performed unless previous arrangements have been made. In addition, stability of the non-standard compound during sample storage, safe sampling volume, and desorption efficiency are not validated. Full validation may be available upon request.

The TO-17 method offers significant flexibility in its scope and application depending on the sorbent selected. The most commonly requested sorbent tubes and associated analytes are summarized in the QC tables below.

Table 1. Summary of Sorbent Applications

Sorbent	Typical Analyte Range	Water Management
Tenax TA	C7 – C26	Hydrophobic
Tenax GR	C7 – C30	Hydrophobic
Multi-bed "VI tube" (See TO-17 VI application)	C3 – C26	Largely Hydrophobic

Table 2. Method TO-17 VOCs (Tenax GR/TA) Reporting Limits and QC Limits

Analytes	Reporting Limit (ng)	QC Acceptance Criteria		
		ICAL (%RSD)	LCS (% R)	CCV (%D)
1,1,1-Trichloroethane	5.0	30	70 – 130	30
1,1,1,2-Tetrachloroethane	5.0	30	70 – 130	30
1,1,2,2-Tetrachloroethane	5.0	30	70 – 130	30
1,1,2-Trichloroethane	5.0	30	70 – 130	30
1,1-Dichloropropene	5.0	30	70 – 130	30
1,2,3-Trichlorobenzene	5.0	30	70 – 130	30
1,2,3-Trichloropropane	5.0	30	70 – 130	30
1,2,4-Trichlorobenzene	5.0	30	70 – 130	30
1,2,4-Trimethylbenzene	5.0	30	70 – 130	30
1,2-Dibromo-3-chloropropane	5.0	30	70 – 130	30
1,2-Dichlorobenzene	5.0	30	70 – 130	30
1,2-Dichloroethane	5.0	30	70 – 130	30
1,2-Dichloropropane	5.0	30	70 – 130	30
1,3,5-Trimethylbenzene	5.0	30	70 – 130	30
1,3-Dichlorobenzene	5.0	30	70 – 130	30
1,3-Dichloropropane	5.0	30	70 – 130	30
1,4-Dichlorobenzene	5.0	30	70 – 130	30
2-Chlorotoluene	5.0	30	70 – 130	30
4-Chlorotoluene	5.0	30	70 – 130	30
Benzene	10	30	70 – 130	30
Bromobenzene	5.0	30	70 – 130	30
Bromodichloromethane	5.0	30	70 – 130	30
Bromoform	5.0	30	70 – 130	30
Butylbenzene	5.0	30	70 – 130	30
Carbon Tetrachloride	5.0	30	70 – 130	30
Chlorobenzene	5.0	30	70 – 130	30
Chloroform	5.0	30	70 – 130	30
cis-1,3-Dichloropropene	5.0	30	70 – 130	30
cis-1,4-Dichloro-2-butene	5.0	30	70 – 130	30
Cumene	5.0	30	70 – 130	30

Dibromochloromethane	5.0	30	70 – 130	30
Dibromomethane	5.0	30	70 – 130	30
Ethylbenzene	5.0	30	70 – 130	30
Ethylene Dibromide	5.0	30	70 – 130	30
Hexachlorobutadiene	5.0	30	70 – 130	30
Naphthalene	5.0	30	70 – 130	30
m,p-Xylene	10	30	70 – 130	30
o-Xylene	5.0	30	70 – 130	30
p-Cymene	5.0	30	70 – 130	30
Propylbenzene	5.0	30	70 – 130	30
sec-Butylbenzene	5.0	30	70 – 130	30
Styrene	5.0	30	70 – 130	30
tert-Butylbenzene	5.0	30	70 – 130	30
Tetrachloroethene	5.0	30	70 – 130	30
Toluene	5.0	30	70 – 130	30
trans-1,3-Dichloropropene	5.0	30	70 – 130	30
trans-1,4-Dichloro-2-butene	5.0	30	70 – 130	30
Trichloroethene	5.0	30	70 – 130	30

Note: Full list may not be appropriate, depending on sample volume requirements.

Table 3. Commonly requested TPH parameters (Tenax GR/TA)

TPH	Reporting Limit (ng)	ICAL (%RSD)	ICV (% R)	CCV (%D)	LCS (%R)
GRO (Gasoline Range)	1000	30	70 – 130	30	70 – 130
DRO (C10-C24 Diesel Range)	1000	30	70 – 130	30	70 – 130
Kerosene	1000	30	70 – 130	30	70 – 130
Mineral Spirits (C9-C12 range)	1000	30	70 – 130	30	70 – 130

Table 4. Internal Standard and Field Surrogate Recoveries

Internal Standards		
Analyte	**CCV IS % Recovery**	**Sample IS % Recovery**
Bromochloromethane	60 – 140	60 – 140
1,4-Difluorobenzene	60 – 140	60 – 140
Chlorobenzene-d5	60 – 140	60 – 140
Field Surrogates		
Analyte	**% Recovery**	
1,2-Dichloroethane-d4	50 – 150	
Toluene-d8	50 – 150	
Naphthalene-d8	50 – 150	

Table 5. TO-17 SVOCs (Tenax GR/TA)

Analytes	Reporting Limit (ng)	Acceptance Criteria		
		ICAL (%RSD)	LCS (% R)	CCV (%D)
Naphthalene	5.0	30	70 – 130	30
2-Methylnaphthalene	5.0	30	70 – 130	30
Acenaphthylene	5.0	30	70 – 130	30
Acenaphthene	5.0	30	70 – 130	30
Fluorene	5.0	30	70 – 130	30
Phenanthrene	5.0	30	70 – 130	30
Anthracene	5.0	30	70 – 130	30
Fluoranthene	5.0	30	70 – 130	30
Pyrene	10	30	70 – 130	30
Internal Standards				
Analyte	**CCV IS % Recovery**		**Sample IS % Recovery**	
Bromofluorobenzene	60 – 140		60 – 140	
Field Surrogates				
Analyte	**% Recovery**			
Naphthalene-d8	50 – 150			

Table 5. Summary of Calibration and QC Procedures for TO-17 General Application

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
BFB Tune Check	Every 24 hours	TO-15 tune criteria	Correct problem then repeat tune.
5-Point Calibration	Prior to sample analysis	%RSD ≤ 30%, 2 allowed out up to 40%	Correct problem then repeat Initial Calibration Curve.
LCS	After each initial Calibration Curve and daily prior to analysis	Recovery 70 – 130%	If more than 5% target compounds exceed criteria, evaluate system and reanalyze the standard. Re-prepare the standard if necessary. Re-calibrate the instrument if the criteria cannot be met.
LCSD	Each analytical batch	Recovery 70 – 130%; %RPD ≤ 25%	If more than 5% target compounds exceed criteria, evaluate system and recollection process. Correct problem and reanalyze.
Continuing Calibration Verification (CCV)	At the start of each analytical clock	70 – 130 %	If project-specified risk drivers exceed these criteria, more than 5% of the compounds exceed these criteria, or any VOC exceeds 50–150% recovery, maintenance is performed and the CCV test repeated. If the system still fails the CCV, perform a new 5-point Calibration Curve.
Laboratory Blank	After the CCV and at the end of the analytical batch	Results less than the laboratory RL	Inspect the system and re-analyze the Blank. No corrective action for Lab Blank at end of batch.
Internal Standard (IS)	As each standard, Blank, and sample is being loaded	**CCVs:** area counts 60–140%, RT w/in 20 sec of mid-point in ICAL **Blanks and samples**: Retention time (RT) must be within ±0.33 minutes of the RT in the CCV. The IS area must be within ±40% of the CCV's IS area for the Blanks and samples.	**CCV:** Inspect and correct system prior to sample analysis. **Blanks:** Inspect the system and re-analyze the Blank. **Samples:** Samples cannot be re-analyzed due to the nature of the sorbent cartridges. However investigate the problem by reviewing the data. If necessary, run a Lab Blank to check the instrument performance. Report the data and narrate.

Field Surrogates	Each clean sample tube used for pumped sample collection and lab blank and QC samples	50 – 150%	**For blanks:** Inspect the system and re-analyze the Blank. **For samples:** If no obvious reason can be ascertained after evaluation of the data and sample collection parameters, the sample should be reanalyzed to verify out of control recovery. If recovery is out of acceptance criteria in both the primary and recollected sample, the primary sample is reported with the surrogate flagged.

ANALYTICAL METHODS

Section 2.0

Method: EPA Method TO-14A/TO-15 Volatile Organic Compounds (Standard/Quad)

Eurofins Air Toxics SOP #6 Revision 30 Effective Date: April 30, 2013 Methods Manual Summary

Description: This method involves full scan gas chromatograph/mass spectrometer (GC/MS) analysis of whole air samples collected in evacuated stainless steel canisters. Samples are analyzed for volatile organic compounds (VOCs) using EPA Method TO-14A/TO-15 protocols. An aliquot of up to 0.5 liters of air is withdrawn from the canister utilizing a volumetric syringe, volumetric loop, or mass flow controller. This volume is loaded onto a hydrophobic multibed sorbent trap to remove water and carbon dioxide and to concentrate the vapor sample. The focused sample is then flash-heated to sweep adsorbed VOCs onto a secondary trap for further concentration and/or directly onto a GC/MS for separation and detection.

Eurofins Air Toxics maintains a suite of TO-14A/TO-15 methods, each optimized to efficiently meet the data objectives for a wide range of targeted concentration ranges. The methods, their reporting limits, and typical applications are summarized in the table below. This method summary describes TO-14A/TO-15 (Standard or Quad).

Eurofins Air Toxics Method	Base Reporting Limits	Typical Application
TO-14A/TO-15 (5&20)	5 – 20 ppbv	Soil gas and ppmv range vapor matrices
TO-14A/TO-15 (Standard or Quad)	0.5 – 5.0 ppbv	Ambient air, soil gas, and ppbv level vapor matrices
TO-14A/TO-15 (Low-level)	0.1 – 0.5 ppbv	Indoor and outdoor air
TO-14A/TO-15 SIM	0.003 – 0.5 ppbv	Indoor and outdoor air

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, Eurofins Air Toxics reports these non-routine compounds with partial validation. Validation may include a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification analyzed, and no method detection limit study performed unless previous arrangements have been made. In addition, stability of the non-standard compound during sample storage is not validated. Full validation may be available upon request.

Eurofins Air Toxics takes no modifications of technical significance to Method TO-15 for the "Quad" configurations. Since Eurofins Air Toxics applies TO-15 methodology to all Summa canisters regardless of whether TO-14A or TO-15 is specified by the project, the laboratory performs a modified version of method TO-14A as detailed in Table 1. Please note that Methods TO-14A and TO-15 were validated for specially treated canisters. As such, the use of Tedlar bags for sample collection is outside the scope of the method and not recommended for ambient or indoor air samples. It is the responsibility of the data user to determine the usability of TO-14A and TO-15 results generated from Tedlar bags.

Table 1. Summary of TO-14A Method Modifications

Requirement	TO-14A	Eurofins Air Toxics Modifications
Sample Drying System	Nafion Drier	Multibed hydrophobic sorbent
Blank acceptance criteria	≤ 0.2 ppbv	≤ RL
BFB ion abundance criteria	Ion abundance criteria listed in Table 4 of TO-14A	Follow abundance criteria listed in TO-15.
BFB absolute abundance criteria	Within 10% when comparing to the previous daily BFB	CCV internal standard area counts are compared to ICAL; corrective action when recovery is less than 60%.
Initial Calibration	≤ 30% RSD for listed 39 VOCs	≤ 30% RSD with 2 of Eurofins Air Toxics' 62 standard compounds allowed out to ≤ 40% RSD

The standard target analyte list, reporting limit (RL) also referred to as Limit of Quantitation, QC criteria, and QC summary can be found in Tables 2 through 5.

Table 2. Method TO-14A/TO-15 Analyte List (Quad)

Analyte	RL/LOQ (ppbv)	QC Acceptance Criteria			
		ICAL (%RSD)	CCV (%R)	ICV/LCS (%R)	Precision Limits (Max. RPD)
1,1,2,2-Tetrachloroethane	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,1,2-Trichloroethane	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,1-Dichloroethane	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,1-Dichloroethene	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,2,4-Trichlorobenzene	2.0	≤ 30%	70 – 130	70 – 130	± 25
1,2,4-Trimethylbenzene	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dibromoethane (EDB)	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichlorobenzene	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichloroethane	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichloropropane	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,3,5-Trimethylbenzene	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,3-Dichlorobenzene	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,4-Dichlorobenzene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Benzene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Bromomethane*	5.0	≤ 30%	70 – 130	70 – 130	± 25
Carbon Tetrachloride	0.5	≤ 30%	70 – 130	70 – 130	± 25
Chlorobenzene	0.5	≤ 30%	70 – 130	70 – 130	± 25

Chloroethane	2.0	≤ 30%	70 – 130	70 – 130	± 25
Chloroform	0.5	≤ 30%	70 – 130	70 – 130	± 25
Chloromethane	5.0	≤ 30%	70 – 130	70 – 130	± 25
Chlorotoluene (Benzyl Chloride)	0.5	≤ 30%	70 – 130	70 – 130	± 25
cis-1,2-Dichloroethene	0.5	≤ 30%	70 – 130	70 – 130	± 25
cis-1,3-Dichloropropene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Dichloromethane (Methylene Chloride)	5.0	≤ 30%	70 – 130	70 – 130	± 25
Ethylbenzene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Freon 11 (Trichlorofluoromethane)	0.5	≤ 30%	70 – 130	70 – 130	± 25
Freon 113 (Trichlorotrifluoroethane)	0.5	≤ 30%	70 – 130	70 – 130	± 25
Freon 114	0.5	≤ 30%	70 – 130	70 – 130	± 25
Freon 12 (Dichlorodifluoromethane)	0.5	≤ 30%	70 – 130	70 – 130	± 25
Hexachlorobutadiene	2.0	≤ 30%	70 – 130	70 – 130	± 25
m,p-Xylene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Methyl Chloroform (1,1,1-Trichloroethane)	0.5	≤ 30%	70 – 130	70 – 130	± 25
o-Xylene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Styrene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Tetrachloroethene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Toluene	0.5	≤ 30%	70 – 130	70 – 130	± 25
trans-1,3-Dichloropropene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Trichloroethene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Vinyl Chloride	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,3-Butadiene	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,4-Dioxane	2.0	≤ 30%	70 – 130	70 – 130	± 25
2-Butanone (Methyl Ethyl Ketone)	2.0	≤ 30%	70 – 130	70 – 130	± 25
2-Hexanone	2.0	≤ 30%	70 – 130	70 – 130	± 25
4-Ethyltoluene	0.5	≤ 30%	70 – 130	70 – 130	± 25
4-Methyl-2-Pentanone (MIBK)	0.5	≤ 30%	70 – 130	70 – 130	± 25
Acetone	5.0	≤ 30%	70 – 130	70 – 130	± 25
Bromodichloromethane	0.5	≤ 30%	70 – 130	70 – 130	± 25
Bromoform	0.5	≤ 30%	70 – 130	70 – 130	± 25
Carbon Disulfide	2.0	≤ 30%	70 – 130	70 – 130	± 25
Cyclohexane	0.5	≤ 30%	70 – 130	70 – 130	± 25
Dibromochloromethane	0.5	≤ 30%	70 – 130	70 – 130	± 25
Ethanol	2.0	≤ 30%	70 – 130	70 – 130	± 25

Heptane	0.5	≤ 30%	70 – 130	70 – 130	± 25
Hexane	0.5	≤ 30%	70 – 130	70 – 130	± 25
Isopropanol	2.0	≤ 30%	70 – 130	70 – 130	± 25
Methyl t-Butyl Ether (MTBE)	0.5	≤ 30%	70 – 130	70 – 130	± 25
Tetrahydrofuran	0.5	≤ 30%	70 – 130	70 – 130	± 25
trans-1,2-Dichloroethene	0.5	≤ 30%	70 – 130	70 – 130	± 25
2,2,4-Trimethylpentane	0.5	≤ 30%	70 – 130	70 – 130	± 25
Cumene	0.5	≤ 30%	70 – 130	70 – 130	± 25
Propylbenzene	0.5	≤ 30%	70 – 130	70 – 130	± 25
3-Chloroprene	2.0	≤ 30%	70 – 130	70 – 130	± 25
Naphthalene**	2.0	≤40%	60 – 140	60 – 140	± 25
TPH (Gasoline) ***	25	1-Point Calibration	N/A	ICV only; 60 – 140	± 25
NMOC (Hexane/Heptane)***	10	1-Point Calibration	N/A	NA	± 25

*Bromomethane recovery can be variable due to moisture/sorbent interactions specifically on the 2-trap concentration system. Data may require qualifier flags.

**Due to its low vapor pressure, Naphthalene may exceed TO-15 performance requirements. The wider QC limits reflect typical performance. Although Naphthalene is not on Eurofins Air Toxics "standard" TO-15 list, it is commonly requested and included in Table 2.

***TPH and NMOC are not on Eurofins Air Toxics' "standard" TO-15 list, but are included in Table 2 due to common requests.

Table 3. Internal Standards

Analyte	Accuracy (% R)
Bromochloromethane	60 – 140
1,4-Difluorobenzene	60 – 140
Chlorobenzene-d_5	60 – 140

Table 4. Surrogates

Analyte	Accuracy (% R)
1,2-Dichloroethane-d_4	70 – 130
Toluene-d_8	70 – 130
4-Bromofluorobenzene	70 – 130

Table 5. Summary of Calibration and QC Procedures for Methods TO-14A/TO-15

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Tuning Criteria	Every 24 hours	TO-15 ion abundance criteria	Correct problem then repeat tune.
Minimum 5-Point Initial Calibration (ICAL)	Prior to sample analysis	% RSD ≤ 30 with 2 compounds allowed out to ≤ 40% RSD	Correct problem then repeat Initial Calibration curve.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS)	After each Initial Calibration curve, and daily prior to sample analysis	Recoveries for 85% of "Standard" compounds must be 70–130%. No recovery may be < 50%. If specified by the client, in-house generated control limits may be used.	Check the system and reanalyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS) for Non-standard compounds	Per client request or specific project requirements only	Recoveries of compounds must be 60–140%. No recovery may be <50%.	Check the system and reanalyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Continuing Calibration Verification (CCV) for Standard compounds	At the start of each analytical clock after the tune check	70–130%	Compounds exceeding this criterion and associated data will be flagged and narrated with the exception of high bias associated with non-detects. If more than two compounds from the standard list recover outside of 70–130%, corrective action will be taken. If any compound exceeds 60–140%, samples are not analyzed unless data meets project needs. Check the system and reanalyze the standard. Re-prepare the standard if necessary. Re-calibrate the instrument if the criteria cannot be met.
Continuing Calibration Verification (CCV) for Non-standard Compounds	Per client request or specific project requirements only.	Recoveries of compounds must be 60–140%. No recovery may be <50%.	Check the system and reanalyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Laboratory Blank	After analysis of standards and prior to sample analysis, or when contamination is present.	Results less than the laboratory reporting limit	Inspect the system and re-analyze the blank. "B"-flag data for common contaminants.

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Internal Standard (IS)	As each standard, blank, and sample is being loaded	Retention time (RT) for blanks and samples must be within ±0.33 min of the RT in the CCV and within ±40% of the area counts of the daily CCV internal standards.	**For blanks:** Inspect the system and reanalyze the blank. **For samples:** Re-analyze the sample. If the ISs are within limits in the re-analysis, report the second analysis. If ISs are out-of-limits a second time, dilute the sample until ISs are within acceptance limits and narrate.
Surrogates	As each standard, blank, and sample is being loaded	70–130% If specified by the client, in-house generated control limits may be used.	**For blanks:** Inspect the system and reanalyze the blank. **For samples:** Re-analyze the sample unless obvious matrix interference is documented. If the %Rs are within limits in the re-analysis, report the second analysis. If %Rs are out-of-limits a second time, report data from first analysis and narrate.
Laboratory Duplicates – Laboratory Control Spike Duplicates (LCSD)	One per analytical batch	RPD ≤25%	Narrate exceedances. If more than 5% of compound list is outside criteria or if compound has >40%RPD, investigate the cause and perform maintenance as required. If instrument maintenance is required, calibrate as needed.

ANALYTICAL METHODS

Section 3.0

Method: ASTM D1946 – Atmospheric Gases

Eurofins Air Toxics SOP #8 Revision 22 Effective Date: December 24, 2013 Methods Manual Summary

Description: This method involves gas chromatograph (GC) analysis of soil gas, landfill gas, ambient air, or stack gas collected in Summa™ canisters, Tedlar bags, or any vessel that has been demonstrated to be clean and leak free. Samples are analyzed for Methane, fixed gases, and Non-Methane Organic Carbon (NMOC) using modified ASTM D1946 protocols. Because the sample is withdrawn from the vessel by positive pressure, rigid containers are first filled to positive pressure using UHP Helium or Nitrogen. Samples are then analyzed using a GC equipped with a FID and a TCD.

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, the laboratory reports these non-standard compounds with partial validation. Validation includes a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification is analyzed, and no method detection limit study is performed unless previous arrangements have been made. In addition, stability of the non-standard compound during sample storage is not validated. Full validation may be available upon request.

Since the protocols in the ASTM D1946 standard were designed for the analysis of reformed gas, the laboratory has taken modifications to apply the method to environmental samples covering a wide concentration range and to implement standard NELAP and EPA calibration criteria. The method modifications, standard target analyte list, reporting limits (RL), Quality Control (QC) criteria, and QC summary can be found in the following tables.

Table 1. Summary of Method Modifications for ASTM D1946

Requirement	ASTM D1946	Eurofins Air Toxics Modifications
Calibration	A single-point calibration is performed using a reference standard closely matching the composition of the unknown.	A minimum 3-point calibration curve is performed. Quantitation is based on a daily calibration standard, which may or may not resemble the composition of the associated samples.
Reference Standard	The composition of any reference standard must be known to within 0.01 mol % for any component.	The standards used by Eurofins Air Toxics are blended to a ≥ 95% accuracy.
Sample Injection Volume	Components whose concentrations are in excess of 5% should not be analyzed by using sample volumes greater than 0.5 mL.	The sample container is connected directly to a fixed volume sample loop of 1.0 mL. Linear range is defined by the calibration curve. Bags may be loaded by vacuum or by positive pressure.
Normalization	Normalize the mole percent values by multiplying each value by 100 and dividing by the sum of the original values. The sum of the original values should not differ from 100% by more than 1.0%.	Results are not normalized. The sum of the reported values can differ from 100% by as much as 15%, either due to analytical variability or an unusual sample matrix.

Precision	Precision requirements established at each concentration level.	Duplicates should agree within 25% RPD for detections >5X the RL.

Table 2. ASTM D1946 Method Compound List and QC Limits

Compound	Reporting Limit (%)	ICAL Criteria (%RSD)	ICV/LCS Criteria (%R)	CCV Criteria (%D)	Precision Limits (RPD)**
Carbon Dioxide	0.010	≤ 15%	85 – 115	± 15%	± 25%
Carbon Monoxide	0.010	≤ 15%	85 – 115	± 15%	± 25%
Methane	0.00010	≤ 15%	85 – 115	± 15%	± 25%
Ethene	0.0010	≤ 15%	85 – 115	± 15%	± 25%
Ethane	0.0010	≤ 15%	85 – 115	± 15%	± 25%
Nitrogen	0.10	≤ 15%	85 – 115	± 15%	± 25%
NMOC	0.010	≤ 15%	85 – 115	± 15%	± 25%
Oxygen	0.10	≤ 15%	85 – 115	± 15%	± 25%
Helium	0.050	≤ 15%	85 – 115	± 15%	± 25%
Hydrogen	0.010*	≤ 15%	85 – 115	± 15%	± 25%

*Reporting limit is 1.0% when sample is pressurized with Helium.
**For detections greater than 5 times the reporting limit.

Note: Results are reported in units of mol %. If required to report volume % or ppmV, a compressibility factor of 1 for all gases will be assumed. As a result, mol % is assumed to be equivalent to volume %. This assumption may result in a bias for highly compressible gases at high concentrations and pressures.

Table 3. Summary of Calibration and QC Procedures for Mod. ASTM Method D1946

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Initial Calibration Curve (ICAL)	Prior to sample analysis	RSD ≤ 15%	Correct problem then repeat Initial Calibration.
Second Source Verification (LCS)	All analytes: once per Initial Calibration, and with each analytical batch.	%R between 85–115%	Check the system and re-analyze the standard. Re-calibrate the instrument if the criteria cannot be met.
Continuing Calibration Verification (CCV)	Daily prior to sample analysis and after every 20 reportable samples.	%D ±15%	Check the system and re-analyze the standard. Re-calibrate the instrument if the criteria cannot be met.
Laboratory Blank (He) (N_2 for He and H_2 analysis)	After each daily check standard and prior to sample analysis, or when contamination is present.	Results below the RL	Inspect the system and re-analyze the Blank.
End Check	At the end of analytical sequence. It can be primary (CCV) or Independent Source (LCS).	%R between 85–115%	Check system and re-analyze the standard. If the 2nd analysis fails, identify and correct the problem. Samples analyzed after the last acceptable CCV are re-analyzed.
Sample Duplicates - Laboratory Control Spike Duplicate (LCSD)	One per analytical batch	RPD ≤ 25%	Narrate exceedances. Investigate the cause and perform maintenance as required and re-calibrate as needed.

ANALYTICAL METHODS

Section 4.0

Method: EPA Method TO-13A PAHs (Full Scan and SIM)

Eurofins Air Toxics SOP #10 Revision 18 Effective Date: April 26, 2013 Methods Manual Summary

Eurofins Air Toxics SOP #74 Revision 10 Effective Date: January 14, 2013 Methods Manual Summary

Description: This method involves drawing a measured volume of air through a filter and sorbent cartridge to collect Polychlorinated Biphenyls (PAHs) in the vapor and particulate phases. The cartridge can be PUF/XAD2 or XAD2 only. While TO-13A describes the use of a high-volume sampling pump, which allows for up to 300 cubic meters (m^3) of air to be collected over a 24-hour period, the method can also be applied to low-volume sample applications suitable for indoor air or soil gas. The sample media is extracted in the laboratory using Soxhlet extraction or pressurized fluid extraction (PFE). The concentrated extracts are analyzed for PAHs using a quadrupole gas chromatograph/mass spectrometer (GC/MS) in full scan or SIM mode by TO-13A protocol. Eurofins Air Toxics performs a modified version of this method. The method modifications, standard target analyte list, Limit of Quantitation (LOQ), QC criteria, and QC summary can be found in the following tables.

In relation to the prescribed media, sampling and collection efficiencies for compounds not listed in TO-13A have not been evaluated. However, if non-standard compounds are required for a project, the laboratory reports these compounds with partial validation. Validation includes a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification is analyzed, and no method detection limit study is performed unless previous arrangements have been made. In addition, stability of the non-standard compound during sample storage is not validated. Full validation may be available upon request.

Required Field QC: EPA Method TO-13 requires at least one field blank per sampling episode. Matrix spikes are referenced, but not definitively required in the routine QA specifications.

Table 1. Summary of Method Modifications for TO-13A

Requirements	EPA Method TO-13A	Eurofins Air Toxics Modifications
Extraction Solvent	10% ether in hexane for PUF; DCM for XAD sorbent. Final extract in hexane.	DCM for PUF/XAD cartridge and XAD sorbent. Final extract in DCM.
Glassware Cleaning	Muffle furnace is utilized.	Solvent cleaning procedure is used.
Extraction Technique	Soxhlet extraction	Soxhlet extraction or pressurized fluid extraction (PFE)
Reporting List	19 PAHs	See Table 2
Calibration range	0.1–2.5 µg/mL in hexane	1.0–160 µg/mL in methylene chloride for standard (quad) or 0.1–40 µg/mL for SIM
Method Blank	< MDL	< Reporting Limit

Table 2. Modified Method TO-13A Analyte List and Reporting Limits

Analyte	SIM RL (µg)	RL (µg)	Minimum ICAL RRF	ICAL (%RSD)	ICV (%R)	CCV (%R)	Precision (%RPD)
2-Chloronaphthalene*	0.1	1.0	NA	≤ 30	± 30	± 30	≤ 25%
2-Methylnaphthalene*	0.1	1.0	NA	≤ 30	± 30	± 30	≤ 25%
Acenaphthylene	0.1	1.0	1.3	≤ 30	± 30	± 30	≤ 25%
Acenaphthene	0.1	1.0	0.8	≤ 30	± 30	± 30	≤ 25%
Anthracene	0.1	1.0	0.7	≤ 30	± 30	± 30	≤ 25%
Benzo(a)anthracene	0.1	1.0	0.8	≤ 30	± 30	± 30	≤ 25%
Benzo(e)pyrene*	0.1	1.0	NA	≤ 30	± 30	± 30	≤ 25%
Benzo(a)pyrene	0.1	1.0	0.7	≤ 30	± 30	± 30	≤ 25%
Benzo(b)fluoranthene	0.1	1.0	0.7	≤ 30	± 30	± 30	≤ 25%
Benzo(g,h,i)perylene	0.1	1.0	0.5	≤ 30	± 30	± 30	≤ 25%
Benzo(k)fluoranthene	0.1	1.0	0.7	≤ 30	± 30	± 30	≤ 25%
Chrysene	0.1	1.0	0.7	≤ 30	± 30	± 30	≤ 25%
Dibenz(a,h)anthracene	0.1	1.0	0.4	≤ 30	± 30	± 30	≤ 25%
Fluoranthene	0.1	1.0	0.6	≤ 30	± 30	± 30	≤ 25%
Fluorene	0.1	1.0	0.9	≤ 30	± 30	± 30	≤ 25%
Indeno(1,2,3-c,d)pyrene	0.1	1.0	0.5	≤ 30	± 30	± 30	≤ 25%
Naphthalene	0.1	1.0	0.7	≤ 30	± 30	± 30	≤ 25%
Phenanthrene	0.1	1.0	0.7	≤ 30	± 30	± 30	≤ 25%
Pyrene	0.1	1.0	0.6	≤ 30	± 30	± 30	≤ 25%

* Not included in the TO-13A method.

The following two compounds can be analyzed upon client request:

Analyte	SIM RL (µg)	RL (µg)	Minimum ICAL RRF	ICAL (%RSD)	ICV (%R)	CCV (%R)	Precision (%RPD)
Perylene	N/A	1.0	0.5	≤ 30	± 30	± 30	≤ 25%
Coronene	N/A	1.0	0.7	≤ 30	± 30	± 30	≤ 25%

Table 3. Surrogates

Field Surrogates	Accuracy (%R)
Fluoranthene-d_{10}	50 – 150
Benzo(a)pyrene-d_{12}	50 – 150

Extraction Surrogates	Accuracy (%R)*
Fluorene-d_{10}	60 – 120
Pyrene-d_{10}	60 – 120

Table 4. Internal Standards

Analyte	Accuracy (%R)
Acenaphthene-d_{10}	-50 to +100
Chrysene-d_{12}	-50 to +100
1,4-Dichlorobenzene-d_4	-50 to +100
Naphthalene-d_8	-50 to +100
Perylene-d_{12}	-50 to +100
Phenanthrene-d_{10}	-50 to +100

Table 5. Extracted Laboratory Control Samples for TO-13A (PAHs) in Full Scan and SIM

Analyte	(%R)*
Naphthalene	60 – 120
Acenapthylene	60 – 120
Acenaphthene	60 – 120
Fluorene	60 – 120
Phenanthrene	60 – 120
Anthracene	60 – 120
Fluoranthene	60 – 120
Pyrene	60 – 120
Benzo(a)anthracene	60 – 120
Chrysene	60 – 120
Benzo(b)fluoranthene	60 – 120
Benzo(k)fluoranthene	60 – 120
Benzo(a)pyrene	60 – 120
Indeno(1,2,3-cd)pyrene	60 – 120
Dibenzo(a,h)anthracene	60 – 120
Benzo(g,h,i)perylene	60 – 120
2-Methylnaphthalene	60 - 120
2-Chloronaphthalene	60 – 120

*The LCS and Surrogate limits are derived from Compendium Method TO-13A, Sections 13.3.7.4 and 13.4.6.3 (January 1999). These limits only apply to samples that are extracted by Eurofins Air Toxics. When sample extracts are sent to the lab for analysis only, limits of 50-150 % are applied.

Table 6. Summary of Calibration and QC Procedures for EPA Method TO-13A

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Tuning Criteria	Prior to calibration and at start of every 12 hours	TO-13A tuning criteria	Correct problem then repeat tune.
Initial 5-Point Calibration	Prior to sample analysis	ICAL criteria in Table 2	Correct problem then repeat initial calibration.
ICAL ICV	All analytes: Once per initial calibration	All target compound recoveries must be between 70 – 130%	Determine the source of discrepancy between standards. Re-calibrate if needed.
Continuing Calibration Verification (CCV)	At the start of every clock immediately after the DFTPP tune check	PAHs list: Meet Table 2 Min. RRF requirement; %D ≤ 30%	Investigate and correct the problem, up to and including re-calibration if necessary. High bias associated with non-detects in samples will not result in re-analysis.
Internal Standards (IS)	Injected into each standard, blank, and sample extract prior to analysis	**For CCV:** Area count within 50% to 200% of the midpoint of ICAL. **For blanks, samples, and non-CCV QC checks:** retention times within ± 0.33 minutes (20 seconds) and area counts within 50% to 200% of the CCV.	**For CCVs:** Investigate and correct the problem before proceeding with sample analysis. **For blanks:** Inspect the system and re-analyze the blank. **For samples and non-CCV QC:** Unless there is obvious matrix effect, re-analyze the samples and dilute the sample until the ISs meet the criteria; narrate the data to indicate interference.
Surrogates	Field Surrogates: Blank cartridges prior to transport to field for sampling and lab QC prior to extraction. Extraction Surrogates: All samples and lab QC prior to extraction.	See Table 3.	A new aliquot of the extract is analyzed. If Surrogate recoveries are out-of-control a second time, data is flagged and narrated. Re-analysis is not necessary for obvious matrix effects (data is flagged for out-of-control surrogate recoveries). Air samples cannot be re-extracted.
Extracted Laboratory Control Samples (LCS)	With each set of up to 20 extracted samples	See LCS criteria in Table 5.	Re-aliquot and re-analyze the extract. If within limits, report the re-analysis. Otherwise, narrate.

Laboratory Blank	With each set of up to 20 extracted samples	Results less than laboratory reporting limit (Table 2).	Re-aliquot and re-analyze the extract. If less than reporting limit, report the re-analysis. Otherwise, narrate and flag the data.
Solvent Blank	When samples that are extracted together are analyzed on different analytical shifts	All target compounds below the reporting limit (Table 2).	Re-aliquot and re-analyze the solvent. If less than reporting limit, report the re-analysis. Identify the source of contamination, and perform maintenance as needed. If maintenance required, restart the analytical clock.
Laboratory Duplicates – Laboratory Control Spike Duplicates	One per analytical batch	RPD ≤ 25%	Re-analyze duplicate. Investigate the cause, perform maintenance as required, and re-calibrate as needed.

ANALYTICAL METHODS

Section 5.0

Method: Modified EPA Method TO-11A Aldehydes/Ketones

Eurofins Air Toxics SOP #11 Revision 17 Effective Date: March 4, 2014 Methods Manual Summary

Description: This method involves high-pressure liquid chromatography (HPLC) analysis of aldehydes and ketones in ambient air samples. The sampling media is a 2,4-Dinitrophenylhydrazine (DNPH)-coated (silica) cartridge. Aldehydes and ketones are readily converted to a stable hydrazone derivative. The DNPH cartridges are eluted with acetonitrile using gravity-feed technique. Analysis is performed by reverse phase HPLC with UV detection at 360 nm.

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, Eurofins Air Toxics reports these non-standard compounds with partial validation. Validation includes a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification is analyzed, and no method detection limit study is performed unless previous arrangements have been made. For the extraction process, the non-standard compound recovery is evaluated in the extracted laboratory control spike. In addition, stability of the non-standard compound during sample storage is not validated. Full validation may be available upon request.

Eurofins Air Toxics performs modified versions of this method. The method modifications, standard target analyte list, Limits of Quantitation (LOQs), reporting limits (RLs), Quality Control (QC) criteria, and QC summary can be found in the following tables.

Table 1. Summary of Method TO-11A Modifications

Requirement	TO-11A	Eurofins Air Toxics Modifications
Initial Calibration Curve (ICAL)	Multi-point using linear regression performed every 6 months	Multi-point using average Response Factor; re-calibration if daily calibration fails, major maintenance, or column change. Linear regression is performed when requested. Initial Calibration (ICAL) is performed at least once per year.
ICAL Criteria	R^2 for curve ≥ 0.999	%RSD ≤ 10% unless linear regression is required, with R^2 for curve ≥ 0.999
Blank Subtraction	Average blank concentrations calculated. Blank value subtracted from sample result.	One Lab Blank is analyzed per batch; no automatic blank subtraction performed on samples.
Retention Times	Precision of Retention Times ±7%	Retention Time window study is performed, but RT windows are determined by bracketing standards.

Table 2. Method TO-11A Analyte List and QC Criteria (Environmental Field Samples)

Analyte	TO-11A LOQ/RL[a] (µg)	ICAL (%RSD)	ISCV (%R)	CCV (%R)
Acetaldehyde	0.10	≤ 10	± 15	± 10
Acrolein[b]	0.25[d]	≤ 10	± 15	± 10
Benzaldehyde	0.25	≤ 10	± 15	± 10
Crotonaldehyde	0.25	≤ 10	± 15	± 10
Formaldehyde	0.05	≤ 10	± 15	± 10
Hexanal	0.25	≤ 10	± 15	± 10
Isopentanal	0.25	≤ 10	± 15	± 10
MEK/Butyraldehydes[c]	0.25	≤ 10	± 15	± 10
m,p-Tolualdehyde	0.25	≤ 10	± 15	± 10
o-Tolualdehyde	0.25	≤ 10	± 15	± 10
Pentanal	0.25	≤ 10	± 15	± 10
Propanal	0.25	≤ 10	± 15	± 10
Acetone	0.25	≤ 10	± 15	± 10
Acetophenone*	N/A	≤ 10	± 15	± 10
Isophorone*	N/A	≤ 10	± 15	± 10
Heptaldehyde*	0.25	≤ 10	± 15	± 10
2,5-Dimethylbenzaldehyde*	0.25	≤ 10	± 15	± 10

[a] Noted reporting limits are subject to change based on most current MDL study.

[b] Because its derivative is not stable, when the target analyte list includes Acrolein the sample will need to be extracted in field. A special order should be placed with the laboratory during the project set-up stage.

[c] Methyl Ethyl Ketone and the Butyraldehydes co-elute.

[d] Not recommended.

* Special compounds upon request only.

Table 3. Summary of Calibration and QC Procedures for Method TO-11A

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
5-Point Initial Calibration Curve (ICAL)	Analyzed in triplicate prior to sample analysis	%RSD ≤ 10	Repeat calibration.
Instrument LCS	With each ICAL	%R = 85–115%	Check the system and re-analyze the standard. Re-calibrate the instrument if the criteria cannot be met.
Continuing Calibration Verification (CCV)	Daily prior to sample analysis, after a maximum of every 10 injections, and at the end of the analytical batch	Within ±10% of the expected value	Check the system and re-analyze the standard. If the criteria cannot be met, re-calibrate the instrument. If the standard is biased low, re-analyze all samples since last acceptable CCV. If biased high and samples are "ND", re-analysis is not required. "Q"-flag high recoveries.
Instrument (Solvent) Blank Analysis	Following analysis of Standards	Results less than the laboratory RL	Inspect the system and re-analyze the blank.
Laboratory Duplicates - Laboratory Control Spike Duplicate	One per analytical batch	RPD ≤ 25%	Re-analyze the sample a third time. If the limit is exceeded again, investigate the cause and bring the system back to working order. If no problem is found with the system, narrate the data.

ANALYTICAL METHODS

Section 6.0

Method: ASTM D5504 – Sulfur Compounds

Eurofins Air Toxics SOP #13 Revision 17 Effective Date: December 27, 2013 Methods Manual Summary

Description: This method involves gas chromatograph (GC) analysis of whole air samples for sulfur compounds collected in Tedlar bags. Detection of volatile sulfur compounds is accomplished using a Sulfur Chemiluminescence Detector (SCD) following method ASTM D5504.

Care should be taken to ensure samples to be analyzed for reduced sulfur compounds do not come into contact with any metal surfaces. In addition, because of the reactivity of Hydrogen Sulfide (H_2S), and mercaptans, samples collected in Tedlar bags should be analyzed within 24 hours of collection. Samples collected in Tedlar bags should also be protected from heat and light.

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, the laboratory reports these non-standard compounds with partial validation. Validation includes a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification is analyzed, and no method detection limit study is performed unless previous arrangements have been made. In addition, stability of the non-standard compound during sample storage is not validated. Full validation may be available upon request.

The laboratory is not equipped to handle >100 ppmv levels of sulfur compounds. Please notify the laboratory if ppmv levels of sulfur compounds are anticipated.

Method Modifications: The Quality Control (QC) elements listed in the latest ASTM Method D5504-01 are suggested, *not required*. In general, calibration protocols followed by the laboratory are designed to meet standard NELAP and EPA environmental data acceptance criteria. Several method suggestions of note are not included in the laboratory QC procedures unless requested by the client. The deviations from the method recommendations are as follows:

- All field samples are not analyzed in duplicate.
- Daily spiked field samples are not analyzed.

Additionally, upon special request, Eurofins Air Toxics provides passivated canisters for sulfur collection. *Air Toxics does not examine passivated canisters for continued sulfur stability as required by the method, and previous studies have demonstrated that recoveries of the glass-lined canisters indicate a potential loss of inertness which can vary from canister to canister.* Sample analysis results derived from passivated canister media are reported with the appropriate narration. Per the ASTM D5504 method, the storage time when using a passivated/lined canister is not to exceed 7 days.

The standard target analyte list, reporting limits (RL), QC criteria, and QC summary can be found in the following tables.

Table 1. ASTM Method D5504 Compound List and QC Limits

Analyte	RL (ppbv)	QC Acceptance Criteria		
		ICAL (% RSD)	LCS/ CCV* (% R)	Precision (% RPD)
2,5-Dimethylthiophene	4.0	≤ 30	70 – 130	≤ 25
2-Ethylthiophene	4.0	≤ 30	70 –130	≤ 25
3-Methylthiophene	4.0	≤ 30	70 – 130	≤ 25
Carbon Disulfide	5.0	≤ 30	70 – 130	≤ 25
Carbonyl Sulfide	4.0	≤ 30	70 – 130	≤ 25
Diethyl Disulfide	4.0	≤ 30	70 – 130	≤ 25
Diethyl Sulfide	4.0	≤ 30	70 – 130	≤ 25
Dimethyl Disulfide	4.0	≤ 30	70 – 130	≤ 25
Dimethyl Sulfide	4.0	≤ 30	70 – 130	≤ 25
Ethyl Mercaptan	4.0	≤ 30	70 – 130	≤ 25
Ethyl Methyl Sulfide	4.0	≤ 30	70 – 130	≤ 25
Hydrogen Sulfide	4.0	≤ 30	70 – 130	≤ 25
Isobutyl Mercaptan	4.0	≤ 30	70 – 130	≤ 25
Isopropyl Mercaptan	4.0	≤ 30	70 – 130	≤ 25
Methyl Mercaptan	4.0	≤ 30	70 – 130	≤ 25
n-Butyl Mercaptan	4.0	≤ 30	70 – 130	≤ 25
n-Propyl Mercaptan	4.0	≤ 30	70 – 130	≤ 25
tert-Butyl Mercaptan	4.0	≤ 30	70 – 130	≤ 25
Tetrahydrothiophene	4.0	≤ 30	70 – 130	≤ 25
Thiophene	4.0	≤ 30	70 – 130	≤ 25

*The recovery for all analytes should be 70-130%; end check recoveries are 70-130% with 2 allowed out up to 60-140%. The recovery for Hydrogen Sulfide, Carbonyl Sulfide and Carbon Disulfide must be 70-130%.

Table 2. Summary of Calibration and QC Procedures for ASTM Method D 5504

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Initial Calibration (ICAL)	Prior to sample analysis	A minimum of 5 points (3 points may be accepted to meet sample hold times.) % RSD ≤ 30	Evaluate system. Re-prepare and/or re-analyze calibration points.
Second Source Verification (LCS)	With each Initial Calibration; with each analytical batch.	70–130% of the expected values for all the compounds	Check the system, re-prepare and/or re-analyze standard. Re-calibrate instrument if CCV shows similar recoveries. If recoveries are high and no detections are expected, sample analysis may proceed. If hold-time is at risk, flagging and narration of non-compliant compounds may be appropriate.
Continuing Calibration Verification (CCV)	Daily prior to sample analysis	%Recovery = 70–130%	Check the system, re-prepare and re-analyze standard. Re-calibrate instrument if re-analysis shows similar recoveries. If recoveries are high and no detections are expected, sample analysis may proceed. If hold-time is at risk, flagging and narration of non-compliant may be appropriate.
Laboratory Blank	After daily LCS and after high level samples and mid-check standards as needed	Results less than the laboratory reporting limit.	Inspect the system and re-prepare the lab blank bag. Flag associated detections with a “B” flag.
End Check	At the end of the analytical sequence	Recoveries within 70–130% with 2 target analytes not exceeding 60–140%. The recovery for Hydrogen Sulfide, Carbonyl Sulfur and Carbon Disulfide must be 70–130%.	Re-analyze the standard to confirm loading procedure. If the 2nd analysis fails, identify and correct the problem. If possible re-analyze all or a subset samples after the last compliant QC check. If re-analysis within hold-time is not possible, flag data affected data. No flags are required if recovery is high and no associated compounds are detected.

Laboratory Duplicates – LCS/LCSD	One per analytical batch	RPD $\leq$ 25%	Verify that the sample or LCS is securely attached to the sample introduction line. If a problem is identified, document in the run log and re-analyze the duplicate pair. If no loading problem is identified, narrate exceedances. If LCSD is analyzed immediately after LCS and precision is not met, notify manager or technical support team before proceeding with sample analysis.

ANALYTICAL METHODS

Section 7.0

Method: Modified EPA Methods TO-4A/TO-10A Pesticides and PCBs

Eurofins Air Toxics SOP #26 Revision 18 Effective Date: December 27, 2013 Methods Manual Summary

Description: These methods involve drawing a measured volume of air through a filter and PUF cartridge to collect pesticides and Aroclors in the vapor and particulate phases. EPA Method TO-4A describes the use of a high-volume sampling pump which allows for up to 300 cubic meters (m^3) of air to be collected over a 24-hour period, while the TO-10A method describes a low-volume sample application suitable for indoor air. Filters are not required for TO-10A sample collection. The sample media is extracted in the laboratory using Soxhlet extraction or Pressurized Fluid Extraction (PFE). The extracts are solvent-exchanged to hexane, concentrated to a final volume, and analyzed for chlorinated pesticides and PCBs using a gas chromatograph (GC) equipped with a dual Electron Capture Detector (ECD) for detection and confirmation.

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, the laboratory reports these non-standard compounds with partial validation. Validation includes a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification is analyzed, and no method detection limit study is performed unless previous arrangements have been made. For the extraction process, the non-standard compound recovery is evaluated in the extracted laboratory control spike. In addition, stability of the non-standard compound during sample storage is not validated. Full validation may be available upon request.

Eurofins Air Toxics performs modified versions of these methods. The method modifications, standard target analyte list, reporting limit (RL) Quality Control (QC) criteria, and QC summary can be found in the following tables.

Table 1. Summary of Method Modifications for TO-4A/TO-10A

Requirement	EPA Methods TO-4A/TO-10A	Eurofins Air Toxics Modifications
Extraction Solvent	10% (5% for TO-10A) Diethyl Ether in Hexane	Dichloromethane (DCM) exchanging to Hexane during the concentration step
Reagent Blank	Set up extraction system without filter/PUF; reflux with solvent.	No Reagent Blank is extracted. Reagent lots are certified as acceptable prior to use.
Media certification (TO-10A only)	< 0.01 µg for single peak analytes; < 0.1 µg for PCBs	< Reporting Limit for all analytes
Frequency of Continuing Calibration Verification (CCV)	Every 10 samples	Every 20 samples with internal standard
PCB Quantitation	Requires a minimum of 5 peaks.	Use 4 peaks for quantitation.

Field Spike	Requires one PUF cartridge from each batch of 20 to be spiked with standard and not be used during the sampling period. The spiked PUF plug is placed in a sealed container, then extracted along with samples.	A spike is prepared at the time of sample extraction only.
Sampling Efficiency Determination	Prior to implementation of method and then periodically determine sampling efficiency by spiking PUF and sampling ambient air to determine recoveries.	No sampling efficiencies have been determined by the laboratory.

Table 2. Methods TO-4A/TO-10A Reporting and QC Limits

Analyte	RL (µg)	Low Point of the Curve (µg)	QC Acceptance Criteria			
			ICAL (%RSD)	ICV (%R)	CCV (%D)	LCS (%R)
4,4'-DDD	0.10	0.10	≤ 20	± 15	± 15	65 – 125
4,4'-DDE	0.10	0.10	≤ 20	± 15	± 15	65 – 125
4,4'-DDT	0.10	0.10	≤ 20	± 15	± 15	65 – 125
4,4'-Methoxychlor	1.0	1.0	≤ 20	± 15	± 15	65 – 125
Aldrin	0.10	0.10	≤ 20	± 15	± 15	65 – 125
alpha-BHC	0.10	0.10	≤ 20	± 15	± 15	65 – 125
cis-Chlordane	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Aroclor 1016/1242	1.0	1.0	≤ 20	± 15	± 15	65 – 125
Aroclor 1221[①]	1.0	NA	≤ 20	± 15	± 15	
Aroclor 1232[①]	1.0	NA	≤ 20	± 15	± 15	
Aroclor 1248[①]	1.0	NA	≤ 20	± 15	± 15	
Aroclor 1254[①]	1.0	NA	≤ 20	± 15	± 15	
Aroclor 1260	1.0	1.0	≤ 20	± 15	± 15	65 – 125
beta-BHC	0.10	0.10	≤ 20	± 15	± 15	65 – 125
delta-BHC	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Dieldrin	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Endosulfan I	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Endosulfan II	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Endosulfan Sulfate	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Endrin	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Endrin Aldehyde*	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Endrin Ketone	0.10	0.10	≤ 20	± 15	± 15	65 – 125
gamma-BHC (Lindane)	0.10	0.10	≤ 20	± 15	± 15	65 – 125
trans-Chlordane	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Heptachlor	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Heptachlor Epoxide	0.10	0.10	≤ 20	± 15	± 15	65 – 125
Technical Chlordane[①④]	1.0	NA	≤ 20	± 15	± 15	
Toxaphene[①]	1.0	NA	≤ 20	± 15	± 15	

Mirex is not included in the standard pesticides list but can be performed upon request.

*Internal studies have shown poor recoveries of Endrin Aldehyde from PUF cartridge. In-house generated control limits are used to evaluate recovery of this compound.

Surrogates③

Analyte	%R
2,4,5,6-Tetrachloro-m-xylene (TCMX)	60 – 120②
Decachlorobiphenyl (DCB)	60 – 120②

① *The noted multi-component compounds use a one-point calibration.*
② *Recovery limits are derived from Compendium Method TO-10A January 1999.*
③ *Recovery limits are for extracted samples only. Non-extracted samples use limits of 85–115 %R.*
④ *Not routinely reported but available at client request.*

Table 3. Summary of Calibration and QC Procedures for Methods TO-4A/TO-10A

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
5-Point Initial Calibration Curve (ICAL)*	Prior to sample analysis	%RSD ≤ 20 for each compound or average %RSD ≤ 20.	Use linear regression per SW-846 or re-calibrate.
Independent Calibration Verification (ICV)	After each Initial Calibration	Recovery of an individual component or the average of all the target components for a list of 5 or more target components within 85–115% recovery. Not to exceed 75–125% for any individual compounds.	Investigate the source of discrepancy, including re-preparation and re-analysis of standard. Re-calibrate if needed.
Breakdown Check (Endrin and p,p'-DDT)	Daily, prior to Initial Curve; CCV for pesticide analysis only.	Degradation ≤ 15%	Perform maintenance. Repeat breakdown check.
Continuing Calibration Verification (CCV)	Daily, prior to sample analysis, every 20 samples, and at the end of the analysis sequence, at a minimum of every 24 hours.	Recovery of an individual component or the average of all the pesticide target components for a list of 5 or more target components, within 15% of the expected values. Not to exceed 75–125% for any individual compounds.	Analyze new ICAL and/or prepare fresh standards. If the standard analyzed is recovering high and associated samples are ND, "Q" flag the high recoveries. If the standard analyzed is recovering low, re-analyze all samples.
Laboratory Control Spike (LCS) for compounds noted in Table 2.	Extracted with each set of up to 20 samples	As mentioned in Table 2	Analyze another aliquot. If it still fails, "Q" flag the compounds that are outside the control limits.

Surrogates	All samples, QC, and blanks prior to extraction	As mentioned in Table 2	Analyze another aliquot. If it still fails, "Q" flag the compounds outside the control limits.
Internal Standard	With all analyses	CCV 50–200% compared to midpoint of ICAL; samples 50–200% compared to first CCV of the daily analytical batch.	Analyze another aliquot. If a CCV fails, correct problem before proceeding. If a sample fails, analyze a second time. If it still fails, dilute the sample until IS meets the criteria. Narrate the matrix interference.
Laboratory Blanks	With each set of up to 20 samples extracted	Results less than the Laboratory reporting limit.	Analyze another aliquot. If it still fails, "B" flag the compounds that do not meet the acceptance criteria.
Laboratory Duplicates Laboratory Control Spike Duplicate	One per analytical batch	RPD ≤ 25%	Narrate exceedances. Investigate the cause and perform maintenance as required and re-calibrate as needed.
Second-Column Confirmation	100% for all positive results, for both pesticide and PCB analyses	Same as for initial or primary column analysis	Same as for initial or primary column analysis

* A single-point calibration is performed for Technical Chlordane, Toxaphene, and certain Aroclors.

ANALYTICAL METHODS

Section 8.0

Method: EPA Method TO-12 (Non-methane Organic Compounds)

Eurofins Air Toxics SOP #36 Revision 16 Effective Date: April 03, 2013 Methods Manual Summary

Description: This method involves gas chromatograph analysis of whole air samples collected in Summa™ canisters or Tedlar bags. Samples are analyzed for Non-Methane Organic Compounds (NMOC) using EPA Method TO-12 protocols. After concentration on a sorbent bed, samples are analyzed using a Flame Ionization Detector (FID). This method is used when speciation is not required.

NMOC concentrations are quantified using the response factor of heptane. As required by the project, NMOC results referenced to heptane can be converted to units of ppmC (parts per million of Carbon). Additionally, hydrocarbon ranges can be provided based on the elution time of the normal alkanes on the GC column.

Eurofins Air Toxics performs a modified version for each of these methods. The method modifications, standard target analyte list, RL, QC criteria, and QC summary can be found in the following tables.

Table 1. Summary of Method Modifications for TO-12

Requirement	EPA Method TO-12	Eurofins Air Toxics Modifications
Reporting Limit	0.02 ppmC	0.010 ppmv
Initial Calibration	Five levels: Each level three runs with %RSD < 3%; linearity criterion not specified	Minimum of three single levels; %RSD ≤ 30%.
Sample Analysis Frequency	Duplicate analysis with RPD<5%; report average results of two analyses.	Single analysis. Duplicate 10% of samples with RPD ≤ 25% for detections > 5X the RL.
Column*	GC column not used.	GC column used for analysis.
Sample concentration	Cyrogenic concentration	Multibed sorbent concentration

* The column modification implemented for sample analysis allows for additional characterization based on carbon ranges.

Table 2. Method Compound List and QC Limits

Analyte	RL (ppmv)	Acceptance Criteria		
		ICAL (%RSD)	LCS/CCV (%R)	Precision (%RPD)
Total NMOC ref. to Heptane	0.010	≤ 30	75-125%	≤ 25

Table 3. Summary of Calibration and QC Procedures for TO-12 (NMOC)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Initial Calibration Curve (ICAL)	Prior to sample analysis and/or annually	% RSD ≤ 30	Repeat the calibration.
Laboratory Control Sample (LCS)	With each initial calibration and analytical batch	75–125% of the expected value	Check the system and re-analyze the standard. Re-calibrate the instrument if the criteria cannot be met.
Continuing Calibration Verification (CCV)	Daily prior to sample analysis and after every 20 samples or at the end of the analytical sequence	% Difference ± 25 of expected value	Check the system and re-analyze the standard. Re-calibrate the instrument if the criteria cannot be met. Re-analyze all samples since the last acceptable CCV.
Laboratory Blank	In between analysis of standards and project samples	Results less than laboratory reporting limit	Repeat the Laboratory Blank. If the re-analysis of the Lab Blank contains above but at less than 5X the reporting limit, sample analysis may proceed and the associated sample results will be reported with a B flag.
Laboratory Duplicates/ Laboratory Control Spike Duplicate (LCSD)	One per analytical batch	RPD ≤ 25%	Narrate exceedances. Investigate the cause and perform maintenance as required and re-calibrate as needed.

ANALYTICAL METHODS

Section 9.0

Method: EPA Method TO-14A/TO-15 Volatile Organic Compounds by SIM

Eurofins Air Toxics SOP #38 Revision 17 Effective Date: December 27, 2013 Methods Manual Summary

Description: This method involves Selective Ion Monitoring (SIM) gas chromatograph/mass spectrometer (GC/MS) analysis of whole air samples collected in evacuated stainless steel canisters. Samples are analyzed for volatile organic compounds (VOCs) using EPA Method TO-14A/TO-15 protocols. An aliquot of the sample is withdrawn from the canister through a mass flow controller and concentrated onto a hydrophobic drying system that removes water from the sample stream. The sample is then focused onto a cryogenic-cooled column prior to analysis by GC/MS in the SIM mode.

Mass spectrometer detectors can be set to acquire both SIM and full scan data simultaneously. This generates two separate data files in the analytical software. One file contains full scan data and the other contains SIM data for selected compounds. The results for each sample in a report will be from two separate data files originating from the same analytical run. The two data files have the same base file name and are differentiated with a "sim" extension on the SIM data file.

Eurofins Air Toxics maintains a suite of TO-14A/TO-15 methods, each optimized to efficiently meet the data objectives for a wide range of targeted concentration ranges. The methods, their reporting limits, and typical applications are summarized in the table below. This method summary describes TO-14A/TO-15 SIM.

Eurofins Air Toxics Method	Base Reporting Limits	Typical Application
TO-14A/TO-15 (5&20)	5 – 20 ppbv	Soil gas and ppmv range vapor matrices
TO-14A/TO-15 (Standard or Quad)	0.5 – 5.0 ppbv	Ambient air, soil gas, and ppbv level vapor matrices
TO-14A/TO-15 (Low-level)	0.1 – 0.5 ppbv	Indoor and outdoor air
TO-14A/TO-15 SIM	0.003 – 0.5 ppbv	Indoor and outdoor air

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. If full validation of the required compound(s) is not available, the laboratory will present Quality Control (QC) options to the client based on the project objectives.

Please note that Methods TO-14A and TO-15 were validated for specially treated canisters. As such, the use of Tedlar bags for sample collection is outside the scope of the method and not recommended for ambient or indoor air samples. It is the responsibility of the data user to determine the usability of TO-14A and TO-15 results generated from Tedlar bags.

All samples submitted for TO-15 SIM are screened prior to analysis. If samples contain high concentrations of target and/or non-target VOCs, samples may be analyzed by an alternative TO-15 method (i.e. Standard or 5&20) with a higher dynamic calibration range.

Eurofins Air Toxics performs a modified version of TO-15 SIM as detailed in Table 1. Additionally, since Eurofins Air Toxics applies TO-15 methodology to all Summa™ canisters regardless of whether TO-14A or TO-15 is specified by the project, Eurofins Air Toxics performs a modified version of method TO-14A as described in Table 2. The default SIM target list, reporting limits (RL), QC criteria and QC summary may be found in tables 3 and 4.

Table 1. Summary of TO-15 SIM Method Modifications

Requirement	TO-15	Eurofins Air Toxics Modifications
Blank and standards	Zero Air	Nitrogen

Table 2. Summary of TO-14A SIM Method Modifications

Requirement	TO-14A	Eurofins Air Toxics Modifications
Sample Drying System	Nafion Dryer	Multibed hydrophobic sorbent
ICAL %RSD acceptance criteria	≤ 30% RSD for listed 39 VOCs	Follow TO-15 requirements of ≤ 30%RSD with 2 of standard compound list allowed out to ≤ 40%RSD
Blank and standards	Zero air	Nitrogen
BFB ion abundance criteria	Ion abundance criteria listed in Table 4 of TO-14A	Follow abundance criteria listed in TO-15.
BFB absolute abundance criteria	Within 10% when comparing to the previous daily BFB	CCV internal standard area counts are compared to ICAL; corrective action when recovery is less than 60%

Table 3. Method TO-14A/TO-15 Standard Analyte List (SIM) and QC Limits

Analyte	RL/LOQ (ppbv)	QC Acceptance Criteria			
		ICAL (%RSD)	CCV (%R)	ICV/LCS (%R)	Precision Limits (Max. RPD)
Dichlorodifluoromethane (Fr12)	0.020	≤ 30%	70 – 130	70 – 130	± 25
Freon 114	0.020	≤ 30%	70 – 130	70 – 130	± 25
Chloromethane	0.050	≤ 30%	70 – 130	70 – 130	± 25
Vinyl Chloride	0.010	≤ 30%	70 – 130	70 – 130	± 25
Chloroethane	0.050	≤ 30%	70 – 130	70 – 130	± 25
1,1-Dichloroethene	0.010	≤ 30%	70 – 130	70 – 130	± 25
Trans-1,2-Dichloroethene	0.100	≤ 30%	70 – 130	70 – 130	± 25
Methyl tert-Butyl Ether	0.100	≤ 30%	70 – 130	70 – 130	± 25
1,1-Dichloroethane	0.020	≤ 30%	70 – 130	70 – 130	± 25
cis-1,2-Dichloroethene	0.020	≤ 30%	70 – 130	70 – 130	± 25
Chloroform	0.020	≤ 30%	70 – 130	70 – 130	± 25
1,1,1-Trichloroethane	0.020	≤ 30%	70 – 130	70 – 130	± 25
Carbon Tetrachloride	0.020	≤ 40%	60 - 140	60 - 140	± 25
Benzene	0.050	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichloroethane	0.020	≤ 30%	70 – 130	70 – 130	± 25
Trichloroethene	0.020	≤ 30%	70 – 130	70 – 130	± 25
Toluene	0.020	≤ 30%	70 – 130	70 – 130	± 25
1,1,2-Trichloroethane	0.020	≤ 30%	70 – 130	70 – 130	± 25
Tetrachloroethene	0.020	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dibromoethane	0.020	≤ 30%	70 – 130	70 – 130	± 25
Ethyl Benzene	0.020	≤ 30%	70 – 130	70 – 130	± 25
m,p-Xylene	0.040	≤ 30%	70 – 130	70 – 130	± 25
o-Xylene	0.020	≤ 30%	70 – 130	70 – 130	± 25
1,1,2,2-Tetrachloroethane	0.020	≤ 30%	70 – 130	70 – 130	± 25
1,4-Dichlorobenzene	0.020	≤ 30%	70 – 130	70 – 130	± 25
Naphthalene	0.050	≤ 40%	60 – 140	60 – 140	± 25

Table 3 is the list of Standard compounds, reporting limits and QC acceptance criteria. Each project may be customized as needed. Additional compounds and different reporting limits may be obtainable and/or achieved upon request.

Table 4. Summary of Calibration and QC Procedures for Methods TO-14A/TO-15 by SIM

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Tuning Criteria	Every 24 hours	TO-15 Ion Abundance criteria	Correct problem then repeat tune.
Multi-point Calibration (Minimum of 5 points)	Prior to sample analysis	≤ 30% for standard compounds with 2 compounds allowed out to ≤ 40% RSD	Correct problem then repeat Initial Calibration Curve.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS)	After each initial calibration curve, and daily prior to sample analysis	Recoveries for 85% of standard compounds must be 70–130% (≤ 40% for Methyl tert-Butyl Ether and trans-1,2-Dichloroethene). No recovery may be ≤ 50%. If specified by the client, in-house generated control limits may be used.	Check the system and re-analyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS) for <u>Non-Standard</u> Compounds	Per client request or specific project requirements only	Recoveries of compounds must be 60–140%. No recovery may be ≤ 50%.	Check the system and re-analyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Continuing Calibration Verification (CCV)	At the start of each day after the BFB tune check	70–130%	Compounds exceeding this criterion and associated data will be flagged and narrated with the exception of high bias associated with non-detects. If more than two compounds from the standard list recover outside of 70–130%, corrective action will be taken. If any compound exceeds 60–140%, samples are not analyzed unless data meets project needs. Check the system and re-analyze the standard. Re-prepare the standard if necessary. Re-calibrate the instrument if the criteria cannot be met.
Continuing Calibration Verification (CCV) for <u>Non-Standard</u> Compounds	Per client request or specific project requirements only	Recoveries of compounds must be 60–140%. No recovery may be ≤ 50%.	Check the system and re-analyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.

Laboratory Blank	After analysis of standards and prior to sample analysis, or when contamination is present.	Results less than the laboratory reporting limit (Table 4) or project required reporting limit.	Inspect the system and re-analyze the blank. "B" flag data for common contaminants.
Internal Standard (IS)	As each standard, blank, and sample is being loaded	Retention time (RT) for blanks and samples must be within ±0.33 min of the RT in the CCV and within ±40% of the area counts of the daily CCV internal standards.	**For blanks:** Inspect the system and re-analyze the blank. **For samples:** Re-analyze the sample. If the ISs are within limits in the re-analysis, report the second analysis. If ISs are out-of-limits a second time, dilute the sample until ISs are within acceptance limits and narrate.
Surrogates	As each standard, blank, and sample is being loaded	70–130% If specified by the client, in-house generated control limits may be used.	**For blanks:** Inspect the system and re-analyze the blank. **For samples:** Re-analyze the sample unless obvious matrix interference is documented. If the %Rs are within limits in the re-analysis, report the second analysis. If %Rs are out-of-limits a second time, report data from first analysis and narrate.
Laboratory Duplicates - Laboratory Control Spike Duplicate (LCSD)	One per analytical batch	RPD ≤ 25%	Narrate exceedances. If more than 5% of compound list outside criteria or if compound is > 40%RPD, investigate the cause and perform maintenance as required. If instrument maintenance is required, calibrate as needed.

ANALYTICAL METHODS

Section 10.0

Method: EPA Methods TO-3 and TO-14A (BTEX/TPH)

Eurofins Air Toxics SOP #43 Revision 20 Effective Date: April 02, 2013 Methods Manual Summary

Description: This method involves GC analysis of whole air samples collected in Summa canisters or Tedlar bags. Samples are analyzed for Benzene, Toluene, Ethylbenzene, Xylenes, (BTEX) and Total Petroleum Hydrocarbons (TPH). Either modified EPA Method TO-3 or Method TO-14A or can be used to reference laboratory protocols. BTEX is measured using a Photo Ionization Detector (PID), and TPH is measured using a Flame Ionization Detector (FID). Depending on the client's request, TPH is analyzed and referenced to either gasoline or jet fuel.

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, the laboratory reports these non-standard compounds with partial validation. Validation includes a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification is analyzed, and no method detection limit study is performed unless previous arrangements have been made. In addition, stability of the non-standard compound during sample storage is not validated. Full validation may be available upon request.

Eurofins Air Toxics performs a modified version for these methods. The method modifications, standard target analyte list, reporting limit (RL), QC criteria, and QC summary can be found in the following tables.

Table 1. Summary of Method Modifications for TO-14A

Requirement	EPA Method TO-14A	Eurofins Air Toxics Modifications
Sample Drying System*	Nafion Dryer	Multi-bed sorbent
Sample collection containers	Specially treated stainless steel canisters	Method TO-14A is validated for samples collected in specially treated canisters. As such, the use of Tedlar bags for sample collection is outside the scope of the method and not recommended for ambient or indoor air samples. Associated results are considered qualified.

* The pre-concentrator modification implemented for sample analysis allows for superior performance over the water management and concentration procedures outlined in Method TO-14A. This multi-bed sorbent approach used in EPA Method TO-15 allows for the inclusion of polar compounds such as MTBE, and demonstrates superior performance by minimizing carryover issues that can be problematic using the Nafion dryer scenario described in Method TO-14A.

Table 2. Summary of Method Modifications for TO-3

Requirement	EPA Method TO-3	Eurofins Air Toxics Modifications
Sample Collection	In-line field method	Collection of sample in specially treated canisters or alternative containers for transport to and analysis by an off-site laboratory.
Preparation of Standards	Levels achieved through dilution of gas mixture	Levels achieved through loading various volumes of the gas mixture.
Initial Calibration Calculation	4-point calibration using a linear regression model	5-point calibration using average Response Factor
Initial Calibration Frequency	Weekly	When daily calibration standard recovery is outside 75–125%, or upon significant changes to the procedure or instrumentation.
Daily Calibration Standard Frequency	Prior to sample analysis and every 4-6 hrs	Prior to sample analysis
Minimum Detection Limit (MDL)	Calculated using the equation DL = A+3.3S, where A is intercept of calibration line and S is the standard deviation of at least 3 reps of low level standard.	40 CFR Part 136, App. B
Sample pre-concentration and moisture management	Cyrogenic pre-concentrator with a Nafion dryer	Multi-bed sorbent system

Table 3. Method Compound List and QC Limits

Analyte	RL (ppmv)	Acceptance Criteria		
		ICAL (%RSD)	LCS/CCV (%R)	Precision (%RPD)
Benzene	0.001	≤ 30	± 25	≤ 25
Toluene	0.001	≤ 30	± 25	≤ 25
Ethyl Benzene	0.001	≤ 30	± 25	≤ 25
m,p-Xylenes	0.001	≤ 30	± 25	≤ 25
o-Xylene	0.001	≤ 30	± 25	≤ 25
MTBE	0.001	≤ 30	± 25	≤ 25
TPH (Gasoline Range) MW = 100	0.025	≤ 30	± 25	≤ 25
TPH (JP-4 Range) MW = 156	0.025	≤ 30	± 25	≤ 25

Table 4. Surrogate QC Limits

Surrogate	PID Accuracy (%R)	FID Accuracy (%R)
Fluorobenzene	75–125%	75–150%

Table 5. Summary of Calibration and QC Procedures for TO-3/TO-14A (BTEX & TPH)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
5-Point Initial Calibration (ICAL)	Prior to sample analysis and annually	%RSD ≤ 30	Correct problem, then repeat the calibration.
Initial Calibration Verification and Laboratory Control Sample (ICV/LCS)	With each initial calibration, and with each analytical batch.	±25% of the expected value	Check the system and re-analyze the standard. Re-prepare the standard or re-calibrate the instrument if the criteria cannot be met.
Continuing Calibration Verification (CCV)	Daily prior to sample analysis and can be used as an End Check	±25% of the expected value	**For initial CCV:** Check the system and re-analyze the standard. Re-calibrate the instrument if the criteria cannot be met. **For Mid- and End Checks:** Check system and re-analyze the standard. If the second analysis fails, identify and correct the problem, then re-analyze all samples since the last acceptable CCV.
Laboratory Blank	In between analysis of standards and project samples	Results less than the laboratory Reporting Limit	Inspect the system and re-analyze the Laboratory Blank.
Surrogate	As each standard, blank, and sample is being loaded	75–125% recovery on the PID; 75–150% on the FID	Low surrogate recovery results in re-analysis (at a higher dilution if high levels of moisture are present). If recovery is out and still low, report the analysis with the better recovery and flag. Because of TPH interference, high surrogate recoveries do not result in re-analysis. Data is flagged to note high recovery.
Laboratory Duplicate - Laboratory Control Spike Duplicate (LCSD)	One per analytical batch	RPD ≤ 25%	Narrate exceedances. Investigate the cause, perform maintenance as required, and re-calibrate as needed.

ANALYTICAL METHODS

Section 11.0

Method: ASTM D1945 – Fixed Gases & C1-C6

Eurofins Air Toxics SOP #54 Revision 18 Effective Date: December 27, 2013 Methods Manual Summary

Description: This method involves gas chromatograph (GC) analysis of soil gas, landfill gas, ambient air, or stack gas collected in Summa^{TM} canisters, Tedlar bags, or any vessel that has been demonstrated to be clean and leak free. Samples are analyzed for Methane and fixed gases and can be used to speciate individual light hydrocarbons up to C6. This method is also used to provide an estimation of the heating value of the gas by method ASTM D3588. Because the sample is withdrawn from the vessel by positive pressure, rigid containers are first filled to positive pressure using UHP Helium or Nitrogen. Samples are then analyzed using a GC equipped with a Flame Ionization Detector (FID) and a Thermal Conductivity Detector (TCD).

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, the laboratory reports these non-standard compounds with partial validation. Validation includes a 3-point calibration with the lowest concentration defining the reporting limit (RL), no second source verification is analyzed, and no method detection limit study is performed unless previous arrangements have been made. In addition, stability of the non-standard compounds during sample storage is not validated. Full validation may be available upon request.

Since the protocols in the ASTM D1945 standard were designed for the analysis of natural gas, the laboratory has made modifications in order to apply the method to environmental samples covering a wide concentration range and to implement standard NELAP and EPA calibration criteria. The method modifications, standard target analyte list, RL, Quality Control (QC) criteria, and QC summary can be found in the following tables.

Table 1. Summary of Method Modifications for ASTM D1945

Requirement	ASTM D1945	Eurofins Air Toxics Modifications
Sample Injection Volume	0.50 mL to achieve Methane linearity.	1.0 mL
Reference Standard	Concentration should not be < half of nor differ by more than 2X the concentration of the sample. Run 2 consecutive checks; must agree within 1%.	A minimum 3-point linear calibration. The acceptance criterion is RSD ≤ 15%. All target analytes must be within the linear range of calibration (with the exception of O_2, N_2, and C6+ hydrocarbons).
Sample Analysis	Equilibrate samples to 20-50° F above source temperature at field sampling.	No heating of samples is performed.
Sample Calculation	Response factor is calculated using peak height for C5 and lighter compounds.	Peak areas are used for all target analytes to quantitate concentrations.

Normalization	Sum of original values should not differ from 100.0% by more than 1.0%.	Sum of original values may range between 85–115%; normalization of data not performed unless client requested.

Table 2. ASTM Method D1945 Compound List and QC Limits

Analyte	Reporting Limit (%)	QC Acceptance Criteria		
		ICAL (%RSD)	CCV/LCS/ICV (%R)	Precision* (%RPD)
Carbon Dioxide	0.01	≤ 15%	± 15%	≤ 25%
Carbon Monoxide	0.01	≤ 15%	± 15%	≤ 25%
Ethene	0.001	≤ 15%	± 15%	≤ 25%
Ethane	0.001	≤ 15%	± 15%	≤ 25%
Acetylene	0.001	≤ 15%	± 15%	≤ 25%
Isobutane	0.001	≤ 15%	± 15%	≤ 25%
Isopentane	0.001	≤ 15%	± 15%	≤ 25%
Methane	0.0001	≤ 15%	± 15%	≤ 25%
n-Butane	0.001	≤ 15%	± 15%	≤ 25%
Neopentane	0.001	≤ 15%	± 15%	≤ 25%
n-Pentane	0.001	≤ 15%	± 15%	≤ 25%
Nitrogen**	0.10	≤ 15%	± 15%	≤ 25%
NMOC (C6+)	0.01	≤ 15%	± 15%	≤ 25%
Oxygen	0.10	≤ 15%	± 15%	≤ 25%
Propane	0.001	≤ 15%	± 15%	≤ 25%
Hydrogen***	0.01	≤ 15%	± 15%	≤ 25%
Helium****	0.05	≤ 15%	± 15%	≤ 25%

* For detections at > 5X the Reporting Limit.
**For canisters that have been pressurized with Nitrogen, the amount of Nitrogen in the sample is determined by subtraction.
***For canisters that have been pressurized with Helium, the Reporting Limit is 1.0%.
****Included by special request only.

Note: Results are reported in units of mol %. If required to report volume % or ppmV, a compressibility factor of 1 for all gases will be assumed. As a result, mol % is assumed to be equivalent to volume %. This assumption may result in a bias for highly compressible gases at high concentrations and pressures.

Table 3. Summary of Calibration and QC Procedures for Mod. ASTM Method D1945

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Initial Calibration (ICAL)	Prior to sample analysis and annually	≤ 15% RSD	Correct problem, then repeat Initial Calibration.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS)	After each Initial Calibration and once per analytical batch.	85–115% Recovery If specified by the client, in-house generated control limits may be used.	Check the system and re-analyze the standard. Re-prepare the standard if necessary. If the primary standard is found to be in error, re-prepare the primary and calibrate the instrument.
Continuing Calibration Verification (CCV)	Daily prior to sample analysis, and can be used as an End Check.	± 15% Difference	Check the system and re-analyze the standard. Re-prepare the standard if necessary. Re-calibrate the instrument if the criteria cannot be met. If the closing CCV fails, the system is checked and the standard is re-analyzed. Re-prepare the standard if necessary. If the second analysis fails, identify and correct the problem, then re-analyze all samples since the last acceptable CCV.
Laboratory Blank	After analysis of standards and prior to sample analysis, or when contamination is present.	Results less than the laboratory Reporting Limit	Inspect the system and re-analyze the Laboratory Blank.
Laboratory Duplicates-Laboratory Control Spike Duplicate (LCSD)	One per analytical batch	RPD ≤ 25%	Narrate exceedances. Investigate the cause and perform maintenance as required and re-calibrate as needed.

ANALYTICAL METHODS

Section 12.0

Method: PM10/TSP – Particulate Matter

Eurofins Air Toxics SOP #66 Revision 13 Effective Date: December 30, 2013 Methods Manual Summary

Description: This method involves equilibrating quartz filters in a conditioning environment of a specified temperature and humidity range and weighing the filters before and after field sampling. Samples are analyzed for method PM_{10} using 40 CFR Part 50 Appendix J or for Total Suspended Particulate (TSP) using 40 CFR Part 50 Appendix B. An analytical balance with 0.1 mg resolution is used to measure the filter weights. The corresponding change in mass represents the TSP or PM_{10} result, expressed in µg or µg/m^3. The reporting limit is typically 1000 µg. Sampling volumes are required to calculate results in units of µg/m^3.

Table 1. Conditioning Environment Criteria for Methods PM10 and TSP

Method	Conditioning Environment Temperature (˚F)	Conditioning Environment Relative Humidity (%)
PM10	59°F – 86°F ± 5°F	20% – 45% ± 5%
TSP	59°F – 86°F ± 5°F	≤ 50% ± 5%

Table 2. Summary of Calibration and QC Procedures for Methods PM10 and TSP

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Calibration	Calibration checks of 3.00 grams (g) and 5.00 g are weighed to bracket the expected filter weight of ~4.5 g prior to sample analysis and at the end of the analytical batch.	Accuracy limits of 3.00 g weight: 2.997 g – 3.003 g Accuracy limits of 5.00 g weight: 4.995 g - 5.005 g	Correct problem then repeat calibration.
Laboratory Duplicates	Unexposed filters: One per analytical batch Exposed filters: One duplicate per work order	Unexposed filters: Weights of the clean filters should be within ±0.0028 g of the original value. Exposed filters: ≤ 25% RPD and weights must be within ±0.005 g	Re-condition the filter and re-weigh.
Laboratory Blanks	Immediately after the calibration checks	Post-weight of Lab Blank is less than pre-weight and the difference is < 0.0028 g.	Confirm the weight difference and narrate.

ANALYTICAL METHODS

Section 13.0

Method: EPA Method TO-14A/TO-15 Volatile Organic Compounds (Low-Level)

Eurofins Air Toxics SOP #83 Revision 12 Effective Date: February 13, 2014 Methods Manual Summary

Description: This method involves full scan gas chromatograph/mass spectrometer (GC/MS) analysis of whole air samples collected in evacuated stainless steel canisters. Samples are analyzed for volatile organic compounds (VOCs) using EPA Method TO-14A/TO-15 protocols. An aliquot of up to 250 mL of air is withdrawn from the canister utilizing a volumetric syringe, volumetric loop, or mass flow controller. This volume is loaded onto a hydrophobic multibed sorbent trap to remove water and carbon dioxide and to concentrate the vapor sample. The focused sample is then flash-heated to sweep adsorbed VOCs onto a GC/MS for separation and detection. Compounds are detected using a MS operating in full scan mode.

Eurofins Air Toxics maintains a suite of TO-14A/TO-15 methods, each optimized to efficiently meet the data objectives for a wide range of targeted concentration ranges. The methods, their reporting limits, and typical applications are summarized in the table below. This method summary describes TO-14A/TO-15 (Low-Level).

Eurofins Air Toxics Method	Base Reporting Limits	Typical Application
TO-14A/TO-15 (5&20)	5 – 20 ppbv	Soil gas and ppmv range vapor matrices
TO-14A/TO-15 (Standard or Quad)	0.5 – 5.0 ppbv	Ambient air, soil gas, and ppbv level vapor matrices
TO-14A/TO-15 (Low-Level)	0.1 – 0.5 ppbv	Indoor and outdoor air
TO-14A/TO-15 SIM	0.003 – 0.5 ppbv	Indoor and outdoor air

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, Eurofins Air Toxics reports these non-routine compounds with partial validation. Validation may include a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification analyzed, and no method detection limit study performed unless previous arrangements have been made. In addition, stability of the non-standard compound during sample storage is not validated. Full validation may be available upon request.

Since Eurofins Air Toxics applies TO-15 methodology to all Summa™ canisters regardless of whether TO-14A or TO-15 is specified by the project, Eurofins Air Toxics performs a modified version of method TO-14A as detailed in Table 1. Please note that Methods TO-14A and TO-15 were validated for specially treated canisters. As such, the use of Tedlar bags for sample collection is outside the scope of the method and is not recommended for ambient or indoor air samples. It is the responsibility of the data user to determine the usability of TO-14A and TO-15 results generated from Tedlar bags.

All samples submitted for TO-15 Low-Level are screened prior to analysis. If samples contain high concentrations of target and/or non-target VOCs, samples may be analyzed by an alternative TO-15 method (i.e., Standard or 5&20) with a higher dynamic calibration range.

Table 1. Summary of TO-14A Method Modifications

Requirement	TO-14A	Eurofins Air Toxics Modifications
Sample Drying System	Nafion Dryer	Multibed hydrophobic sorbent
Blank acceptance criteria	< 0.2 ppbv	< RL
BFB ion abundance criteria	Ion abundance criteria listed in Table 4 of TO-14A	Follow abundance criteria listed in TO-15.
BFB absolute abundance criteria	Within 10% when comparing to the previous daily BFB	CCV internal standard area counts are compared to ICAL; corrective action taken when recovery is less than 60%.
Blanks and standards	Zero Air	UHP Nitrogen provides a higher purity gas matrix than zero air.
Initial Calibration	≤ 30% RSD for listed 39 VOCs	≤ 30% RSD with 4 compounds allowed out to ≤ 40%

Table 2. Summary of Method TO-15 Modifications

Requirement	TO-15	Eurofins Air Toxics Modifications
Initial Calibration	≤ 30% RSD with 2 compounds allowed out to < 40% RSD	≤ 30% RSD with 4 compounds allowed out to ≤ 40%
Blanks and standards	Zero Air	UHP Nitrogen provides a higher purity gas matrix than zero air.

The standard target analyte list, reporting limits (RL), also referred to as Limit of Quantitation (LOQ), Quality Control (QC) criteria, and QC summary can be found in tables 3 through 6.

Table 3. Method TO-14A/TO-15 Analyte List (Low-Level) and QC Limits

Analyte	RL/LOQ (ppbv)	QC Acceptance Criteria			
		ICAL (%RSD)	CCV (%R)	ICV/LCS* (%R)	Precision Limits (Max. RPD)
1,1,2,2-Tetrachloroethane	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,1,2-Trichloroethane	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,1-Dichloroethane	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,1-Dichloroethene	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,2,4-Trichlorobenzene	0.5	≤ 30%	70 – 130	70 – 130	± 25
1,2,4-Trimethylbenzene	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dibromoethane (EDB)	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichlorobenzene	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichloroethane	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichloropropane	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,3,5-Trimethylbenzene	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,3-Dichlorobenzene	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,4-Dichlorobenzene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Benzene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Bromomethane	0.5	≤ 30%	70 – 130	70 – 130	± 25
Carbon Tetrachloride	0.1	≤ 30%	70 – 130	70 – 130	± 25
Chlorobenzene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Chloroethane	0.5	≤ 30%	70 – 130	70 – 130	± 25
Chloroform	0.1	≤ 30%	70 – 130	70 – 130	± 25
Chloromethane	0.5	≤ 30%	70 – 130	70 – 130	± 25
Chlorotoluene (Benzyl Chloride)	0.1	≤ 30%	70 – 130	70 – 130	± 25
cis-1,2-Dichloroethene	0.1	≤ 30%	70 – 130	70 – 130	± 25
cis-1,3-Dichloropropene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Dichloromethane (Methylene Chloride)	0.2	≤ 30%	70 – 130	70 – 130	± 25
Ethylbenzene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Freon 11 (Trichlorofluoromethane)	0.1	≤ 30%	70 – 130	70 – 130	± 25
Freon 113 (Trichlorotrifluoroethane)	0.1	≤ 30%	70 – 130	70 – 130	± 25
Freon 114	0.1	≤ 30%	70 – 130	70 – 130	± 25
Freon 12 (Dichlorodifluoromethane)	0.1	≤ 30%	70 – 130	70 – 130	± 25
Hexachlorobutadiene	0.5	≤ 30%	70 – 130	70 – 130	± 25
m,p-Xylene	0.1	≤ 30%	70 – 130	70 – 130	± 25

Methyl Chloroform (1,1,1-Trichloroethane)	0.1	≤ 30%	70 – 130	70 – 130	± 25
o-Xylene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Styrene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Tetrachloroethene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Toluene	0.1	< 30%	70 – 130	70 – 130	± 25
trans-1,3-Dichloropropene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Trichloroethene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Vinyl Chloride	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,3-Butadiene	0.1	≤ 30%	70 – 130	70 – 130	± 25
1,4-Dioxane	0.1	≤ 30%	70 – 130	70 – 130	± 25
2-Butanone (Methyl Ethyl Ketone)	0.5	≤ 30%	70 – 130	70 – 130	± 25
2-Hexanone	0.5	≤ 30%	70 – 130	70 – 130	± 25
4-Ethyltoluene	0.1	≤ 30%	70 – 130	70 – 130	± 25
4-Methyl-2-Pentanone (MIBK)	0.1	≤ 30%	70 – 130	70 – 130	± 25
Acetone	0.5	≤ 30%	70 – 130	70 – 130	± 25
Bromodichloromethane	0.1	≤ 30%	70 – 130	70 – 130	± 25
Bromoform	0.1	≤ 30%	70 – 130	70 – 130	± 25
Carbon Disulfide	0.5	≤ 30%	70 – 130	70 – 130	± 25
Cumene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Cyclohexane	0.1	≤ 30%	70 – 130	70 – 130	± 25
Dibromochloromethane	0.1	≤ 30%	70 – 130	70 – 130	± 25
Ethanol	0.5	≤ 30%	70 – 130	70 – 130	± 25
Heptane	0.1	≤ 30%	70 – 130	70 – 130	± 25
Hexane	0.1	≤ 30%	70 – 130	70 – 130	± 25
Isopropanol	0.5	≤ 30%	70 – 130	70 – 130	± 25
Methyl tert-Butyl Ether (MTBE)	0.1	≤ 30%	70 – 130	70 – 130	± 25
Propylbenzene	0.1	≤ 30%	70 – 130	70 – 130	± 25
Tetrahydrofuran	0.5	≤ 30%	70 – 130	70 – 130	± 25
trans-1,2-Dichloroethene	0.1	≤ 30%	70 – 130	70 – 130	± 25
2,2,4-Trimethylpentane	0.5	≤ 30%	70 – 130	70 – 130	± 25
3-Chloroprene	0.5	≤ 30%	70 – 130	70 – 130	± 25

Non-Standard Compounds

Analyte	RL/LOQ (ppbv)	QC Acceptance Criteria			
		ICAL (%RSD)	CCV (%R)	ICV/LCS (%R)	Precision Limits (Max. RPD)
Acrolein	0.5	≤ 40%	60 – 140	60 – 140	± 25
Butane	0.5	≤ 40%	60 – 140	60 – 140	± 25
Ethyl tert-Butyl Ether	0.5	≤ 40%	60 – 140	60 – 140	± 25
Isopentane	0.5	≤ 40%	60 – 140	60 – 140	± 25
Isopropyl Ether	0.5	≤ 40%	60 – 140	60 – 140	± 25
Methylcyclohexane	0.5	≤ 40%	60 – 140	60 – 140	± 25
Naphthalene**	0.5	≤ 40%	60 – 140	60 – 140	± 25
Propylene	0.5	≤ 40%	60 – 140	60 – 140	± 25
tert-Amyl Methyl Ether	0.5	≤ 40%	60 – 140	60 – 140	± 25
Vinyl Acetate	0.5	≤ 40%	60 – 140	60 – 140	± 25
tert-Butyl Alcohol	0.5	≤ 40%	60 – 140	60 – 140	± 25
TPH (Gasoline)***	10	1- Point Calibration	N/A	ICV only: 60 – 140	± 25
NMOC (Hexane/Heptane)***	2.0	1- Point Calibration	N/A	N/A	± 25

*See Table 6.

**Due to its low vapor pressure, Naphthalene does not meet TO-15 performance requirements. The wider QC limits reflect typical performance. Although Naphthalene is not on Eurofins Air Toxics "standard" TO-15 list, it is commonly requested and therefore included in Table 3.

***TPH and NMOC are not on Eurofins Air Toxics' standard TO-15 list, but are included in Table 3 due to common requests.

Table 4. Internal Standards

Analyte	Accuracy (% R)
Bromochloromethane	60 – 140
1,4-Difluorobenzene	60 – 140
Chlorobenzene-d_5	60 – 140

Table 5. Surrogates

Analyte	Accuracy (% R)
1,2-Dichloroethane-d_4	70 – 130
Toluene-d_8	70 – 130
4-Bromofluorobenzene	70 – 130

Table 6. Summary of Calibration and QC Procedures for Methods TO-14A/TO-15 Low-Level

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Tuning Criteria	Every 24 hours	TO-15 ion abundance criteria	Correct problem then repeat tune.
Minimum 5-Point Initial Calibration (ICAL)	Prior to sample analysis	% RSD ≤ 30 with 4 compounds allowed out to ≤ 40% RSD	Correct problem then repeat Initial Calibration curve.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS)	After each Initial Calibration curve, and daily prior to sample analysis	Recoveries for 85% of Standard compounds must be 70–130%. No recovery may be < 50%. If specified by the client, in-house generated control limits may be used.	Check the system and re-analyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS) for Non-standard Compounds	Per client request or specific project requirements only	Recoveries of compounds must be 60–140%. No recovery may be <50%.	Check the system and re-analyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Continuing Calibration Verification (CCV) for Standard compounds	At the start of each analytical clock after the tune check	70–130%	Compounds exceeding this criterion and associated data will be flagged and narrated with the exception of high bias associated with non-detects. If more than 4 compounds from the standard list recover outside of 70–130%, corrective action will be taken. If any compound exceeds 60–140%, samples are not analyzed unless data meets project needs. Check the system and re-analyze the standard. Re-prepare the standard if necessary. Re-calibrate the instrument if the criteria cannot be met.
Continuing Calibration Verification (CCV) for Non-Standard compounds	Per client request or specific project requirements only	Recoveries of compounds must be 60–140%. No recovery may be <50%.	Check the system and re-analyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.

Laboratory Blank	After analysis of standards and prior to sample analysis, or when contamination is present	Results less than the laboratory reporting limit	Inspect the system and re-analyze the blank. "B"-flag data for common contaminants.
Internal Standard (IS)	As each standard, blank, and sample is being loaded	Retention time (RT) for blanks and samples must be within ±0.33 min of the RT in the CCV and within ± 40% of the area counts of the daily CCV internal standards.	**For blanks:** Inspect the system and reanalyze the blank. **For samples:** Re-analyze the sample unless obvious matrix interference is documented. If the ISs are within limits in the re-analysis, report the second analysis. If ISs are out-of-limits a second time, report data from first analysis and narrate.
Surrogates	As each standard, blank, and sample is being loaded	70–130% R If specified by the client, in-house generated control limits may be used.	**For blanks:** Inspect the system and re-analyze the blank **For samples:** Re-analyze the sample unless obvious matrix interference is documented. If the %Rs are within limits in the re-analysis, report the second analysis. If %Rs are out-of-limits a second time, report data from first analysis and narrate.
Laboratory Duplicates - Laboratory Control Spike Duplicate (LCSD)	One per analytical batch	RPD ≤25%	Narrate exceedances. If more than 5% of compound list is outside criteria or if compound is >40% RPD, investigate the cause and perform maintenance as required. If instrument maintenance is required, calibrate as needed.

ANALYTICAL METHODS

Section 14.0

Method: EPA Method TO-14A/TO-15 Volatile Organic Compounds (5&20)

Eurofins Air Toxics SOP #91 Revision 5 Effective Date: January 14, 2013 Methods Manual Summary

Description: This method involves full scan gas chromatograph/mass spectrometer (GC/MS) analysis of whole air samples collected in evacuated stainless steel canisters. Samples are analyzed for volatile organic compounds (VOCs) using EPA Method TO-14A/TO-15 protocols. An aliquot of up to 0.05 liters of air is withdrawn from the canister utilizing a volumetric syringe or mass flow controller. This volume is loaded onto a hydrophobic multibed sorbent trap to remove water and carbon dioxide and to concentrate the vapor sample. The focused sample is then flash-heated to sweep adsorbed VOCs onto a secondary trap for further concentration and/or onto a GC/MS for separation and detection.

Eurofins Air Toxics maintains a suite of TO-14A/TO-15 methods, each optimized to efficiently meet the data objectives for a wide range of targeted concentration ranges. The methods, their reporting limits, and typical applications are summarized in the table below. This method summary describes TO-14A/TO-15 (5&20). The 5&20 analytical configuration is designed to directly measure ppmv concentrations with minimal offline dilutions due to its wide dynamic calibration range.

Eurofins Air Toxics Method	Base Reporting Limits	Typical Application
TO-14A/TO-15 (5&20)	5 – 20 ppbv	Soil gas and ppmv range vapor matrices
TO-14A/TO-15 (Standard or Quad)	0.5 – 5.0 ppbv	Ambient air, soil gas, and ppbv level vapor matrices
TO-14A/TO-15 (Low-level)	0.1 – 0.5 ppbv	Indoor and outdoor air
TO-14A/TO-15 SIM	0.003 – 0.5 ppbv	Indoor and outdoor air

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, Eurofins Air Toxics reports these non-routine compounds with partial validation. Validation may include a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification analyzed, and no method detection limit study performed unless previous arrangements have been made. In addition, stability of the non-standard compound during sample storage is not validated. Full validation may be available upon request.

Eurofins Air Toxics takes no modifications of technical significance to Method TO-15 for the "5&20" configuration. Since Eurofins Air Toxics applies TO-15 methodology to all Summa canisters regardless of whether TO-14A or TO-15 is specified by the project, the laboratory performs a modified version of method TO-14A as detailed in Table 1. Please note that Methods TO-14A and TO-15 were validated for specially treated canisters. As such, the use of Tedlar bags for sample collection is outside the scope of the method and not recommended for ambient air samples. It is the responsibility of the data user to determine the usability of TO-14A and TO-15 results generated from Tedlar bags.

Table 1. Summary of TO-14A Method Modifications

Requirement	TO-14A	ATL Modifications
Sample Drying System	Nafion Drier	Multibed hydrophobic sorbent
Blank acceptance criteria	< 0.2 ppbv	< RL
BFB ion abundance criteria	Ion abundance criteria listed in Table 4 of TO-14A	Follow abundance criteria listed in TO-15
BFB absolute abundance criteria	Within 10% when comparing to the previous daily BFB	CCV internal standard area counts are compared to ICAL; corrective action when recovery is less than 60%.
Initial Calibration	≤ 30% RSD for listed 39 VOCs	≤ 30% RSD with 2 of Eurofins Air Toxics' 62 standard compounds allowed out to ≤ 40%

The standard target analyte list, reporting limit (RL), also referred to as Limit of Quantitation (LOQ), QC criteria, and QC summary can be found in Tables 2 through 5.

Table 2. Method TO-14A/TO-15 Analyte List (5&20)

Analyte	RL/LOQ (ppbv)	QC Acceptance Criteria			
		ICAL (%RSD)	CCV (%R)	ICV/LCS (%R)	Precision Limits (Max. RPD)
1,1,2,2-Tetrachloroethane	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,1,2-Trichloroethane	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,1-Dichloroethane	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,1-Dichloroethene	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,2,4-Trichlorobenzene	20	≤ 30%	70 – 130	70 – 130	± 25
1,2,4-Trimethylbenzene	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dibromoethane (EDB)	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichlorobenzene	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichloroethane	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,2-Dichloropropane	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,3,5-Trimethylbenzene	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,3-Dichlorobenzene	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,4-Dichlorobenzene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Benzene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Bromomethane*	5.0	≤ 30%	70 – 130	70 – 130	± 25
Carbon Tetrachloride	5.0	≤ 30%	70 – 130	70 – 130	± 25
Chlorobenzene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Chloroethane	20	≤ 30%	70 – 130	70 – 130	± 25

Dibromochloromethane	5.0	≤ 30%	70 – 130	70 – 130	± 25
Chloroform	5.0	≤ 30%	70 – 130	70 – 130	± 25
Chloromethane	20	≤ 30%	70 – 130	70 – 130	± 25
Chlorotoluene (Benzyl Chloride)	5.0	≤ 30%	70 – 130	70 – 130	± 25
cis-1,2-Dichloroethene	5.0	≤ 30%	70 – 130	70 – 130	± 25
cis-1,3-Dichloropropene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Dichloromethane (Methylene Chloride)	5.0	≤ 30%	70 – 130	70 – 130	± 25
Ethylbenzene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Freon 11 (Trichlorofluoromethane)	5.0	≤ 30%	70 – 130	70 – 130	± 25
Freon 113 (Trichlorotrifluoroethane)	5.0	≤ 30%	70 – 130	70 – 130	± 25
Freon 114	5.0	≤ 30%	70 – 130	70 – 130	± 25
Freon 12 (Dichlorodifluoromethane)	5.0	≤ 30%	70 – 130	70 – 130	± 25
Hexachlorobutadiene	20	≤ 30%	70 – 130	70 – 130	± 25
m,p-Xylene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Methyl Chloroform (1,1,1-Trichloroethane)	5.0	≤ 30%	70 – 130	70 – 130	± 25
o-Xylene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Styrene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Tetrachloroethene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Toluene	5.0	≤ 30%	70 – 130	70 – 130	± 25
trans-1,3-Dichloropropene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Trichloroethene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Vinyl Chloride	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,3-Butadiene	5.0	≤ 30%	70 – 130	70 – 130	± 25
1,4-Dioxane	20	≤ 30%	70 – 130	70 – 130	± 25
2-Butanone (Methyl Ethyl Ketone)	20	≤ 30%	70 – 130	70 – 130	± 25
2-Hexanone	20	≤ 30%	70 – 130	70 – 130	± 25
4-Ethyltoluene	5.0	≤ 30%	70 – 130	70 – 130	± 25
4-Methyl-2-Pentanone (MIBK)	5.0	≤ 30%	70 – 130	70 – 130	± 25
Acetone	20	≤ 30%	70 – 130	70 – 130	± 25
Bromodichloromethane	5.0	≤ 30%	70 – 130	70 – 130	± 25
Bromoform	5.0	≤ 30%	70 – 130	70 – 130	± 25
Carbon Disulfide	5.0	≤ 30%	70 – 130	70 – 130	± 25
Cyclohexane	5.0	≤ 30%	70 – 130	70 – 130	± 25

Dibromochloromethane	5.0	≤ 30%	70 – 130	70 – 130	± 25
Ethanol	20	≤ 30%	70 – 130	70 – 130	± 25
Heptane	5.0	≤ 30%	70 – 130	70 – 130	± 25
Hexane	5.0	≤ 30%	70 – 130	70 – 130	± 25
Isopropanol	20	≤ 30%	70 – 130	70 – 130	± 25
Methyl t-Butyl Ether (MTBE)	5.0	≤ 30%	70 – 130	70 – 130	± 25
Tetrahydrofuran	5.0	≤ 30%	70 – 130	70 – 130	± 25
trans-1,2-Dichloroethene	5.0	≤ 30%	70 – 130	70 – 130	± 25
2,2,4-Trimethylpentane	5.0	≤ 30%	70 – 130	70 – 130	± 25
Cumene	5.0	≤ 30%	70 – 130	70 – 130	± 25
Propylbenzene	5.0	≤ 30%	70 – 130	70 – 130	± 25
3-Chloroprene	20	≤ 30%	70 – 130	70 – 130	± 25
Naphthalene**	20	≤ 40%	60 – 140	60 – 140	± 25
TPH (Gasoline) ***	100	1- Point Calibration	NA	ICV only: 60 – 140	± 25
NMOC (Hexane/Heptane)***	100	1- Point Calibration	NA	NA	± 25

*Bromomethane recovery can be variable due to moisture/sorbent interactions specifically on the 2-trap concentration system. Data may require qualifier flags.

**Due to its low vapor pressure, Naphthalene may exceed TO-15 performance requirements. The wider QC limits reflect typical performance. Although Naphthalene is not on Eurofins Air Toxics "standard" TO-15 list, it is commonly requested and included in Table 2.

***TPH and NMOC are not on Eurofins Air Toxics' "standard" TO-15 list, but are included in Table 2 due to common requests.

Table 3. Internal Standards **Table 4. Surrogates**

Analyte	Accuracy (% R)	Analyte	Accuracy (% R)
Bromochloromethane	60 – 140	1,2-Dichloroethane-d_4	70 – 130
1,4-Difluorobenzene	60 – 140	Toluene-d_8	70 – 130
Chlorobenzene-d_5	60 – 140	4-Bromofluorobenzene	70 – 130

Table 5. Summary of Calibration and QC Procedures for Methods TO-14A/TO-15 (5&20)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Tuning Criteria	Every 24 hours.	TO-15 ion abundance criteria	Correct problem then repeat tune.
Minimum 5-Point Initial Calibration (ICAL)	Prior to sample analysis.	% RSD ≤ 30 with 2 compounds allowed out to ≤ 40% RSD	Correct problem then repeat Initial Calibration Curve.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS)	After each Initial Calibration curve, and daily prior to sample analysis	Recoveries for 85% of "Standard" compounds must be 70-130%. No recovery may be <50%. If specified by the client, in-house generated control limits may be used.	Check the system and reanalyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Initial Calibration Verification and Laboratory Control Spike (ICV and LCS) for Non-standard compounds	Per client request or specific project requirements only.	Recoveries of compounds must be 60–140%. No recovery may be <50%.	Check the system and reanalyze the standard. Re-prepare the standard if necessary to determine the source of error. Re-calibrate the instrument if the primary standard is found to be in error.
Continuing Calibration Verification (CCV)	At the start of each analytical clock after the tune check.	70–130%	Compounds exceeding this criterion and associated data will be flagged and narrated with the exception of high bias associated with non-detects. If more than two compounds from the standard list recover outside of 70-130%, corrective action will be taken. If any compound exceeds 60-140%, samples are not analyzed unless data meets project needs. Check the system and reanalyze the standard. Re-prepare the standard if necessary. Re-calibrate the instrument if the criteria cannot be met.
Laboratory Blank	After analysis of standards and prior to sample analysis, or when contamination is present.	Results less than the laboratory reporting limit	Inspect the system and re-analyze the blank. "B"-flag data for common contaminants.
Internal Standard (IS)	As each standard, blank, and sample is being loaded	Retention time (RT) for blanks and samples must be within ±0.33 min of the RT in the CCV and within ±40% of the area counts of the daily CCV internal standards.	**For blanks:** Inspect the system and reanalyze the blank. **For samples:** Re-analyze the sample. If the ISs are within limits in the re-analysis, report the second analysis. If ISs are out-of-limits a second time, dilute the sample until ISs are within acceptance limits and narrate.

Surrogates	As each standard, blank, and sample is being loaded.	70–130% If specified by the client, in-house generated control limits may be used.	**For blanks:** Inspect the system and reanalyze the blank. **For samples:** re-analyze the sample unless obvious matrix interference is documented. If the %Rs are within limits in the re-analysis, report the second analysis. If %Rs are out-of-limits a second time, report data from first analysis and narrate.
Laboratory Duplicates – Laboratory Control Spike Duplicates (LCSD)	One per analytical batch	RPD ≤25%	Narrate exceedances. If more than 5% of compound list is outside criteria or if compound has >40%RPD, investigate the cause and perform maintenance as required. If instrument maintenance is required, calibrate as needed.

ANALYTICAL METHODS

Section 15.0

Method: TO-15 Aliphatic and Aromatic Volatile Petroleum Hydrocarbons (VPH) Fractions by GC/MS

Eurofins Air Toxics SOP #103   Revision 5   Effective Date: January 29, 2014   Methods Manual Summary

Description: The TO-15 VPH method outlines procedures to estimate the concentrations of gaseous phase Aliphatic and Aromatic ranges in ambient air and soil gas collected in stainless steel Summa canisters. The volatile Aliphatic hydrocarbons are collectively quantified within the C5 to C6 range, C6 to C8 range, C8 to C10 range, and the C10 to C12 range. Additionally, the volatile Aromatic hydrocarbons are collectively quantified within the C8 to C10 range and the C10 to C12 range. The Aromatic ranges refer to the equivalent carbon (EC) ranges.

Data is acquired using standard TO-15 GC/MS instrumentation. Procedures are largely based on the hydrocarbon ranges and calibration reference compounds defined by the Washington State Department of Ecology (WSDE) Method for the Determination of Volatile Petroleum Hydrocarbons (VPH) Fractions, dated June 1997. Additionally, the WSDE VPH calibration and quantitation procedures for the Aromatic fraction have been enhanced to more effectively isolate the compounds of interest. The Aromatic fraction measurement is based on a modification of the Massachusetts Department of Environmental Protection (MADEP) Air Phase Hydrocarbon Method (2009).

Eurofins Air Toxics performs a modified version of this method. The method modifications, standard target analyte list, reporting limit (RL) or Limit of Quantitation (LOQ), QC criteria, and QC summary can be found in the following tables.

Table 1. Summary of Method Modifications for TO-15 VPH

Requirement	VPH	Eurofins Air Toxics Modifications
Detector	Tandem GC/FID/PID	GC/MS
Matrix	Soil, water, and sediments	Whole air samples
C6-C8 Reference Compound	Octane	Heptane
Surrogate	2,5-Dibromotoluene	Bromochloromethane, 1,2-Dichloroethane-d4, Toluene-d8, Chlorobenzene-d5, and 4-Bromofluorobenzene
%RSD for Reference Compounds	≤ 20% RSD	≤ 30% RSD with the exception of Decane, Dodecane, 1,2,4,5-Tetramethylbenzene, and Naphthalene at ≤ 40% RSD
%D for the CCV	±20%D	±30%D with the exception of Decane, Dodecane, 1,2,4,5-Tetramethylbenzene, and Naphthalene at ±40%D

Laboratory Control Spike	Matrix Spiking Solution	Independently prepared source performed after initial calibration, 70–130% recovery, with the exception of Decane, Dodecane,1,2,4,5-Tetramethylbenzene, and Naphthalene at 60–140%
CCV Frequency	Before and after every 10 samples	Daily before sample analysis
IDOC	4 Replicates of a CCV at ±20%D; %RSD ≤ 20%	Not performed for this method; TO-15 IDOC performed on the same instrument

Table 2. VPH Standard Target Analyte List (Note: TO-15 analytes can also be included.)

Analyte	Standard RL (ppbv)	5&20 RL (ppbv)	Acceptance Criteria		
			ICAL %RSD	ICV (%R)	CCV (%D)
Pentane	NA	NA	≤ 30%	70-130	≤ 30%
Hexane	NA	NA	≤ 30%	70-130	≤ 30%
C_5-C_6 Aliphatics Pentane + Hexane	**10**	**50**	**≤ 30%**	**70-130**	**≤ 30%**
C_6-C_8 Aliphatics ref. to Heptane	**10**	**50**	**≤ 30%**	**70-130**	**≤ 30%**
C_8-C_{10} Aliphatics ref. to Decane	**10**	**50**	**≤ 40%**	**60-140**	**≤ 40%**
C_{10}-C_{12} Aliphatics ref. to Dodecane	**10**	**50**	**≤ 40%**	**60-140**	**≤ 40%**
Ethyl benzene	2	10	≤ 30%	70-130	≤ 30%
m/p-Xylene	2	10	≤ 30%	70-130	≤ 30%
o-Xylene	2	10	≤ 30%	70-130	≤ 30%
1,2,3-Trimethylbenzene	NA	NA	≤ 30%	70-130	≤ 30%
C_8-C_{10} Aromatics	**10**	**50**	**≤ 30%**	**70-130**	**≤ 30%**
Naphthalene	2	10	≤ 40%	60-140	≤ 40%
1,2,4,5-Tetramethylbenzene	NA	NA	≤ 40%	60-140	≤ 40%
C_{10}-C_{12} Aromatics	**10**	**50**	**≤ 40%**	**60-140**	**≤ 40%**

Table 3. Internal Standard Acceptance Criterion – Aliphatic Fraction

Analyte	Recovery Limits (%R)
1,4-Difluorobenzene	50 – 200%

Table 4. Internal Standard Acceptance Criterion – Aromatic Fraction

Analyte	Recovery Limits (%R)
Chlorobenzene-d_5	60 – 140%

Table 4. Summary of Calibration and QC Procedures

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Tuning Criteria	Every 24 hours	Compendium of Methods for Toxic Organic Air Pollutants, Method TO-15, January 1999	Correct problem then repeat tune.
6-Point Initial Calibration (ICAL)	Prior to sample analysis	%RSD ≤ 30% for VPH Target Analyte List with exceptions for 1,2,4,5-Tetramethylbenzene and Naphthalene, which are ≤40%	Correct problem then repeat initial calibration curve.
Initial Calibration Verification (ICV)	After each initial calibration curve	Recoveries for VPH target compounds 70–130%, or 60–140% for 1,2,4,5-Tetramethylbenzene and Naphthalene. If recovery of any compound is above 130%, analyze samples as long as compound is not detected.	Check the system and re-analyze the standard. Re-prepare the standard if necessary. Re-calibrate the instrument if the criteria cannot be met.
Continuing Calibration Verification (CCV)	At the start of each analytical clock after the tune check	%D ≤ 30% for VPH target compounds with exceptions for 1,2,4,5-Tetramethylbenzene and Naphthalene, which are <40%. One compound is allowed to be out as long as it is ≤ 50%D. If recovery of any compound is above 150% the instrument must be re-calibrated.	Perform maintenance and repeat test. If the CCV still fails, perform maintenance and a new 6-point calibration curve.
Laboratory Blank	After the CCV	Results less than the laboratory RL	Inspect the system and re-analyze the blank.
Internal Standard (IS)	As each standard, blank, and sample is being loaded.	Retention time (RT) for the blanks and samples must be within ±0.33 min of the RT in the CCV. For the aliphatic fraction using the total ion area, the IS area must be within -50% to 200% of the CCV's IS area for the blanks and samples. For the aromatic fraction using extracted ion areas, the IS area must be within -40% to +40% of the CCV's extracted ion IS area.	**For blanks:** Inspect the system and re-analyze the blank **For samples:** If there is not obvious interference with the internal standard, re-analyze the sample. If the ISs are within limits in the re-analysis, report the second analysis. Dilution of the sample to get IS areas within limits may be used if the RL is being obtained.
Laboratory Duplicates	One per analytical batch; since VPH analysis occurs with TO-15 analysis, the Duplicate is reported from the daily TO-15 LCS/LCSD pair. The result is not reported with the VPH fraction.	RPD ≤ 25% for detections >5X the RL	Re-analyze the sample a third time. If the limit is exceeded again, investigate the cause and bring the system back to working order. If no problem is found with the system, narrate.

ANALYTICAL METHODS

Section 16.0

Method: Modified EPA TO-17 VOCs and SVOCs (Vapor Intrusion Application) by GC/MS (Full Scan)

Eurofins Air Toxics SOP #109 Revision 4 Effective Date: December 24, 2013 Methods Manual Summary

Description: The TO-17 "Vapor Intrusion" method utilizes a multi-bed thermal desorption tube for the measurement of air-phase Volatile Organic Compounds (VOCs) and Polycyclic Aromatic Hydrocarbons (PAHs). These tubes are marketed by Eurofins Air Toxics as "TO-17 VI" tubes. The TO-17 VI tubes are applicable to a wide variety of vapor matrices including soil gas, indoor air, and outdoor air. Parameters are optimized to effectively manage high humidity conditions. The TO-17 VI method is an alternative to the canister-based sampling and analysis methods that are presented in EPA Compendium Methods TO-14A and TO-15 as well as an alternative to PUF/XAD sampling for semi-volatile compounds as described by EPA Compendium TO-13A. The VI tube provides sufficient retention of light VOCs such as 1,3-Butadiene while providing an efficient desorption of semi-volatile compounds such as Pyrene.

Samples are collected by drawing a measured volume of air through the VI sorbent tubes. Collection is performed using a low-flow vacuum pump or a volumetric syringe attached to the outlet side of the tube. Analysis is accomplished by heating the sorbent tube and sweeping the desorbed compounds onto a secondary "cold" trap for water management and analyte refocusing. The secondary trap is heated for efficient transfer of compounds onto the gas chromatograph (GC) for separation followed by detection using mass spectrometry (MS).

Certain compounds are not included in Eurofins Air Toxics' standard target analyte list. These compounds are communicated at the time of client proposal request. Unless otherwise directed, the laboratory reports these non-standard compounds with partial validation. Validation includes a 3-point calibration with the lowest concentration defining the reporting limit, no second source verification is analyzed, and no method detection limit study is performed unless previous arrangements have been made. In addition, stability of the non-standard compounds during sample storage, safe sampling volume, and desorption efficiency are not validated. Full validation may be available upon request.

Since the TO-17 VI application significantly extends the scope of target compounds addressed in EPA Method TO-15 and TO-17, the laboratory has implemented several method modifications as outlined in Table 1.

Table 1. EPA TO-17 Method Modifications – VI Application

Requirement	TO-17	Eurofins Air Toxics Modifications
Initial Calibration	%RSD ≤ 30% with 2 allowed out up to 40%	For the VOC list: %RSD ≤ 30% with 2 allowed out up to 40% For the PAH list: %RSD ≤ 30% with 2 allowed out up to 40%
Daily Calibration	%D for each target compound within ±30%.	Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene within ±40%D
Audit Accuracy	70 – 130%	Second source recovery limits for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene = 60 – 140%
Distributed Volume Pairs	Collection of distributed volume pairs required for monitoring ambient air to ensure high quality.	If the client is sampling well-characterized air or has verified performance through previous sampling or distributed pairs, single tube sampling may be appropriate. Distributed volume pairs may not be practical or useful for soil vapor collection due to required configuration and volume constraints.

Table 2. Method TO-17 VI Standard Analyte List and QC Limits

Volatile Organic Compounds	Reporting Limit (ng)	QC Acceptance Criteria			
		ICAL (%RSD)	ICV (%R)	CCV (%D)	LCS (%R)
Freon 114	14	30	70 – 130	30	70 – 130
Vinyl Chloride	2.6	30	70 – 130	30	70 – 130
1,3-Butadiene	2.2	30	70 – 130	30	70 – 130
Isopentane	5.9	30	70 – 130	30	70 – 130
Freon 11	11	30	70 – 130	30	70 – 130
1,1-Dichloroethene	4.0	30	70 – 130	30	70 – 130
Methylene Chloride	21	30	70 – 130	30	70 – 130
Freon 113	7.7	30	70 – 130	30	70 – 130
Trans-1,2-Dichloroethene	4.0	30	70 – 130	30	70 – 130
1,1-Dichloroethane	4.0	30	70 – 130	30	70 – 130
cis-1,2-Dichloroethene	4.0	30	70 – 130	30	70 – 130
Hexane	35	30	70 – 130	30	70 – 130
Chloroform	4.9	30	70 – 130	30	70 – 130
1,2-Dichloroethane	4.0	30	70 – 130	30	70 – 130
1,1,1-Trichloroethane	5.4	30	70 – 130	30	70 – 130
Benzene	6.4	30	70 – 130	30	70 – 130
Carbon Tetrachloride	6.3	30	70 – 130	30	70 – 130

Cyclohexane	6.9	30	70 – 130	30	70 – 130
1,2-Dichloropropane	4.6	30	70 – 130	30	70 – 130
Trichloroethene	5.4	30	70 – 130	30	70 – 130
1,4-Dioxane	11	30	70 – 130	30	70 – 130
2,2,4-Trimethylpentane	9.4	30	70 – 130	30	70 – 130
Heptane	8.2	30	70 – 130	30	70 – 130
Methylcyclohexane	8.0	30	70 – 130	30	70 – 130
1,1,2-Trichloroethane	5.4	30	70 – 130	30	70 – 130
Methyl isobutyl ketone	8.2	30	70 – 130	30	70 – 130
Toluene	7.5	30	70 – 130	30	70 – 130
Methylbutylketone	8.2	30	70 – 130	30	70 – 130
Tetrachloroethene	6.8	30	70 – 130	30	70 – 130
Chlorobenzene	4.6	30	70 – 130	30	70 – 130
Ethylbenzene	4.3	30	70 – 130	30	70 – 130
M,p-xylene	8.7	30	70 – 130	30	70 – 130
o-Xylene	8.7	30	70 – 130	30	70 – 130
Styrene	8.5	30	70 – 130	30	70 – 130
1,1,2,2-Tetrachloroethane	6.9	30	70 – 130	30	70 – 130
Cumene	9.8	30	70 – 130	30	70 – 130
n-Propylbenzene	9.8	30	70 – 130	30	70 – 130
4-Ethyltoluene	9.8	30	70 – 130	30	70 – 130
1,3,5-Trimethylbenzene	9.8	30	70 – 130	30	70 – 130
1,2,4-Trimethylbenzene	29	30	70 – 130	30	70 – 130
1,3-Dichlorobenzene	6.0	30	70 – 130	30	70 – 130
1,4-Dichlorobenzene	6.0	30	70 – 130	30	70 – 130
1,2-Dichlorobenzene	6.0	30	70 – 130	30	70 – 130
1,2,4-Trichlorobenzene	15	30	70 – 130	30	70 – 130
Hexachlorobutadiene	21	30	70 – 130	30	70 – 130
Chloroethane†	16	30	70 – 130	30	70 – 130
Isopropyl alcohol†	49	30	70 – 130	30	70 – 130
Carbon Disulfide†	6.2	30	70 – 130	30	70 – 130
MTBE†‡	22	30	70 – 130	30	70 – 130
Methyl Ethyl Ketone†	59	30	70 – 130	30	70 – 130

Polyaromatic Hydrocarbons	Reporting Limit (ng)	ICAL (%RSD)	ICV (%R)	CCV (%D)	LCS (%R)
Naphthalene	0.5	30	70 – 130	30	70 – 130
2-Methylnaphthalene	1.0	30	70 – 130	30	70 – 130
1-Methylnaphthalene	1.0	30	70 – 130	30	70 – 130
Acenaphthylene	5.0	30	70 – 130	30	70 – 130
Acenaphthene	5.0	30	70 – 130	30	70 – 130
Fluorene	5.0	30	60 – 140	40	60 – 140
Phenanthrene	5.0	30	60 – 140	40	60 – 140
Anthracene	5.0	30	60 – 140	40	60 – 140
Fluoranthene	5.0	30	60 – 140	40	60 – 140
Pyrene	5.0	30	60 – 140	40	60 – 140

†Non-routine compounds by special request only.
‡Poor recovery performance when dry purge is applied for sample collection volumes greater than 1 Liter.

Table 3. Commonly requested TPH parameters – Optional

TPH	Reporting Limit (ng)	ICAL (%RSD)	ICV (%R)	CCV (%D)	LCS (%R)
GRO (Gasoline Range)	1000	30	60-140	30	60 – 140
DRO (C10-C24 Diesel Range)	1000	30	60-140	30	60 – 140

Table 4. Internal Standard and Field Surrogate Recoveries

Internal Standards		
Analyte	**CCV IS % Recovery**	**Sample IS % Recovery**
Bromochloromethane	60 – 140	60 – 140
1,4-Difluorobenzene	60 – 140	60 – 140
Chlorobenzene-d_5	60 – 140	60 – 140
Bromofluorobenzene	60 – 140	60 – 140
Field Surrogates		
Analyte	**% Recovery**	
1,2-Dichloroethane-d4	50 – 150	
Toluene-d8	50 – 150	
Naphthalene-d8	50 – 150	

Table 5. Summary of Calibration and QC Procedures for Modified Method TO-17 VI

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
BFB Tune Check	Before initial and daily calibration. Check is valid for 24 hours.	TO-15 tune criteria	Correct problem then repeat tune.
5-Point Calibration	Prior to sample analysis	%RSD ≤ 30% with 2 VOCs exceeding up to 40% RSD and 2 PAHS exceeding criteria up to 40%RSD.	Correct problem then repeat Initial Calibration Curve.
Initial Calibration Verification (ICV)	After each initial Calibration Curve	See Table 2; 20% of the compounds are allowed to exceed criterion.	Determine if the exceedance is due to an inaccurate calibration standard or inaccurate ICV standard. Recalibrate with an accurate standard or re-prepare the ICV as necessary. If any VOC exceeds 50–150% recovery, system is checked and the ICV is reanalyzed. For compounds with recoveries greater than 150% and no positive detections in the samples, approval to proceed will be granted on a case-by-case basis.
Continuing Calibration Verification (CCV)	At the start of each 24-hour clock after the Tune Check	70 – 130% 60–140% for Fluorene, Phenanthrene, Anthracene, Fluoranthene and Pyrene	If project-specified risk drivers exceed these criteria, more than 5% of the compounds exceed these criteria, or any VOC exceeds 50–150% recovery, maintenance is performed and the CCV test repeated. If the system still fails the CCV, perform a new 5-point Calibration Curve.
Laboratory Blank	After the CCV and before the samples and at end of sequence	Results less than the laboratory RL for Lab Blank analyzed prior to samples	Inspect the system and re-analyze the Blank. Flag associated data as appropriate.
Laboratory Control Spike (LCS)	Once per analytical batch	70 – 130% 60–140% for Fluorene, Phenanthrene, Anthracene, Fluoranthene and Pyrene; 20% of compound list may exceed criteria before corrective action is required.	Verify accuracy of standard. Re-prepare LCS if necessary. If calibration curve and/or system is found to be out of control, perform maintenance and re-calibrate. If any VOC exceeds 50–150% recovery, maintenance is performed and the ICV test is repeated. For compounds with recoveries greater than 150% and no positive detections in the samples, approval to proceed will be granted on a case-by-case basis.

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Laboratory Control Spike Duplicate (LCSD)	Once per analytical batch (reanalysis of LCS)	≤ 20% RPD	Verify accuracy of standard. Re-prepare LCS if necessary. If calibration curve and/or system is found to be out of control, perform maintenance and re-calibrate. If any VOC exceeds 50–150% recovery, maintenance is performed and the ICV test is repeated. For compounds with recoveries greater than 150% and no positive detections in the samples, approval to proceed will be granted on a case-by-case basis.
Internal Standard (IS)	As each QC sample and sample are being loaded	**CCVs:** Area counts > 60% recovery; Retention Time (RT) within 20 seconds of mid-point in ICAL. **Blanks and samples**: Retention time (RT) must be within ±0.33 minutes of the RT in the CCV. The IS area must be within ±40% of the CCV's IS area for the Blanks and samples.	**CCV:** Inspect and correct system prior to sample analysis. **Blanks:** Inspect the system and re-analyze the Blank. **Samples:** Investigate the problem by verifying the instrument is in control by running a Lab Blank. Re-analyze recollected samples to verify recovery. Report the run with acceptable IS recovery. If both runs are unacceptable, narrate and flag associated data.
Field Surrogates	Added to each tube prior to shipment to field. Added to QC samples prior to analysis.	50–150%	**For blanks:** Inspect the system and re-analyze the Blank. **For samples:** Review data to determine whether sample collection parameters or matrix interference resulted in the exceedances. If so, narrate and flag recovery. If no cause is evident, verify the instrument is in control by running a Lab Blank. Re-analyze recollected sample to verify recovery.
Field Blank	Project-dependent	Artifact levels should be less than the reporting limit or less than 10% of the mass measured on the sampled tubes, whichever is less.	Flag associated results and evaluate tube conditioning and storage procedures.
Distributed Pairs	Project-dependent	%RPD ≤ 25%	Narrate discrepancy.

ANALYTICAL METHODS

Section 17.0

Method: ANALYSIS OF VOCS BY GC/MS COLLECTED ON CHARCOAL-BASED PASSIVE SAMPLERS

Eurofins Air Toxics SOP #100 Revision 4 Effective Date: January 10, 2014 Methods Manual Summary

Description: This method involves gas chromatograph/mass spectrometer (GC/MS) analysis of volatile organic compounds (VOCs) collected using charcoal-based passive samplers. These passive samplers include the Radiello® 130, SKC badges (575 and Ultra series), 3M™ OVM badges, and the WMS™ permeation sampler. Passive samplers are used to measure vapor-phase VOCs in a variety of gaseous matrices including indoor air, outdoor air, extracted soil gas, and emissions from materials. VOCs in the sampling environment pass through the diffusive barrier or permeable membrane of the sampler at a known, controlled rate (defined as the sampling rate) and adsorb to the charcoal-based sorbent pad of the sampler. The sorbent is extracted using a volume of carbon disulfide, and the extract is directly injected into a GC equipped with an MS. The retention time and spectral pattern of a compound are compared with that of known standard. Concentrations of the analytes are calculated from the average relative response factors of calibration curves obtained from analysis of standard solutions. The results are reported in units of µg/sample or µg/m^3 if the sampling rate and duration is known. Results for subsurface soil gas measurements are typically reported in units of µg/sample since there may be a low bias in the calculated µg/m^3 concentration due to starvation effects. Starvation effects occur when the uptake rate of the sampler exceeds the delivery rate of vapors from the surrounding soil.

There are no regulatory methods for the preparation and analysis of the Radiello and WMS samplers, while OSHA methods are available for workplace exposure measurements for several of the VOCs using 3M OVM 3500 and SKC 575 series samplers. The OSHA methods and recommended procedures published by Radiello (FSM) and 3M serve as the basis for this standard operating procedure for the analysis of environmental samples. Additionally, QC elements outlined in EPA SW-846 8260 and 8270 are incorporated as applicable. One variance of note that Eurofins Air Toxics has taken to the OSHA, Radiello, and the OVM 3500 methods is the use of GC/MS instead of GC/FID, thus providing more definitive compound identification and quantification for trace level environmental measurements.

Table 1 lists the target analytes routinely calibrated, along with the extract reporting limits and QC acceptance criteria. Tables 4 through 6 list the reporting limit for each sampler type in units of mass and the sampling rate. The sampling rates for the WMS sampler are maintained as proprietary and are not published as part of this document. To calculate the sample reporting limit in terms of µg/m^3, the compound sampling rate and the sample duration are required. Please consult with the laboratory to determine the appropriate sampler to meet project objectives.

Table1. Target Analytes, (Extract) Reporting Limits, and QC Criteria

Analytes	Reporting Limit (µg/mL)	Acceptance Criteria			
		ICAL (%RSD)	ICV (% R)	LCS (%R)	CCV (%D)
Chloromethane	0.2	30	70 – 130	50 – 140	%D ≤ 40%
Vinyl Chloride	0.2	30	50 – 140	50 – 140	%D ≤ 40%
Ethanol	0.5	30	70 – 130	50 – 130*	%D ≤ 30%
1,1-Dichloroethene	0.2	30	70 – 130	70 – 130	%D ≤ 30%
Acetone	0.1	30	70 – 130	70 – 130	%D ≤ 30%
2-Propanol	0.1	30	50 – 130	50 – 130	%D ≤ 30%
MTBE	0.05	30	70 – 130	70 – 130	%D ≤ 30%
trans-1,2-Dichloroethene	0.1	20	80 – 120	70 – 130	%D ≤ 20%
Hexane	0.05	30	70 – 130	70 – 130	%D ≤ 30%
1,1-Dichloroethane	0.05	20	80 – 120	70 – 130	%D ≤ 20%
Ethyl Acetate	0.2	30	70 – 130	70 – 130	%D ≤ 30%
2-Butanone	0.05	30	70 – 130	70 – 130	%D ≤ 30%
cis-1,2-Dichloroethene	0.1	20	80 – 120	70 – 130	%D ≤ 20%
Chloroform	0.05	20	80 – 120	70 – 130	%D ≤ 20%
Cyclohexane	0.05	30	70 – 130	70 – 130	%D ≤ 20%
1,1,1-trichloroethane	0.05	20	80 – 120	70 – 130	%D ≤ 20%
Carbon Tetrachloride	0.05	20	80 – 120	70 – 130	%D ≤ 20%
Benzene	0.2	30	70 – 130	70 – 130	%D ≤ 30%
1,2-Dichloroethane	0.05	20	80 – 120	70 – 130	%D ≤ 20%
Heptane	0.05	20	80 – 120	70 – 130	%D ≤ 20%
Trichloroethene	0.05	20	80 – 120	70 – 130	%D ≤ 20%
4-Methyl-2-pentanone	0.1	30	70 – 130	70 – 130	%D ≤ 30%
Toluene	0.05	20	80 – 120	70 – 130	%D ≤ 20%
1,1,2-Trichloroethane	0.05	20	80 – 120	70 – 130	%D ≤ 20%
Tetrachloroethene	0.05	20	80 – 120	70 – 130	%D ≤ 20%
Chlorobenzene	0.05	20	80 – 120	70 – 130	%D ≤ 20%
Ethylbenzene	0.05	20	80 – 120	70 – 130	%D ≤ 20%
m,p-Xylene	0.05	20	80 – 120	70 – 130	%D ≤ 20%
o-Xylene	0.05	30	70 – 130	70 – 130	%D ≤ 20%
Styrene	0.05	30	70 – 130	20-100*	%D ≤ 30%

1,1,2,2-Tetrachloroethane	0.05	30	70 – 130	60 – 130	%D ≤ 30%
Propylbenzene	0.05	20	80 – 120	70 – 130	%D ≤ 20%
1,3,5-Trimethylbenzene	0.05	20	80 – 120	70 – 130	%D ≤ 20%
1,2,4-Trimethylbenzene	0.05	20	80 – 120	70 – 130	%D ≤ 20%
1,3-Dichlorobenzene	0.05	30	70 – 130	50 – 110**	%D ≤ 30%
1,4-Dichlorobenzene	0.05	30	70 – 130	50 – 110**	%D ≤ 30%
1,2-Dichlorobenzene	0.05	30	70 – 130	50 – 110**	%D ≤ 30%
Naphthalene	0.05	30	70 – 130	5-80*	%D ≤ 30%

*Acceptance limits based on desorption efficiency studies
**60 – 130% for WMS

Table 2. Internal Standard

Analyte	CCV IS (%R)	Sample IS (%)R
2-Fluorotoluene	50 – 200	50 – 200

Table 3. Surrogate

Analyte	%R
Toluene-d8	70-130

Table 4. Sampling Rates for "Standard" target compounds (RAD 130)

Analytes	Reporting Limit (µg/mL)	Reporting Limit (µg/sampler)	Sampling Rates for Radiello 130 Sampler (mL/min)
Chloromethane	0.2	0.4	107*
Vinyl Chloride	0.2	0.4	90*
Ethanol	0.5	1.0	102
1,1-Dichloroethene	0.2	0.4	76*
Acetone	0.1	0.2	77
2-Propanol	0.1	0.2	52
MTBE	0.05	0.1	65
trans-1,2-Dichloroethene	0.1	0.2	60*
Hexane	0.05	0.1	66
1,1-Dichloroethane	0.05	0.1	63*
Ethyl Acetate	0.2	0.4	78
2-Butanone	0.05	0.1	79
cis-1,2-Dichloroethene	0.05	0.1	62*
Chloroform	0.05	0.1	75
Cyclohexane	0.05	0.1	54
1,1,1-trichloroethane	0.05	0.1	62
Carbon Tetrachloride	0.05	0.1	67
Benzene	0.2	0.4	80
1,2-Dichloroethane	0.05	0.1	77
Heptane	0.05	0.1	58
Trichloroethene	0.05	0.1	69
4-Methyl-2-pentanone	0.1	0.2	67
Toluene	0.05	0.1	74

1,1,2-Trichloroethane	0.05	0.1	66*
Tetrachloroethene	0.05	0.1	59
Chlorobenzene	0.05	0.1	68
Ethylbenzene	0.05	0.1	68
m,p-Xylene	0.05	0.1	70
o-Xylene	0.05	0.1	65
Styrene	0.05	0.1	61
1,1,2,2-Tetrachloroethane	0.05	0.1	60*
Propylbenzene	0.05	0.1	57
1,3,5-Trimethylbenzene	0.05	0.1	53*
1,2,4-Trimethylbenzene	0.05	0.1	50
1,3-Dichlorobenzene	0.05	0.1	59*
1,4-Dichlorobenzene	0.05	0.1	51
1,2-Dichlorobenzene	0.05	0.1	58*
Naphthalene	0.05	0.1	25

*Estimated rate

Table 5. Sampling Rates for "Standard" target compounds (OVM)

Analytes	Reporting Limit (µg/mL)	Reporting Limit (µg/sampler)	Sampling Rates for OVM Sampler (mL/min)
Chloromethane	0.2	0.30	Estimated
Vinyl Chloride	0.2	0.30	41
Ethanol	0.5	0.75	44
1,1-Dichloroethene	0.2	0.30	Estimated
Acetone	0.1	0.15	40
2-Propanol	0.1	0.15	39
MTBE	0.05	0.075	38
trans-1,2-Dichloroethene	0.1	0.15	Estimated
Hexane	0.05	0.075	32
1,1-Dichloroethane	0.05	0.075	33
Ethyl Acetate	0.2	0.3	34
2-Butanone	0.05	0.075	36
cis-1,2-Dichloroethene	0.05	0.075	Estimated
Chloroform	0.05	0.075	34
Cyclohexane	0.05	0.075	32
1,1,1-trichloroethane	0.05	0.075	31
Carbon Tetrachloride	0.05	0.075	30
Benzene	0.2	0.30	80
1,2-Dichloroethane	0.05	0.075	33
Heptane	0.05	0.075	29
Trichloroethene	0.05	0.075	31
4-Methyl-2-pentanone	0.1	0.15	30
Toluene	0.05	0.075	31
1,1,2-Trichloroethane	0.05	0.075	30
Tetrachloroethene	0.05	0.075	28
Chlorobenzene	0.05	0.075	29
Ethylbenzene	0.05	0.075	27
m,p-Xylene	0.05	0.075	27

o-Xylene	0.05	0.075	27
Styrene	0.05	0.075	29
1,1,2,2-Tetrachloroethane	0.05	0.075	28
Propylbenzene	0.05	0.075	Estimated
1,3,5-Trimethylbenzene	0.05	0.075	Estimated
1,2,4-Trimethylbenzene	0.05	0.075	Estimated
1,3-Dichlorobenzene	0.05	0.075	Estimated
1,4-Dichlorobenzene	0.05	0.075	27.8
1,2-Dichlorobenzene	0.05	0.075	27.8
Naphthalene	0.05	0.075	25

Table 6. Sampling Rates for "Standard" target compounds (SKC Badge)

Analytes	Reporting Limit (µg/mL)	Reporting Limit (µg/sampler)	Sampling Rates for Indoor Air Applications „Zero Face velocity" (mL/min)	Sampling Rates for Outdoor/Worker Exposure (mL/min)
Chloromethane	0.2	0.4	Estimated	Estimated
Vinyl Chloride	0.2	0.4	17.4*	21.2*
Ethanol	0.5	1.0	11.7	20.0
1,1-Dichloroethene	0.2	0.4	9.74	12.3
Acetone	0.1	0.2	12.6	15.2
2-Propanol	0.1	0.2	9.65	20.0
MTBE	0.05	0.1	9.84	13.6
trans-1,2-Dichloroethene	0.1	0.2	10.2	14.8
Hexane	0.05	0.1	9.59	14.3
1,1-Dichloroethane	0.05	0.1	13.14	12.3
Ethyl Acetate	0.2	0.4	9.26	13.75
2-Butanone	0.05	0.1	6.27	17.1
cis-1,2-Dichloroethene	0.05	0.1	11.54*	14.8*
Chloroform	0.05	0.1	10.14	13
Cyclohexane	0.05	0.1	7.76	15.6
1,1,1-trichloroethane	0.05	0.1	9.40	14.1
Carbon Tetrachloride	0.05	0.1	10.41	14.1
Benzene	0.2	0.4	10.69	16
1,2-Dichloroethane	0.05	0.1	11.79	14.2
Heptane	0.05	0.1	9.38	13.9
Trichloroethene	0.05	0.1	11.47	14.9
4-Methyl-2-pentanone	0.1	0.2	7.29	13.5
Toluene	0.05	0.1	8.90	14.5
1,1,2-Trichloroethane	0.05	0.1	9.64	12.5
Tetrachloroethene	0.05	0.1	10.02	13.1
Chlorobenzene	0.05	0.1	8.23*	18.74*
Ethylbenzene	0.05	0.1	9.02	12.9
m,p-Xylene	0.05	0.1	8.1	12.65
o-Xylene	0.05	0.1	8.11	11.9
Styrene	0.05	0.1	9.04	13.7
1,1,2,2-Tetrachloroethane	0.05	0.1	9.98	11.8
Propylbenzene	0.05	0.1	6.41*	11.69*
1,3,5-Trimethylbenzene	0.05	0.1	7.29*	12.1*

1,2,4-Trimethylbenzene	0.05	0.1	9.92*	12.1*
1,3-Dichlorobenzene	0.05	0.1	5.79*	12.7*
1,4-Dichlorobenzene	0.05	0.1	10.74*	12.7*
1,2-Dichlorobenzene	0.05	0.1	4.97*	12.6*
Naphthalene	0.05	0.1	2.71*	13.7*

*Calculated by SKC

Table 7. Summary of Calibration and QC Procedures

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
Tuning Criteria	Prior to calibration and at the start of every 12-hour clock	Method 8260B tuning criteria	Correct problem then repeat tune.
Initial 5-Point Calibration (ICAL)	Prior to sample analysis	Compound criteria in Table 1	Correct problem then repeat initial calibration. Analysis may proceed if no more than 2 VOCs exceed criteria or 5% of VOCs if short list is used. Narrate exceedances.
Initial Calibration Verification (ICV)	Once per initial calibration	See Table 1	Verify concentrations and standard preparation. Analysis may proceed if no more than 2 VOCs exceed criteria or 5% of VOCs if short list is used. Narrate exceedances.
Continuing Calibration Verification (CCV)	At the start of every shift immediately after the BFB tune check	See "CCV criteria" column in Table 1	Investigate and correct the problem, up to and including recalibration if necessary. Analysis may proceed if no more than 2 VOCs exceed criteria or 5% of VOCs if short list is used. Associated results are flagged.
Internal Standards (IS)	IS is added at the time of extraction to all samples and QC samples.	**For CCVs:** Area counts 50 –200%; RT w/in 30 seconds of midpoint in ICAL **For blanks, samples and non-CCV QC checks:** Area counts 50 – 200%; RT within 20 seconds of RT in CCV	**CCV:** Inspect and correct system prior to sample analysis. **For blanks:** Inspect the system and re-analyze the blank. **For samples:** Re-analyze; if out again, flag data.
Surrogate	Surrogate is added at the time of extraction to all samples and QC samples.	70–130%	Same as for Internal Standards.
Solvent Blanks	Immediately after the calibration standard or after samples with high concentrations	Results less than laboratory reporting limit (see Table 1)	Re-aliquot and re-analyze solvent blank. If detections remain, flag concentrations in associated samples.

Extracted Laboratory Blank	Each set of up to 20 samples	Results less than the reporting limit	Flag sample concentrations in associated extraction batch.
Extracted Laboratory Control Spike (LCS)	Each set of up to 20 samples	See Table 1.	Re-aliquot and re-analyze the extract. If within limits, report the re-analysis. Otherwise, narrate.
Extracted Laboratory Control Spike Duplicate (LCSD)	Each set of up to 20 samples	%RPD ≤ 25%	Analysis may proceed if no more than 2 VOCs exceed criteria (or 5% for short list exceed criteria). Run a 3rd time; perform corrective action or narrate as appropriate.

LABORATORY QUALITY ASSURANCE MANUAL

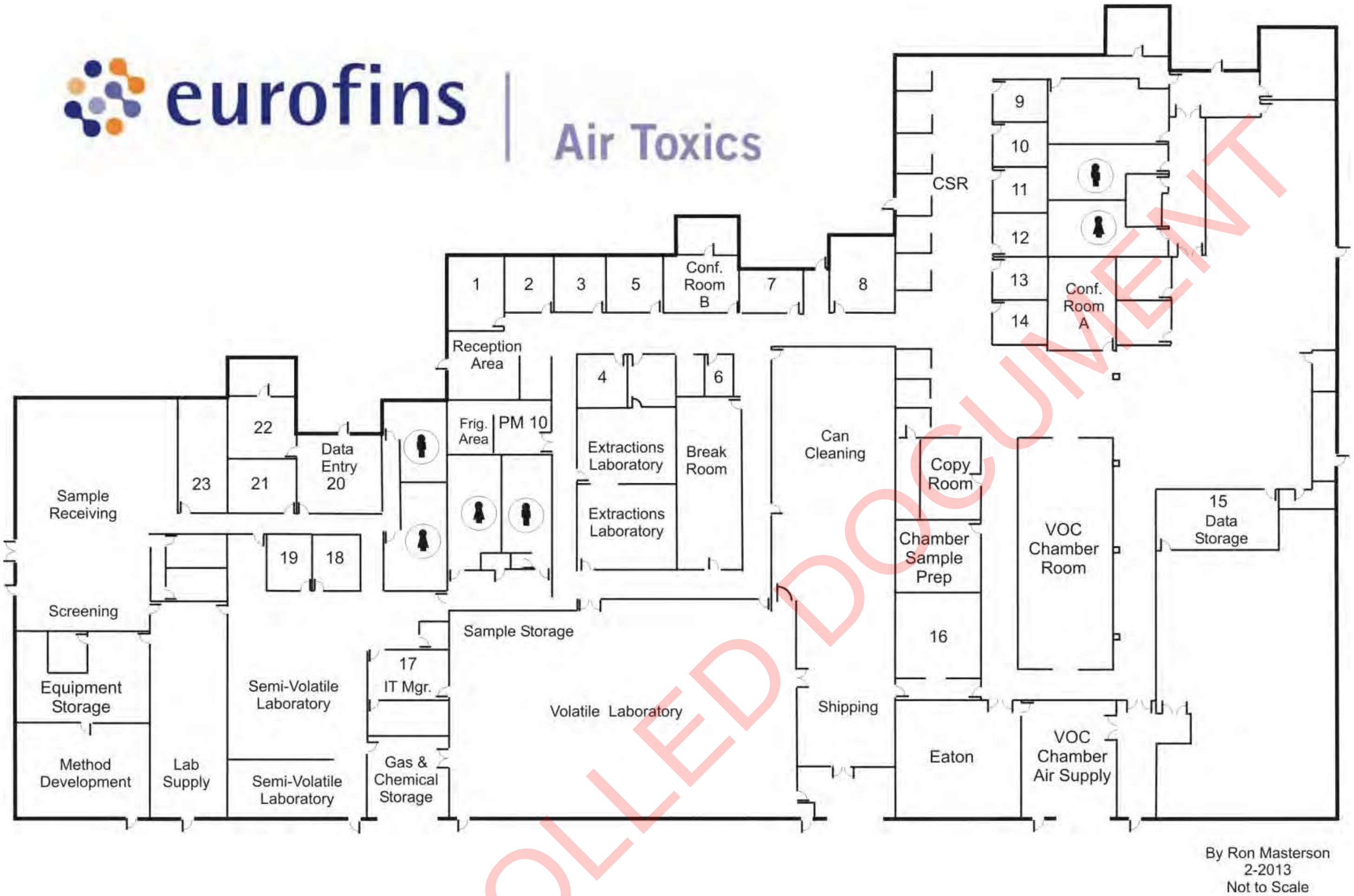
(LQAM)

Appendix F

Facility Map

(Two total pages including this cover)

Current as of March 5, 2014


eurofins | Air Toxics
CSR
9
10
11
12
13
14
Conf. Room A
1
2
3
5
Conf. Room B
7
8
Reception Area
4
6
Frig. Area
PM 10
22
Data Entry 20
23
21
Sample Receiving
Extractions Laboratory
Extractions Laboratory
Break Room
Can Cleaning
Copy Room
Chamber Sample Prep
VOC Chamber Room
15 Data Storage
19
18
Screening
Sample Storage
17 IT Mgr.
16
Equipment Storage
Semi-Volatile Laboratory
Volatile Laboratory
Shipping
Eaton
VOC Chamber Air Supply
Method Development
Lab Supply
Semi-Volatile Laboratory
Gas & Chemical Storage
By Ron Masterson
2-2013
Not to Scale

LABORATORY QUALITY ASSURANCE MANUAL

(LQAM)

Appendix G

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(Two total pages including this cover)

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APPENDIX B
HEALTH AND SAFETY PLAN (HASP)

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LOS PEÑASQUITOS LAGOON TMDL SEDIMENT MONITORING

HEALTH AND SAFETY PLAN (HASP)

Prepared by Amec Foster Wheeler

June 2015

Reviewed and Approved: ______________________________
Jesse Davis
Health and Safety Officer

Reviewed and Approved: ______________________________
Jeremy Burns
Project Manager

Reviewed and Approved: ______________________________
Kiernan Brtalik
Project Coordinator/Field Sampling Manager

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) addresses health and safety concerns related to the fieldwork associated with the Los Peñasquitos Lagoon TMDL Sediment Monitoring Program. All Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) field team members and subcontractor's field teams must become familiar with the contents of this HASP and site-specific safety concerns.

The project Health and Safety Officer (HSO) will be responsible for assuring that all members of the field team are familiar with the requirements of the HASP and appropriate training is receive for their specific roles. The Field Sampling Manager is responsible for enforcing site-specific health and safety protocols (SSHS), including emergency response/contingency plans. The Project Manager and individual employees have the authority to suspend work, if necessary, due to health and safety concerns.

1.1 Field Activities

Amec Foster Wheeler is responsible for field activities associated with the Los Peñasquitos Lagoon TMDL Sediment Monitoring. The following sub-sections discuss these field activities in detail.

1.1.1 Site Selection of Monitoring Sites

Site selection for this project will include physical exertion (walking, standing, and bending) in extreme weather conditions (heat and cold) for moderate periods over uneven surfaces. This will also include moderate lifting (manhole covers, sample, and equipment handling).

1.1.2 Equipment Installation and Maintenance

Equipment installation and maintenance may include working with power tools in wet or damp environments and the operation of heavy equipment. Confined space entry may be required for equipment installation and occasional maintenance activities.

1.1.3 Travel

Travel to and from the selected monitoring sites will occur for equipment installation, maintenance activities, and pre- and post-storm event monitoring. Although automated equipment lessens required travel during storm events, some access is typically necessary during storm events and often at night to: document observations, collect samples, take field measurements, replace composite sample containers, and repair any malfunctioning equipment.

Establishment of Work Zones and Traffic Control

Field crew will make efforts to locate equipment in safe work zones, far from high-traffic and high-use areas. If equipment location is adjacent to high-traffic and high-use zone, field crew will implement appropriate traffic control measures, as needed.

Removal and Replacement of Sample Containers

Composite sample containers will need to be removed and replaced immediately after each storm event and, perhaps, during storm events.

1.2 Traffic Safety

Working near roadways presents inherent risks dominated by the possibility of errant vehicles. The motoring public is largely made of conscientious drivers operating well-maintained equipment. However, some percentage of vehicles on the road at any given time may be marginally under control due to driving factors like distractions, fatigue, confusion, or inadequate training, as well as mechanical factors like vehicle age and condition. Any or all of these factors may contribute to a vehicle leaving the traveled lanes and entering the work site.

Traffic load, posted speed limits, and proximity to travel lanes all have a direct relation to the probability of worker exposure to errant vehicles. Work site selection can reduce the exposure potential relating to these factors. In all cases, the Field Sampling Manager will make the final evaluation of the appropriateness for performing work based on present site conditions.

Field teams will use signs, cones, and flashing amber lights when necessary based on traffic control permitting requirements for sites within the roadway in order to inform motorists of activities that may influence roadway travel conditions. To avoid shoulder and lane closures, field crew will attempt to pull vehicles off the road and perform work as far away from the edge of pavement as possible.

Field members will work in teams and utilize high-visibility, reflective (Class 2 ANSI/ISEA minimum) vests and/or clothing. Steel-toed boots and hard hats are required for the entrant during confined space entry, if overhead hazards exist, and/or if operating heavy equipment when working along roadsides.

When working on or near the shoulder, physical barriers will be employed whenever possible to protect workers from errant vehicles. Physical barriers include barrier vehicles, guardrails, fences, and other fabricated or natural objects capable of slowing, stopping, or diverting an errant vehicle. Barrier vehicles are to be unoccupied, positioned upstream of the work zone, and parked to prevent the vehicle from rolling into the work area or active travel lanes if struck by an errant vehicle. Workers not protected by a physical barrier should employ the use of a lookout.

1.3 Confined Space Entry

There are no known instances where a permitted confined space entry will be necessary during the course of site selection or monitoring. However, non-permitted confined space entry may occur for installation of automated equipment. The Project Manager, the Site Health and Safety Officer, and the Health and Safety Director must be notified and proper procedures will be followed should a situation arise that requires a non-permitted confined space entry;

The Occupational Safety and Health Administration (OSHA) requires that all individuals entering a permitted or non-permitted confined space be trained in confined space entry, instructed in the nature of the hazards involved, the necessary precautions to be taken, and the use of protective and emergency equipment required for the job. Amec Foster Wheeler employees will be trained in confined space entry procedures prior to entry.

1.4 General Safety

In addition to traffic hazards, field teams may face a variety of potential dangers while maintaining the facilities, installing equipment, and performing environmental monitoring. Some of these dangers include:

- Slippery and wet pavements
- Unstable earth and surfaces
- Poor visibility, especially at night and during rain storms
- Back injuries
- Swift moving water
- Falling into water/drowning
- Trip and fall
- Pinching and/or crushing of hands and fingers
- Dermal/eye contact with storm contaminants
- Walking on uneven/unstable surfaces
- Ergonomic injury/repetitive motions
- Heat illness
- Prolonged weather exposure (heat and cold)
- Power tools and heavy equipment
- Lifting heavy objects
- Electrical hazards posed by field equipment malfunctions
- Light to moderate carrying of field equipment and supplies

- Transients, muggers, and criminals
- Sharp edges and broken glass
- Animals and other biological hazards

Field crews are trained to take the following safety while working in the field:

- Stay away from the edges of fast moving water and avoid areas of pooled water by roadways. These areas are usually slippery during rainy conditions.
- If sampling is required within the riparian zone, use a lifeline and a personal flotation device. Always have one crewmember serve as a lookout on shore.
- Watch your step while walking in and around rocks in the riparian zones. Wet rocks are usually sharp and slippery during rainy conditions.
- Never work alone at night or during the day. Two people are required during each site visit. Stay within shouting distance of your partner at all times.
- Avoid leaving materials, tools, and equipment lying around where someone can trip over them.
- Maximize lighting at all times, especially at night.
- Always keep a charged cellular phone or other means of communication nearby.
- Do not use your back to lift heavy objects. When lifting objects weighing 50 lbs or more, two or more employees are required to excuse the lift.
- Never use drugs or alcohol while working.
- Always wear an orange reflective vest during site visits, when necessary and a hard hat when overhead dangers exist.
- Always wear appropriate footwear, including steel-toed boots and/or rain boots.
- Use a buddy system if working over water. Stay clear from edges of swift water.
- Do not use power tools and equipment unless trained in the proper use and care of the specific tools.
- Always wear eye protection when working with tools or chemicals.
- Wear nitrile gloves when collecting samples.
- Respond appropriately to protect workers from the elements, including but not limited to sun, rain and wind.
- Avoid excessive sun or hat exposure. Wear a hat, sunglasses, and sunscreen.
- Be knowledgeable of heat illness symptoms and know how to respond to them.
- If lightning is observed while working in the field, seek shelter.

- Be aware of your surroundings. Watch for plants, animals, people, and tripping hazards. Clean up the work area before leaving.
- Always carry sufficient amounts of drinking water. Employees should drink at a minimum one quart of water per hour for the entire shift.
- Be aware of the nearest toilet and hand washing facilities.

Field crew will complete the following personal hygiene procedures:

- Toilet and hand washing facilities will not be located on-site. An alternate sanitary facility and its specific location will be identified prior to beginning work activities.
- Personal protective equipment (PPE) shall be kept clean, in good repair, and on-site. Safety devices, including protective clothing worn by the employee, shall not be interchanged among the employees until properly cleaned.
- All equipment will be free of gross hazardous and non-hazardous waste (i.e., mud and/or soil) upon leaving the work site.

2.0 SITE-SPECIFIC HASP

This section provides information on unique hazards and necessary precautions for the types of sites included in this program. Emergency response phone numbers and routes to the nearest medical emergency facilities can be found at the end of this appendix. Field personnel will be responsible for adhering to the requirements of this HASP and the task-specific Activity Hazard Assessments (AHAs) for installation, maintenance, and wet/dry weather monitoring. If additional measures are required due to unforeseen or temporary changes to the work environment, the on-site team leader will make the final judgment for any safety procedure changes.

2.1 Errant Vehicles

There is a minimum to moderate exposure hazard from errant vehicles while accessing most sites. While personnel are station along the shoulder of the roadway, they should be located far away from the roadway lanes and face the approaching traffic. Field crew should always remain on the side of the vehicle furthest from the travel lane and employ the use of flashing amber lights. A lookout person is required if two or more field crew are engaged in exposed activity within 30 feet of the travel lane. Exposed activities may occur before, during, and after storm events.

2.2 Chemical Hazards

Chemical hazards may collect within pipes and/or collection channels. Chemicals can be corrosive and can burn exposed flesh, and/or they can cause severe illness if they are absorbed through the skin or ingested. When encountering a suspected liquid hazard exercise caution. Use a pH meter or pH test paper to test for corrosives, but always assume that a hazardous chemical is present and wear personal protective clothing. Chemical hazards other than those described above could be hazardous chemicals that have precipitated or accumulated on the sides of the pipes and channels. Table 2-1 lists potential chemicals in gaseous form that may be on-site along with each chemical's Permissible Exposure Limit (PEL), Immediately Dangerous to Life and Health (IDHL), odor thresholds, and routes of entry. Personnel will use proper PPE to guard against chemical hazards.

Table 2-1: Toxic Gases

Name	Source/Use	IDLH[a] Ceiling PPM	STEL[b] PPM/Exposure Time (min)	TWA[c] 8-Hr PEL[d] PPM	Odor Threshold
Acetone	Solvent	2,500	1,000/15	750	100
Carbon Dioxide	Comb./Sludge	40,000	30,000/15	5,000	–
Carbon Monoxide	Comb./Exhaust	1,200	–	25	–
Chlorine	–	10	1/15	0.5	–
Gasoline	Fuel	–	500/15	300	0.005-10
Hydrogen Sulfide	Sewer/Sludge Coal Gas/Petrol	100	15/15	10	Impairs smell
Nitrogen Oxides	–	20	1/15	–	–
Ozone	Electric Arcing	5	0.3/15	0.1	0.015

[a] IDLH = Immediately Dangerous to Life and Health
[b] STEL = Short Term Exposure Limit
[c] TWA = Time Weighted Average
[d] PEL = Permissible Exposure Limit

2.3 Physical Hazards

Always be alert and use adequate protection to safeguard against the physical hazards associated with working at these sites. The most common hazard encountered is falling or tripping, potentially causing mechanical injury. The following are some other common hazards:

- Sharp objects
- "Flash" flooding
- High water
- Strong currents
- Electrical risk
- Moving vehicles
- Travel risk
- Uneven walking surfaces
- Heat and cold
- Plant and structures

2.4 Biological Hazards

Beware of poison ivy, poison oak, and other plants that cause allergic reactions. Also, use protection against bacteria and other micro biota that could be present in the water and sediment. Be aware that mosquitoes are a common vector for human diseases. Use caution when unlocking or opening equipment that has been stored on-site as black widows, snakes, and other venomous or stinging insects/animals may be present.

2.5 Drowning Hazards

Working in or near the rivers may expose field crews to potential drowning hazards. The chance of drowning can occur along the riverbed or in the water. However, drowning hazards are more common when wading or standing in the river. Do not enter the water if the field team leader determines the conditions to be unsafe or if posted advisories are along the sampling site. Field crew should equip personal floatation devices, lifelines, and all necessary PPE.

2.6 Heat Stress

Heat stress is a major hazard, especially for workers wearing protective clothing. The same protective materials that shield the body from chemical exposure also limit the dissipation of body heat and moisture causing dangerous rises in body temperature. In its early stages, heat stress can cause rashes, cramps, discomfort, and drowsiness, resulting in impaired functional ability that threatens the safety of both the individual and coworkers. Untreated heat stress can lead to heat stroke and even death. Careful training and frequent monitoring of personnel who wear protective clothing, sensible scheduling of work and rest periods, and frequent replacement of fluids can protect against this hazard.

There is a possibility that heat stress may occur on this project during the dry weather season. Workers will be instructed to take breaks in a shaded area in order to mitigate any symptoms or signs of heat stress, should they exist. Symptoms of heat stress include excessive sweating, muscle spasms, thirst, dizziness, rapid/weak pulse, flushed skin, loss of consciousness, or convulsions. Breaks will last until symptoms are relieved and/or the pulse of the worker is less than 110 beats per minute. As a preventive measure, workers will be instructed to drink fluids to keep hydrated. For severe heat stress, workers will be examined by a health-care professional as soon as possible.

Additionally, during periods of hot weather or other potential heat stress conditions the following safe work practices must apply:

- Be knowledgeable of heat illness symptoms during periods of abnormally high heat.
- Watch for symptoms of heat illness which include excessive sweating, headache, poor concentration, muscle pain, headache, cramping, dizziness, and irritability, loss of coordination, vomiting, blurry vision, confusion, and lack of sweating, fainting, or seizures.
- Drink plenty of water throughout the day. Employees working in the heat need to drink (4) eight ounce glasses of water per hour, including at the start of the shift to replace the water lost due to sweat. This is the minimum amount per person that should be brought into the field.
- Dress appropriately for weather conditions. Wear lightweight, light-colored, loose clothing. Wear a wide brimmed hat if possible.
- Wear sunscreen and sunglasses.

- Use cool compresses to stay cool. Placing cool compresses on the back of the neck lowers the body's core temperature.
- Take scheduled rest periods and spend them in the shade.
- Tell your supervisor immediately if you feel you may be getting sick from the heat.
- Know the locations of the closest drinking water supplies.
- Keep track of your coworkers. You all need to look out for each other.
- Know how to contact emergency services in the event of heat illness, how to effectively report the work location to 911, and the location of the nearest hospital and the quickest route for arrival.

2.7 Cold Exposure

Storms can bring unusual cold weather to the area. Low temperatures and wet conditions are potential dangers that can cause cold injury (frostbite and hypothermia) and impair the ability to work. Wear appropriate clothing, have warm shelter readily available (vehicle), carefully schedule work and rest periods, and monitor workers' physical conditions to safeguard against these types of hazards. Should an employee begin to feel the effects of cold injury they should be removed from cold exposure in a manner that will not cause their condition to worsen or cause their body to go into shock.

2.8 Dehydration

Dehydration can occur during wet or dry weather, and in heat or in cold. High altitudes, limited shade, extreme temperatures, and physical exertion increase the rate of dehydration. Drink plenty of water throughout the day. Ensure sufficient amounts of water are brought to the site for each employee. Take water and rest breaks in shaded areas where possible and safe to do so.

2.9 Worker Safety

Only personnel trained in the use of the proper safety equipment will be allowed to complete the required tasks.

2.9.1 Personal Protective Equipment (PPE)

Recommended PPE includes hard hats, safety vests, work boots, gloves, and sturdy clothing. This equipment will not only help protect against numerous potential hazards but will also allow others to identify you as belonging to the work site. Additionally, Nitrile, latex, or other plastic-based PPE will be used by any personnel who is likely to come in contact with storm water runoff as the contents of the water are unknown and potentially dangerous.

The safety officer will select the PPE ensemble based on the potential hazards. **Each worker will be responsible for maintaining his or her own PPE**.

In general the following in Table 2-2 applies:

Table 2-2: Standard PPE for Non-Hazardous Work Zones

Activity	Head/Face/Ear	Foot	Hands	Respirator	Clothing
General Site Labor	Hard hat (Class B or E)[c] Safety glasses Hearing protection[b]	Steel-toed boots w/ puncture resistant insoles.[d]	Leather/Nitrile gloves as needed	None[a]	Shirt w/sleeves. Long pants. High-visibility reflective vest Personal Floatation Device
Supervision of Work	Hard hat (Class B or E) [c] Safety glasses Hearing protection[b]	Steel-toed boots w/ puncture resistant insoles. [d]	Leather/Nitrile gloves as needed	None[a]	Shirt w/sleeves. Long pants. High-visibility reflective vest Personal Floatation Device
Site Visitors	Hard hat (Class B or E) [c] Safety glasses Hearing protection[b]	Steel-toed boots w/ puncture resistant insoles. [d]	None	None[a]	Shirt w/sleeves. Long pants. High-visibility reflective vest Personal Floatation Device

[a] Voluntary use of respirators is authorized for nuisance dusts and exposures known to be below PEL levels. For nuisance dust use disposable N, R, or P95 or better (dispose of N or R types daily and P type weekly). For odors use half mask with OV or OV/P95 or better (change at start of week).
[b] Hearing protection with adequate noise reduction rating (if consistently exposed to greater than 85 decibels steady-state or 140 decibels impulse). Workers should use clean hands to insert earplugs. Ample supplies of disposable earplugs will be available onsite.
[c] Hard hats are required only when overhead dangers exist.
[d] Steel-toed boots are required at sites when site conditions pose a risk to foot injury from falling objects.

2.9.2 Special Circumstances

Extreme caution will be used when maintaining pole-mounted equipment. Qualified individuals will perform this task with proper equipment due to the danger of potential slips and falls.

2.10 Traffic Safety

A shoulder or lane closure will be considered for all work near the shoulder that is expected to last more than 30 minutes.

2.11 Sample Collection Safety

The following precautions will be taken while collecting samples at the monitoring stations:

- Use plenty of light during the evening hours and use reflective ANSI/ISEA class II or III vests (23 CFR Part 634) if working near the roadway.

- Always wear protective gloves, a reflective vest, and a hard hat when overhead dangers exist.
- Wear boots and foul weather gear during rainy weather.
- Keep a safe distance from the water body if deep water, rapid flow or flash flood conditions are present or imminent. Employees should avoid unstable banks, employ the use of a grab pole, and use a lifeline and a personal flotation device. If the Field Team Leader determines the site is unsafe to collect samples even with proper precautions in place, do not collect samples.
- Do not eat or smoke while on the job site.
- Use proper lifting techniques and get assistance when moving coolers and large sample containers or other equipment.
- Handle glass sample containers with care. If a glass container breaks, employees should wear proper PPE and use appropriate cleanup equipment.

2.12 Installation Safety

The following precautions will be taken while installing the storm water monitoring stations:

- Use plenty of light during the evening hours and use reflective ANSI/ISEA class II or III vests (23 CFR Part 634) if working near the roadway.
- Always wear protective gloves, a reflective vest, and a hard hat when overhead dangers exist.
- Wear boots and foul weather gear during rainy weather.
- Do not eat or smoke while on the job site.
- Use proper lifting techniques and get assistance when moving coolers and large sample composite containers or other equipment.

2.13 Medical Emergency Procedures

Even with full safety awareness and compliance by field teams, medical emergencies can and do occur. To handle minor injuries, field teams will have a basic first aid kit on-site at all times. Table 2-3 is a list of site-specific emergency contacts.

Table 2-3: Emergency Contacts

Name	Phone	Comments
San Diego Police Department	911	From cell phone
Jeremy Burns, Project Manager	858-342-8828	From cell phone

Document all information related to the accident or incident that resulted in injury or damage and report it to the Consultant Safety Manager.

The nearest hospital is located at:

> Scripps Memorial Hospital
> 9888 Genesee Avenue
> La Jolla, CA 92037

Maps showing driving routes are presented in Figures 2-1 – 2-3 show the location and driving route to the nearest hospital. Driving directions to the hospital from each monitoring location are also provided in Tables 2-4 through 2-6.

Table 2-4: Driving Directions to Hospital from Site CCC

Site	Directions/Hospital Name/Address		Hospital Route Map Figure No.
Carroll Canyon Creek (CCC)	• Head north on Roselle St toward Sorrento Valley Blvd • Turn left to merge onto I-5 S • Take the Genesee Ave exit • Keep left at the fork, follow signs for Genesee Avenue E • Turn left at Genesee Ave • Turn right at light with sign indicating Scripps Hospital • Hospital entrance will be on the right.	Scripps Memorial Hospital 9888 Genesee Ave La Jolla, CA 92037	Figure 2-1

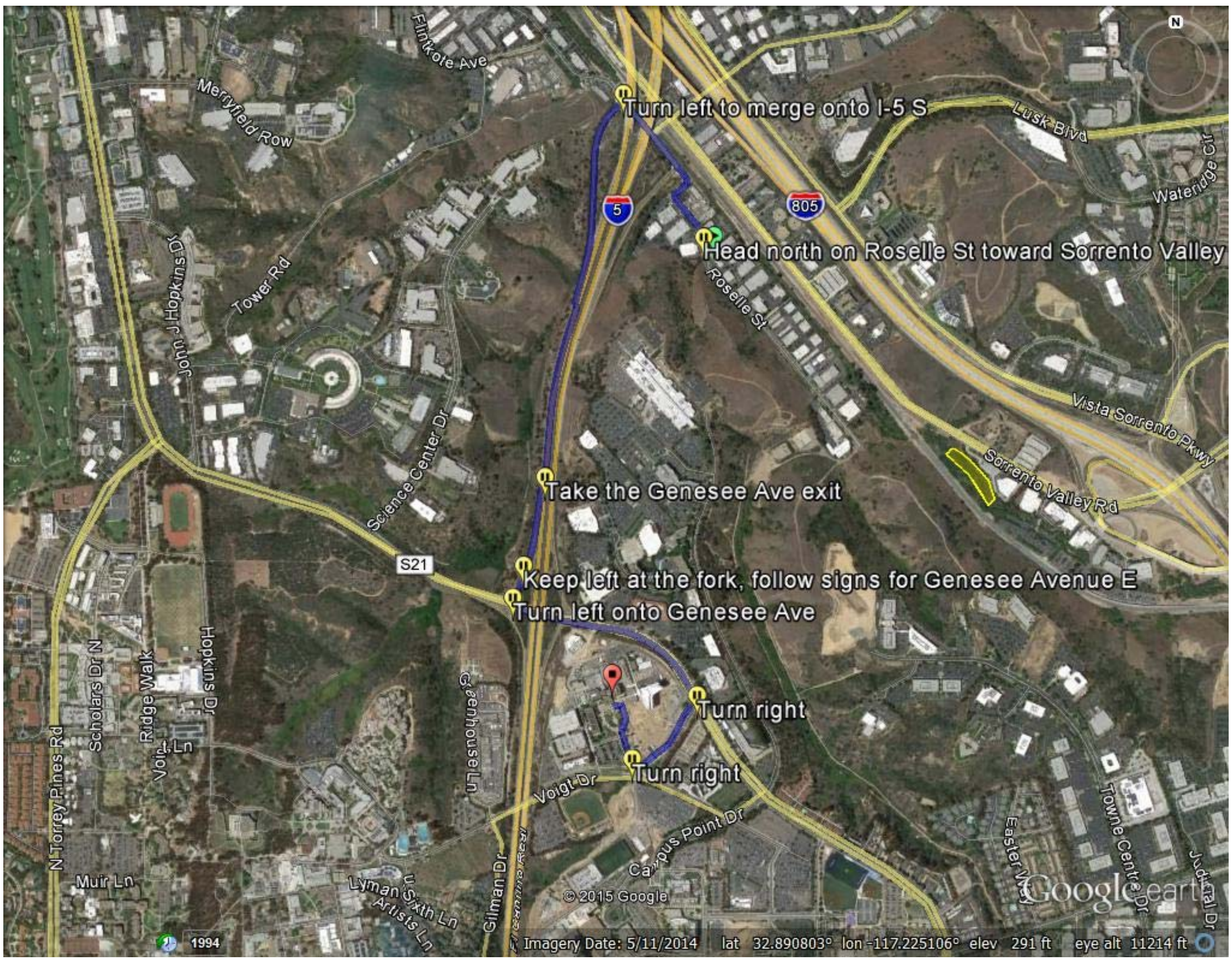

Figure 2-1: Hospital Map from Site CCC

Table 2-5: Driving Directions to Hospital from Site LPC

Site	Directions/Hospital Name/Address		Hospital Route Map Figure No.
Los Peñasquitos Creek (LPC)	• Head northwest on Vista Sorrento Pkwy toward Calle Mar De Mariposa • Turn left onto Carmel Mountain Rd • Turn left onto the I-5 S ramp • Merge onto I-5 Local Bypass S • Take the exit on the left onto I-5S toward Downton • Take the Genesee Ave exit • Keep left at the fork, follow signs for Genesee Avenue E • Turn left at Genesee Ave • Turn right at light with sign indicating Scripps Hospital • Hospital entrance will be on the right.	Scripps Memorial Hospital 9888 Genesee Ave La Jolla, CA 92037	Figure 2-2

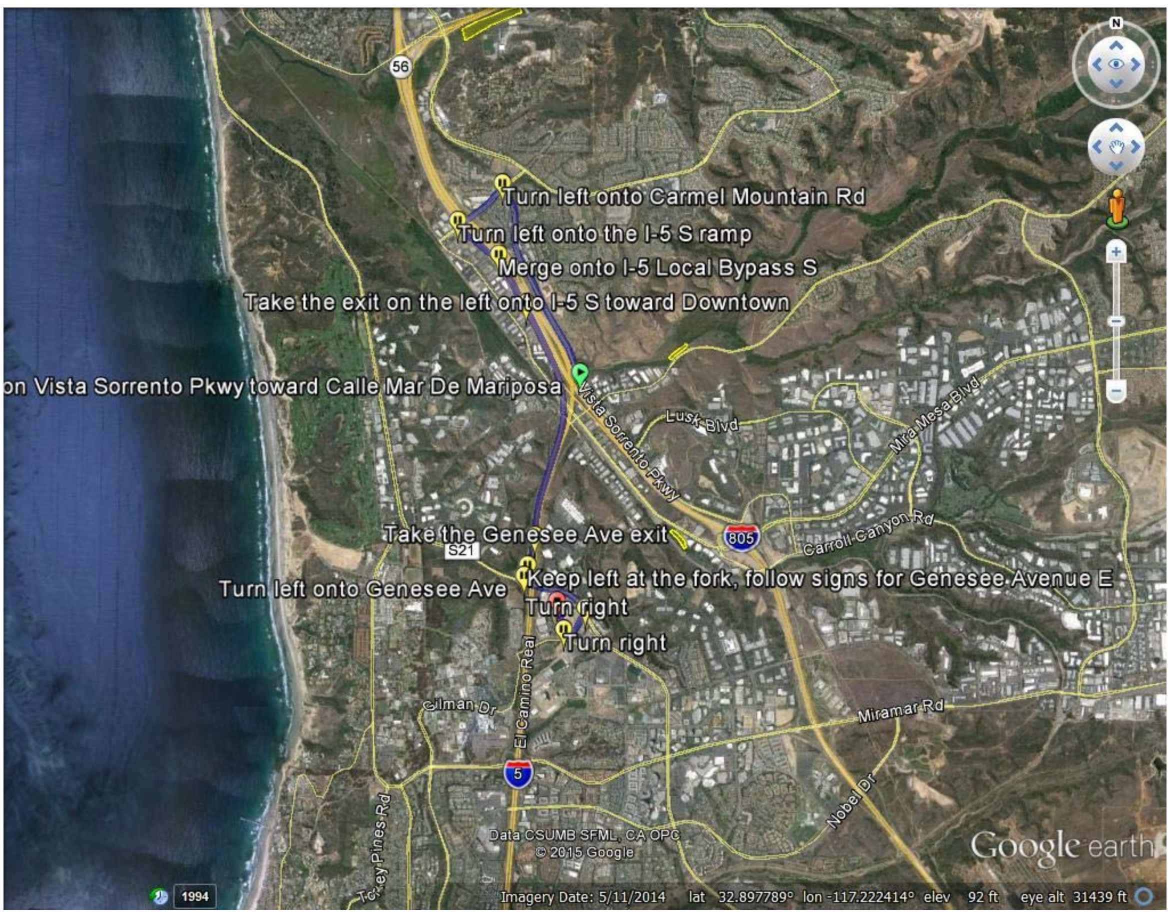

Figure 2-2: Hospital Map from Site LPC

Table 2-6: Driving Directions to Hospital from Site CVC

Site	Directions/Hospital Name/Address		Hospital Route Map Figure No.
Carmel Valley Creek (CVC)	• Head northwest on Sorrento Valley Rd toward Carmel Valley Rd • Turn right onto Carmel Valley Rd • Turn right to merge onto I-5 S toward San Diego • Merge onto I-5 S • Keep right at the fork to stay on I-5 S, follow signs for Interstate 5 S/ Downtown • Take the Genesee Ave exit • Keep left at the fork, follow signs for Genesee Avenue E • Turn left at Genesee Ave • Turn right at light with sign indicating Scripps Hospital • Hospital entrance will be on the right.	Scripps Memorial Hospital 9888 Genesee Ave La Jolla, CA 92037	Figure 2-3

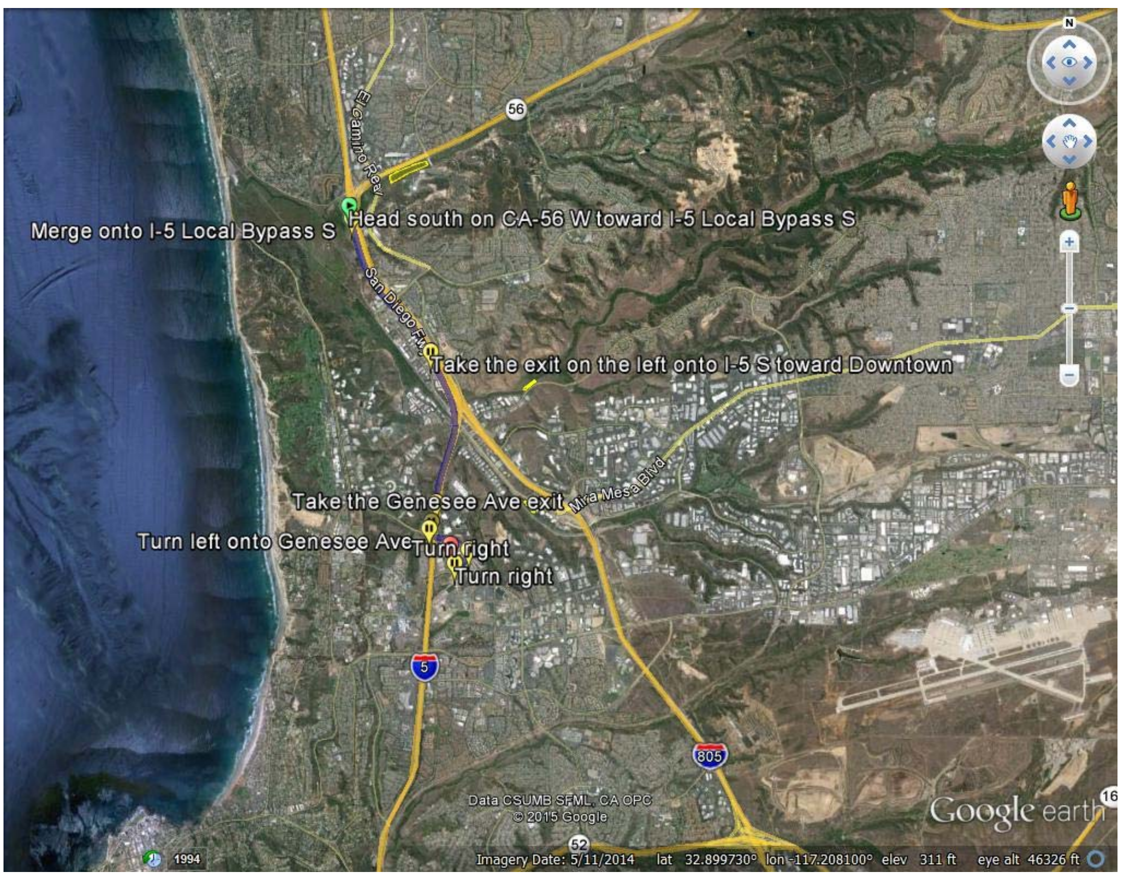

Figure 2-3: Hospital Map from Site CVC

2.14 Hazardous Spills

Hazardous substances may be used for various purposes at and around the site. When working with hazardous substances, leaks and spills are always a concern. At sites within close proximity to the roadway, the potential also exists of hazardous spills originating from traveling vehicles.

A spill may present a number of hazards. The specific hazards depend on the substance(s) involved. Among the possibilities are:

- Fire
- Explosion
- Contamination of individuals who come in contact with the spilled substance
- Hazardous substances entering the water supply

Spill response procedures are designed to minimize the risk of any of these things occurring as a result of a spill or, at the very least, reducing the degree of hazard. The primary concern of spill contamination is to stop or retard the spill before it becomes serious. Field teams working with potentially hazardous materials will be trained in the use of proper PPE, the safe usage or handling of the substances, and contingency plans for spills and leaks.

2.15 Tailgate Safety Training

The Health and Safety Officer or another designated Safety Officer will conduct tailgate safety training sessions regularly. These meetings will be held on-site prior to work operations. New personnel working on-site will be required to attend a tailgate meeting prior to work operations. The purpose of the safety-training meeting is to ensure that field team members understand and will abide by all safety and potential emergency response measures that may be necessary for the wellbeing of the field team.

The following items will be discussed at each safety meeting:

- Traffic safety
- Safe entering and exiting of the highway or roadway
- Use of personal protective clothing and equipment
- Potential chemical and physical hazards and how to deal with them
- Nearest hospital information
- Emergency response procedures
- Any other site-specific safety issues

Field team members must sign the tailgate safety training meeting form in acknowledgment of understanding all issues discussed. An example of a tailgate meeting form is included Figure 2-4.

Figure 2-4: Tailgate Safety Meeting Form

Amec Foster Wheeler SITE VISIT TAILGATE SAFETY MEETING

PROJECT: Los Peñasquitos Lagoon TMDL Sediment Monitoring

Safety Topics Discussed
1. Protective clothing and equipment: PPE – Use the PPE that has been provided to prevent injury, exposure to the cold and wet weather conditions, and exposure to storm water runoff containing diluted levels of chemical contaminates. Typical PPE may consist of a hard hat, rain gear, rubber rain boots, nitrile gloves, pants, long sleeved shirts, and layered clothing. Use and wear a PFD if working over water, on piers or quay walls. Equipment and tool use - Use proper equipment for the task in the prescribed manner to prevent injury.
2. Chemical hazards: Dermal/eye contact with water contaminants - Do not overfill containers. Fill bottles only to the neck or as otherwise instructed by the site manager. Food, drinks, or cigarettes will not be consumed while observing or sampling. Prior to handling food, drinks, or cigarettes, personnel will wash hands and face.
3. Physical hazards: Lifting - Use proper equipment and lifting and motion technique. Do not twist back, stay balanced and use your legs. Vehicle Hazards - Be aware of vehicle operations in your area. Make eye contact with vehicle operators on approaching equipment. Driving - Drive vehicle in accordance with company policy. Drive in right lane, use 3-second rule or extended distance from vehicle in front of you. Drive speed limit or slower depending on road conditions and visibility. Working over water - Exercise care and alertness when working around water. Use the buddy system and wear a PFD if working over water, on piers or quay walls.
4. Vehicle Hazards: - Wear seat belt while vehicle is in motion. - Do not exceed the posted speed limit. - Reduce speed in adverse weather conditions. - Always drive with headlights on. Drive vehicle in accordance with Amec Foster Wheeler policy. Drive in the right lane and maintain an extended distance (3-second rule) from the vehicle in front of you. - Drive defensively and follow traffic regulations. - Do not make sudden lane changes, weave through traffic, or cut off other drivers. - Do not use handheld or hands-free cell phones while driving. - Stop at intersections and give the right-of-way to other vehicles and pedestrians. - Check tires for proper inflation.
5. Traffic Hazards: - Be aware of vehicles in your area. Make eye contact with approaching vehicle operators. - In dry weather, a reflective vest should be worn for maximum visibility in high-traffic areas. - Use traffic cones around the work zone in high-traffic areas. - At least two persons must be present to perform any work in high-traffic areas. One of these persons must monitor approaching traffic for any potential hazards. Watch out for moving vehicles and equipment and equipment.

Safety Topics Discussed (continued)

6. Environmental and biohazards: Dangerous animals and insect bites and stings – Be aware of your surroundings and watch for dangerous animals and insects such as spiders and snakes. Wear appropriate clothing such as pants, long sleeved shirts, and steel toe boots. Watch for Poison oak, Poison ivy, and other biological hazards.
7. Equipment hazards: Pinch Points – Use proper equipment in the prescribed manner in conjunction with proper lifting techniques to avoid pinch points. Wear leather or canvas gloves - to protect the hands when performing manual labor, such as moving manhole covers.
8. Decontamination procedures: If an exposure or eye contact occurs, respond with appropriate first aid and immediately notify the supervisor.
9. Other: The supervisor will review any other significant safety matters specific to sampling and observation activities at this site.
10. Review of emergency procedures: In case of emergency, immediately dial 911.

Attendance Signature

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________
9. ______________________
10. ______________________
11. ______________________
12. ______________________
13. ______________________
14. ______________________
15. ______________________
16. ______________________

____
Amec Foster Wheeler Representative's Signature

APPENDIX C
FIELD FORMS

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Los Peñasquitos Lagoon TMDL Sediment Monitoring

SITE DESCRIPTION

Station ID: ________________________ **Station Name:** ________________________ **Date/Time:** ____________________

Sample Collector: ______________________________ **Data Recorder:** _________________________________

Current Level (in): _____________ **Current Flow (cfs):**________________ **Current Total Rainfall (in):**___________

FLOW CHARACTERISTICS

Clarity ☐ Clear ☐ Cloudy ☐ Opaque ☐ Turbid ☐ Other: _________

Sediment Accumulation ☐ None ☐ Left, Mid, Right Bank (specify location, facing downstream direction)

POLLUTOGRAPH SAMPLE COLLECTION

Pollutograph Sample Number	Date	Time	Flow (cfs)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

EVENT TOTALS

Total Number of Samples	Total Flow (cf)	Total Rainfall (in)

BEDLOAD SAMPLE COLLECTION

Bedload Sampler 1 Location (facing downstream): _________ Install time(s): _________ Removal time(s): _________

Bedload Sampler 2 Location (facing downstream): _________ Install time(s): _________ Removal time(s): _________

COMMENTS: ____

Los Penasquitos Lagoon TMDL Sediment Monitoring

Bedload Sample Collection

Date: ________________

Site ID	Transect Length (Feet)	Collection Width (Feet) (25%, 50%, and 75% of Transect Width)		
Example: CV	*39*	*10*	*20*	*30*

NOTE: WHEN DETERMINING BANK LOCATION FACE DOWNSTREAM

R M L

↓ Downstream

Additional Notes:

Los Penasquitos Lagoon TMDL Sediment Monitoring

Post Storm Pebble Count

Date: ____________ Site ID: ____________

Time: ____________ Sampler(s): ____________

Size Class	Count (Tally)	Count	Frequency (%)	Notes
>= 180				
<128				
<90				
<64				
<45				
<32				
<22.6				
<16				
<11				
<8				
<5.6				
<4				
	Totals			

Additional Observations/Notes/Photo ID's

APPENDIX B
SUSPENDED SEDIMENT CONCENTRATION DATA SUMMARY AND LABORATORY REPORTS

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Table B-1.
Wet Weather Event 1 SSC Concentrations

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Carroll Canyon Creek	1	1/5/2016	11:18	120
	2		11:48	300
	3		12:48	89
	4		13:48	170
	5		14:48	1000
	6		15:17	1500
	7		15:47	1900
	8		16:17	2800
	9		17:17	2200
	10		17:47	4200
	11		18:47	2400
	12		19:17	1300
	13		20:17	1000
	14		21:17	470
	15		21:47	360
	16	1/6/2016	0:16	180
	17		1:46	200
	18		3:46	76
	19		5:46	19
	20		9:16	12
	21		12:45	11
Carmel Valley Creek	1	1/5/2016	12:48	26
	2		14:30	67
	3		15:00	42
	4		15:30	36
	5		16:00	32
	6		16:30	25
	7		17:00	31
	8		18:00	29
	9		19:00	26
	10		20:00	24
	11		21:00	29
	12		21:30	30

Table B-1.
Wet Weather Event 1 SSC Concentrations (continued)

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Carmel Valley Creek (continued)	13	1/5/2016	23:00	240
	14	1/6/2016	0:33	160
	15		1:33	120
	16		3:03	91
	17		4:33	51
	18		5:33	55
	19		7:03	39
	20		11:36	12
	21		13:36	22
Los Peñasquitos Creek	1	1/5/2016	15:00	11
	2		15:59	9
	3		16:59	11
	4		17:59	22
	5		18:59	170
	6		20:59	140
	7		21:59	440
	8		22:59	500
	9		23:58	460
	10	1/6/2016	0:58	370
	11		1:58	360
	12		2:58	360
	13		3:58	370
	14		6:58	220
	15		8:58	210
	16		12:57	110

Table B-2.
Wet Weather Event 2 SSC Concentrations

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Carroll Canyon Creek	1	1/31/2016	7:54	130
	2		8:23	120
	3		8:53	350
	4		9:23	340
	5		9:53	180
	6		10:23	220
	7		10:53	170
	8		12:22	59
	9		13:22	37
	10		14:22	22
	11		14:52	170
	12		15:22	180
	13		15:52	470
	14		16:22	270
	15		16:52	210
	16		18:53	53
	17		21:52	12
	18	2/1/2016	3:52	ND
Carmel Valley Creek	1	1/31/2016	4:31	ND
	2		7:00	10
	3		8:00	33
	4		9:00	52
	5		10:00	35
	6		10:30	24
	7		11:30	17
	8		12:00	20
	9		12:34	14
	10		14:03	8
	11		15:03	17
	12		15:33	260
	13		16:03	63
	14		16:33	41
	15		17:03	20
	16		19:43	9

Table B-2.
Wet Weather Event 2 SSC Concentrations (continued)

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Carmel Valley Creek (continued)	17	1/31/2016	21:43	8
	18		23:43	9
	19	2/1/2016	2:43	ND
	20		13:43	ND
Los Peñasquitos Creek	1	1/31/2016	15:05	40
	2		16:05	19
	3		17:05	21
	4		18:05	20
	5		19:05	17
	6		20:05	16
	7		21:05	17
	8		22:05	18
	9		23:05	18
	10	2/1/2016	0:05	20
	11		2:05	15
	12		4:05	13
	13		8:05	9
	14		14:05	5

Table B-3.
Wet Weather Event 3 SSC Concentrations

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Carroll Canyon Creek	1	3/6/16	09:44	69
	2		10:13	160
	3		10:43	240
	4		11:13	140
	5		12:13	56
	6		14:13	14
	7	3/7/16	09:10	89
	8		09:39	530
	9		10:09	2200
	10		10:39	59
	11		11:09	480
	12		11:39	370
	13		13:39	82
	14		15:39	27
	15		17:39	94
	16		19:09	300
	17		21:39	78
	18		22:09	78
	19		23:39	59
	20		23:39	52
	21	3/8/16	00:09	48
	22		1:39	42
Carmel Valley Creek	1	3/6/16	00:48	4.0
	2		01:47	4.0
	3		02:17	7.0
	4		04:17	6.0
	5		05:17	7.0
	6		05:47	7.0
	7		06:17	8.0
	8		09:17	40
	9		09:47	82
	10		10:17	60
	10a		10:59	23
	11		11:28	13
	12		13:35	37
	13	3/7/16	09:16	550
	14		09:46	23
	15		10:46	10

Table B-3.
Wet Weather Event 3 SSC Concentrations (continued)

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Carmel Valley Creek (continued)	15a	3/7/16	11:16	16
	16		11:45	13
	17		12:46	10
	18		13:46	8.0
	19		14:46	8.0
	20		15:46	6.0
	21		16:16	10
	22		17:16	6.0
	22a		18:19	4
	23		19:49	ND
	24		21:49	ND
	25		13:49	ND
	26	3/8/16	00:49	ND
	27		02:19	ND
	28		4:49	ND
Los Peñasquitos Creek	1	3/6/16	21:11	9.0
	2		21:11	11
	3		12:11	11
	4	3/7/16	03:11	ND
	5		07:11	ND
	6		10:41	6.0
	6a		16:41	5
	7		17:41	13
	8		17:41	12
	9		19:41	13
	10		20:41	9.0
	11		22:41	4.0
	12	3/8/16	22:41	ND
	13		12:41	ND

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	02/17/16 14:27
		Received Date:	01/08/16 12:15
		Turn Around:	Normal
Attention:	Jeremy Burns	**Client Project:**	Los Penasquitos Sediment Transport Mon. 2014-15
Phone:	(858) 514-6464		
Fax:	(858) 278-5300		
Work Order(s):	6A08046		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Jeremy Burns :

Enclosed are the results of analyses for samples received 01/08/16 12:15 with the Chain of Custody document. The samples were received in good condition, at 5.1 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

haiănguyen

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CCC-SSC-WW1-01	KB	6A08046-01	Water	01/05/16 11:18
CCC-SSC-WW1-02	KB	6A08046-02	Water	01/05/16 11:48
CCC-SSC-WW1-03	KB	6A08046-03	Water	01/05/16 12:48
CCC-SSC-WW1-04	KB	6A08046-04	Water	01/05/16 13:48
CCC-SSC-WW1-05	KB	6A08046-05	Water	01/05/16 14:48
CCC-SSC-WW1-06	KB	6A08046-06	Water	01/05/16 15:17
CCC-SSC-WW1-07	KB	6A08046-07	Water	01/05/16 15:47
CCC-SSC-WW1-08	KB	6A08046-08	Water	01/05/16 16:17
CCC-SSC-WW1-09	KB	6A08046-09	Water	01/05/16 17:17
CCC-SSC-WW1-10	KB	6A08046-10	Water	01/05/16 17:47
CCC-SSC-WW1-11	KB	6A08046-11	Water	01/05/16 18:47
CCC-SSC-WW1-12	KB	6A08046-12	Water	01/05/16 19:17
CCC-SSC-WW1-13	KB	6A08046-13	Water	01/05/16 20:17
CCC-SSC-WW1-14	KB	6A08046-14	Water	01/05/16 21:17
CCC-SSC-WW1-15	KB	6A08046-15	Water	01/05/16 21:47
CVC-SSC-WW1-01	KB	6A08046-16	Water	01/05/16 12:48
CVC-SSC-WW1-02	KB	6A08046-17	Water	01/05/16 14:30
CVC-SSC-WW1-03	KB	6A08046-18	Water	01/05/16 15:00
CVC-SSC-WW1-04	KB	6A08046-19	Water	01/05/16 15:30
CVC-SSC-WW1-05	KB	6A08046-20	Water	01/05/16 16:00
CVC-SSC-WW1-06	KB	6A08046-21	Water	01/05/16 16:30
CVC-SSC-WW1-07	KB	6A08046-22	Water	01/05/16 17:00
CVC-SSC-WW1-08	KB	6A08046-23	Water	01/05/16 18:00
CVC-SSC-WW1-09	KB	6A08046-24	Water	01/05/16 19:00
CVC-SSC-WW1-10	KB	6A08046-25	Water	01/05/16 20:00
CVC-SSC-WW1-11	KB	6A08046-26	Water	01/05/16 21:00
CVC-SSC-WW1-12	KB	6A08046-27	Water	01/05/16 21:30
CVC-SSC-WW1-13	KB	6A08046-28	Water	01/05/16 23:33
CVC-SSC-WW1-14	KB	6A08046-29	Water	01/06/16 00:33
CVC-SSC-WW1-15	KB	6A08046-30	Water	01/06/16 01:33
LPC-SSC-WW1-01	KB	6A08046-31	Water	01/05/16 15:00
LPC-SSC-WW1-02	KB	6A08046-32	Water	01/05/16 15:59
LPC-SSC-WW1-03	KB	6A08046-33	Water	01/05/16 16:59
LPC-SSC-WW1-04	KB	6A08046-34	Water	01/05/16 17:59
LPC-SSC-WW1-05	KB	6A08046-35	Water	01/05/16 18:59
LPC-SSC-WW1-06	KB	6A08046-36	Water	01/05/16 20:59
LPC-SSC-WW1-07	KB	6A08046-37	Water	01/05/16 21:59
LPC-SSC-WW1-08	KB	6A08046-38	Water	01/05/16 22:59
LPC-SSC-WW1-09	KB	6A08046-39	Water	01/05/16 23:58
LPC-SSC-WW1-10	KB	6A08046-40	Water	01/06/16 00:58
LPC-SSC-WW1-11	KB	6A08046-41	Water	01/06/16 01:58
LPC-SSC-WW1-12	KB	6A08046-42	Water	01/06/16 02:58
LPC-SSC-WW1-13	KB	6A08046-43	Water	01/06/16 03:58

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
LPC-SSC-WW1-14	KB	6A08046-44	Water	01/06/16 06:58
LPC-SSC-WW1-15	KB	6A08046-45	Water	01/06/16 08:58
CCC-SSC-WW1-16	KB	6A08046-46	Water	01/06/16 00:16
CCC-SSC-WW1-17	KB	6A08046-47	Water	01/06/16 01:46
CCC-SSC-WW1-18	KB	6A08046-48	Water	01/06/16 03:46
CCC-SSC-WW1-19	KB	6A08046-49	Water	01/06/16 05:46
CCC-SSC-WW1-20	KB	6A08046-50	Water	01/06/16 09:16
CVC-SSC-WW1-15	KB	6A08046-51	Water	01/06/16 03:03
CVC-SSC-WW1-16	KB	6A08046-52	Water	01/06/16 04:33
CVC-SSC-WW1-17	KB	6A08046-53	Water	01/06/16 05:33
CVC-SSC-WW1-19	KB	6A08046-54	Water	01/06/16 07:03

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-01 **CCC-SSC-WW1-01**

Sampled: 01/05/16 11:18 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**120**	3.1	5.0	mg/l	1	01/08/16 21:49	

Weck Laboratories, Inc 14859 East Clark Avenue, City of Industry, California 91745-1396 (626) 336-2139 FAX (626) 336-2634

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-02 **CCC-SSC-WW1-02**

Sampled: 01/05/16 11:48 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**300**	3.1	5.0	mg/l	1	01/08/16 21:49	

Weck Laboratories, Inc 14859 East Clark Avenue, City of Industry, California 91745-1396 (626) 336-2139 FAX (626) 336-2634

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-03 **CCC-SSC-WW1-03**

Sampled: 01/05/16 12:48 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**89**	3.1	5.0	mg/l	1	01/08/16 21:49	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-04 **CCC-SSC-WW1-04**

Sampled: 01/05/16 13:48 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**170**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Reported: 02/17/16 14:27

6A08046-05 **CCC-SSC-WW1-05**

Sampled: 01/05/16 14:48 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1000**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-06 **CCC-SSC-WW1-06**

Sampled: 01/05/16 15:17 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1500**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-07 **CCC-SSC-WW1-07**

Sampled: 01/05/16 15:47 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1900**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Reported: 02/17/16 14:27

6A08046-08 **CCC-SSC-WW1-08**

Sampled: 01/05/16 16:17 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**2800**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Reported: 02/17/16 14:27

6A08046-09 **CCC-SSC-WW1-09**

Sampled: 01/05/16 17:17 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**2200**	3.1	5.0	mg/l	1	01/08/16 21:49	

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6A08046-10 **CCC-SSC-WW1-10**

Sampled: 01/05/16 17:47 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**4200**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Reported: 02/17/16 14:27

6A08046-11 **CCC-SSC-WW1-11**

Sampled: 01/05/16 18:47 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**2400**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Reported: 02/17/16 14:27

6A08046-12 **CCC-SSC-WW1-12**

Sampled: 01/05/16 19:17 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1300**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-13 **CCC-SSC-WW1-13**

Sampled: 01/05/16 20:17 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1000**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-14 **CCC-SSC-WW1-14**

Sampled: 01/05/16 21:17 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**470**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-15 **CCC-SSC-WW1-15**

Sampled: 01/05/16 21:47 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**360**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-16 **CVC-SSC-WW1-01**

Sampled: 01/05/16 12:48 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**26**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-17 **CVC-SSC-WW1-02**

Sampled: 01/05/16 14:30 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**67**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-18 **CVC-SSC-WW1-03**

Sampled: 01/05/16 15:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**42**	3.1	5.0	mg/l	1	01/08/16 21:49	

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6A08046-19 **CVC-SSC-WW1-04**

Sampled: 01/05/16 15:30 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**36**	3.1	5.0	mg/l	1	01/08/16 21:49	

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Date Received: 01/08/16 12:15
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6A08046-20 **CVC-SSC-WW1-05**

Sampled: 01/05/16 16:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0408 Prepared: 01/08/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**32**	3.1	5.0	mg/l	1	01/08/16 21:49	

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6A08046-21 **CVC-SSC-WW1-06**

Sampled: 01/05/16 16:30 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**25**	3.1	5.0	mg/l	1	01/09/16 13:35	

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6A08046-22 **CVC-SSC-WW1-07**

Sampled: 01/05/16 17:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**31**	3.1	5.0	mg/l	1	01/09/16 13:35	

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6A08046-23 **CVC-SSC-WW1-08**

Sampled: 01/05/16 18:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**29**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-24 **CVC-SSC-WW1-09**

Sampled: 01/05/16 19:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**26**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Reported: 02/17/16 14:27

6A08046-25 **CVC-SSC-WW1-10**

Sampled: 01/05/16 20:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**24**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-26 **CVC-SSC-WW1-11**

Sampled: 01/05/16 21:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**29**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
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6A08046-27 **CVC-SSC-WW1-12**

Sampled: 01/05/16 21:30 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-28 **CVC-SSC-WW1-13**

Sampled: 01/05/16 23:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**240**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-29 **CVC-SSC-WW1-14**

Sampled: 01/06/16 00:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**160**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-30 **CVC-SSC-WW1-15**

Sampled: 01/06/16 01:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**120**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-31 **LPC-SSC-WW1-01**

Sampled: 01/05/16 15:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**11**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-32 **LPC-SSC-WW1-02**

Sampled: 01/05/16 15:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-33 **LPC-SSC-WW1-03**

Sampled: 01/05/16 16:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**11**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-34 **LPC-SSC-WW1-04**

Sampled: 01/05/16 17:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**22**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-35 **LPC-SSC-WW1-05**

Sampled: 01/05/16 18:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**170**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-36 **LPC-SSC-WW1-06**

Sampled: 01/05/16 20:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**140**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-37 **LPC-SSC-WW1-07**

Sampled: 01/05/16 21:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**440**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-38 **LPC-SSC-WW1-08**

Sampled: 01/05/16 22:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**500**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-39 **LPC-SSC-WW1-09**

Sampled: 01/05/16 23:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**460**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Reported: 02/17/16 14:27

6A08046-40 **LPC-SSC-WW1-10**

Sampled: 01/06/16 00:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0428 Prepared: 01/09/16 08:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**370**	3.1	5.0	mg/l	1	01/09/16 13:35	

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Date Reported: 02/17/16 14:27

6A08046-41 **LPC-SSC-WW1-11**

Sampled: 01/06/16 01:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**360**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-42 **LPC-SSC-WW1-12**

Sampled: 01/06/16 02:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**360**	3.1	5.0	mg/l	1	01/09/16 15:09	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-43 **LPC-SSC-WW1-13**

Sampled: 01/06/16 03:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**370**	3.1	5.0	mg/l	1	01/09/16 15:09	

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San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-44 **LPC-SSC-WW1-14**

Sampled: 01/06/16 06:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**220**	3.1	5.0	mg/l	1	01/09/16 15:09	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-45 **LPC-SSC-WW1-15**

Sampled: 01/06/16 08:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**210**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-46 **CCC-SSC-WW1-16**

Sampled: 01/06/16 00:16 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**180**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-47 **CCC-SSC-WW1-17**

Sampled: 01/06/16 01:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**200**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-48 **CCC-SSC-WW1-18**

Sampled: 01/06/16 03:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**76**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-49 **CCC-SSC-WW1-19**

Sampled: 01/06/16 05:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**19**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-50 **CCC-SSC-WW1-20**

Sampled: 01/06/16 09:16 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-51 **CVC-SSC-WW1-15**

Sampled: 01/06/16 03:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**91**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-52 **CVC-SSC-WW1-16**

Sampled: 01/06/16 04:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**51**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-53 **CVC-SSC-WW1-17**

Sampled: 01/06/16 05:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**55**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

6A08046-54 **CVC-SSC-WW1-19**

Sampled: 01/06/16 07:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**39**	3.1	5.0	mg/l	1	01/09/16 15:09	

AMEC Environment & Infrastructure
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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

QUALITY CONTROL SECTION

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6A0408 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0408-BLK1)					Analyzed: 01/08/16 21:49						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6A0428 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0428-BLK1)					Analyzed: 01/09/16 13:35						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6A0440 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0440-BLK1)					Analyzed: 01/09/16 15:09						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

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AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:27

Notes and Definitions

ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	02/17/16 14:14
		Received Date:	01/12/16 08:00
		Turn Around:	Normal
Attention:	Jeremy Burns	**Client Project:**	Los Penasquitos Special Study 2014-2015
Phone:	(858) 514-6464		
Fax:	(858) 278-5300		
Work Order(s):	6A12003		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

Dear Jeremy Burns :

Enclosed are the results of analyses for samples received 01/12/16 08:00 with the Chain of Custody document. The samples were received in good condition, at 3.1 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

hainguyen

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/12/16 08:00
Date Reported: 02/17/16 14:14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CCC-SSC-WW1-21	KB	6A12003-01	Water	01/06/16 12:45
CVC-SSC-WW1-20	KB	6A12003-02	Water	01/06/16 11:36
CVC-SSC-WW1-21	KB	6A12003-03	Water	01/06/16 13:36
LPC-SSC-WW1-16	KB	6A12003-04	Water	01/06/16 12:57

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/12/16 08:00
Date Reported: 02/17/16 14:14

6A12003-01 **CCC-SSC-WW1-21**

Sampled: 01/06/16 12:45 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0570 Prepared: 01/12/16 13:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**11**	3.1	5.0	mg/l	1	01/12/16 15:00	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/12/16 08:00
Date Reported: 02/17/16 14:14

6A12003-02 **CVC-SSC-WW1-20**

Sampled: 01/06/16 11:36 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0570 Prepared: 01/12/16 13:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	01/12/16 15:00	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/12/16 08:00
Date Reported: 02/17/16 14:14

6A12003-03 **CVC-SSC-WW1-21**

Sampled: 01/06/16 13:36 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0570 Prepared: 01/12/16 13:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**22**	3.1	5.0	mg/l	1	01/12/16 15:00	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/12/16 08:00
Date Reported: 02/17/16 14:14

6A12003-04 **LPC-SSC-WW1-16**

Sampled: 01/06/16 12:57 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0570 Prepared: 01/12/16 13:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**110**	3.1	5.0	mg/l	1	01/12/16 15:00	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/12/16 08:00
Date Reported: 02/17/16 14:14

QUALITY CONTROL SECTION

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/12/16 08:00
Date Reported: 02/17/16 14:14

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6A0570 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0570-BLK1)					Analyzed: 01/12/16 15:00						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/12/16 08:00
Date Reported: 02/17/16 14:14

Notes and Definitions

ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	02/29/16 11:50
		Received Date:	02/03/16 16:50
		Turn Around:	Normal
Attention:	Jeremy Burns	**Client Project:**	Los Penasquitos Sediment Transport Mon. 2015-16
Phone:	(858) 514-6464		
Fax:	(858) 278-5300		
Work Order(s):	6B03070		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Jeremy Burns :

Enclosed are the results of analyses for samples received 02/03/16 16:50 with the Chain of Custody document. The samples were received in good condition, at 1.8 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CCC-SSC-WW2-01	KB	6B03070-01	Water	01/31/16 07:54
CCC-SSC-WW2-02	KB	6B03070-02	Water	01/31/16 08:23
CCC-SSC-WW2-03	KB	6B03070-03	Water	01/31/16 08:53
CCC-SSC-WW2-04	KB	6B03070-04	Water	01/31/16 09:23
CCC-SSC-WW2-05	KB	6B03070-05	Water	01/31/16 09:53
CCC-SSC-WW2-06	KB	6B03070-06	Water	01/31/16 10:23
CCC-SSC-WW2-07	KB	6B03070-07	Water	01/31/16 10:53
CCC-SSC-WW2-08	KB	6B03070-08	Water	01/31/16 12:22
CCC-SSC-WW2-09	KB	6B03070-09	Water	01/31/16 13:22
CCC-SSC-WW2-10	KB	6B03070-10	Water	01/31/16 14:22
CCC-SSC-WW2-11	KB	6B03070-11	Water	01/31/16 14:52
CCC-SSC-WW2-12	KB	6B03070-12	Water	01/31/16 15:22
CCC-SSC-WW2-13	KB	6B03070-13	Water	01/31/16 15:52
CCC-SSC-WW2-14	KB	6B03070-14	Water	01/31/16 16:22
CCC-SSC-WW2-15	KB	6B03070-15	Water	01/31/16 16:52
CCC-SSC-WW2-16	KB	6B03070-16	Water	01/31/16 18:53
CCC-SSC-WW2-17	KB	6B03070-17	Water	01/31/16 21:52
CCC-SSC-WW2-18	KB	6B03070-18	Water	02/01/16 03:52
CVC-SSC-WW2-01	KB	6B03070-19	Water	01/31/16 04:31
CVC-SSC-WW2-02	KB	6B03070-20	Water	01/31/16 07:00
CVC-SSC-WW2-03	KB	6B03070-21	Water	01/31/16 08:00
CVC-SSC-WW2-04	KB	6B03070-22	Water	01/31/16 09:00
CVC-SSC-WW2-05	KB	6B03070-23	Water	01/31/16 10:00
CVC-SSC-WW2-06	KB	6B03070-24	Water	01/31/16 10:30
CVC-SSC-WW2-07	KB	6B03070-25	Water	01/31/16 11:30
CVC-SSC-WW2-08	KB	6B03070-26	Water	01/31/16 12:00
CVC-SSC-WW2-09	KB	6B03070-27	Water	01/31/16 12:34
CVC-SSC-WW2-10	KB	6B03070-28	Water	01/31/16 14:03
CVC-SSC-WW2-11	KB	6B03070-29	Water	01/31/16 15:03
CVC-SSC-WW2-12	KB	6B03070-30	Water	01/31/16 15:33
CVC-SSC-WW2-13	KB	6B03070-31	Water	01/31/16 16:03
CVC-SSC-WW2-14	KB	6B03070-32	Water	01/31/16 16:33
CVC-SSC-WW2-15	KB	6B03070-33	Water	01/31/16 17:03
CVC-SSC-WW2-16	KB	6B03070-34	Water	01/31/16 19:43
CVC-SSC-WW2-17	KB	6B03070-35	Water	01/31/16 21:43
CVC-SSC-WW2-18	KB	6B03070-36	Water	01/31/16 23:43
CVC-SSC-WW2-19	KB	6B03070-37	Water	02/01/16 02:43
CVC-SSC-WW2-20	KB	6B03070-38	Water	02/01/16 13:43
LPC-SSC-WW2-01	KB	6B03070-39	Water	01/31/16 15:05
LPC-SSC-WW2-02	KB	6B03070-40	Water	01/31/16 16:05
LPC-SSC-WW2-03	KB	6B03070-41	Water	01/31/16 17:05
LPC-SSC-WW2-04	KB	6B03070-42	Water	01/31/16 18:05
LPC-SSC-WW2-05	KB	6B03070-43	Water	01/31/16 19:05

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
LPC-SSC-WW2-06	KB	6B03070-44	Water	01/31/16 20:05
LPC-SSC-WW2-07	KB	6B03070-45	Water	01/31/16 21:05
LPC-SSC-WW2-08	KB	6B03070-46	Water	01/31/16 22:05
LPC-SSC-WW2-09	KB	6B03070-47	Water	01/31/16 23:05
LPC-SSC-WW2-10	KB	6B03070-48	Water	02/01/16 00:05
LPC-SSC-WW2-11	KB	6B03070-49	Water	02/01/16 02:05
LPC-SSC-WW2-12	KB	6B03070-50	Water	02/01/16 04:05
LPC-SSC-WW2-13	KB	6B03070-51	Water	02/01/16 08:05
LPC-SSC-WW2-14	KB	6B03070-52	Water	02/01/16 14:05

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-01 **CCC-SSC-WW2-01**

Sampled: 01/31/16 07:54 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**130**	3.1	5.0	mg/l	1	02/04/16 12:30	

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AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-02 **CCC-SSC-WW2-02**

Sampled: 01/31/16 08:23 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**120**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-03 **CCC-SSC-WW2-03**

Sampled: 01/31/16 08:53 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**350**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-04 **CCC-SSC-WW2-04**

Sampled: 01/31/16 09:23 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**340**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-05 **CCC-SSC-WW2-05**

Sampled: 01/31/16 09:53 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**180**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-06 **CCC-SSC-WW2-06**

Sampled: 01/31/16 10:23 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**220**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Reported: 02/29/16 11:50

6B03070-07 **CCC-SSC-WW2-07**

Sampled: 01/31/16 10:53 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**170**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Reported: 02/29/16 11:50

6B03070-08 **CCC-SSC-WW2-08**

Sampled: 01/31/16 12:22 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**59**	3.1	5.0	mg/l	1	02/04/16 12:30	

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6B03070-09 **CCC-SSC-WW2-09**

Sampled: 01/31/16 13:22 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**37**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Reported: 02/29/16 11:50

6B03070-10 **CCC-SSC-WW2-10**

Sampled: 01/31/16 14:22 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**22**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-11 **CCC-SSC-WW2-11**

Sampled: 01/31/16 14:52 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**170**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Reported: 02/29/16 11:50

6B03070-12 **CCC-SSC-WW2-12**

Sampled: 01/31/16 15:22 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**180**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-13 **CCC-SSC-WW2-13**

Sampled: 01/31/16 15:52 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**470**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Reported: 02/29/16 11:50

6B03070-14 **CCC-SSC-WW2-14**

Sampled: 01/31/16 16:22 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**270**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-15 **CCC-SSC-WW2-15**

Sampled: 01/31/16 16:52 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**210**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Reported: 02/29/16 11:50

6B03070-16 **CCC-SSC-WW2-16**

Sampled: 01/31/16 18:53 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**53**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-17 **CCC-SSC-WW2-17**

Sampled: 01/31/16 21:52 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-18 **CCC-SSC-WW2-18**

Sampled: 02/01/16 03:52 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-19 **CVC-SSC-WW2-01**

Sampled: 01/31/16 04:31 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	02/04/16 12:30	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-20 **CVC-SSC-WW2-02**

Sampled: 01/31/16 07:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0294 Prepared: 02/04/16 09:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	02/04/16 12:30	

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6B03070-21 **CVC-SSC-WW2-03**

Sampled: 01/31/16 08:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**33**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-22 **CVC-SSC-WW2-04**

Sampled: 01/31/16 09:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**52**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-23 **CVC-SSC-WW2-05**

Sampled: 01/31/16 10:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**35**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-24 **CVC-SSC-WW2-06**

Sampled: 01/31/16 10:30 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**24**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Reported: 02/29/16 11:50

6B03070-25 **CVC-SSC-WW2-07**

Sampled: 01/31/16 11:30 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**17**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-26 **CVC-SSC-WW2-08**

Sampled: 01/31/16 12:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**20**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-27 **CVC-SSC-WW2-09**

Sampled: 01/31/16 12:34 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**14**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Reported: 02/29/16 11:50

6B03070-28 **CVC-SSC-WW2-10**

Sampled: 01/31/16 14:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-29 **CVC-SSC-WW2-11**

Sampled: 01/31/16 15:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**17**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-30 **CVC-SSC-WW2-12**

Sampled: 01/31/16 15:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**260**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Reported: 02/29/16 11:50

6B03070-31 **CVC-SSC-WW2-13**

Sampled: 01/31/16 16:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**63**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-32 **CVC-SSC-WW2-14**

Sampled: 01/31/16 16:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**41**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-33 **CVC-SSC-WW2-15**

Sampled: 01/31/16 17:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**20**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-34 **CVC-SSC-WW2-16**

Sampled: 01/31/16 19:43 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-35 **CVC-SSC-WW2-17**

Sampled: 01/31/16 21:43 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-36 **CVC-SSC-WW2-18**

Sampled: 01/31/16 23:43 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-37 **CVC-SSC-WW2-19**

Sampled: 02/01/16 02:43 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-38 **CVC-SSC-WW2-20**

Sampled: 02/01/16 13:43 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Reported: 02/29/16 11:50

6B03070-39 **LPC-SSC-WW2-01**

Sampled: 01/31/16 15:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**40**	3.1	5.0	mg/l	1	02/04/16 15:32	

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San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-40 **LPC-SSC-WW2-02**

Sampled: 01/31/16 16:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0295 Prepared: 02/04/16 09:22 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**19**	3.1	5.0	mg/l	1	02/04/16 15:32	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-41 **LPC-SSC-WW2-03**

Sampled: 01/31/16 17:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**21**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-42 **LPC-SSC-WW2-04**

Sampled: 01/31/16 18:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**20**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-43 **LPC-SSC-WW2-05**

Sampled: 01/31/16 19:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**17**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-44 **LPC-SSC-WW2-06**

Sampled: 01/31/16 20:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**16**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-45 **LPC-SSC-WW2-07**

Sampled: 01/31/16 21:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**17**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-46 **LPC-SSC-WW2-08**

Sampled: 01/31/16 22:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**18**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-47 **LPC-SSC-WW2-09**

Sampled: 01/31/16 23:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**18**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-48 **LPC-SSC-WW2-10**

Sampled: 02/01/16 00:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**20**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-49 **LPC-SSC-WW2-11**

Sampled: 02/01/16 02:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**15**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-50 **LPC-SSC-WW2-12**

Sampled: 02/01/16 04:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-51 **LPC-SSC-WW2-13**

Sampled: 02/01/16 08:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

6B03070-52 **LPC-SSC-WW2-14**

Sampled: 02/01/16 14:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**5.0**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

QUALITY CONTROL SECTION

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6B0294 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0294-BLK1)					Analyzed: 02/04/16 12:30						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6B0295 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0295-BLK1)					Analyzed: 02/04/16 15:32						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6B0296 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0296-BLK1)					Analyzed: 02/04/16 14:20						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 11:50

Notes and Definitions

ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	04/01/16 10:37
		Received Date:	03/10/16 16:30
		Turn Around:	Normal
Attention:	Jeremy Burns	**Client Project:**	Los Penasquitos Special Study 2015-16
Phone:	(858) 514-6464		
Fax:	(858) 278-5300	**PO Number:**	C013106084/502515C011
Work Order(s):	6C10070		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Jeremy Burns :

Enclosed are the results of analyses for samples received 03/10/16 16:30 with the Chain of Custody document. The samples were received in good condition, at 5.8 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

hainguyen

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CCC-SSC-WW3-01	Client	6C10070-01	Water	03/06/16 09:44
CCC-SSC-WW3-02	Client	6C10070-02	Water	03/06/16 10:13
CCC-SSC-WW3-03	Client	6C10070-03	Water	03/06/16 10:43
CCC-SSC-WW3-04	Client	6C10070-04	Water	03/06/16 11:13
CCC-SSC-WW3-05	Client	6C10070-05	Water	03/06/16 12:13
CCC-SSC-WW3-06	Client	6C10070-06	Water	03/06/16 14:13
CCC-SSC-WW3-07	Client	6C10070-07	Water	03/07/16 09:10
CCC-SSC-WW3-08	Client	6C10070-08	Water	03/07/16 09:39
CCC-SSC-WW3-09	Client	6C10070-09	Water	03/07/16 10:09
CCC-SSC-WW3-10	Client	6C10070-10	Water	03/07/16 10:39
CCC-SSC-WW3-11	Client	6C10070-11	Water	03/07/16 11:09
CCC-SSC-WW3-12	Client	6C10070-12	Water	03/07/16 11:39
CCC-SSC-WW3-13	Client	6C10070-13	Water	03/07/16 13:39
CCC-SSC-WW3-14	Client	6C10070-14	Water	03/07/16 15:39
CCC-SSC-WW3-15	Client	6C10070-15	Water	03/07/16 17:39
CCC-SSC-WW3-16	Client	6C10070-16	Water	03/07/16 19:09
CCC-SSC-WW3-17	Client	6C10070-17	Water	03/07/16 21:39
CCC-SSC-WW3-18	Client	6C10070-18	Water	03/07/16 22:09
CCC-SSC-WW3-19	Client	6C10070-19	Water	03/07/16 23:39
CCC-SSC-WW3-20	Client	6C10070-20	Water	03/07/16 23:39
CCC-SSC-WW3-21	Client	6C10070-21	Water	03/08/16 00:09
CVC-SSC-WW3-01	Client	6C10070-22	Water	03/06/16 00:48
CVC-SSC-WW3-02	Client	6C10070-23	Water	03/06/16 01:47
CVC-SSC-WW3-03	Client	6C10070-24	Water	03/06/16 02:17
CVC-SSC-WW3-04	Client	6C10070-25	Water	03/06/16 04:17
CVC-SSC-WW3-05	Client	6C10070-26	Water	03/06/16 05:17
CVC-SSC-WW3-06	Client	6C10070-27	Water	03/06/16 05:47
CVC-SSC-WW3-07	Client	6C10070-28	Water	03/06/16 06:17
CVC-SSC-WW3-08	Client	6C10070-29	Water	03/06/16 09:17
CVC-SSC-WW3-09	Client	6C10070-30	Water	03/06/16 09:47
CVC-SSC-WW3-10	Client	6C10070-31	Water	03/06/16 10:17
CVC-SSC-WW3-11	Client	6C10070-32	Water	03/06/16 11:28
CVC-SSC-WW3-12	Client	6C10070-33	Water	03/06/16 13:35
CVC-SSC-WW3-13	Client	6C10070-34	Water	03/07/16 09:16
CVC-SSC-WW3-14	Client	6C10070-35	Water	03/07/16 09:46
CVC-SSC-WW3-15	Client	6C10070-36	Water	03/07/16 10:46
CVC-SSC-WW3-16	Client	6C10070-37	Water	03/07/16 11:45
CVC-SSC-WW3-17	Client	6C10070-38	Water	03/07/16 12:46
CVC-SSC-WW3-18	Client	6C10070-39	Water	03/07/16 13:46
CVC-SSC-WW3-19	Client	6C10070-40	Water	03/07/16 14:46
CVC-SSC-WW3-20	Client	6C10070-41	Water	03/07/16 15:46
CVC-SSC-WW3-21	Client	6C10070-42	Water	03/07/16 16:16
CVC-SSC-WW3-22	Client	6C10070-43	Water	03/07/16 17:16

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CVC-SSC-WW3-23	Client	6C10070-44	Water	03/07/16 19:49
CVC-SSC-WW3-24	Client	6C10070-45	Water	03/07/16 21:49
CVC-SSC-WW3-25	Client	6C10070-46	Water	03/07/16 13:49
CVC-SSC-WW3-26	Client	6C10070-47	Water	03/08/16 00:49
CVC-SSC-WW3-27	Client	6C10070-48	Water	03/08/16 02:19
LPC-SSC-WW3-01	Client	6C10070-49	Water	03/06/16 21:11
LPC-SSC-WW3-02	Client	6C10070-50	Water	03/06/16 21:11
LPC-SSC-WW3-03	Client	6C10070-51	Water	03/06/16 12:11
LPC-SSC-WW3-04	Client	6C10070-52	Water	03/07/16 03:11
LPC-SSC-WW3-05	Client	6C10070-53	Water	03/07/16 07:11
LPC-SSC-WW3-06	Client	6C10070-54	Water	03/07/16 10:41
LPC-SSC-WW3-07	Client	6C10070-55	Water	03/07/16 17:41
LPC-SSC-WW3-08	Client	6C10070-56	Water	03/07/16 17:41
LPC-SSC-WW3-09	Client	6C10070-57	Water	03/07/16 19:41
LPC-SSC-WW3-10	Client	6C10070-58	Water	03/07/16 20:41
LPC-SSC-WW3-11	Client	6C10070-59	Water	03/07/16 22:41
LPC-SSC-WW3-12	Client	6C10070-60	Water	03/08/16 22:41
LPC-SSC-WW3-13	Client	6C10070-61	Water	03/08/16 12:41

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

AMEC Environment & Infrastructure
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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-01 **CCC-SSC-WW3-01**

Sampled: 03/06/16 09:44 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**69**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-02 **CCC-SSC-WW3-02**

Sampled: 03/06/16 10:13 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**160**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-03 **CCC-SSC-WW3-03**

Sampled: 03/06/16 10:43 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**240**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-04 **CCC-SSC-WW3-04**

Sampled: 03/06/16 11:13 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**140**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-05 **CCC-SSC-WW3-05**

Sampled: 03/06/16 12:13 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**56**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-06 **CCC-SSC-WW3-06**

Sampled: 03/06/16 14:13 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**14**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-07 **CCC-SSC-WW3-07**

Sampled: 03/07/16 09:10 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**89**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-08 **CCC-SSC-WW3-08**

Sampled: 03/07/16 09:39 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**530**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-09 **CCC-SSC-WW3-09**

Sampled: 03/07/16 10:09 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**2200**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-10 **CCC-SSC-WW3-10**

Sampled: 03/07/16 10:39 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**59**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-11 **CCC-SSC-WW3-11**

Sampled: 03/07/16 11:09 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**480**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-12 **CCC-SSC-WW3-12**

Sampled: 03/07/16 11:39 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**370**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-13 **CCC-SSC-WW3-13**

Sampled: 03/07/16 13:39 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**82**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-14 **CCC-SSC-WW3-14**

Sampled: 03/07/16 15:39 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**27**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-15 **CCC-SSC-WW3-15**

Sampled: 03/07/16 17:39 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**94**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-16 **CCC-SSC-WW3-16**

Sampled: 03/07/16 19:09 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**300**	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-17 **CCC-SSC-WW3-17**

Sampled: 03/07/16 21:39 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**78**	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-18 **CCC-SSC-WW3-18**

Sampled: 03/07/16 22:09 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**78**	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-19 **CCC-SSC-WW3-19**

Sampled: 03/07/16 23:39 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**59**	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-20 **CCC-SSC-WW3-20**

Sampled: 03/07/16 23:39 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**52**	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-21 **CCC-SSC-WW3-21**

Sampled: 03/08/16 00:09 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**48**	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-22 **CVC-SSC-WW3-01**

Sampled: 03/06/16 00:48 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**4.0**	3.1	5.0	mg/l	1	03/11/16 13:51	J

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-23 **CVC-SSC-WW3-02**

Sampled: 03/06/16 01:47 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**4.0**	3.1	5.0	mg/l	1	03/11/16 13:51	J

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-24 **CVC-SSC-WW3-03**

Sampled: 03/06/16 02:17 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**7.0**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-25 **CVC-SSC-WW3-04**

Sampled: 03/06/16 04:17 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**6.0**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-26 **CVC-SSC-WW3-05**

Sampled: 03/06/16 05:17 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**7.0**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-27 **CVC-SSC-WW3-06**

Sampled: 03/06/16 05:47 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**7.0**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-28 **CVC-SSC-WW3-07**

Sampled: 03/06/16 06:17 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-29 **CVC-SSC-WW3-08**

Sampled: 03/06/16 09:17 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**40**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-30 **CVC-SSC-WW3-09**

Sampled: 03/06/16 09:47 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**82**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-31 **CVC-SSC-WW3-10**

Sampled: 03/06/16 10:17 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**60**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-32 **CVC-SSC-WW3-11**

Sampled: 03/06/16 11:28 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-33 **CVC-SSC-WW3-12**

Sampled: 03/06/16 13:35 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**37**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-34 **CVC-SSC-WW3-13**

Sampled: 03/07/16 09:16 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**550**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-35 **CVC-SSC-WW3-14**

Sampled: 03/07/16 09:46 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**23**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-36 **CVC-SSC-WW3-15**

Sampled: 03/07/16 10:46 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-37 **CVC-SSC-WW3-16**

Sampled: 03/07/16 11:45 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-38 **CVC-SSC-WW3-17**

Sampled: 03/07/16 12:46 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-39 **CVC-SSC-WW3-18**

Sampled: 03/07/16 13:46 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-40 **CVC-SSC-WW3-19**

Sampled: 03/07/16 14:46 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-41 **CVC-SSC-WW3-20**

Sampled: 03/07/16 15:46 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**6.0**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-42 **CVC-SSC-WW3-21**

Sampled: 03/07/16 16:16 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-43 **CVC-SSC-WW3-22**

Sampled: 03/07/16 17:16 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**6.0**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-44 **CVC-SSC-WW3-23**

Sampled: 03/07/16 19:49 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-45 **CVC-SSC-WW3-24**

Sampled: 03/07/16 21:49 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-46 **CVC-SSC-WW3-25**

Sampled: 03/07/16 13:49 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-47 **CVC-SSC-WW3-26**

Sampled: 03/08/16 00:49 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-48 CVC-SSC-WW3-27

Sampled: 03/08/16 02:19 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/14/16 10:50	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-49 **LPC-SSC-WW3-01**

Sampled: 03/06/16 21:11 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	03/11/16 15:30	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-50 **LPC-SSC-WW3-02**

Sampled: 03/06/16 21:11 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**11**	3.1	5.0	mg/l	1	03/11/16 15:30	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-51 **LPC-SSC-WW3-03**

Sampled: 03/06/16 12:11 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**11**	3.1	5.0	mg/l	1	03/11/16 13:31	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-52 **LPC-SSC-WW3-04**

Sampled: 03/07/16 03:11 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/11/16 15:30	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-53 **LPC-SSC-WW3-05**

Sampled: 03/07/16 07:11 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-54 **LPC-SSC-WW3-06**

Sampled: 03/07/16 10:41 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**6.0**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-55 LPC-SSC-WW3-07

Sampled: 03/07/16 17:41 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	03/14/16 10:50	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-56 **LPC-SSC-WW3-08**

Sampled: 03/07/16 17:41 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-57 **LPC-SSC-WW3-09**

Sampled: 03/07/16 19:41 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-58 **LPC-SSC-WW3-10**

Sampled: 03/07/16 20:41 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-59 **LPC-SSC-WW3-11**

Sampled: 03/07/16 22:41 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**4.0**	3.1	5.0	mg/l	1	03/14/16 10:50	J

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-60 **LPC-SSC-WW3-12**

Sampled: 03/08/16 22:41 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/14/16 10:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

6C10070-61 **LPC-SSC-WW3-13**

Sampled: 03/08/16 12:41 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/14/16 10:50	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

QUALITY CONTROL SECTION

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6C0683 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0683-BLK1)					Analyzed: 03/11/16 13:51						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0699 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0699-BLK1)					Analyzed: 03/11/16 13:31						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0703 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0703-BLK1)					Analyzed: 03/11/16 15:30						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0709 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0709-BLK1)					Analyzed: 03/11/16 18:51						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0711 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0711-BLK1)					Analyzed: 03/14/16 11:40						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0788 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0788-BLK1)					Analyzed: 03/14/16 10:50						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:37

Notes and Definitions

J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then not detected at or above the MDL.
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	05/16/16 11:01
		Received Date:	03/15/16 11:40
		Turn Around:	Normal
Attention:	Jeremy Burns	**Client Project:**	Los Penasquitos TMDL Compliance 2015-16
Phone:	(858) 514-6464		
Fax:	(858) 278-5300	**PO Number:**	C013106081/502515C004
Work Order(s):	6C15066		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Jeremy Burns :

Enclosed are the results of analyses for samples received 03/15/ 16 11:40 with the Chain of Custody document. The samples were received in good condition, at 1.3 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:
This is a Supplement to the Certificate of Analysis previously issued 4/1/16 for the above referenced project to correct sample ID to reflect COC and to split report to separate projects.

Reviewed by:

hanangyen

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CCC-SSC-WW3-22	RW	6C15066-02	Water	03/08/16 01:39
CVC-SSC-WW3-10a	RW	6C15066-04	Water	03/06/16 10:59
CVC-SSC-WW3-15a	RW	6C15066-05	Water	03/06/16 11:16
CVC-SSC-WW3-22a	RW	6C15066-06	Water	03/07/16 18:19
CVC-SSC-WW3-28	RW	6C15066-07	Water	03/08/16 04:49
LPC-SSC-WW3-6a	RW	6C15066-09	Water	03/07/16 16:41

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

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Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

6C15066-02 **CCC-SSC-WW3-22**

Sampled: 03/08/16 01:39 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**42**	3.1	5.0	mg/l	1	03/18/16 12:28	

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Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

6C15066-04 **CVC-SSC-WW3-10a**

Sampled: 03/06/16 10:59 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**23**	3.1	5.0	mg/l	1	03/18/16 12:28	

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Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

6C15066-05 **CVC-SSC-WW3-15a**

Sampled: 03/06/16 11:16 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**16**	3.1	5.0	mg/l	1	03/18/16 12:28	

AMEC Environment & Infrastructure
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Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

6C15066-06 **CVC-SSC-WW3-22a**

Sampled: 03/07/16 18:19 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**4.0**	3.1	5.0	mg/l	1	03/18/16 12:28	J

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

6C15066-07 **CVC-SSC-WW3-28**

Sampled: 03/08/16 04:49 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	03/18/16 12:28	

AMEC Environment & Infrastructure
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Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

6C15066-09 **LPC-SSC-WW3-6a**

Sampled: 03/07/16 16:41 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**5.0**	3.1	5.0	mg/l	1	03/18/16 12:28	

AMEC Environment & Infrastructure
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Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

QUALITY CONTROL SECTION

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San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6C1146 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C1146-BLK1)					Analyzed: 03/18/16 12:28						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:01

Notes and Definitions

J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then not detected at or above the MDL.
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

APPENDIX C
BEDLOAD AND VOLUMETRIC STREAMBED PARTICLE-SIZE ANALYSIS

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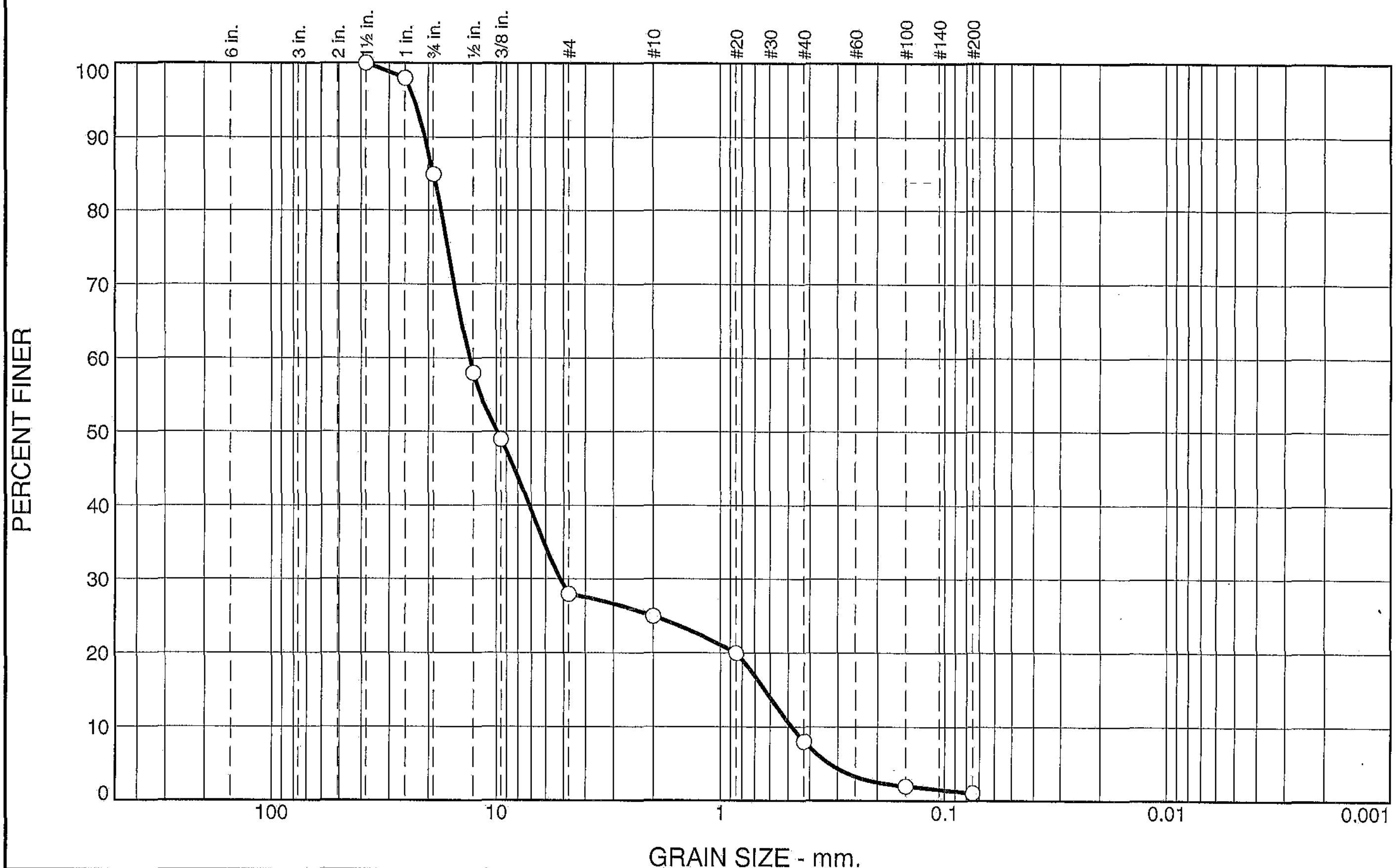
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.0	57.0	3.0	17.0	6.9	1.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1	98.0		
0.75"	85.0		
0.5"	58.0		
0.375"	49.0		
#4	28.0		
#10	25.0		
#20	20.0		
#40	8.0		
#100	2.0		
#200	1.1		

* (no specification provided)

Material Description

GP (#29644)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 20.7471 D_{85}= 19.0500 D_{60}= 13.2023
D_{50}= 9.9020 D_{30}= 5.1790 D_{15}= 0.6351
D_{10}= 0.4826 C_u= 27.36 C_c= 4.21

Classification

USCS= GP AASHTO=

Remarks

Sample Number: CVC-WW1-BL-LB

Date: 2/12/16

amec

Client:
Project: Los Penasquitos Sediment TMDL
Project No: 502515C004.02 **Figure** #29644

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment TMDL
Project Number: 502515C004.02
Sample Number: CVC-WW1-BL-LB
Material Description: GP (#29644)
Date: 2/12/16
USCS Classification: GP
Tested by: R. Valles
Checked by: L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
1.5"	100.0
1	98.0
0.75"	85.0
0.5"	58.0
0.375"	49.0
#4	28.0
#10	25.0
#20	20.0
#40	8.0
#100	2.0
#200	1.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	15.0	57.0	72.0	3.0	17.0	6.9	26.9			1.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.3266	0.4826	0.6351	0.8500	5.1790	7.1430	9.9020	13.2023	17.6903	19.0500	20.7471	23.1259

Fineness Modulus	C_u	C_c
5.70	27.36	4.21

AMEC

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025151004.02	NAME: KiernanPortalik AmecFW	LAB NO.: 29644
LOCATION: Los Penasquitos	SAMPLED BY: Kevin Stolzenbach	DATE: 1-7-16
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL~~: Time: 1200	AUTHORIZED BY:	DATE:
BORING: CVC-WW1-BL-LB	TESTED BY: RW	DATE: 2-12-16
DEPTH:	REVIEWED BY:	DATE:

CTB-4 = 511.5

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		
1 1/2"	0	0		100	
1"	208.9	1.8		98.2	98
3/4"	1731.2	15.3		84.7	85
1/2"	4761.2	42.1		57.9	58
3/8"	5706.1	50.5		49.5	49
#4	8081.9	71.5		28.5	28
#10	72.79	14.2	85.8	24.4	25
#20	157.88	30.9	69.1	19.7	20
#40	365.54	71.5	28.5	8.1	8
#100	480.80	94.0	6.0	1.7	2
#200	492.56	96.3	3.7	1.1	

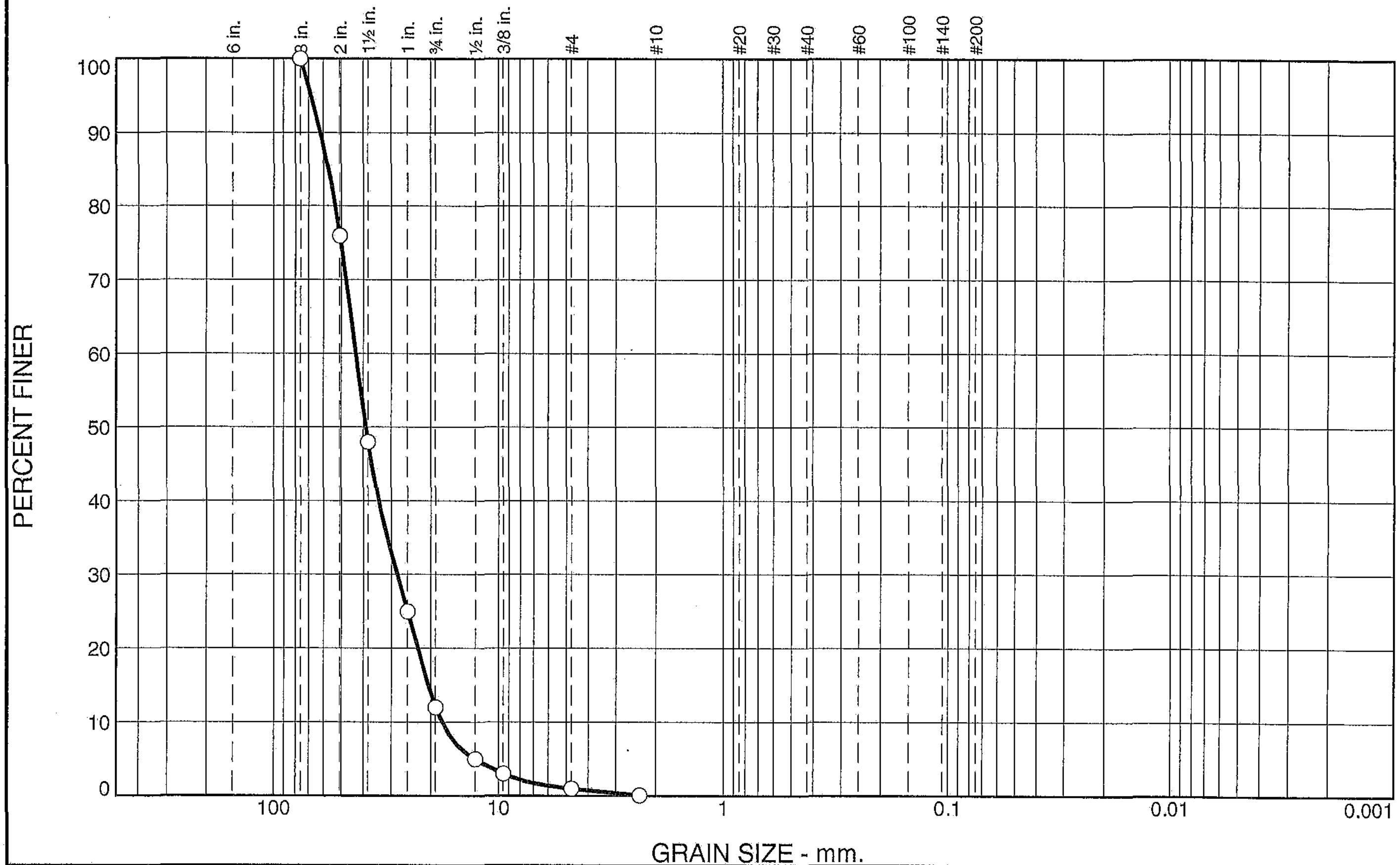
SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______
Weight of soil ~~& tare~~ (dry) 11302.4 w/o pan
Weight of Tare 0
Weight of H20 ______
Net weight of dry soil ______
% H20 ______

WEIGHT BEFORE WASH: 11302.4 (+4)
511.5 (-4)

EQUIPMENT USED:
Scale I.D.: CW 9204
Sieve Set I.D.: Gilson - 12"
Oven I.D.: 184078 - 184077
Shaker I.D.: Gilson / Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	88.0	11.0			1.0		

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	76.0		
1.5"	48.0		
1"	25.0		
0.75"	12.0		
0.5"	5.0		
0.375"	3.0		
#4	1.0		
#8	0.1		

* (no specification provided)

Material Description

(#29646)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 62.0017 D_{85}= 57.1221 D_{60}= 43.1870
D_{50}= 38.9786 D_{30}= 28.3195 D_{15}= 20.5604
D_{10}= 17.8616 C_u= 2.42 C_c= 1.04

Classification

USCS= AASHTO=

Remarks

Sample Number: CCC-WW2-BL-MID

Date: 2/9/16

amec

Client:

Project: Los Penasquitos Sediment TMDL

Project No: 502515C004.02 **Figure** #29646

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment TMDL
Project Number: 502515C004.02
Sample Number: CCC-WW2-BL-MID
Material Description: (#29646)
Date: 2/9/16
Tested by: R. Valles
Checked by: L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
3"	100.0
2"	76.0
1.5"	48.0
1"	25.0
0.75"	12.0
0.5"	5.0
0.375"	3.0
#4	1.0
#8	0.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	88.0	11.0	99.0							

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
12.7000	17.8616	20.5604	22.9022	28.3195	34.1920	38.9786	43.1870	53.3048	57.1221	62.0017	68.3211

Fineness Modulus	C_u	C_c
4.36	2.42	1.04

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Brtalik, AmecFW	LAB NO.: 29646
LOCATION: Los Penasquitos	SAMPLED BY: Kevin S.	DATE: 2-1-16
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL~~: Time 1010	AUTHORIZED BY:	DATE:
BORING: CCC-WW2-BL-MID	TESTED BY:	DATE:
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE	WEIGHT RETAINED GMS.	% RETAINED	% PASS	
3"			100	
2"	1227.8	24.0	76.0	
1 1/2"	2651.3	51.8	48.2	
1"	3823.8	74.8	25.2	25
3/4"	4494.6	87.9	12.1	12
~~3/4"~~ 1/2"	4852.3	94.9	5.1	5
~~1/2"~~ 3/8"	4940.0	96.6	3.4	3
~~3/8"~~ #4	5059.6	98.9	1.1	1
~~#4~~ #8	5110.9	99.9	.1	
#10	.80	14.5	85.5	.0
#20	2.55	46.4	53.6	.0
#40	3.13	56.9	43.1	.0
#100	3.93	71.5	28.5	.0
#200	4.41	80.2	19.8	.1

+8

-8 = 5.5

CTB-13

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______

Weight of soil & tare (dry) 5733.8

Weight of Tare CTB-10 620.0

Weight of H20 ______

Net weight of dry soil ______

% H20 ______

WEIGHT BEFORE WASH: 5113.8 (+8)

5.5 (8)

EQUIPMENT USED:

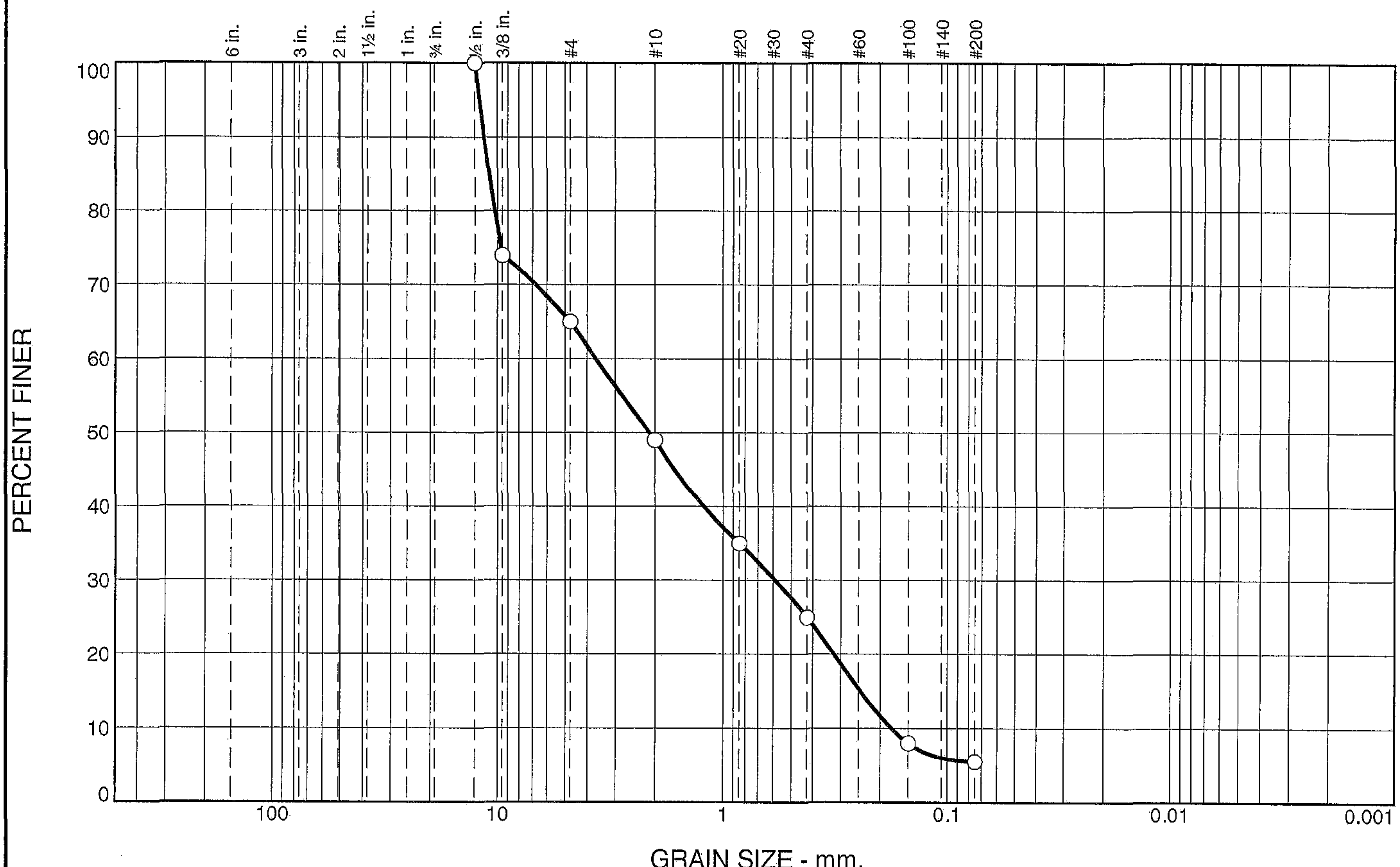
Scale I.D.: CW9204

Sieve Set I.D.: Gilson + 12" Sieves

Oven I.D.: 184078 - 184079

Shaker I.D.: Gilson - Gyrator

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	35.0	16.0	24.0	19.5	5.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5"	100.0		
0.375"	74.0		
#4	65.0		
#10	49.0		
#20	35.0		
#40	25.0		
#100	8.0		
#200	5.5		

* (no specification provided)

Material Description

(#29645)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 11.5085 D_{85}= 10.9232 D_{60}= 3.6634
D_{50}= 2.1177 D_{30}= 0.5873 D_{15}= 0.2452
D_{10}= 0.1786 C_u= 20.51 C_c= 0.53

Classification

USCS= AASHTO=

Remarks

Sample Number: LPC-WW2-MBL-1

Date: 2/9/16

amec

Client:

Project: Los Penasquitos Sediment TMDL

Project No: 502515C004.02 **Figure** #29645

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment TMDL
Project Number: 502515C004.02
Sample Number: LPC-WW2-MBL-1
Material Description: (#29645)
Date: 2/9/16
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.5"	100.0
0.375"	74.0
#4	65.0
#10	49.0
#20	35.0
#40	25.0
#100	8.0
#200	5.5

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	35.0	35.0	16.0	24.0	19.5	59.5			5.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.1786	0.2452	0.3219	0.5873	1.2238	2.1177	3.6634	10.3213	10.9232	11.5085	12.0961

Fineness Modulus	C_u	C_c
4.13	20.51	0.53

AMEC

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Bratalix, AmecFW	LAB NO.: 29645
LOCATION: Los Penasquitos	SAMPLED BY: Kevin S.	DATE: 1-31-16
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL~~: Time: 1630	AUTHORIZED BY:	DATE:
BORING: LPC-WW2-MBL-1	TESTED BY: RW	DATE: 2-9-16
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS	
1 1/2"				
1"				
3/4"				
1/2"	0	0	100	
3/8"	3.55	25.7	74.3	74
#4	4.78	34.5	65.5	65
#10	7.1	51.3	48.7	49
#20	9.00	65.0	35.0	35
#40	10.37	74.9	25.1	25
#100	12.77	92.3	7.7	8
#200	13.08	94.5	5.5	

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______

Weight of soil & tare (dry) 96.9

Weight of Tare 83.06

Weight of H20 LC11 ______

Net weight of dry soil 13.84

% H20 ______

WEIGHT BEFORE WASH: 13.84

EQUIPMENT USED:

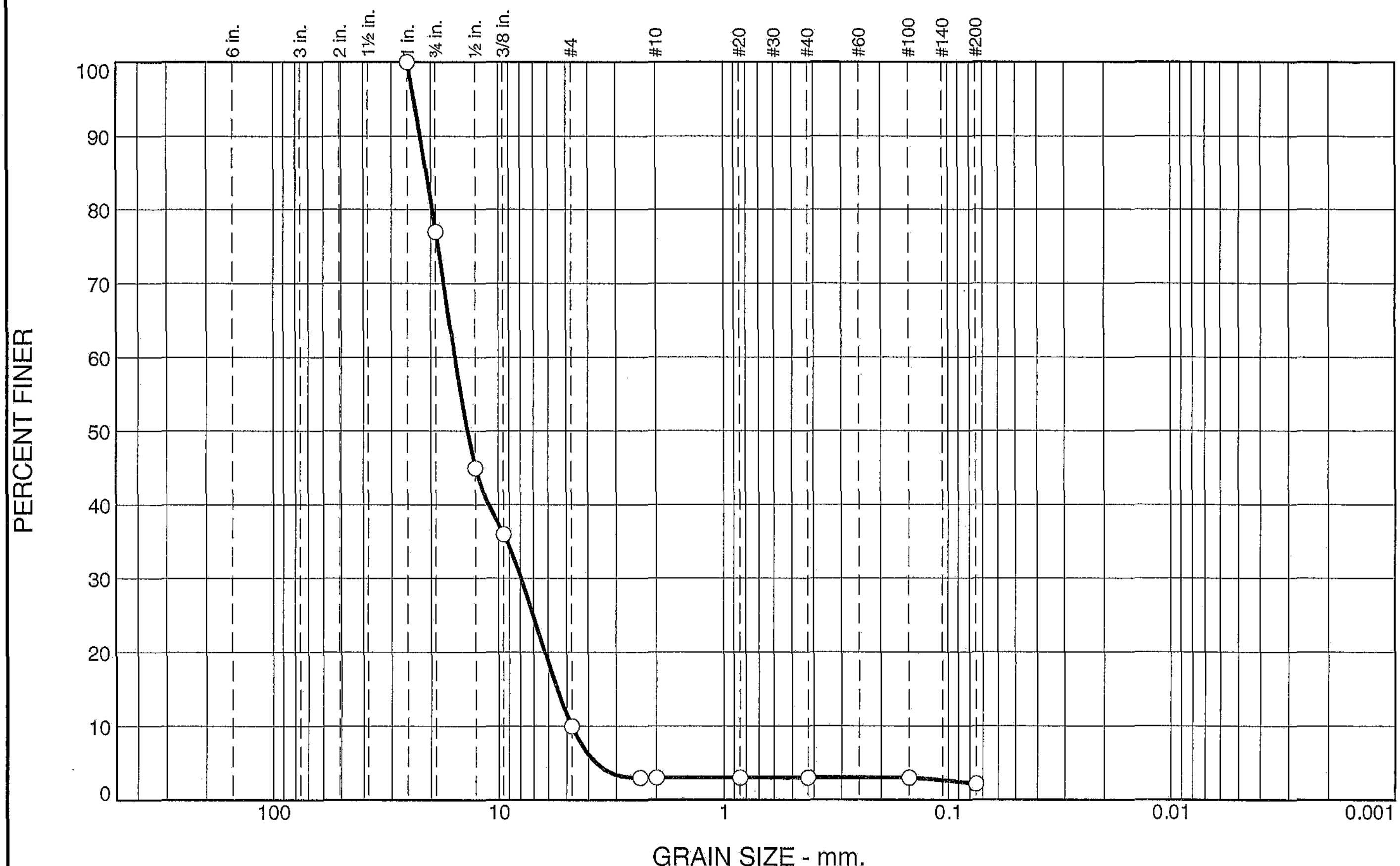
Scale I.D.: CW9204

Sieve Set I.D.: Gilson + 12" Sieves

Oven I.D.: 184078-184077

Shaker I.D.: Gilson – Gyrator

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	23.0	67.0	7.0	0.0	0.8	2.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
0.75"	77.0		
0.5"	45.0		
0.375"	36.0		
#4	10.0		
#8	3.0		
#10	3.0		
#20	3.0		
#40	3.0		
#100	3.0		
#200	2.2		

* (no specification provided)

Material Description

(#29647)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 22.3216 D_{85}= 20.9656 D_{60}= 15.7039
D_{50}= 13.8062 D_{30}= 7.9664 D_{15}= 5.5112
D_{10}= 4.7500 C_u= 3.31 C_c= 0.85

Classification

USCS= GP AASHTO=

Remarks

Sample Number: CVC-WW2-BL-MID

Date: 2/9/16

amec

Client:
Project: Los Penasquitos Sediment TMDL
Project No: 502515C004.02 **Figure** #29647

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment TMDL
Project Number: 502515C004.02
Sample Number: CVC-WW2-BL-MID
Material Description: (#29647)
Date: 2/9/16
USCS Classification: GP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
1"	100.0
0.75"	77.0
0.5"	45.0
0.375"	36.0
#4	10.0
#8	3.0
#10	3.0
#20	3.0
#40	3.0
#100	3.0
#200	2.2

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	23.0	67.0	90.0	7.0	0.0	0.8	7.8			2.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
3.6970	4.7500	5.5112	6.2462	7.9664	11.1301	13.8062	15.7039	19.7327	20.9656	22.3216	23.8015

Fineness Modulus	C_u	C_c
6.62	3.31	0.85

AMEC

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Brtalik, AmecFW	LAB NO.: 29647
LOCATION: Los Penasquitos	SAMPLED BY: Kevin S.	DATE: 2-1-16
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL~~: Time 1045	AUTHORIZED BY:	DATE:
BORING: CVC-WW2-BL-MID	TESTED BY: RU	DATE: 2-9-16
DEPTH:	REVIEWED BY:	DATE:

-8

+

+8 18.7

CTB-15

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS	
~~1 1/2"~~ 1"	0	0	100	
~~1"~~ 3/4	337.9	22.6	77.4	77
~~3/4"~~ 1/2	819.8	54.9	45.1	45
~~1/2"~~ 3/8	958.8	64.2	35.8	36
~~3/8"~~ #4	1339.5	89.8	10.2	10
~~#4~~ #8	1445.2	96.8	3.2	3
#10	1.64 1446.8	~~8.8~~ 97.0	~~91.2~~ 2.9	3
#20	5.59 1450.8	~~29.9~~ 97.2	~~70.1~~ 2.2	3
#40	7.89 1453.1	~~42.2~~ 97.4	~~57.8~~ 1.8	3
#100	12.04 1457.2	~~64.4~~ 97.6	~~35.6~~ 1.1	~~2~~ 3
#200	14.23 1459.4	~~76.1~~ 97.8	~~23.9~~ .8	2.2

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______

Weight of soil & tare (dry) 1997.8

Weight of Tare CTB-25 505.5

Weight of H20 ______

Net weight of dry soil ______

% H20 ______

WEIGHT BEFORE WASH: 1492.3 (+8)

18.7 (-8)

EQUIPMENT USED:

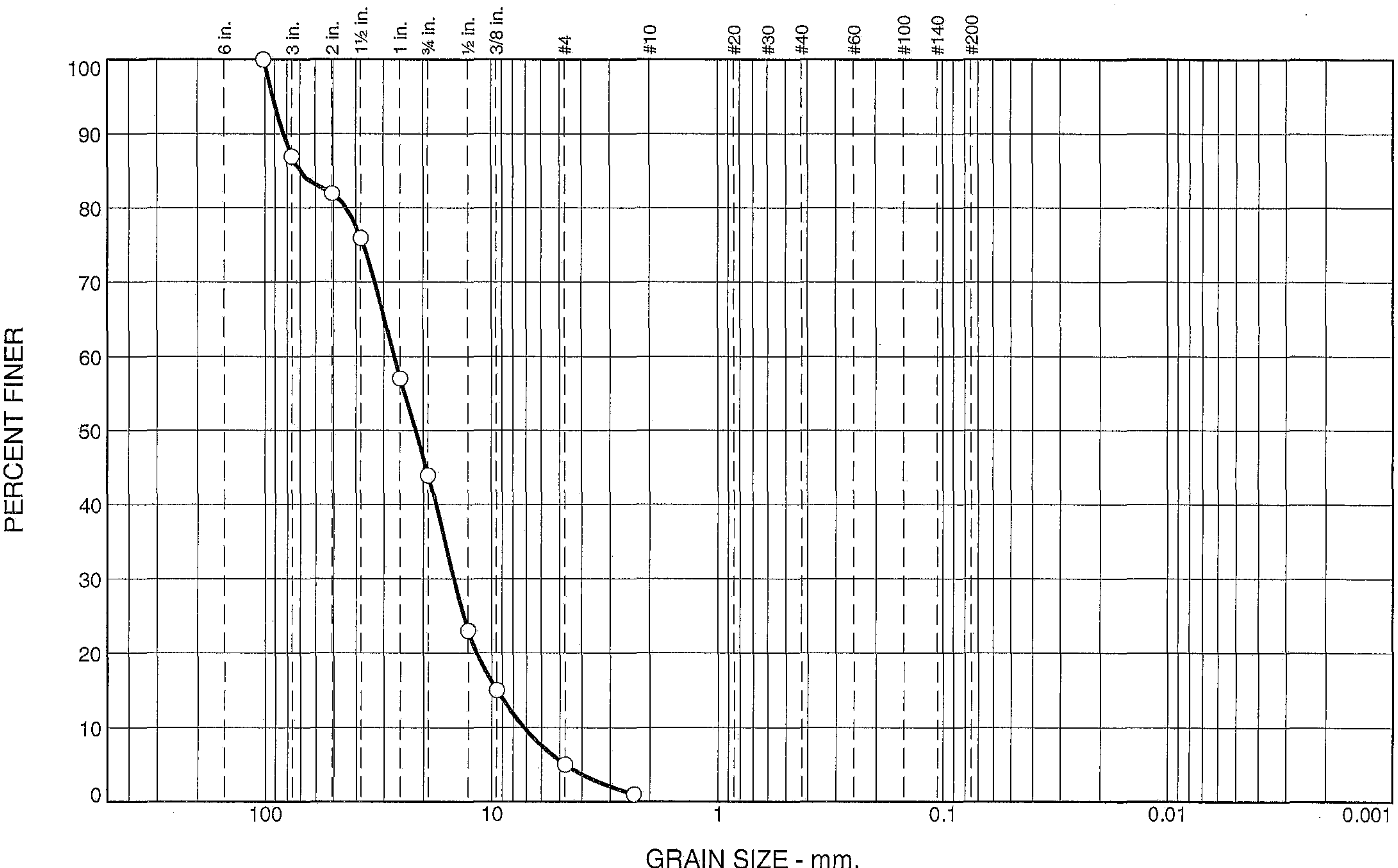
Scale I.D.: CW9204

Sieve Set I.D.: Gilson + 12" Sieves

Oven I.D.: 184078-184077

Shaker I.D.: Gilson - Gilmanger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
13.0	43.0	39.0				5.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
4"	100.0		
3"	87.0		
2"	82.0		
1.5"	76.0		
1"	57.0		
0.75"	44.0		
0.5"	23.0		
0.375"	15.0		
#4	5.0		
#8	1.0		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 82.8396 D_{85}= 70.0649 D_{60}= 27.0200
D_{50}= 21.6978 D_{30}= 14.7103 D_{15}= 9.5250
D_{10}= 7.1843 C_u= 3.76 C_c= 1.11

Classification

USCS= AASHTO=

Remarks

Location: ~~CVC~~-WW3-BL
CCC

Date: 3/8/16

amec

Client:
Project: Los Penasquitos Sediment Transport Monitoring 2014-2015
Project No: 502515C011.02 **Figure** #29699

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

3/18/2016

Project: Los Penasquitos Sediment Transport Monitoring 2014-2015
Project Number: 502515C011.02
Location: ~~CVC~~ CCC WW3-BL
Date: 3/8/16
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
4"	100.0
3"	87.0
2"	82.0
1.5"	76.0
1"	57.0
0.75"	44.0
0.5"	23.0
0.375"	15.0
#4	5.0
#8	1.0

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
13.0	43.0	39.0	82.0							

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
4.7500	7.1843	9.5250	11.6762	14.7103	17.6447	21.6978	27.0200	44.1888	70.0649	82.8396	92.2829

Fineness Modulus	C_u	C_c
3.72	3.76	1.11

AMEC

amec

SIEVE ANALYSIS OF AGGREGATE - SAND EQUIVALENT

ASTM D2419 / AASHTO T176 / CTM217
ASTM C117 / AASHTO T11
ASTM C136 / AASHTO T27

Project No. ________ Project Name: Los Peñasquitos Sediment
Lab No. 29699 Sampled by: ________ Date: ________
Type of Aggregate: ________ Submitted by: ________ Date: ________
Source of Aggregate: ________ Tested by: Ru Date: 3-17-?C
Sample Location: ________ Reviewed by: ________ Date: ________

SAMPLE WEIGHT DRY GMS.					
Screen	Weight Retained	% Retained	% Pass	Cum. Pass	Specification Limit
~~4"~~ 5	0	0	100	100	
~~3"~~ 4	0	0	100	100	
~~2"~~ 3	655.4	13.2	86.8		
~~1-1/2"~~ 2	872.1	17.6	82.4		
~~1"~~ 1½	1186.2	23.9	76.1		
~~3/4"~~ 1	2123.0	42.8	57.2		
~~1/2"~~ 3/4	2781.6	56.1	43.9		
~~3/8"~~ 1/2	3834.7	77.3	22.7		
~~#4~~ 3/8	4217.3	85.0	15.0		
#4 Grading Portion ______ gm					
~~#8~~ 4	4701.6	94.8	5.2		
~~#16~~ 8	4907.1	98.9	1.1		
#30					
#50					
#100					
#200					

MOISTURE CONTENT			SAND EQUIVALENT 5468.0 w/pan	
Weight of sample & tare (wet)			/ =	
Weight of sample & tare (dry)	5467.0		/ =	
Weight of tare C-13-2	507.0		/ =	
Weight of H_20				
Net weight of dry sample	← 4960.0			
% H20			Ave.=	

EQUIPMENT USED:
Sieve Set I.D.: Gilson Mechanical Shaker: I.D.: Gilson
Scale I.D. ________ S.E. Shaker I.D.: ________
Oven I.D.: 184077

Amec Foster Wheeler - Materials Lab

CHAIN OF CUSTODY RECORD

9177 Sky Park Court San Diego, CA 92213-4341
Tel 858-514-3000

STANDARD

Page_____Of_____

CLIENT NAME: Kiernan Brtalik, Amec Foster Wheeler

PROJECT: Los Penasquitos Sediment TMDL
502515C004.02

ADDRESS:
9177 Sky Park Court San Diego, CA 92213-4341

PHONE: 858-514-7752
FAX:
EMAIL: Kiernan.Brtalik@amecfw.com

PROJECT MANAGER Jeremy Burns

SAMPLER Kevin Stolzenbach

ANALYSES REQUESTED

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☐ 10 - 15 Business Days
- ☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Particle Size Distribution									COMMENTS
29644	1/7/16	1200	SED	CVC - WW1 - BL - LB	2	X									
29645	1/31/16	1630	↓	LPC - WW2 - MBL - 1	1	X									
29646	2/1/16	1010	↓	CCC - WW2 - BL - MID	2	X									
29647	2/1/16	1045	↓	CVC - WW2 - BL - MID	1	X									
															48 49

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Attacked	Y / N
Preserved at Lab	Y / N

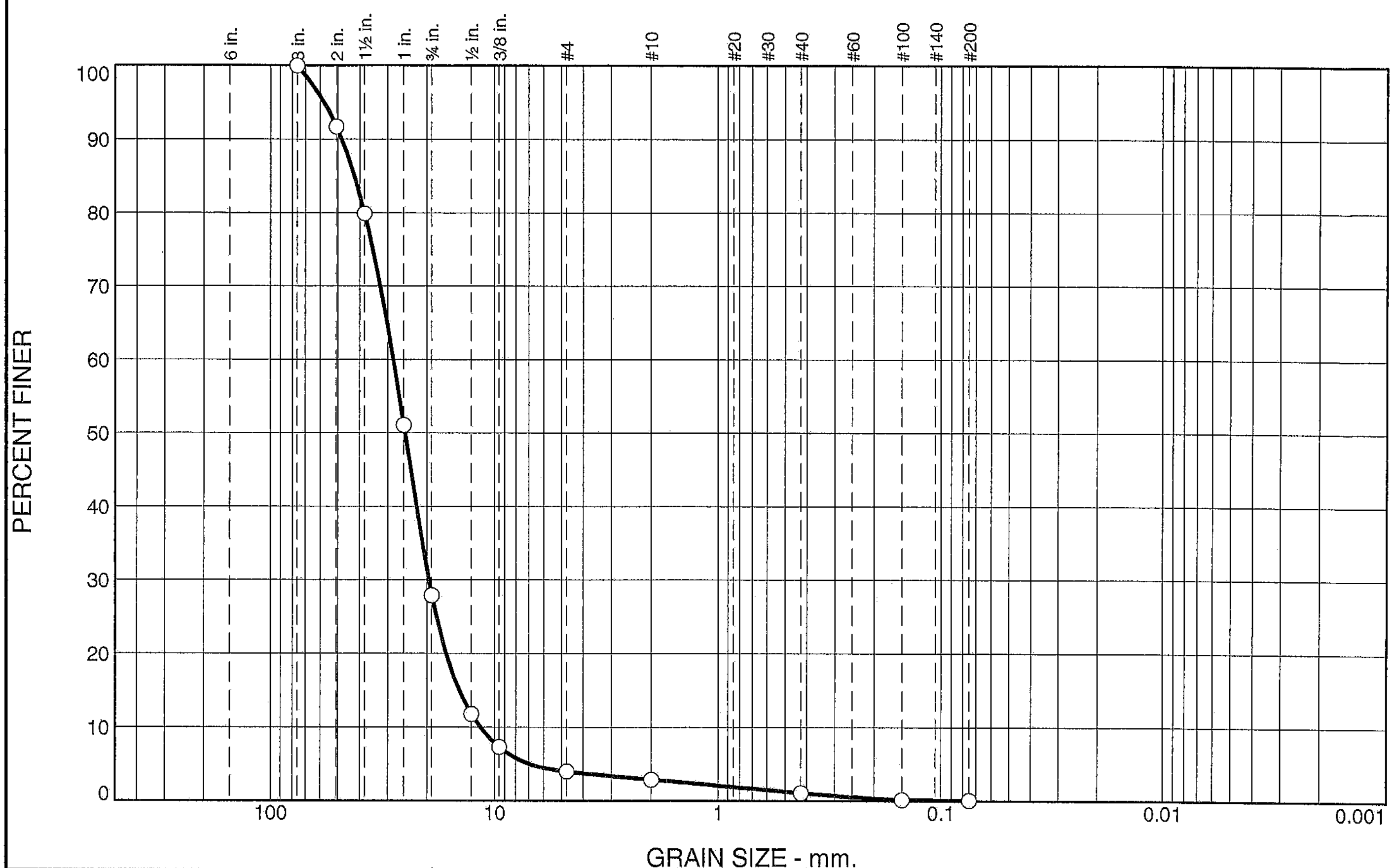
SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION
Bill to 502515C004-02

COC version 042707

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	72.1	23.9	1.1	1.8	1.0	0.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	91.7		
1.5"	79.9		
1"	51.1		
0.75"	27.9		
0.5"	11.8		
0.375"	7.3		
#4	4.0		
#10	2.9		
#40	1.1		
#100	0.2		
#200	0.1		

* (no specification provided)

Material Description

Poorly Graded Gravel, GP (#29240)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 48.1326 D_{85}= 42.2843 D_{60}= 28.3312
D_{50}= 25.0721 D_{30}= 19.6399 D_{15}= 14.4079
D_{10}= 11.5734 C_u= 2.45 C_c= 1.18

Classification

USCS= GP AASHTO=

Remarks

Location: CCC-VBL

Date: 9/14/15

amec

Client: City of San Diego
Project: City of San Diego Los Penasquitos Sediment Transport Monitoring 2015-2016
Project No: 5025151109.02 **Figure** #29240

Tested By: H. Alwaque **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

9/14/2015

Client: City of San Diego
Project: City of San Diego Los Penasquitos Sediment Transport Monitoring 2015-2016
Project Number: 5025151109.02
Location: CCC-VBL
Material Description: Poorly Graded Gravel, GP (#29240)
Date: 9/14/15
USCS Classification: GP
Tested by: H. Alwaque **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
3"	100.0
2"	91.7
1.5"	79.9
1"	51.1
0.75"	27.9
0.5"	11.8
0.375"	7.3
#4	4.0
#10	2.9
#40	1.1
#100	0.2
#200	0.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	72.1	23.9	96.0	1.1	1.8	1.0	3.9			0.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
6.9838	11.5734	14.4079	16.5000	19.6399	22.3008	25.0721	28.3312	38.1707	42.2843	48.1326	57.7471

Fineness Modulus	C_u	C_c
7.73	2.45	1.18

AMEC

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

City of San Diego 2015-2016

PROJECT NO: 5025.15.1109.02	NAME: Los Penasquitos Sediment Trans.	LAB NO.: 29240
LOCATION: CCC-VBL	SAMPLED BY: KB/RW	DATE: 9/10/15
SOURCE:	SUBMITTED BY: Jeremy Burns	DATE: 9/10/15
MATERIAL:	AUTHORIZED BY:	DATE:
BORING:	TESTED BY: HA	DATE: 9/11 + 9/14/15
~~DEPTH~~: 10:50 TIME	REVIEWED BY:	DATE: 100

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		
2"	583.6	8.3	91.7		92
1 1/2"	1416.6	20.1	79.9		80
1"	3451.1	48.9	51.1		51
3/4"	5086.0	72.1	27.9		28
1/2"	6224.8	88.2	11.8		12
3/8"	6541.9	92.7	7.3		
#4	235.5	45.4	54.6	4.0	4
#10	312.2	60.1	39.9	2.9	3
#20	366.3	70.6	29.4	2.2	2
#40	439.7	84.7	15.3	1.1	1
#100	501.3	96.6	3.4	0.2	
#200	509.1	98.1	1.9	0.1	
PAN	511.1	98.5	1.5	0.1	

~~516.5~~
519.1

SAMPLE MOISTURE CONTENT

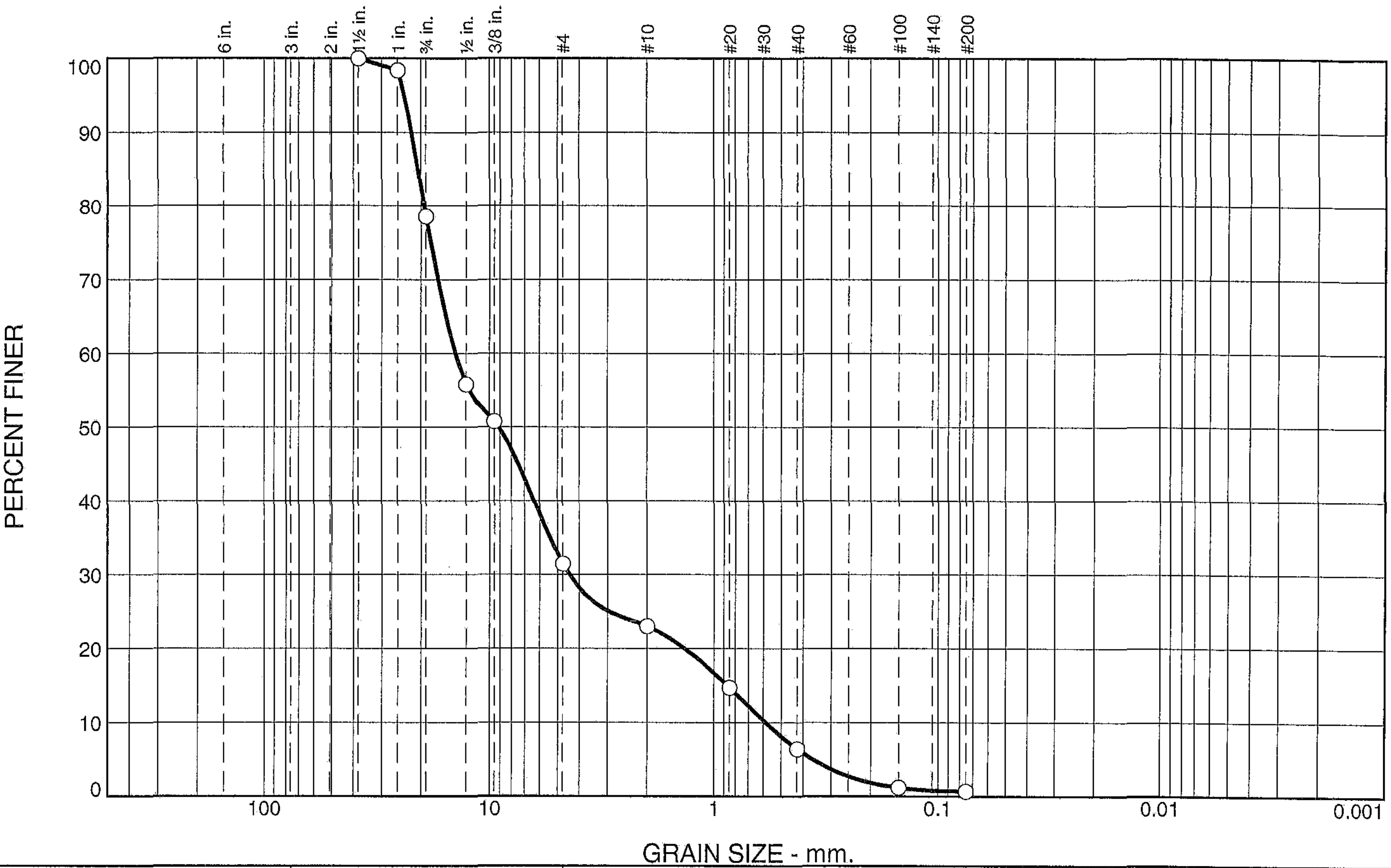
Weight of soil & tare (wet)	
Weight of soil & tare (dry)	9225.4
Weight of Tare	2167.0
Weight of H20	
Net weight of dry soil	7058.4
% H20	

WEIGHT BEFORE WASH: 519.1 Bowl CTB-19 NET soil wt

After wash 511.0

EQUIPMENT USED:
Scale I.D.: CW 9204
Sieve Set I.D.: 12", SET 1
Oven I.D.: 148875
Shaker I.D.: Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.4	47.1	8.5	16.6	5.7	0.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	98.4		
0.75"	78.6		
0.5"	55.8		
0.375"	50.8		
#4	31.5		
#10	23.0		
#20	14.7		
#40	6.4		
#100	1.2		
#200	0.7		

* (no specification provided)

Material Description

(#29241)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 22.0954 D_{85}= 20.6827 D_{60}= 14.1816
D_{50}= 9.1172 D_{30}= 4.4362 D_{15}= 0.8707
D_{10}= 0.5863 C_u= 24.19 C_c= 2.37

Classification

USCS= GW AASHTO=

Remarks

Location: CVC-VBL

Date: 9/14/15

amec

Client: City of San Diego
Project: City of San Diego Los Penasquitos Sediment Transport Monitoring 2015-2016
Project No: 5025151109.02 **Figure** #29241

Tested By: H. Alwaque **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

9/14/2015

Client: City of San Diego
Project: City of San Diego Los Penasquitos Sediment Transport Monitoring 2015-2016
Project Number: 5025151109.02
Location: CVC-VBL
Material Description: (#29241)
Date: 9/14/15
USCS Classification: GW
Tested by: H. Alwaque **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
1.5"	100.0
1"	98.4
0.75"	78.6
0.5"	55.8
0.375"	50.8
#4	31.5
#10	23.0
#20	14.7
#40	6.4
#100	1.2
#200	0.7

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	21.4	47.1	68.5	8.5	16.6	5.7	30.8			0.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.3625	0.5863	0.8707	1.3594	4.4362	6.3622	9.1172	14.1816	19.3995	20.6827	22.0954	23.8063

Fineness Modulus	C_u	C_c
5.82	24.19	2.37

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

City of San Diego 2015-2016

PROJECT NO: 5025.15.1109.02	NAME: Los Penasquitos Sediment Trans.	LAB NO.: 29241
LOCATION: CVC	SAMPLED BY: KB/RW	DATE: 9/10/15
SOURCE:	SUBMITTED BY: Jeremy Burns	DATE: 9/10/15
MATERIAL:	AUTHORIZED BY:	DATE:
BORING:	TESTED BY: HA	DATE: 9/11 + 9/14/15
~~DEPTH~~: 11:30 TIME	REVIEWED BY:	DATE:

~~2931.0~~

678.7

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS	
1 1/2"	0	0	100	
1"	93.9	1.6	98.4	98
3/4"	1236.4	21.4	78.6	79
1/2"	2549.9	44.2	55.8	
3/8"	2841.8	49.2	50.8	
#4	257.5	37.9	62.1	31.5
#10	371.1	54.7	45.3	23.0
#20	482.1	71.0	29.0	14.7
#40	592.9	89.4	12.6	6.4
#100	662.2	97.6	2.4	1.2
#200	669.1	98.6	1.4	0.7
PAN	671.3	98.9	1.1	0.6

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) __________

Weight of soil & tare (dry) 9987.6

Weight of Tare 4214.6

Weight of H20 __________

Net weight of dry soil 5773.0

% H20 __________

WEIGHT BEFORE WASH: 678.7 NET SOIL WT. Bowl 008A

After wash 671.5

EQUIPMENT USED:

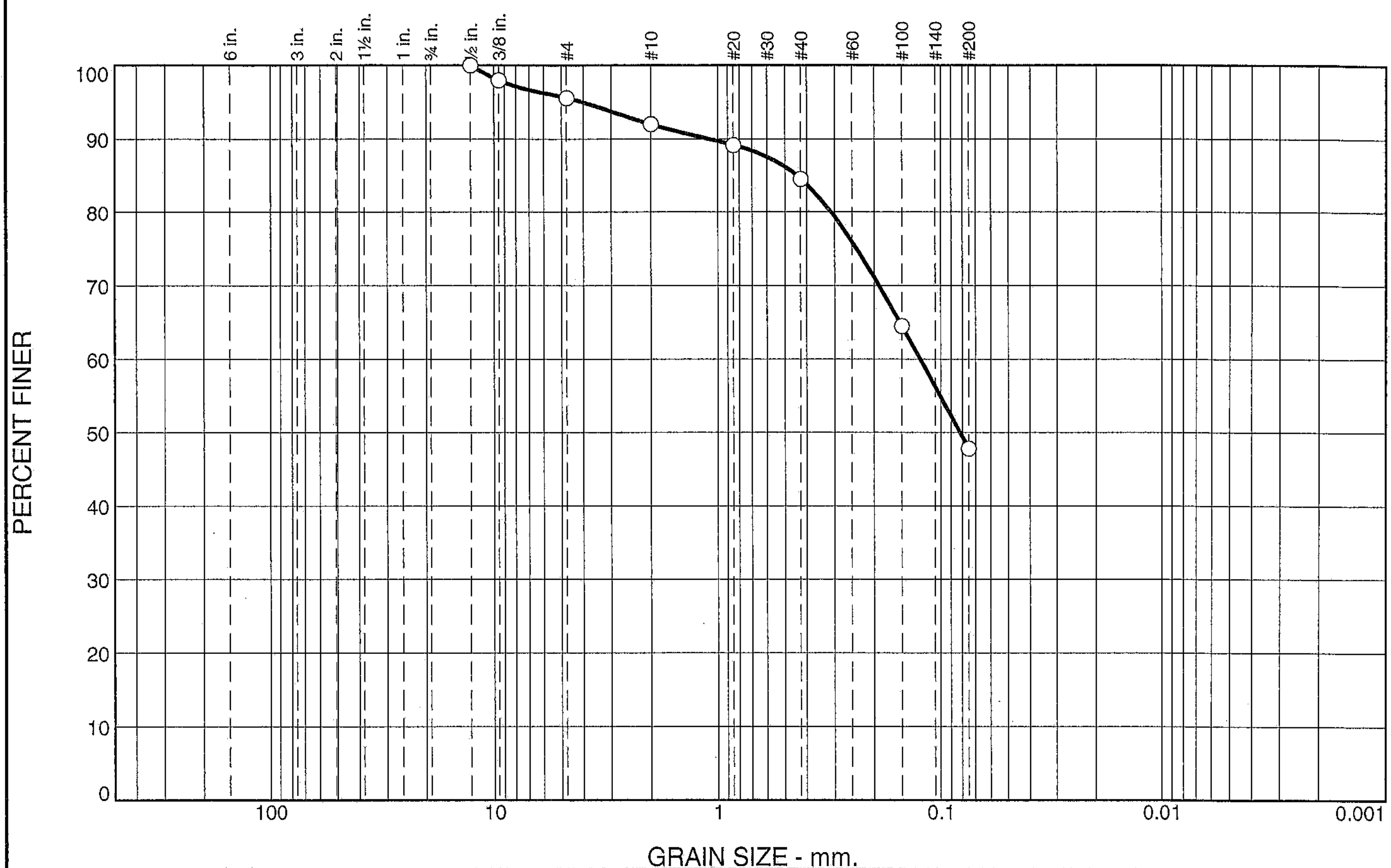
Scale I.D.: CW 9204

Sieve Set I.D.: 12" SET 1

Oven I.D.: 148875

Shaker I.D.: Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	3.6	7.4	36.8	47.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5"	100.0		
0.375"	98.0		
#4	95.6		
#10	92.0		
#20	89.2		
#40	84.6		
#100	64.5		
#200	47.8		

* (no specification provided)

Material Description

(#29242)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.0825 D_{85}= 0.4402 D_{60}= 0.1242
D_{50}= 0.0821 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: LPC

Date: 9/15/15

amec

Client: City of San Diego
Project: City of San Diego Los Penasquitos Sediment Transport Monitoring 2015-2016
Project No: 5025151109.02 **Figure** #29242

Tested By: H. Alwaque **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

9/15/2015

Client: City of San Diego
Project: City of San Diego Los Penasquitos Sediment Transport Monitoring 2015-2016
Project Number: 5025151109.02
Location: LPC
Material Description: (#29242)
Date: 9/15/15
Tested by: H. Alwaque **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.5"	100.0
0.375"	98.0
#4	95.6
#10	92.0
#20	89.2
#40	84.6
#100	64.5
#200	47.8

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	4.4	4.4	3.6	7.4	36.8	47.8			47.8

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.0821	0.1242	0.3108	0.4402	1.0825	4.0163

Fineness Modulus
0.92

AMEC

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

City of San Diego 2015-2016

PROJECT NO: 5025.15.1109.02	NAME: Los Penasquitos Sediment Trans.	LAB NO.: 69242
LOCATION: LPC	SAMPLED BY: KB/RW	DATE: 9/10/15
SOURCE:	SUBMITTED BY: Jeremy Burns	DATE: 9/10/15
MATERIAL:	AUTHORIZED BY:	DATE:
BORING:	TESTED BY: HA	DATE: 9/15/15
~~DEPTH~~: 11:00	REVIEWED BY:	DATE:

TIME

+3/8 @ 132.3

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS	
1 1/2"				
1"				
3/4"				
1/2"			100	
3/8"		2.0	98.0	
#4	14.1	2.4	97.6	95.6
#10	35.5	6.1	93.9	92.0
#20	52.3	9.0	91.0	89.2
#40	79.1	13.7	86.3	84.6
#100	198.2	34.2	65.8	64.5
#200	296.5	51.2	48.8	47.8
PAN	322.2	55.7	44.3	

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ________

Weight of soil & tare (dry) 10,802.3

Weight of Tare 4199.6

Weight of H20 ________

Net weight of dry soil 6602.7

% H20 ________

WEIGHT BEFORE WASH: 578.9 NET WT SOIL BOWL YB

After Wash: 321.4

EQUIPMENT USED:

Scale I.D.: CW 9204

Sieve Set I.D.: 12" SET #1

Oven I.D.: 148875

Shaker I.D.: Ginger

5025 151109.02

Analysis Request and Chain of Custody

City of San Diego 2015-2016

Los Penasquitos Sediment Transport Monitoring ~~2014-2015~~

From:
AMEC Environment & Infrastructure
Attn: Jeremy Burns
9177 Sky Park Court
San Diego, CA 92123
Phone: (858) 278-3600 Fax: (858) 278-5300

To:
AMEC Environment Infrastructure
Attn: Liz Collins
9177 Sky Park Court San
Diego, CA 92123
Phone: (858) 278-3600 Fax: (858) 278-5300

	SampleID	Date	Time	Analyses	Bottle Type	Preservative	Bottle Count
29240	CCC-VBL	9/10/15	10:50	Particle Size Distribution	5 Gallon Plastic Bucket	NA	1 of 1
29241	CVC-VBL	↓	11:30	Particle Size Distribution	5 Gallon Plastic Bucket	NA	1 of 1
29242	LPC-VBL	↓	11:00	Particle Size Distribution	5 Gallon Plastic Bucket	NA	1 of 1

USE SOIL SIEVES

Sampler's Initials: KB/RW

Relinquished By: [signature] Date/Time: 9/10/15 12:45 Received By: [signature] Date/Time: 9/10/15 12:45

Relinquished By:____ Date/Time:____ Received By:____ Date/Time:____

APPENDIX D
PEBBLE COUNT PARTICLE-SIZE DISTRIBUTION ANALYSIS

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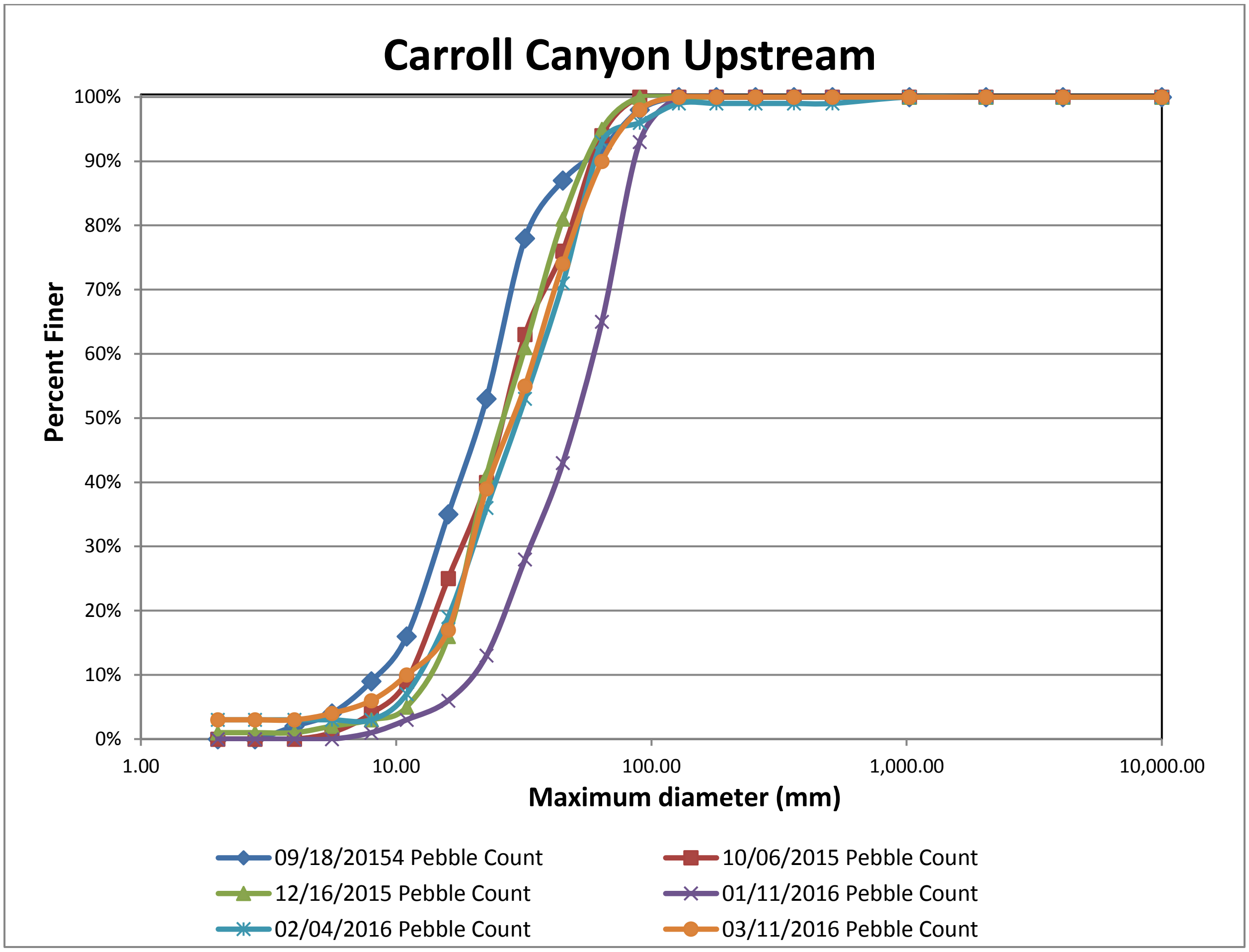
APPENDIX D: POST-STORM PEBBLE COUNT PARTICLE SIZE DISTRIBUTION ANALYSIS

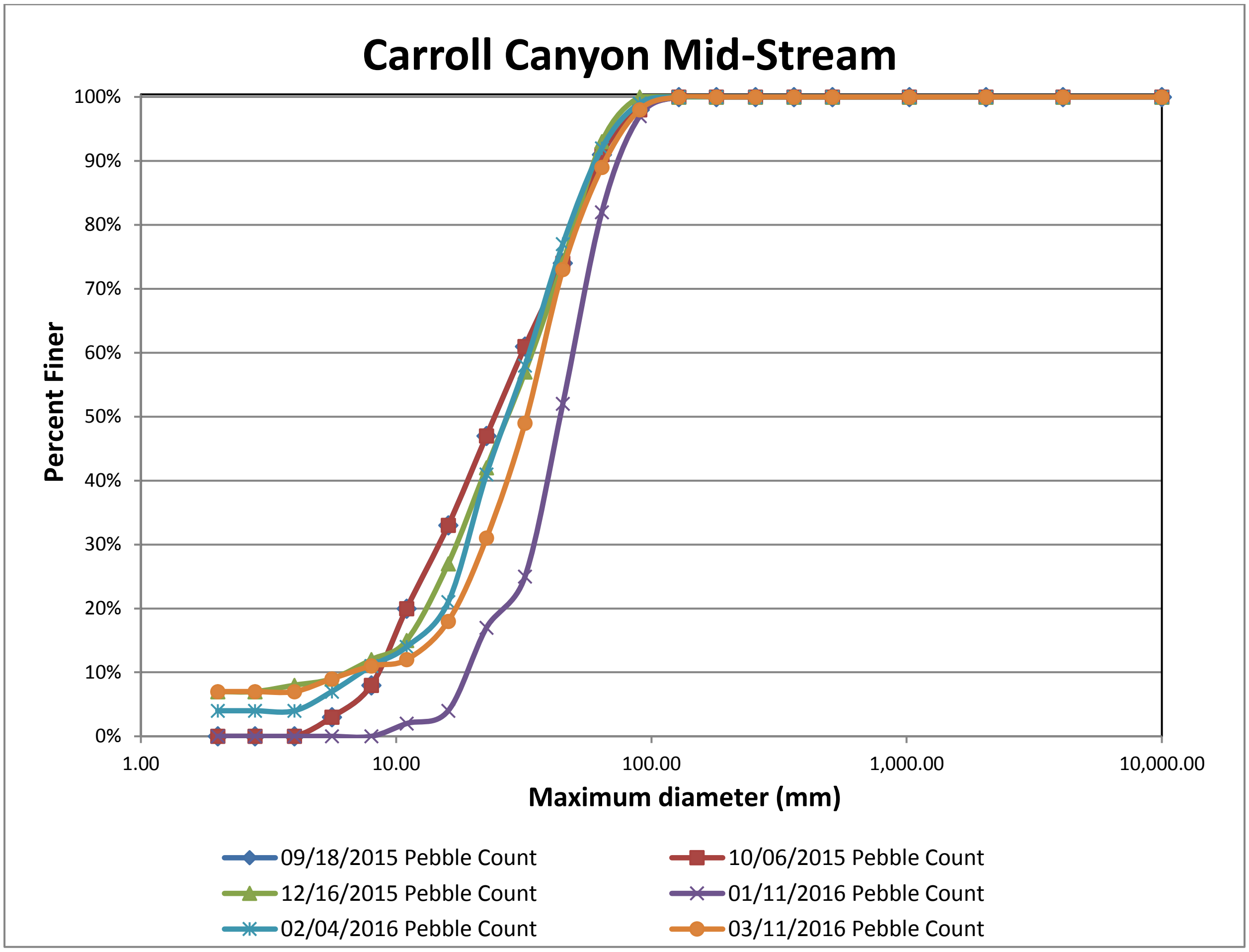
This appendix presents the particle size distribution analysis results conducted for Carroll Canyon, Carmel Valley, and Los Peñasquitos Creek using the post-storm pebble count data collected throughout the wet weather season.

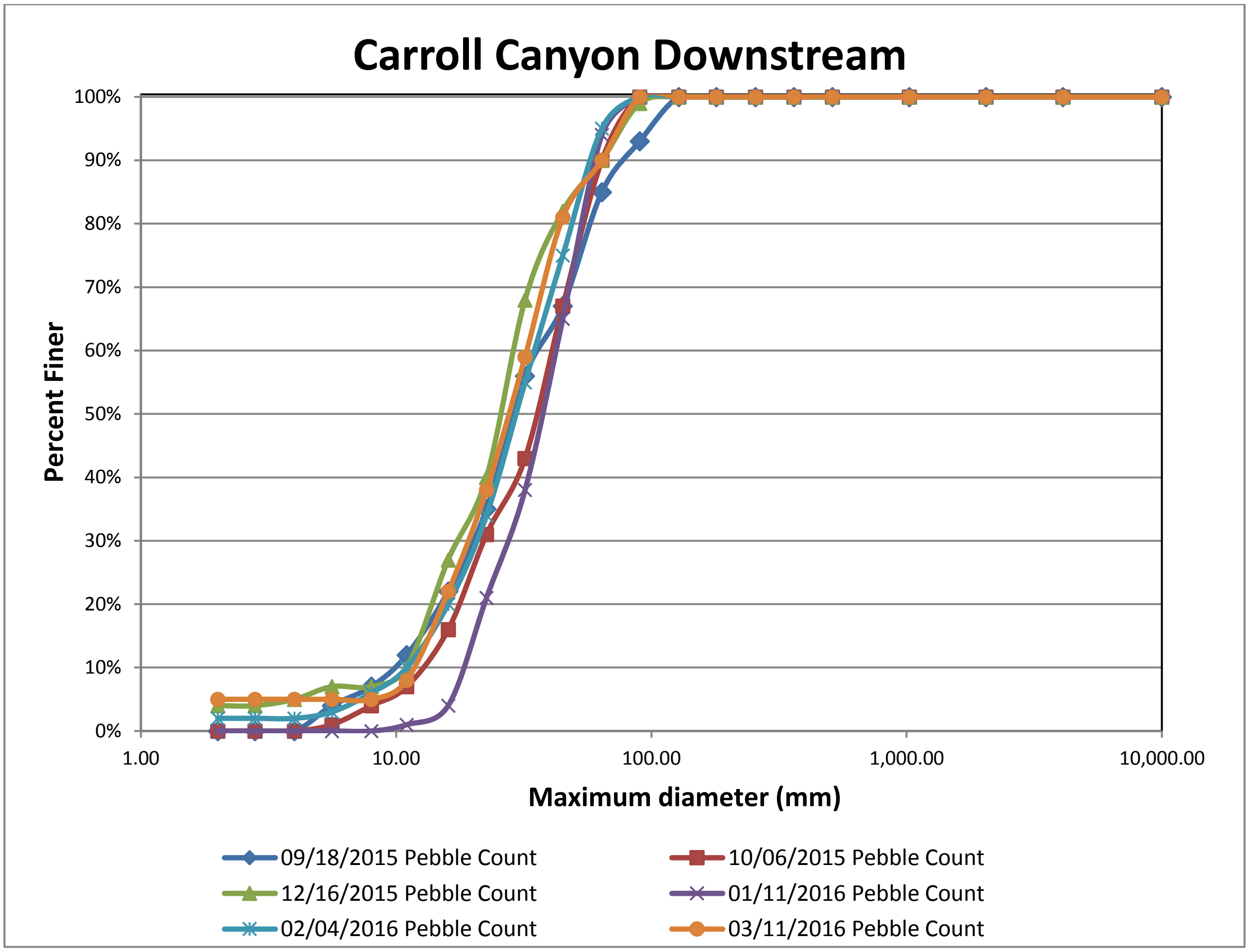
The graphs for Carroll Canyon and Carmel Valley Creeks are relatively consistent, but show a trend toward larger pebble sizes after the largest series of rainfall events of the monitoring season, January 4 to January 7, 2016. This series of events had intense periods of rain resulting in high flow rates, known to transport particles (particularly smaller particles) at higher rates based on supply limits, leaving behind a higher proportion of larger pebbles. The results for Los Peñasquitos Creek did not show a consistent pattern until after the large rainfall event in January, where the grain size distribution shifted to larger percentages of sand accumulating compared to the beginning of the monitoring season. This may be to the very high flow during the January 4 to January 7 storm scouring the bottom of fine material and depositing larger particles (e.g., sand), with subsequent storms (with low flows) depositing fine particles again. The survey at this site on October 6, 2015 seems to be the outlier in terms of having the lowest percentage of sand. If that survey is removed, the lowest percentage of sand observed in the streambed occurred after the largest storm in January 2016. While large events may mobilize particles and transport them downstream, results from past years in addition to this season suggest that low flow conditions do not alter the streambed composition at Los Peñasquitos Creek by transporting material downstream, rather the composition is most affected by deposition over time.

Complete pebble count results and particle-size distribution plots are provided below.

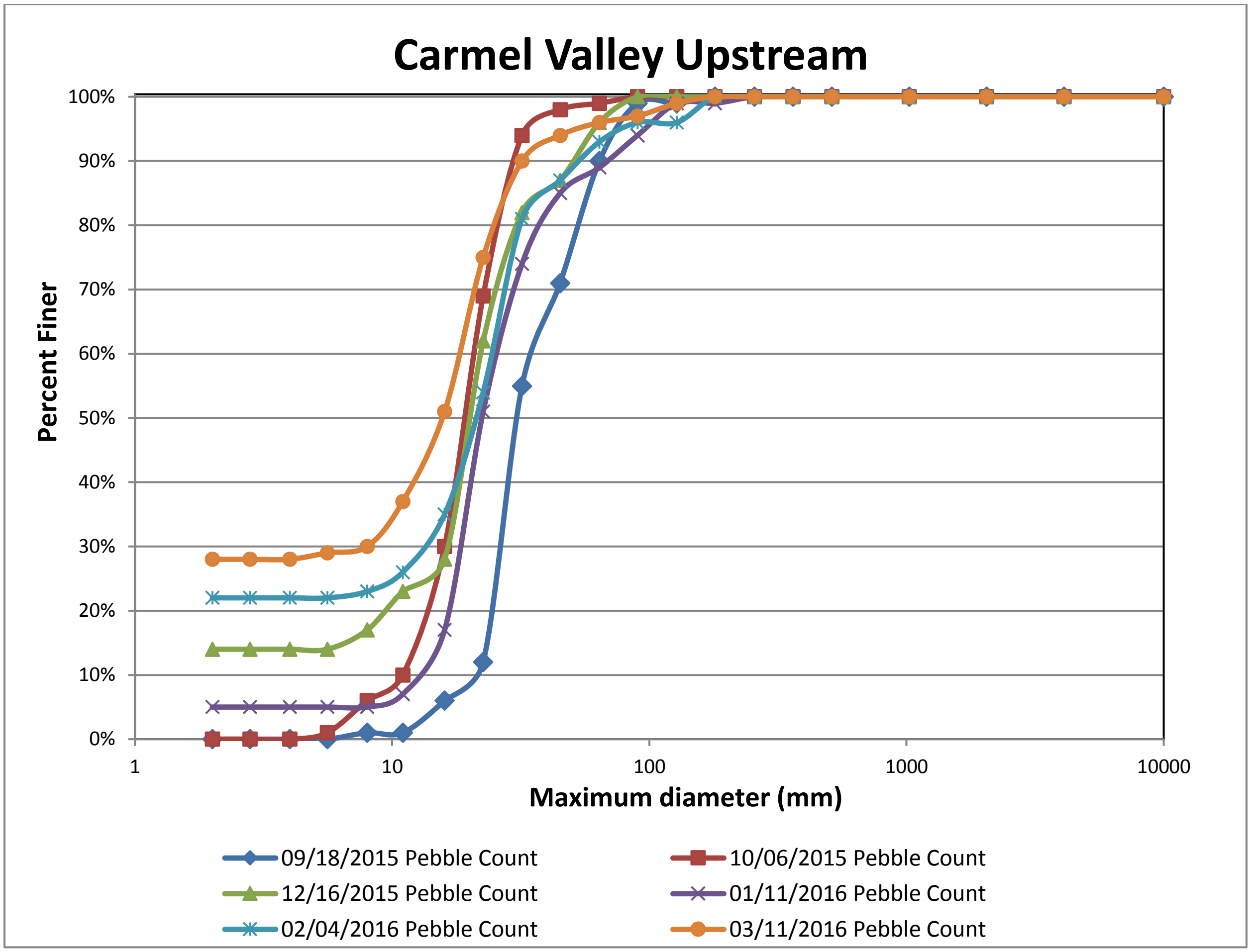
<u>Carroll Canyon Creek:</u>

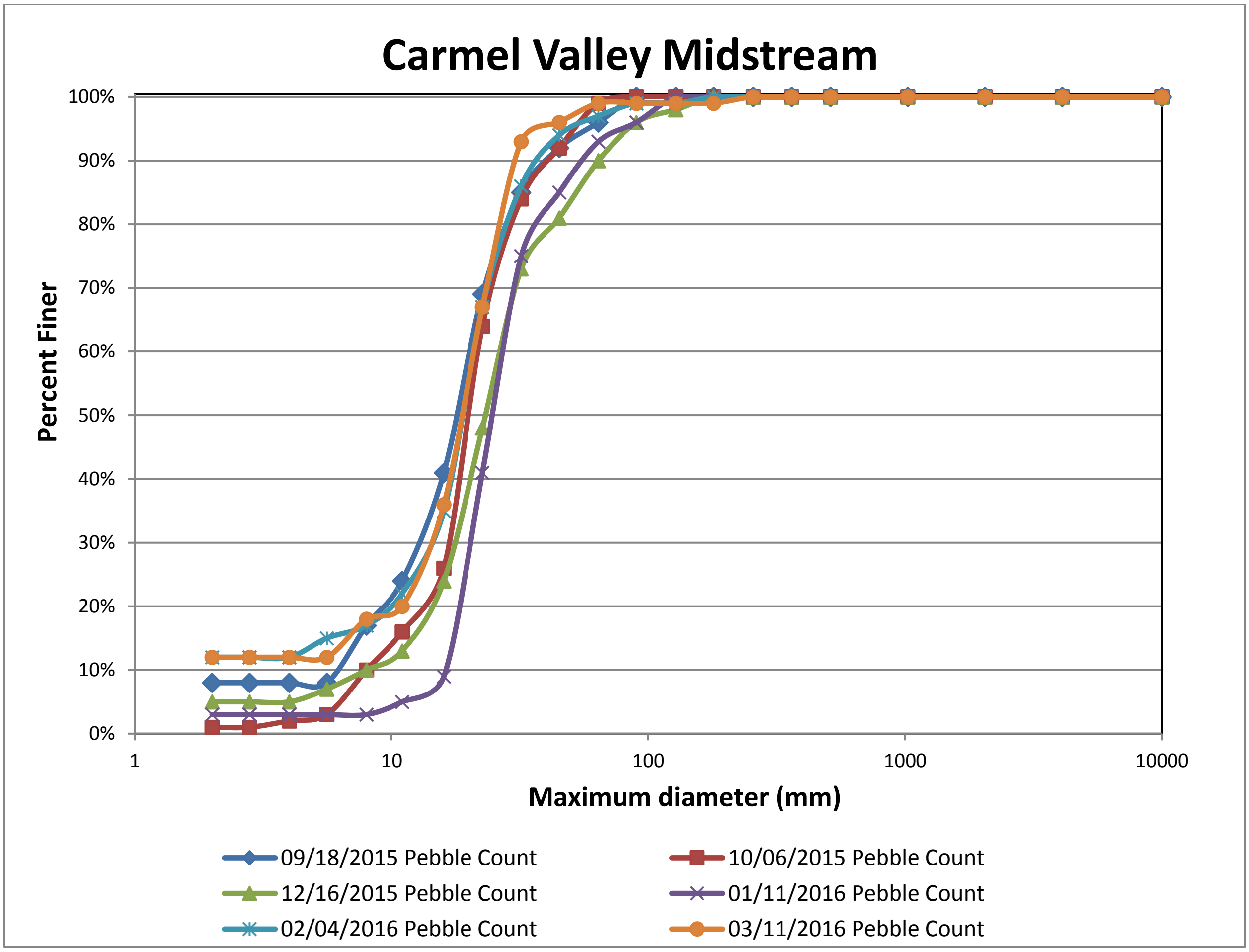


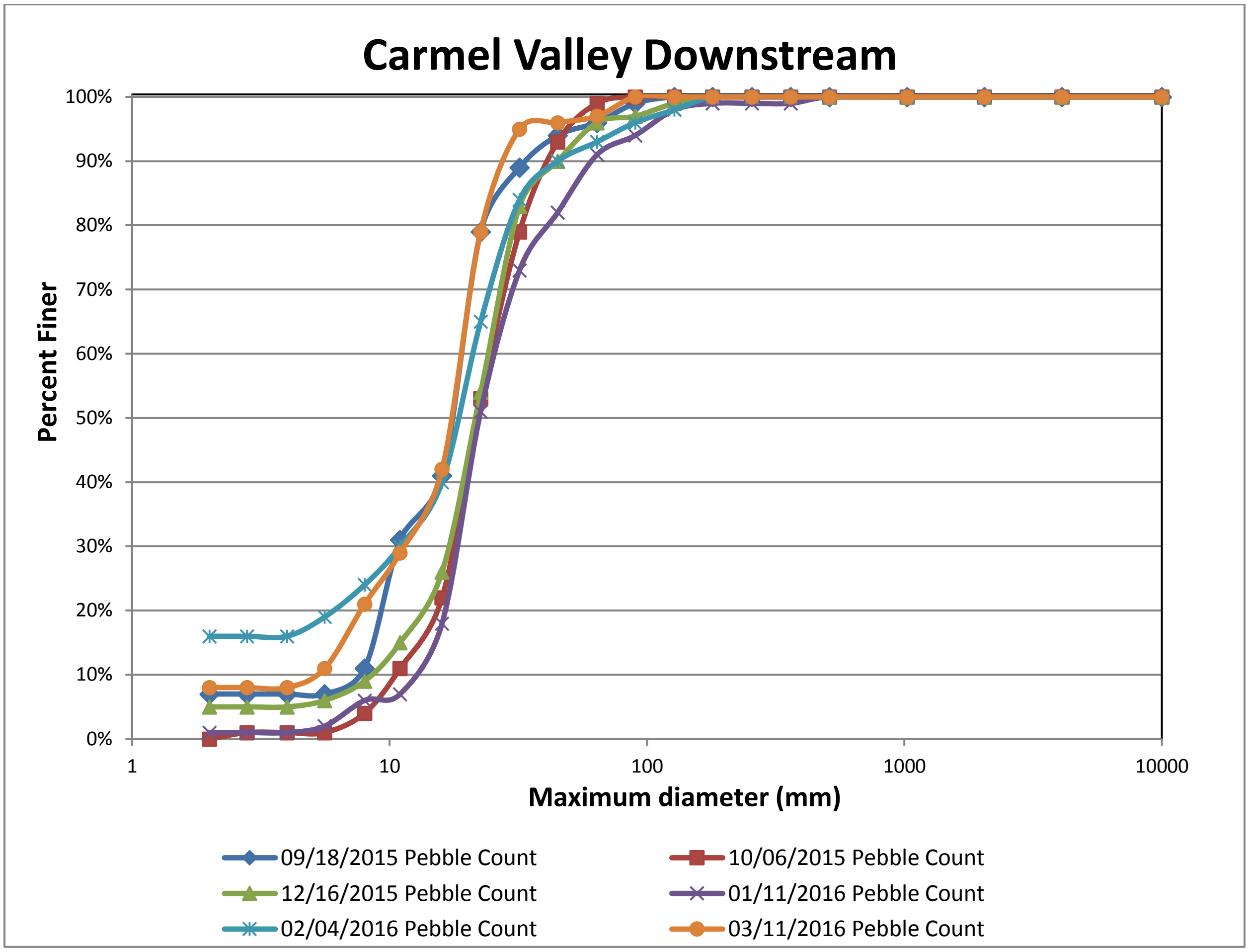

Carroll Canyon Mid-Stream
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Finer
1.00
10.00
100.00
1,000.00
10,000.00
Maximum diameter (mm)
09/18/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count


Carroll Canyon Downstream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1.00
10.00
100.00
1,000.00
10,000.00
Maximum diameter (mm)
09/18/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count

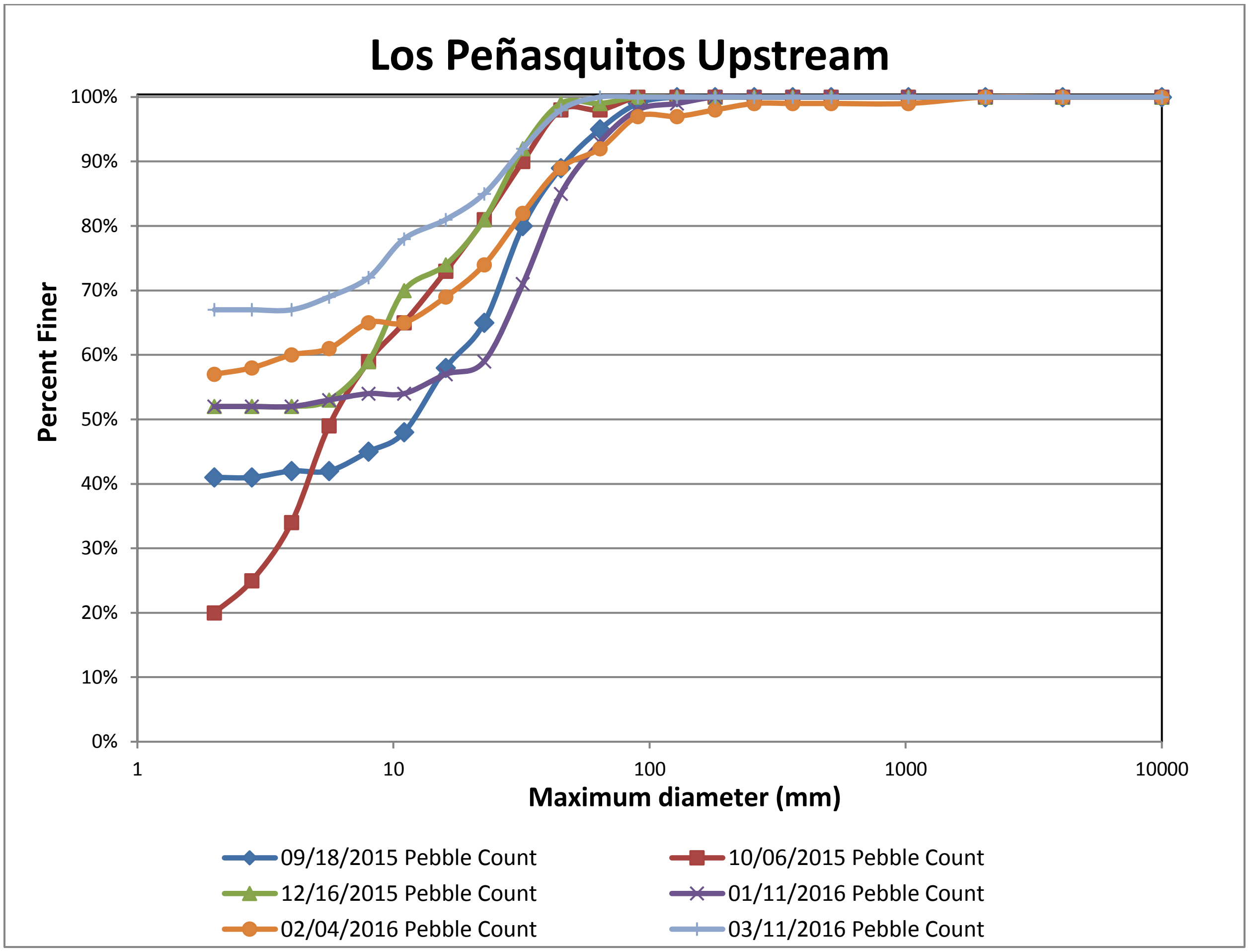
Carmel Valley Creek:

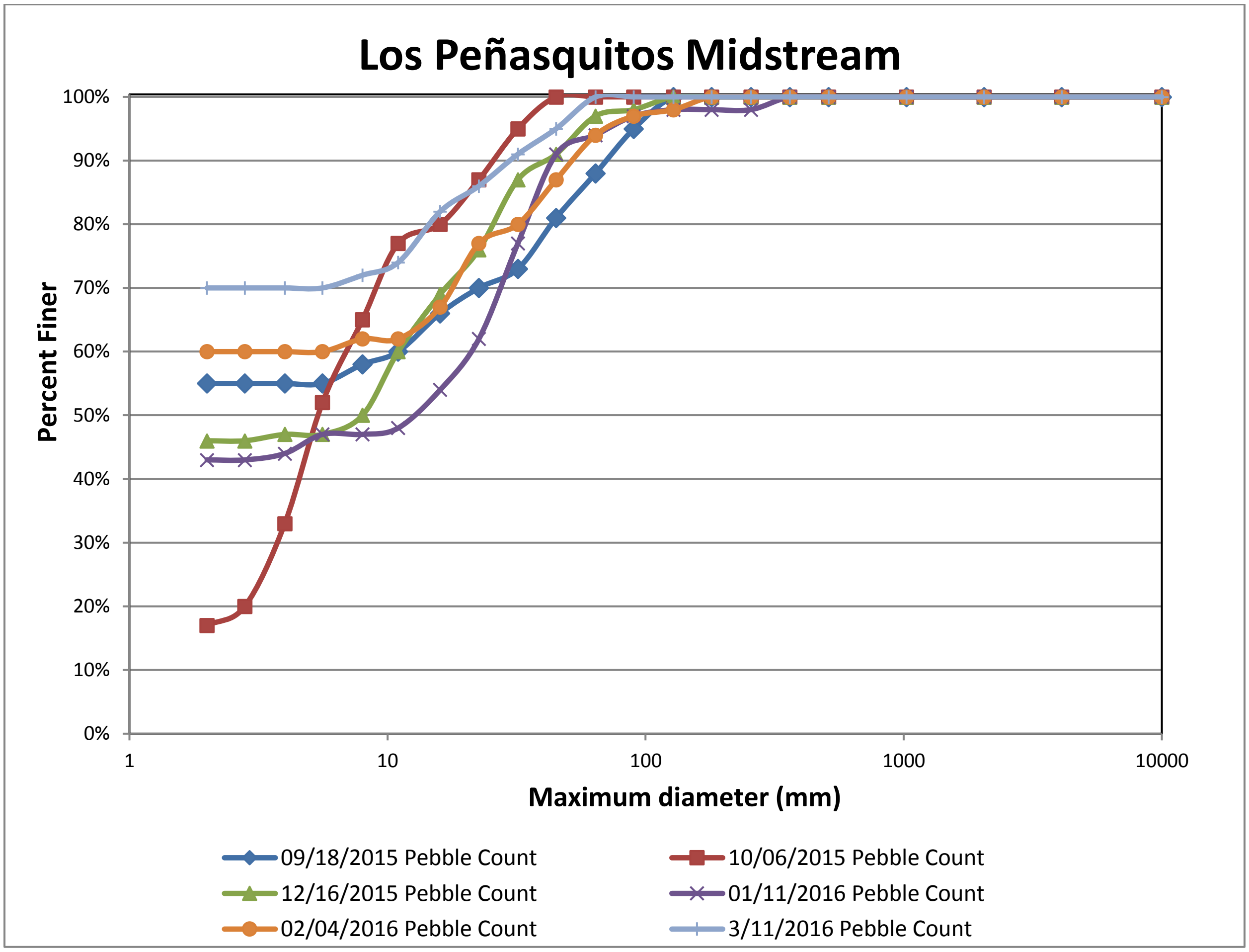


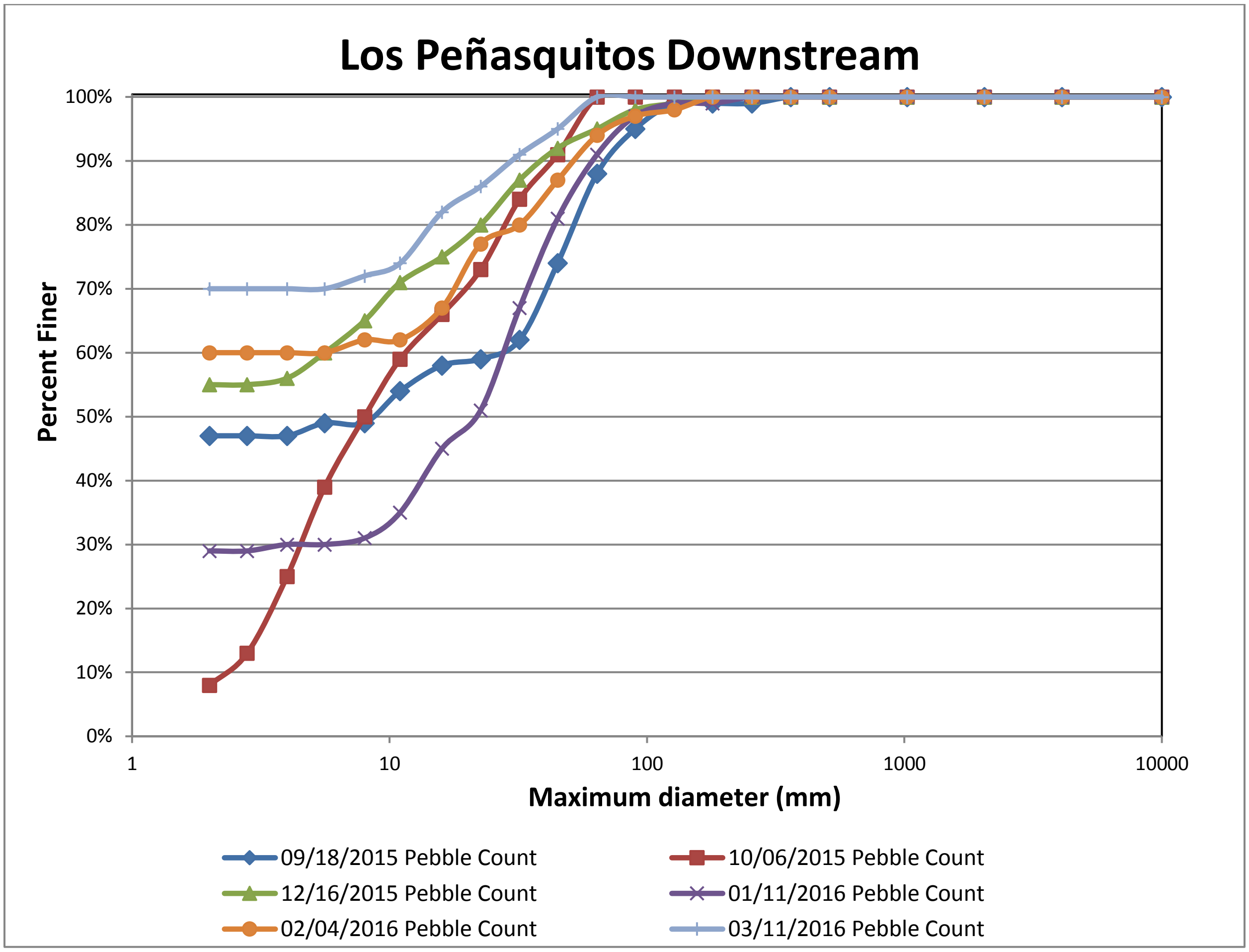

Carmel Valley Midstream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/18/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count


Carmel Valley Downstream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/18/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count

Los Peñasquitos Creek:




Los Peñasquitos Midstream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/18/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
3/11/2016 Pebble Count


Los Peñasquitos Downstream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/18/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count

APPENDIX E
STREAMBED PHOTOGRAPH LOG

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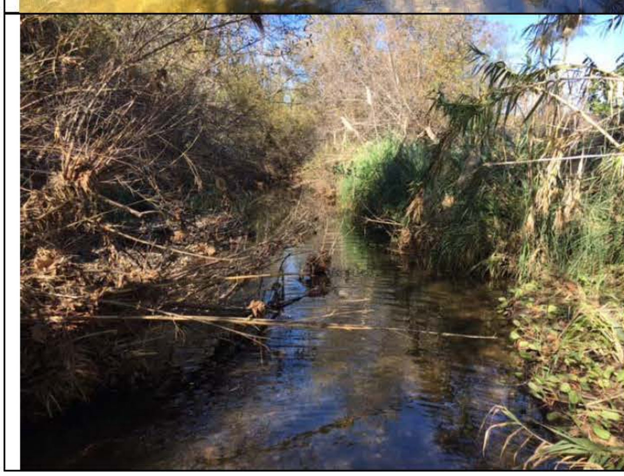
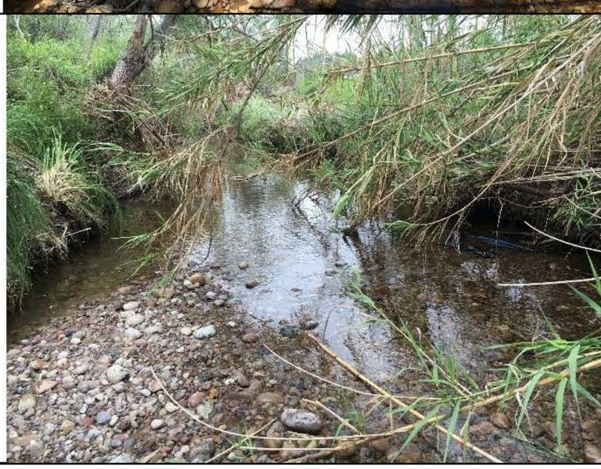
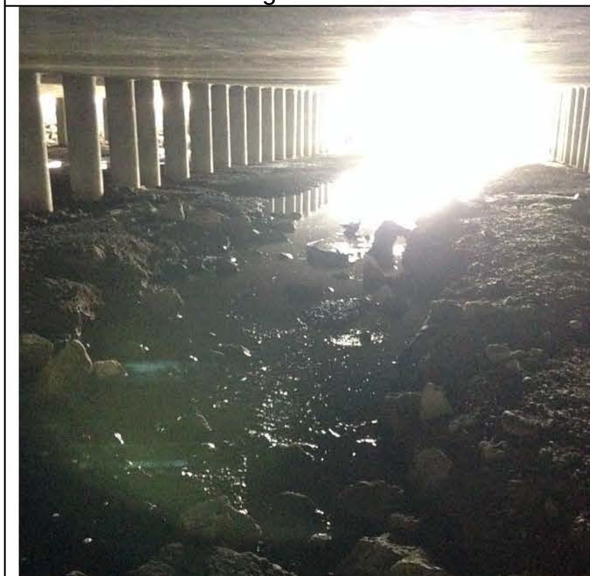
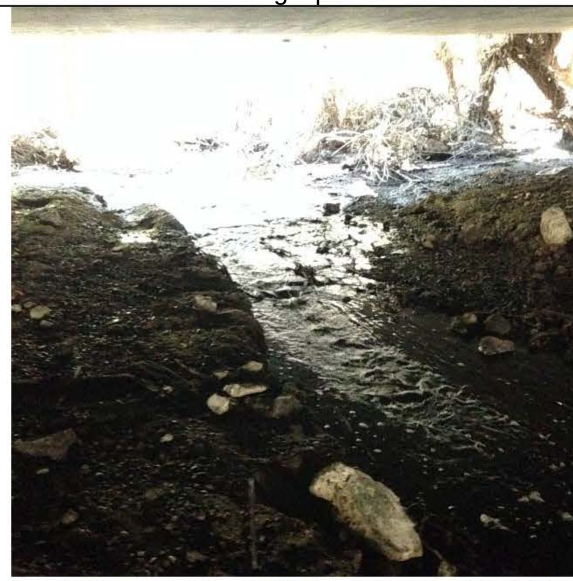
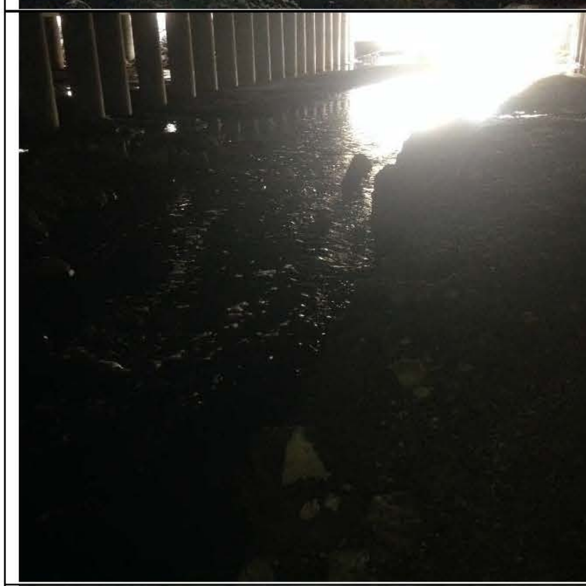
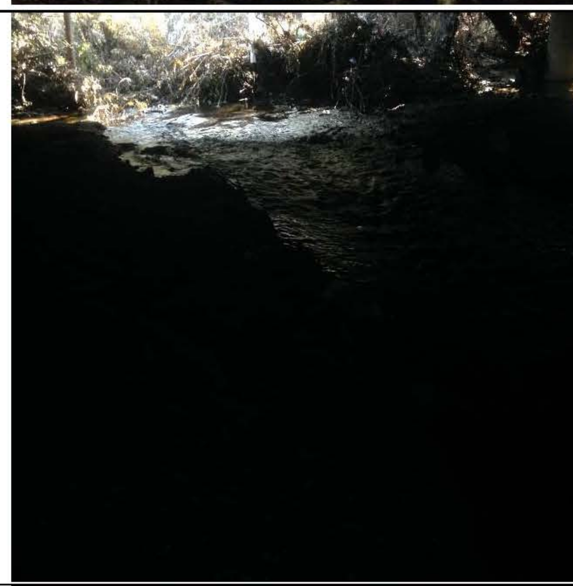
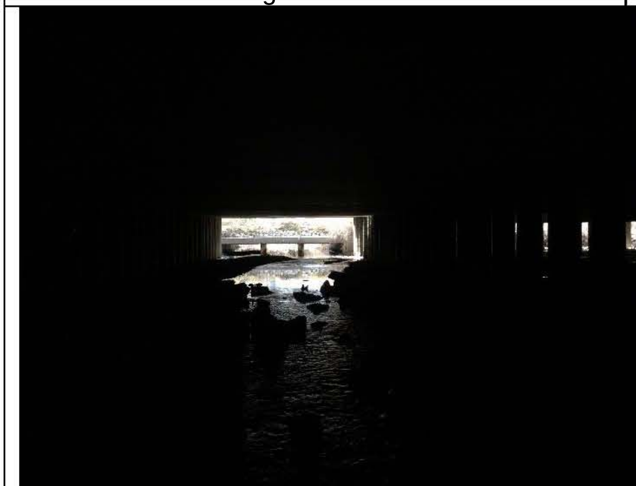
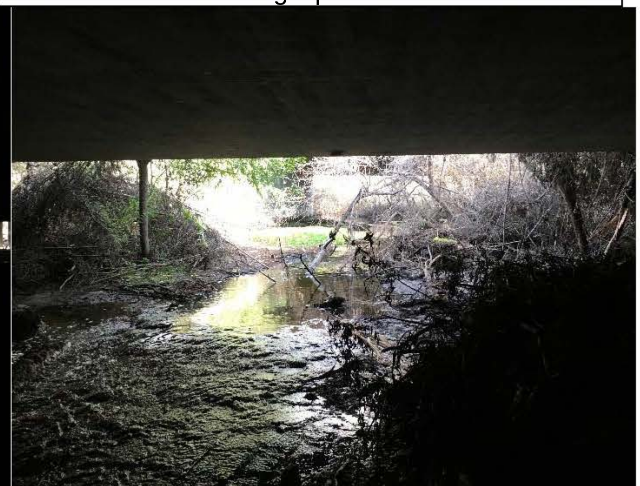
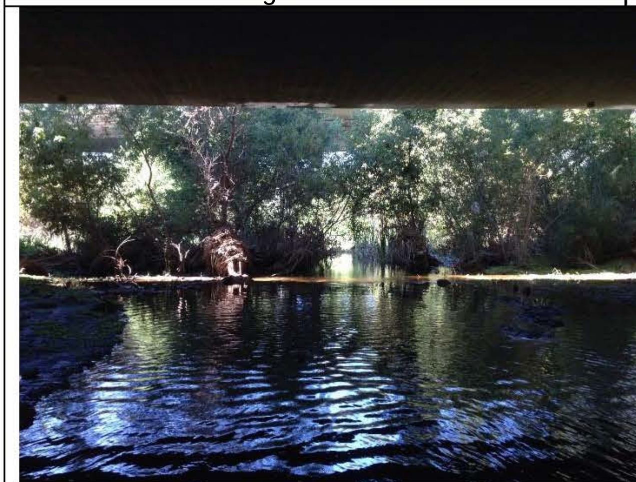
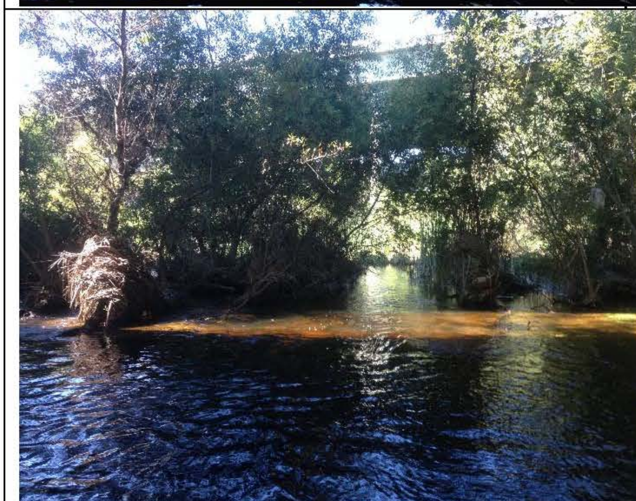
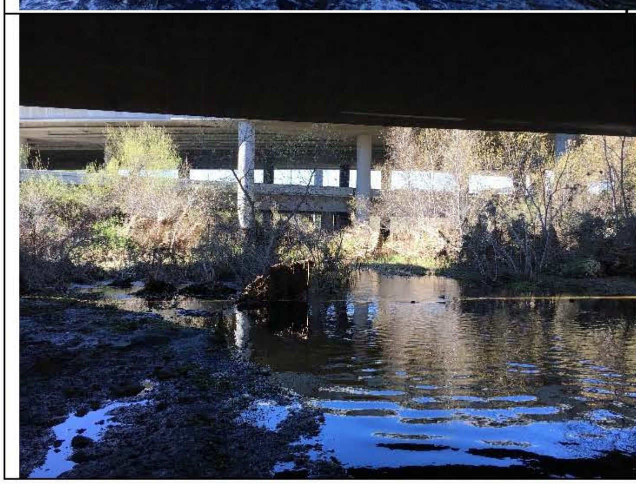
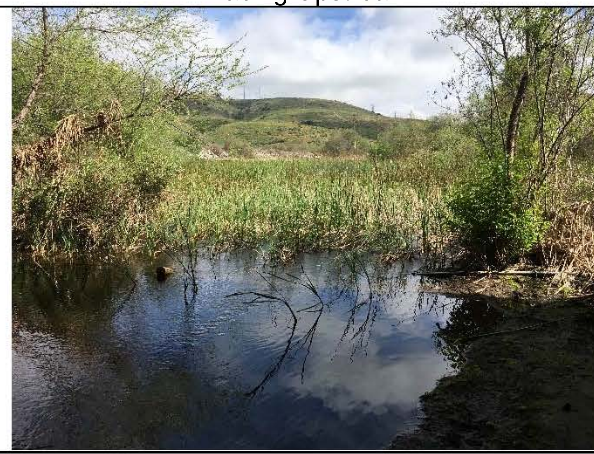
Carroll Canyon Creek Bedload Monitoring Location	
Facing Downstream	Facing Upstream
	
	
	

Carroll Canyon Creek Bedload Monitoring Location	
Facing Downstream	Facing Upstream
	
	
	

Carmel Valley Creek Bedload Monitoring Location	
Facing Downstream	Facing Upstream
	
	
	

Carmel Valley Creek Bedload Monitoring Location	
Facing Downstream	Facing Upstream
	
	
	

Los Peñasquitos Creek Bedload Monitoring Location	
Facing Downstream	Facing Upstream
	
	
	

Los Peñasquitos Creek Bedload Monitoring Location	
Facing Downstream	Facing Upstream
	

APPENDIX F
CROSS-SECTION SURVEYS AND HEAD-VERSUS-FLOW TABLE CALCULATIONS

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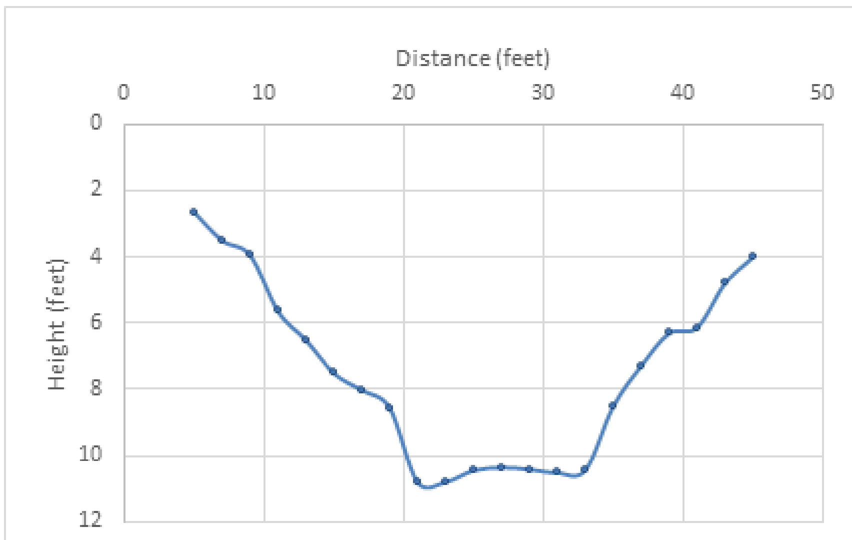
Revised Head versus Flow Estimates

During the 2015–2016 monitoring season, cross-sectional areas of streambeds at the three monitored locations were updated and used to revise the head-versus-flow tables. Refined cross-sectional areas were captured using a laser-level scope. Cross-sectional survey results are provided in the following tables and graphs:

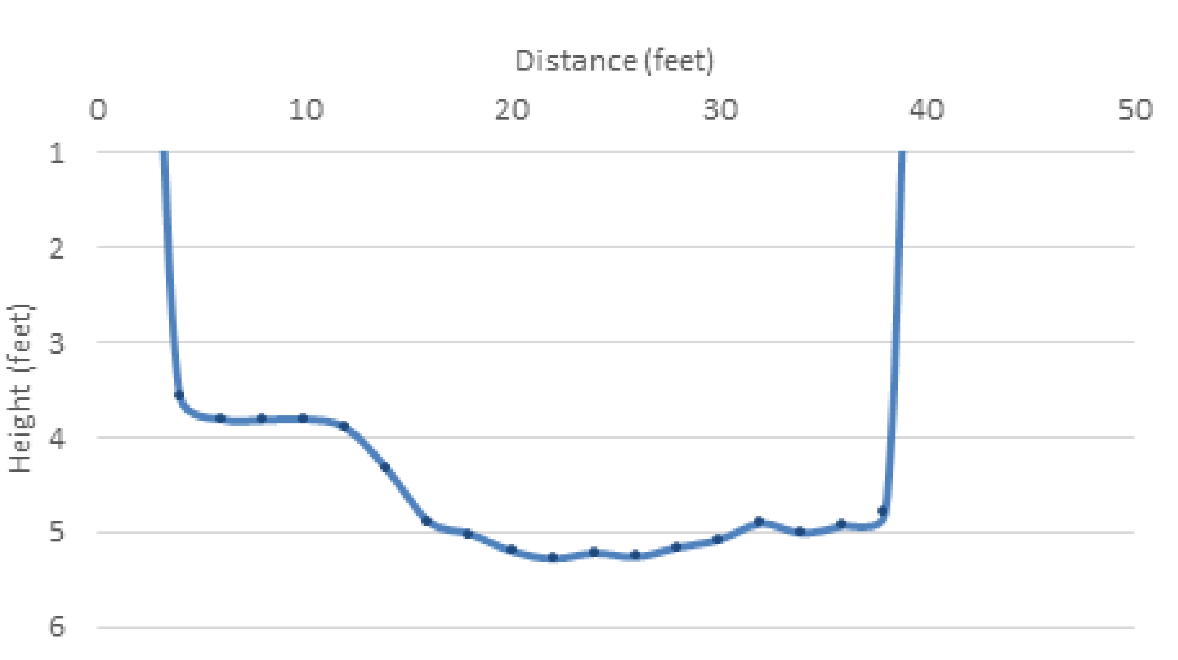
Cross Section Survey Results for Carroll Canyon Creek

Note: Cross-sectional survey of streambeds conducted using a laser-level scope.

Distance (ft)	Height (ft)
5	2.65
7	3.5
9	3.95
11	5.65
13	6.52
15	7.51
17	8.02
19	8.55
21	10.81
23	10.8
25	10.45
27	10.36
29	10.42
31	10.52
33	10.45
35	8.52
37	7.3
39	6.31
41	6.14
43	4.8
45	4



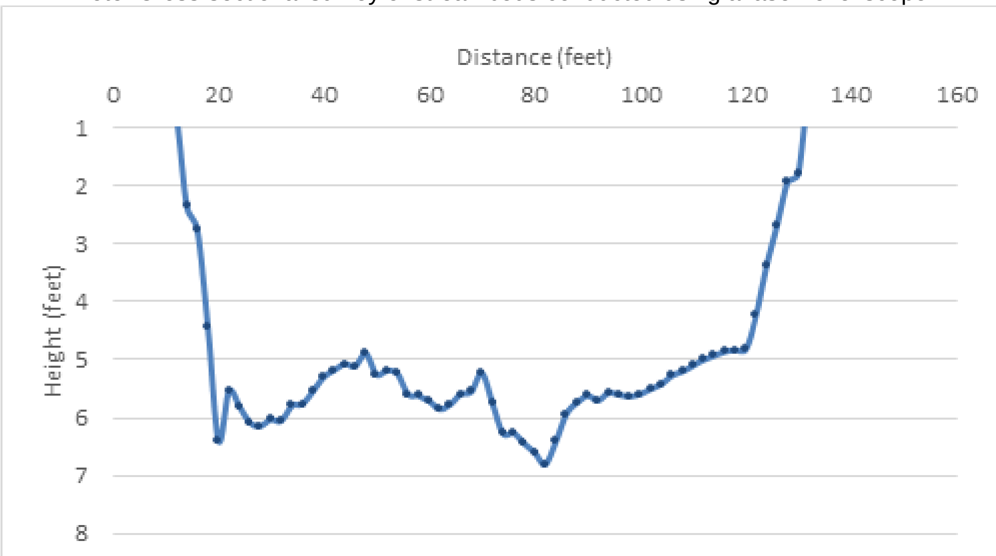
Note: Chart represents data from last year, no updated survey data is available for this site.



Distance (ft)	Height (ft)	Distance (ft)	Height (ft)
3	0.00	**22**	5.28
4	3.57	**24**	5.22
6	3.81	**26**	5.26
8	3.82	**28**	5.16
10	3.81	**30**	5.08
12	3.90	**32**	4.91
14	4.34	**34**	5.01
16	4.89	**36**	4.93
18	5.02	**38**	4.80
20	5.20	**39**	0.00

Cross Section Survey Results for Los Peñasquitos Creek

Note: Cross-sectional survey of streambeds conducted using a laser-level scope.



Distance (ft)	Height (ft)	Distance (ft)	Height (ft)	Distance (ft)	Height (ft)
8	-0.82	52	5.19	96	5.6
10	0.47	54	5.24	98	5.63
12	0.80	56	5.59	100	5.59
14	2.35	58	5.62	102	5.5
16	2.76	60	5.71	104	5.42
18	4.43	62	5.85	106	5.27
20	6.39	64	5.77	108	5.2
22	5.54	66	5.59	110	5.1
24	5.81	68	5.55	112	5
26	6.08	70	5.23	114	4.93
28	6.14	72	5.75	116	4.86
30	6.03	74	6.27	118	4.83
32	6.05	76	6.26	120	4.82
34	5.79	78	6.44	122	4.24
36	5.76	80	6.60	124	3.38
38	5.54	82	6.80	126	2.68
40	5.30	84	6.41	128	1.93
42	5.18	86	5.93	130	1.79
44	5.07	88	5.74	132	0.35
46	5.11	90	5.62	134	-0.23
48	4.89	92	5.7	136	-1.32
50	5.25	94	5.57		

Multiple field flow measurements using wading rods and StreamPro ADCPs were used to verify and calibrate the revised head-versus-flow table. Flow estimates were estimated using the Manning's equation, which is used to calculate cross-sectional average velocity in open channels:

$$v = k_n / n \, R^{2/3} \, S^{1/2} \quad (1)$$

Where,

v = cross-sectional mean velocity (ft/s)
k_n = 1.486
n = Manning coefficient of roughness
R = hydraulic radius (ft)
S = slope of pipe (ft/ft)

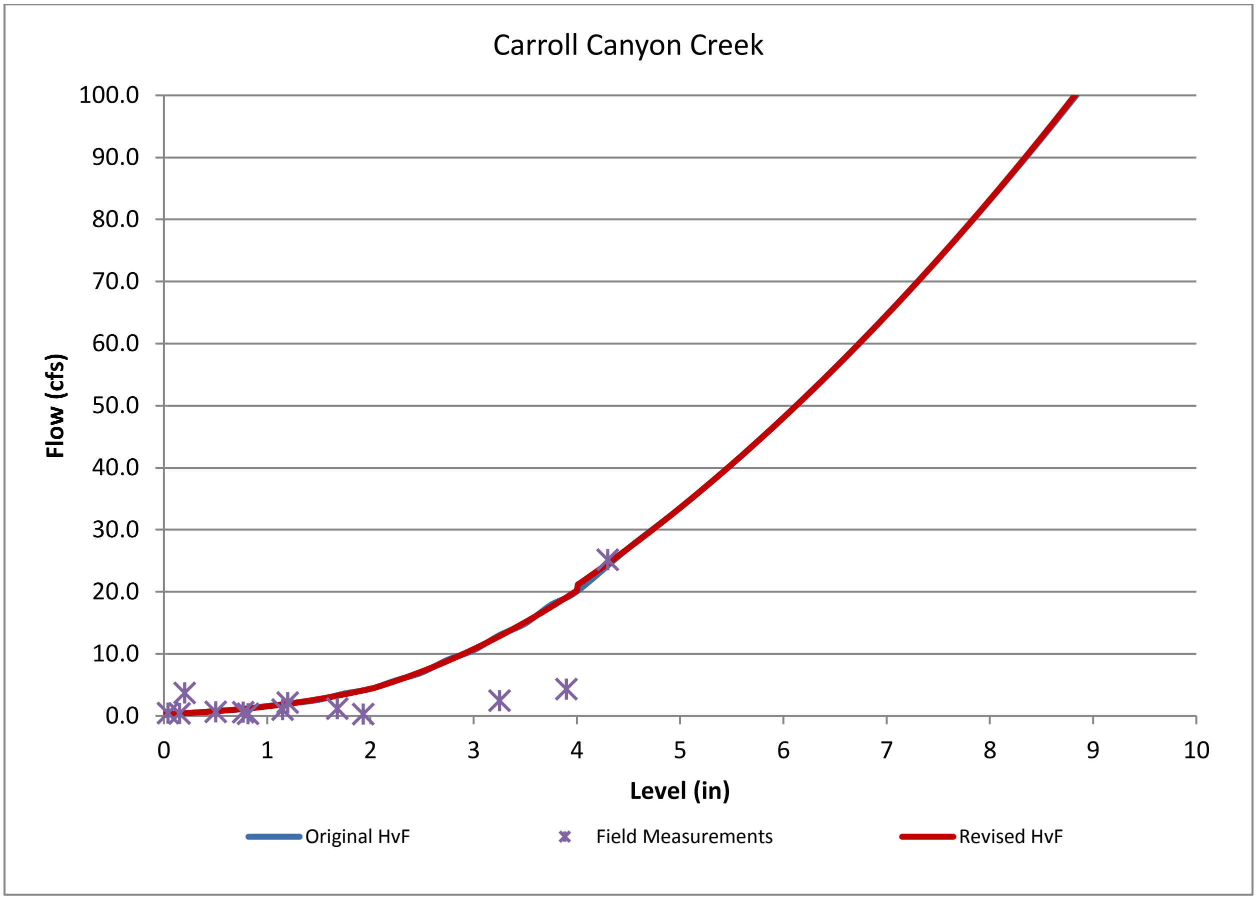
Hydraulic radius can be expressed as:

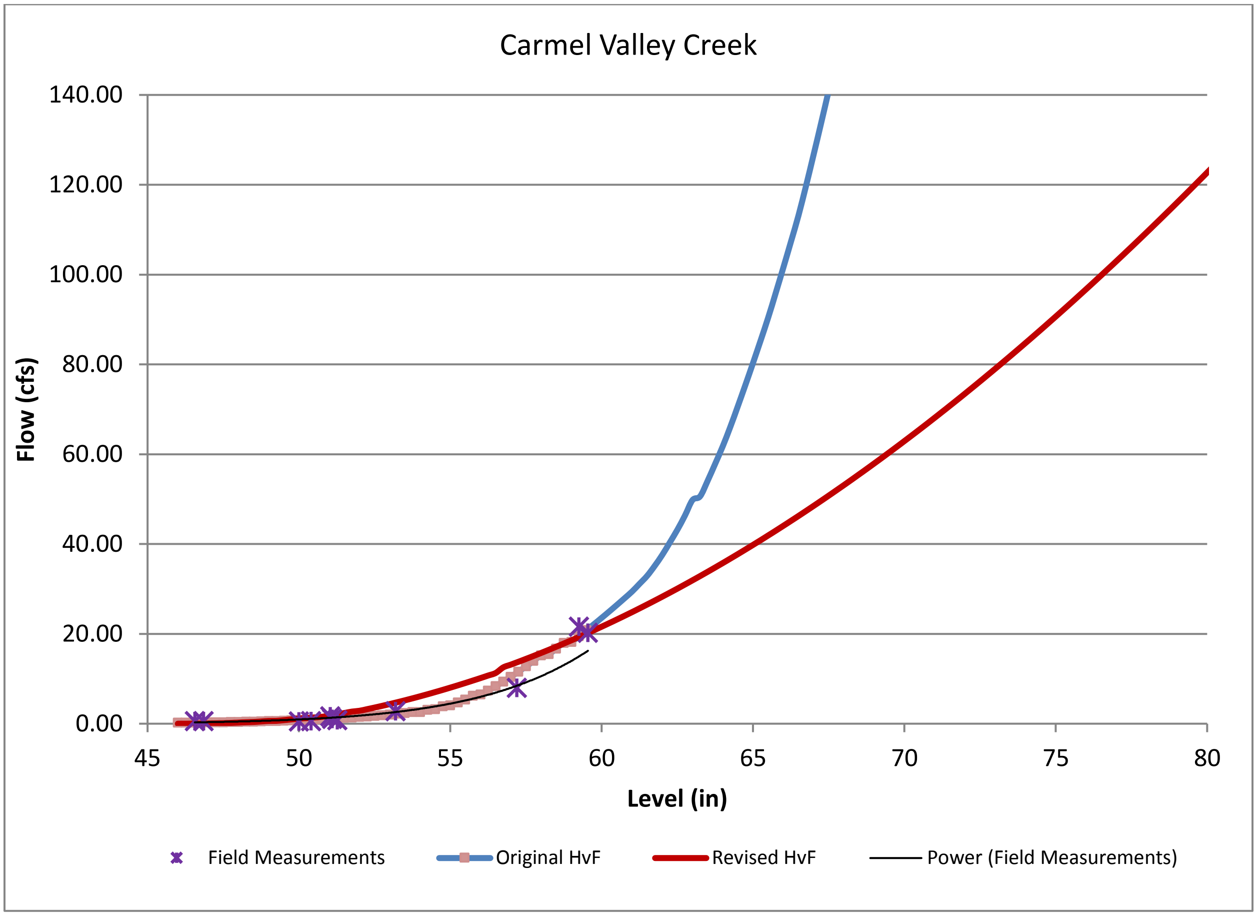
$$R = A / P \qquad (2)$$

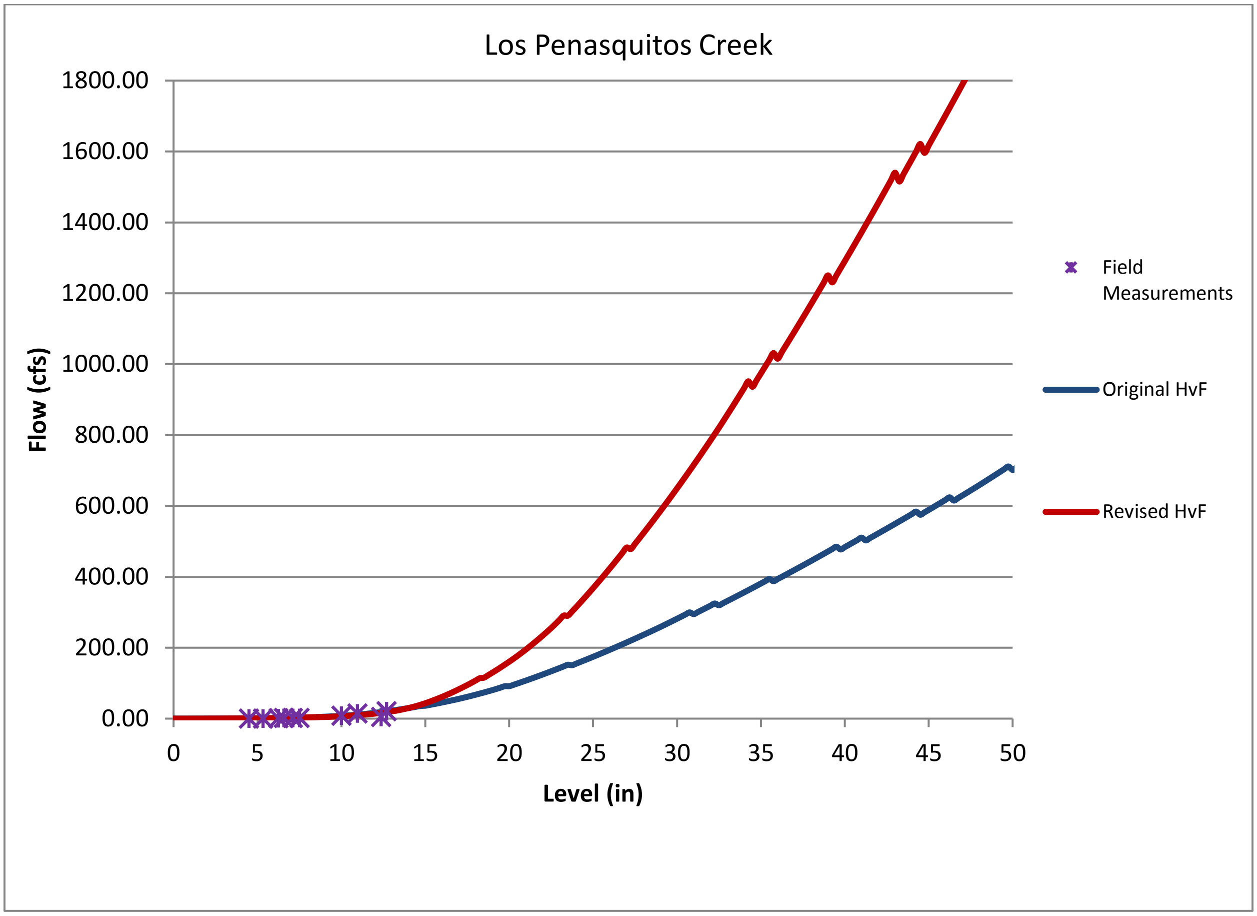
Where,

A = cross sectional area of flow (ft^2)
P = wetted perimeter (ft)

The following figures show the revised and previous head versus flow estimates and field flow measurements for Carroll Canyon, Carmel Valley and Los Peñasquitos Creeks:


Carroll Canyon Creek
Flow (cfs)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0
1
2
3
4
5
6
7
8
9
10
Level (in)
Original HvF
Field Measurements
Revised HvF


Carmel Valley Creek
Flow (cfs)
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
45
50
55
60
65
70
75
80
Level (in)
Field Measurements
Original HvF
Revised HvF
Power (Field Measurements)


Los Penasquitos Creek
1800.00
1600.00
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
Flow (cfs)
0
5
10
15
20
25
30
35
40
45
50
Level (in)
Field Measurements
Original HvF
Revised HvF

APPENDIX G
ALTERNATIVE LOAD ESTIMATION ANALYSIS

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FY16 Update

Rainfall intensities were estimated for both FY15 and FY16 based on data recorded from Los Peñasquitos Creek rain gauge and relationships between maximum 1-hour rainfall intensity and estimated daily load using data collected during FY14 and FY15. When incorporating data collected during FY16, the relationships were much weaker and deemed unreliable. This is likely due to the intense nature of storms monitoring in FY16. Therefore, the best fit line developed in FY15 was used to calculate non-monitored load estimates for FY15 and FY16. Although this analysis is preliminary, the equations from FY15 were used for comparison purposes between the FY16 load estimations using the “average estimation method” described in the Monitoring Report, and for comparison of the effectiveness of the current form of the “rainfall intensity estimation method” described in this appendix between two hydrologically different years. The procedures described below are those used in FY15 (as reported in the FY15 Monitoring Report). Estimation results for FY16 were added to Table G-1.

Estimates of Rainfall Intensities

Estimates of maximum rainfall intensity and maximum 1-hour moving rainfall intensity were calculated using the following method:

- Cumulative event rainfall depths are estimated throughout the storm event using rainfall detection values (when the rain gauge bucket tips and a known depth of rain is recorded) and specific dates and times;
- Rainfall Intensities (in/hr) are estimated based on the slope or measured of depth per time ($\Delta D/\Delta t$) divided by 24, where ΔD is the depth associated with each bucket tip;
- Estimates of rainfall intensities assume the intensity starts at zero and increases to the intensity between the first two recorded bucket tips, and the time of the unrecorded start of the rainfall is equal to the time when rainfall was detected for the first time Δt_1 minus Δt;
- Maximum rainfall intensity (in/hr) is observed as the maximum of all estimated rainfall intensities; and lastly,
- The maximum 1-hour rainfall intensity (in/hr) is estimated as the depth of recorded rainfall that occurs within an hour.

The following table summarizes rainfall intensities calculated for the 2013-2014 and 2014-2015 storm events:

Table G-1.
Rainfall Intensity, EMC and Sediment Daily Load Results

Site	Event Date	Max. 1-Hour Rainfall Intensity (inches/hour)	Predicted Estimated Daily Load (tons/day)	Monitored Storm Event Load Estimation (tons/day)
Carroll Canyon Creek	November 1–2, 2014	0.55	88.5	NM
	December 2–4, 2014	0.16	7.04	44.4
	December 12–13, 2014	0.26	19.0	33.5
	December 16–17, 2014	0.22	13.5	NM
	December 30–31, 2014	0.24	16.2	NM
	January 12, 2015	0.17	7.97	NM
	February 22, 2015	0.09	2.16	2.6
	March 1–2, 2015	0.13	4.6	NM
	April 23–24, 2015	0.08	1.7	NM
	October 4–5, 2015	0.05	0.65	NM
	November 27, 2015	0.04	0.41	NM
	December 11, 2015	0.08	1.70	NM
	December 13–14, 2015	0.07	1.29	NM
	December 19, 2015	0.12	3.90	NM
	December 22, 2015	0.04	0.41	NM
	December 28, 2015	0.1	2.69	NM
	January 4, 2016	0.04	0.41	1,283
	January 5, 2016	0.78	181	
	January 6, 2016	0.82	200.62	NM
	January 7, 2016	0.25	17.57	NM
	January 31, 2016	0.1	2.69, 15.2[b c]	15.2
	February 18, 2016	0.1	2.69	NM
	March 5, 2016	0.24	16.2	25.8
	March 7, 2016	0.23	14.81	
	March 11, 2016	0.25	17.57	NM
	April 7, 2016	0.13	4.60	NM
	April 8, 2016	0.15	6.17	NM
	April 10, 2016	0.3	25.54	NM
Estimated Annual Loads			**Average Method**	**Rainfall Intensity Method**
Carroll Canyon Creek 2014–2015 Annual Load (tons/year)			**250**	**376**
Carroll Canyon Creek 2015–2016 Annual Load (tons/year)			**554**	**9,270**

Table G-1.
Rainfall Intensity, EMC and Sediment Daily Load Results (continued)

Site	Event Date	Max. 1-Hour Rainfall Intensity (inches/hour)	Predicted Estimated Daily Load (tons/day)	Monitored Storm Event Load Estimation (tons/day)
Carmel Valley Creek	November 1–2, 2014	0.55	0.972	
	December 2–4, 2014	0.16	0.163	0.198
	December 12–13, 2014	0.26	0.329	0,902
	December 16–17, 2014	0.22	0.258	
	December 30–31, 2014	0.24	0.293	
	January 12, 2015	0.17	0.178	
	February 22, 2015	0.09	0.0707	0.041
	March 1–2, 2015	0.13	0.12	
	April 23–24, 2015	0.08	0.06	
	October 4–5, 2015	0.05	0.03	
	November 27, 2015	0.04	0.02	
	December 11, 2015	0.08	0.06	
	December 13–14, 2015	0.07	0.05	
	December 19, 2015	0.12	0.11	
	December 22, 2015	0.04	0.02	
	December 28, 2015	0.1	0.08	
	January 4, 2016	0.04	0.02	23.9
	January 5, 2016	0.78	1.61	
	January 6, 2016	0.82	1.73	
	January 7, 2016	0.25	0.31	
	January 31, 2016	0.1	0.08, 1.73[b]	1.73
	February 18, 2016	0.1	0.08	
	March 5, 2016	0.24	0.29	1.67
	March 7, 2016	0.23	0.28	
	March 11, 2016	0.25	0.31	
	April 7, 2016	0.13	0.12	
	April 8, 2016	0.15	0.15	
	April 10, 2016	0.3	0.40	
Estimated Annual Loads			**Average Method**	**Rainfall Intensity Method**
Carmel Valley Creek 2014–2015 Annual Load (tons/year)			**3.80**	**5.32**
Carmel Valley Creek 2015–2016 Annual Load (tons/year)			**6.37**	**191**

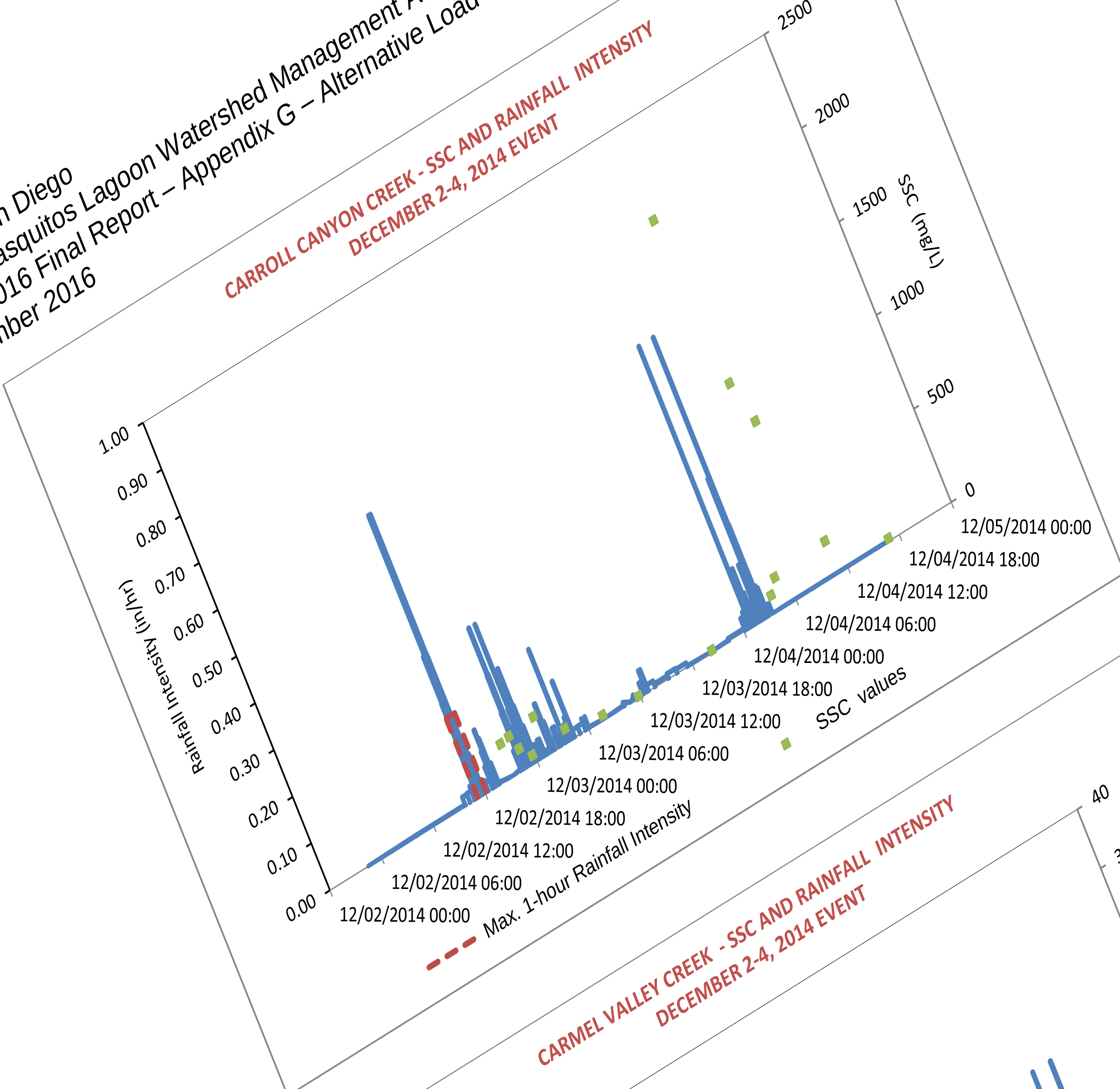
Table G-1.
Rainfall Intensity, EMC and Sediment Daily Load Results (continued)

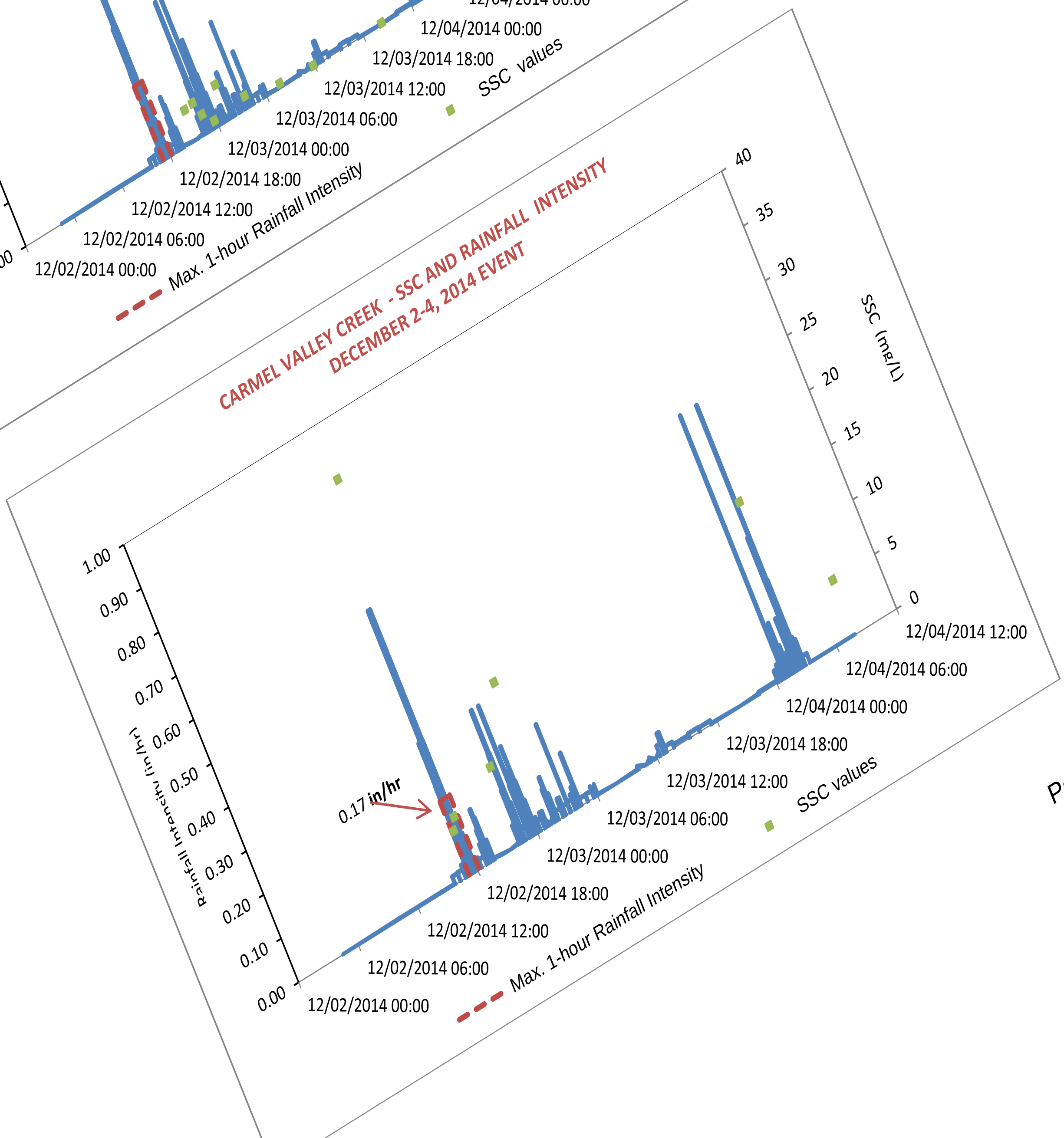
Site	Event Date	Max. 1-Hour Rainfall Intensity (inches/hour)	Predicted Estimated Daily Load (tons/day)	Monitored Storm Event Load Estimation (tons/day)
Los Peñasquitos Creek	November 1–2, 2014	0.55	15.7	
	December 2–4, 2014	0.16	0.270	10.4
	December 12–13, 2014	0.26	1.33	4.67
	December 16–17, 2014	0.22	0.77	
	December 30–31, 2014	0.24	1.03	
	January 12, 2015	0.17	0.329	
	February 22, 2015	0.09	0.0405	0.0855
	March 1–2, 2015	0.13	0.136	
	April 23–24, 2015	0.08	0.03	
	October 4–5, 2015	0.05	0.01	
	November 27, 2015	0.04	0.0028	
	December 11, 2015	0.08	0.03	
	December 13–14, 2015	0.07	0.02	
	December 19, 2015	0.12	0.10	
	December 22, 2015	0.04	0.0028	
	December 28, 2015	0.1	0.06	
	January 4, 2016	0.04	0.0028	2004
	January 5, 2016	0.78	49.76	
	January 6, 2016	0.82	58.67	
	January 7, 2016	0.25	1.17	
	January 31, 2016	0.1	0.06, 6.11[b]	6.11
	February 18, 2016	0.1	0.06	
	March 5, 2016	0.24	1.03	0.75
	March 7, 2016	0.23	0.89	
	March 11, 2016	0.25	1.17	
	April 7, 2016	0.13	0.14	
	April 8, 2016	0.15	0.22	
	April 10, 2016	0.3	2.14	
Estimated Annual Loads			**Average Method**	**Rainfall Intensity Method**
Los Peñasquitos Creek 2014–2015 Annual Load (tons/year)			**30.6**	**70.7**
Los Peñasquitos Creek 2015–2016 Annual Load (tons/year)			**128**	**14,100**

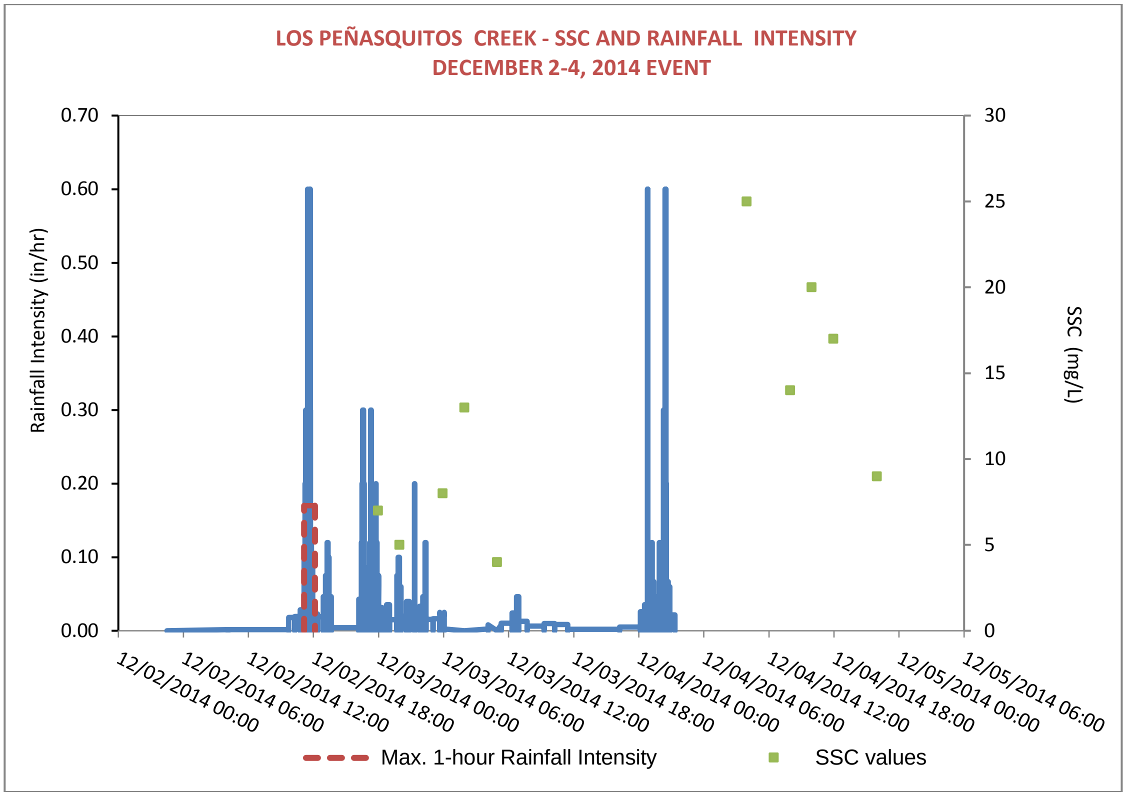
Table G-1.
Rainfall Intensity, EMC and Sediment Daily Load Results (continued)

Estimated Annual Loads	Average Estimation Method	Rainfall Intensity Estimation Method
Carroll Canyon Creek 2014–2015 Annual Load (tons/year)	250	376
Carmel Valley Creek 2014–2015 Annual Load (tons/year)	3.80	5.32
Los Peñasquitos Creek 2014–2015 Annual Load (tons/year)	30.6	70.7
Total Estimated Annual Load 2014–2015 (tons/year)	**284**	**452**
Carroll Canyon Creek 2015–2016 Annual Load (tons/year)	554	9,270
Carmel Valley Creek 2015–2016 Annual Load (tons/year)	6.37	191
Los Peñasquitos Creek 2015–2016 Annual Load (tons/year)	128	14,100
Total Estimated Annual Load 2015–2016 (tons/year)	**688**	**23,500**

a. For the 2014–2015 year, monitoring occurred on December 2–4, 2014, December 12–13, 2014, and February 22, 2015; For the 2015–2016 year, monitoring occurred on January 4–5, 2016, January 31, 2016, and March 5–7, 2016; daily loads are calculated using SSC data and flow duration (see Sections 3.1 and 3.4).
b. Represents calculated value for monitored event.
c. Calculated value for monitored event covers all days of the monitored storm, not just the listed day. For example, for Carroll Canyon Creek, the value of 1,283 represents the calculated value for January 4 and 5, 2016, and 25.8 represents the calculated value for March 5–7, 2016.


CARROLL CANYON CREEK - SSC AND RAINFALL INTENSITY
DECEMBER 2-4, 2014 EVENT
Rainfall Intensity (in/hr)
SSC (mg/L)
12/02/2014 00:00
12/02/2014 06:00
12/02/2014 12:00
12/02/2014 18:00
12/03/2014 00:00
12/03/2014 06:00
12/03/2014 12:00
12/03/2014 18:00
12/04/2014 00:00
12/04/2014 06:00
12/04/2014 12:00
12/04/2014 18:00
12/05/2014 00:00
SSC values
Max. 1-hour Rainfall Intensity


CARMEL VALLEY CREEK - SSC AND RAINFALL INTENSITY
DECEMBER 2-4, 2014 EVENT
Rainfall Intensity (in/hr)
SSC (mg/L)
0.17 in/hr
12/02/2014 00:00
12/02/2014 06:00
12/02/2014 12:00
12/02/2014 18:00
12/03/2014 00:00
12/03/2014 06:00
12/03/2014 12:00
12/03/2014 18:00
12/04/2014 00:00
12/04/2014 06:00
12/04/2014 12:00
SSC values
Max. 1-hour Rainfall Intensity



Comparative Graphs: Rainfall Intensities versus EMC and Sediment Loads

Estimates of flow-weighted event mean concentrations (EMCs) and sediment loads, which are estimates based analytical SSCs and flow data, were compared with the maximum rainfall intensities. Six pair of estimated values was plotted for each monitoring location: Carroll Canyon, Carmel Valley and Los Peñasquitos Creek. Preliminary graphs using all data indicating a stronger relationship between the maximum 1-hour rainfall intensity and sediment load than maximum rainfall intensity and sediment load. For example, Los Peñasquitos Creek trend curve had a coefficient of determination (R^2) higher (0.51) using the maximum 1-hour rainfall intensity than using the maximum rainfall for the limited set of data (0.31).

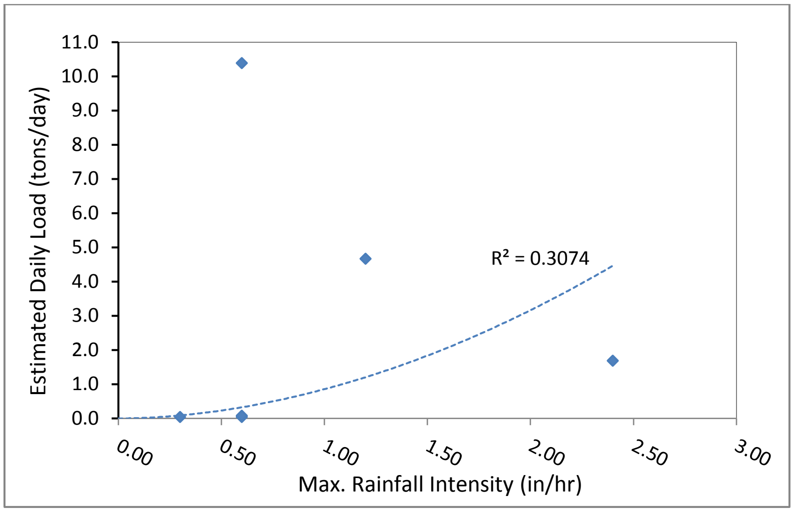


Figure G-1.
Los Peñasquitos Creek, Maximum Rainfall Intensity vs. Daily Sediment Load

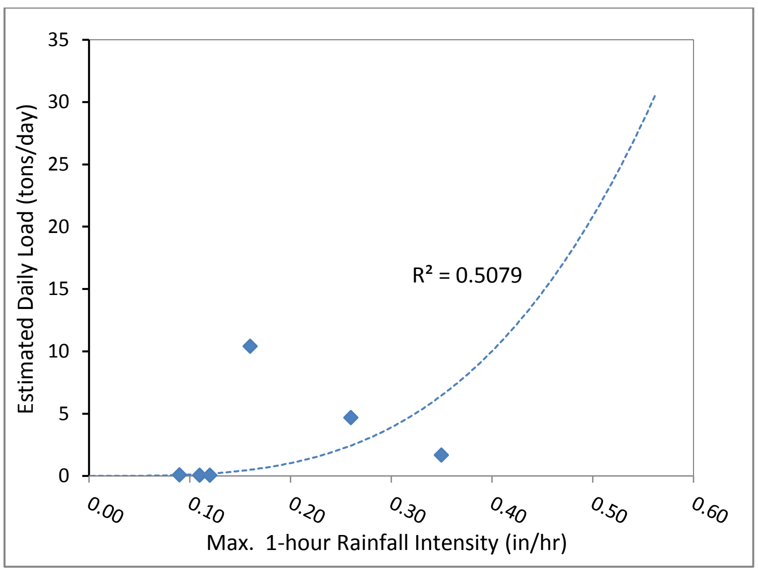


Figure G-2.
Los Peñasquitos Creek, Maximum 1-hour Rainfall Intensity vs. Daily Sediment Load

To further refine trend lines and as part of this evaluation, outliers in this set of data pairs were identified using a statistical regression analysis. For example, if the estimated standardized residual for a data pair was above 2 (standard deviations) and was not consistent with its neighbor points, the data pair was identified as an outlier. See example below.

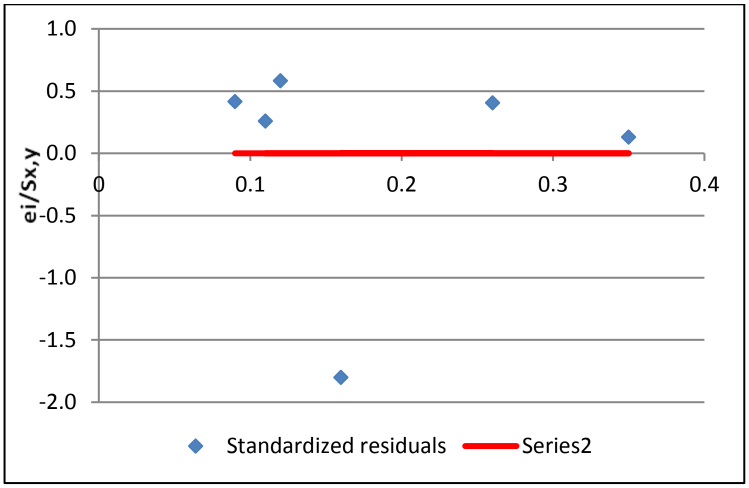


Figure G-3.
Los Peñasquitos Creek, 1-hour Maximum Rainfall Intensity versus Standardized Residual

Data from the December 2-4, 2014 monitoring storm event was identified as outlier for Carroll Canyon and Los Peñasquitos Creeks and from the November 21, 2013 monitoring storm event for Carmel Valley Creek.

Based on final set of limited data, revised graphs were prepared and provided in Figures 3-10 through 3-12 (see Section 3.5).

<u>Estimated Sediment Loads during Monitored and Non-monitored Storm Events</u>

Best-fitting equations from the refined set of data for Carroll Canyon, Carmel Valley and Los Peñasquitos Creeks were used to estimate EMC and sediment load values for the 2014-2015 monitored and non-monitored storm events (See Section 3.5). Equations used to predict sediment loads are as follow:

Table G-2.
Best-fitting Equations

Site	EMC	Daily Sediment Load
Carroll Canyon Creek	$Y= 648.2*X^{0.7434}$	$Y= 301.34*X^{2.0499}$
Carmel Valley Creek	$Y= -10.011*X + 11.67$	$Y= 2.3091*X^{1.4476}$
Los Peñasquitos Creek	$Y= 33.86*X^{1.1806}$	$Y= 112.81*X^{3.294}$

Note: X as Maximum 1-hour Rainfall Intensity, and Y as EMC and Sediment Load Values

Estimated EMC and daily sediment loads for monitored and non-monitoring storm events are provided in Table 3-5 (See section 3.5).

Refinement of sediment load estimates will be conducted during future monitoring activities at these locations. A statistical regression analysis will be rerun and trend lines will be re-estimated as more data become available (wider range of rainfall intensity values and storm patterns). It is expected that equations from this analysis will be refined to provide a better relationship between rainfall intensity and estimated EMC and sediment load values for each monitoring location.

Additional parameters (such as total rainfall volume, storm duration, etc) may be evaluated in addition to the maximum 1-hour rainfall intensity to conduct a multiple regression analysis using more than one independent variable. Although this would add more complexity, it can also provide a more robust and realistic approach since the sediment loads is dependent on a variety of factors.

Attachment B – Bacteria TMDL Compliance Report

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LOS PEÑASQUITOS WATERSHED MANAGEMENT AREA

BACTERIA TOTAL MAXIMUM DAILY LOAD

2015–2016 COMPLIANCE MONITORING REPORT

Submitted to the San Diego Regional Water Quality Control Board by:

Prepared by:
Amec Foster Wheeler Environment & Infrastructure, Inc.
San Diego, California

January 2017

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ACRONYMS AND ABBREVIATIONS

%	percent
303(d) List	CWA Section 303(d) List of Water Quality Limited Segments
µS/cm	microSiemens per centimeter
AB 411	(California) Assembly Bill 411, the Beach Safety Act
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
Bacteria TMDL	*A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek),* 2010
Bight ’08	Southern California Bight 2008 Regional Monitoring Program
CFU	colony-forming unit
Compliance Monitoring Plan	*Los Peñasquitos River WMA Bacteria TMDL Compliance Monitoring Plan*
CWA	Clean Water Act
DW	dry weather
EM&TS	(City of San Diego) Environmental Monitoring and Technical Services Laboratory
FIB	fecal indicator bacteria
FM-100	Los Peñasquitos River Outlet/Beach compliance monitoring location
FY	fiscal year
ID	identification
MDL	method detection limit
mL	milliliters
Miramar	Marine Corps Air Station Miramar
MNAS	Miramar Naval Air Station
MPN	most probable number
MS4	Municipal Separate Storm Sewer System
MS4 Permit	*National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region,* Order Number R9 2013-0001, 2013
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
NWS	National Weather Service
Ocean Plan	*California Ocean Plan,* SWRCB Resolution No. 2012-0056, 2012
QA	quality assurance
QC	quality control
RA	Responsible Agency
REC-1	water contact recreation beneficial use
Regional Board	San Diego Regional Water Quality Control Board

ACRONYMS AND ABBREVIATIONS (CONTINUED)

RL	reporting limit
RWL	receiving water limitation
SCCWRP	Southern California Coastal Water Research Project
SM	USEPA Standard Method
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load
USEPA	United States Environmental Protection Agency
WMA	Watershed Management Area
WQBEL	water quality-based effluent limitation
WQIP	Water Quality Improvement Plan
WRCC	Western Regional Climate Center
WW	wet weather

EXECUTIVE SUMMARY

This report presents the 2015–2016 compliance monitoring data required by the Bacteria Total Maximum Daily Load (TMDL)[1] for the Los Peñasquitos Watershed Management Area (WMA) as incorporated into the Municipal Separate Storm Sewer System (MS4) Permit[2] (San Diego Regional Water Quality Control Board [Regional Board], 2010 and 2013, respectively).

The Bacteria TMDL Compliance Monitoring Program is designed to assess the conditions of the receiving waters and has the following objectives:

- Characterize levels of bacteria concentrations at compliance monitoring locations.
- Track progress toward meeting the Bacteria TMDL numeric targets.

Fecal indicator bacteria[3] (FIB) sampling for the compliance monitoring period (October 2015 through September 2016) was conducted at one beach compliance monitoring location:

- **Los Peñasquitos River Outlet/Beach–FM-100:** An ocean receiving water of the Los Peñasquitos River that receives discharges from the Los Peñasquitos Lagoon and upstream creeks.

Wet weather samples were collected between October 1, 2015, and April 30, 2016, within the first 72 hours after the end of rainfall for three wet weather events. Dry weather samples were collected at least weekly in October 2015 and from April 2016 through September 2016, and at least monthly on dry weather days from November 1, 2015, through March 31, 2016. Weekly monitoring was scheduled so that a minimum of five samples were collected in each calendar month. Samples were analyzed for the FIB compliance constituents: total coliform, fecal coliform, and *Enterococcus*.

This report summarizes FIB concentrations and key hydrologic data at the compliance monitoring location by season. Compliance was assessed by comparing analytical results for total coliform, fecal coliform, and *Enterococcus* with the applicable receiving water limitations (RWLs), in accordance with the Bacteria TMDL requirements in Attachment E of the MS4 Permit. The RWLs are a combination of numeric targets for bacteria density and allowable exceedance frequencies. The MS4 Permit clarifies the final RWLs (as the most probable number [MPN]) for total coliform, fecal coliform, and *Enterococcus*. The single-sample maximum numeric targets are required to be achieved only during wet weather, with a final allowable exceedance frequency of 22 percent (%). For dry weather days, the 30-day geometric mean numeric targets must be achieved, with a 0% exceedance frequency. Table ES-1 lists the numeric targets for beaches.

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[1] *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek),* Resolution No. R9-2010-0001, Regional Board, February 10, 2010 (Bacteria TMDL).

[2] *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region,* Order Number R9-2013-0001, May 14, 2013 (MS4 Permit).

[3] Fecal indicator bacteria include total colifom, fecal coliform, and *Enterococcus*.

Table ES-1.
Final Receiving Water Limitations for Beaches

(Maximum Bacteria Densities and Allowable Exceedance Frequencies)

Constituent	Wet Weather Days [a] Single-Sample Maximum		Dry Weather Days [b] 30-Day Geometric Mean	
	Numeric Target [c] (MPN/100mL)	Final Allowable Exceedance Frequency [d]	Numeric Target [e] (MPN/100mL)	Final Allowable Exceedance Frequency
Total Coliform	10,000	22%	1,000	0%
Fecal Coliform	400	22%	200	0%
Enterococcus	104	22%	35	0%

Notes:
% = percent; mL = milliliters; MPN = most probable number
Source (including footnotes): Bacteria TMDL, Regional Board, Order No. R9-2010-0001, 2010.

a. Wet weather days are defined as days with rainfall events of 0.2 inch or greater, plus the following 72 hours.
b. Dry weather days are defined as days with less than 0.2 inch of rainfall observed on each of the previous 3 days.
c. Wet weather numeric objectives are based on the single-sample maximum (or equivalent) water quality objectives in the *California Ocean Plan* (State Water Resources Control Board [SWRCB], 2012). Compliance with the wet weather TMDLs in the receiving water is based on the frequency of the wet weather days in any given year exceeding the wet weather numeric objective, but the 30-day geometric mean must also be met.
d. The wet weather allowable exceedance frequency is set at 22 percent. In the calculation of the wet weather TMDLs, the Regional Board chose to apply the 22% allowable exceedance frequency as determined for Leo Carrillo Beach in Los Angeles County. At the time the wet weather watershed model was developed, this 22% exceedance frequency was the only reference beach exceedance frequency that was available. The 22% allowable exceedance frequency that is used to calculate the wet weather TMDLs is justified because the San Diego region watersheds' exceedance frequencies will likely be close to the value calculated for Leo Carrillo Beach, and are consistent with the exceedance frequency that was applied by the Los Angeles Regional Board.
e. Dry weather numeric objectives are based on the 30-day geometric mean (or equivalent) water quality objectives in the California Ocean Plan (SWRCB, 2012). Compliance with the dry weather TMDLs in the receiving water is based on the frequency of the dry weather geometric mean exceeding the dry weather numeric objective.

Monitoring Results and Compliance Discussion

In accordance with the monitoring and assessment requirements in the MS4 Permit, three separate weather-based evaluations were used to address the program objectives: wet weather, wet season, and dry season. Table ES-2 summarizes the 2015–2016 exceedance frequency results and compares them with interim and final allowable exceedance frequencies.

Table ES-2.
2015–2016 Bacteria TMDL Exceedance Frequency Results for Los Peñasquitos River WMA

Site ID	Bacteria TMDL Constituent	Wet Weather [a] Single-Sample Maximum (CFU/100mL)			Wet Season [a, c] 5-Sample Geometric Mean (CFU/100mL)			Dry Season [b] 30-Day Geometric Mean (CFU/100mL)		
		2015–2016 [d] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency	2015–2016 [e] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency	2015–2016 [e] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency
FM-100	Total Coliform	13%	26%	22%	0%	1%	0%	0%	1%	0%
	Fecal Coliform	0%	26%	22%	0%	2%	0%	0%	2%	0%
	Enterococcus	13%	26%	22%	0%	10%	0%	0%	10%	0%

Notes:
% = percent; CFU = colony-forming unit; FM-100 = Los Peñasquitos River Outlet/Beach
Green shaded cells show the 2015-2016 observed exceedance frequency.

a. October 1, 2015–April 30, 2016
b. May 1, 2016–September 30, 2016
c. In accordance with the MS4 Permit, wet and dry weather FIB data were combined to calculate geometric means for the wet season and compared with dry weather RWLs (numeric targets and allowable exceedance frequencies) as shown in Table ES-1.
d. The exceedance frequency was derived by dividing the total number of wet weather days (days with 0.2 inch of rainfall or greater plus the following 72 hours) that exceeded the single-sample maximum numeric target divided by the total number of wet weather days during the wet season. To determine exceedances for non-sampled wet weather days, the average (interpreted as the geometric mean) of the analytical results from three monitored storm events was applied to the remaining observed wet weather days that were not sampled. The results from the total number of wet weather days, with either assigned averages or analyzed result values, were then compared with single-sample maximum numeric targets.
e. The exceedance frequency was derived by dividing the total number of geometric exceedances by the total number of geometric means calculated during the season.

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Wet Weather Single-Sample Maximum Exceedance Frequencies

The wet weather exceedance rate applies only to wet weather days (days with 0.2 inch of rainfall or more, plus the following 72 hours) between October 1 and April 30 of each year. Wet weather exceedance rates for total coliform, fecal coliform, and *Enterococcus* were derived by calculating the average result of wet weather samples and applying that average to the remaining (not sampled) observed wet weather days. Sampling results and the assigned averages were compared with single-sample maximum numeric targets, as established in the Bacteria TMDL. A total of three storm events were sampled during the 2015–2016 wet weather season, at the following location:

- **FM-100:** During wet weather, the receiving waters at Los Peñasquitos River Outlet/Beach achieved a 0% single-sample maximum exceedance frequency for compliance constituent fecal coliform. The single-sample maximum exceedance frequency for compliance constituents total coliform and *Enterococcus* was 13%.

Wet Season Geometric Mean Exceedance Frequencies

The wet season is from October 1 through April 30 of each year. Wet season exceedance rates for total coliform, fecal coliform, and *Enterococcus* are derived by calculating a rolling geometric mean using results from the last five sampling results (combined dry weather and wet weather):

- **FM-100:** During the wet season, the receiving waters at Los Peñasquitos River Outlet/Beach achieved 0% exceedance frequencies for compliance constituents total coliform, fecal coliform, and *Enterococcus.*

Dry Season Geometric Means and Exceedance Frequencies

The dry season is May 1 through September 30 of each year. Dry season exceedance rates for total coliform, fecal coliform, and *Enterococcus* are derived by calculating a rolling 30-day geometric mean using the last five sampling results, as described in the *California Ocean Plan,* (Ocean Plan) (SWCRB, 2012), at the compliance monitoring location:

- **FM-100:** During the dry season, the receiving waters at Los Peñasquitos River Outlet/Beach achieved 0% exceedance frequencies for compliance constituents total coliform, fecal coliform, and *Enterococcus.*

Summary

Collectively, these findings suggest that bacteria densities support water contact recreation beneficial use (REC-1) conditions in the Los Peñasquitos WMA year-round.

During the wet season, which evaluates a combination of both wet and dry weather samples, FM-100 achieved a 0% exceedance frequency and is in compliance with the final dry weather geometric mean RWLs.

During the dry season, when recreational activities occur with more regularity, FM-100 achieved a 0% exceedance frequency and is in compliance with the final dry weather geometric mean RWLs.

Ongoing Efforts

Certain studies and activities of the Los Peñasquitos WMA Responsible Agencies (RAs) may provide additional data that could be used in subsequent Bacteria TMDL compliance assessments:

- The City and County of San Diego are participating in data assessments and coordination meetings with the Regional Board and other Copermittees to determine potential modifications to be considered in the Bacteria TMDL Reopener. During the Bacteria TMDL Reopener, the Regional Board will update the TMDL based on current data and United States Environmental Protection Agency (USEPA) policy, which may lead to revised terms of compliance. The Bacteria TMDL Reopener is in progress and is expected to be completed in 2018.
- The RAs have completed the San Diego Regional Reference Stream Study and San Diego Regional Reference Beach Studies. The data are being used in the Bacteria TMDL Reopener to evaluate natural sources of bacteria in reference streams and at beaches and these data are being utilized in the Bacteria TMDL Reopener to update numeric targets (Southern California Coastal Water Research Project [SCCWRP], 2015, 2016).
- Additional information regarding bacteria densities and sources in the Los Peñasquitos WMA may be included in Water Quality Improvement Plan Annual Report.
- RAs will continue to monitor for the Bacteria TMDL Compliance Monitoring Program for fiscal year (FY)17.

1.0 INTRODUCTION

This report presents the 2015–2016 Los Peñasquitos Watershed Management Area (WMA) Bacteria Total Maximum Daily Load (TMDL)[4] (San Diego Regional Water Quality Control Board [Regional Board], 2010) compliance monitoring data, in accordance with Attachment E.6 of the Municipal Separate Storm Sewer System (MS4) Permit.[5] The Los Peñasquitos River WMA Bacteria TMDL Compliance Monitoring Plan (Los Peñasquitos Watershed Management Area Responsible Agencies [Responsible Agencies], 2015) (Compliance Monitoring Plan) was developed to meet the Bacteria TMDL requirements of the MS4 Permit and to generate data to support the Los Peñasquitos WMA Water Quality Improvement Plan (Responsible Agencies, 2016). Supporting information for this compliance monitoring report is in the Compliance Monitoring Plan and Los Peñasquitos WMA Water Quality Improvement Plan located on the Project Clean Water websites (www.projectcleanwater.org).

The Bacteria TMDL Compliance Monitoring Program is designed to assess the conditions of the receiving waters and has the following objectives:

- Characterize levels of bacteria concentrations at compliance monitoring locations.
- Track progress toward meeting the Bacteria TMDL numeric targets.

In accordance with the Compliance Monitoring Plan, the Responsible Agencies (RAs) monitored the Pacific Ocean Shoreline at the Los Peñasquitos River Outlet/Beach (Los Peñasquitos River compliance monitoring location, or FM-100). Table 1-1 provides the location name and coordinates for the compliance monitoring location, and Figure 1-1 presents a map of the compliance monitoring location within the WMA. Indicator bacteria sampling for the 2015–2016 compliance monitoring season was conducted during wet and dry weather at the Los Peñasquitos River Outlet/Beach compliance monitoring location and samples were analyzed for three fecal indicator bacteria (FIB) compliance constituents: total coliform, fecal coliform, and *Enterococcus.*

Table 1-1.
Bacteria TMDL Compliance Monitoring Location

Site ID	Site Name	Site Type	Latitude	Longitude
FM-100 [a]	Los Peñasquitos River Outlet/Beach	Pacific Ocean Shoreline	32.935	–117.261

Notes:
ID = identification
a. Approximately 25 meters north of the river outlet.

[4] *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek),* Resolution No. R9-2010-0001, Regional Board, February 10, 2010 (Bacteria TMDL).

[5] *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region,* Order Number R9-2013-0001, May 14, 2013 (MS4 Permit).

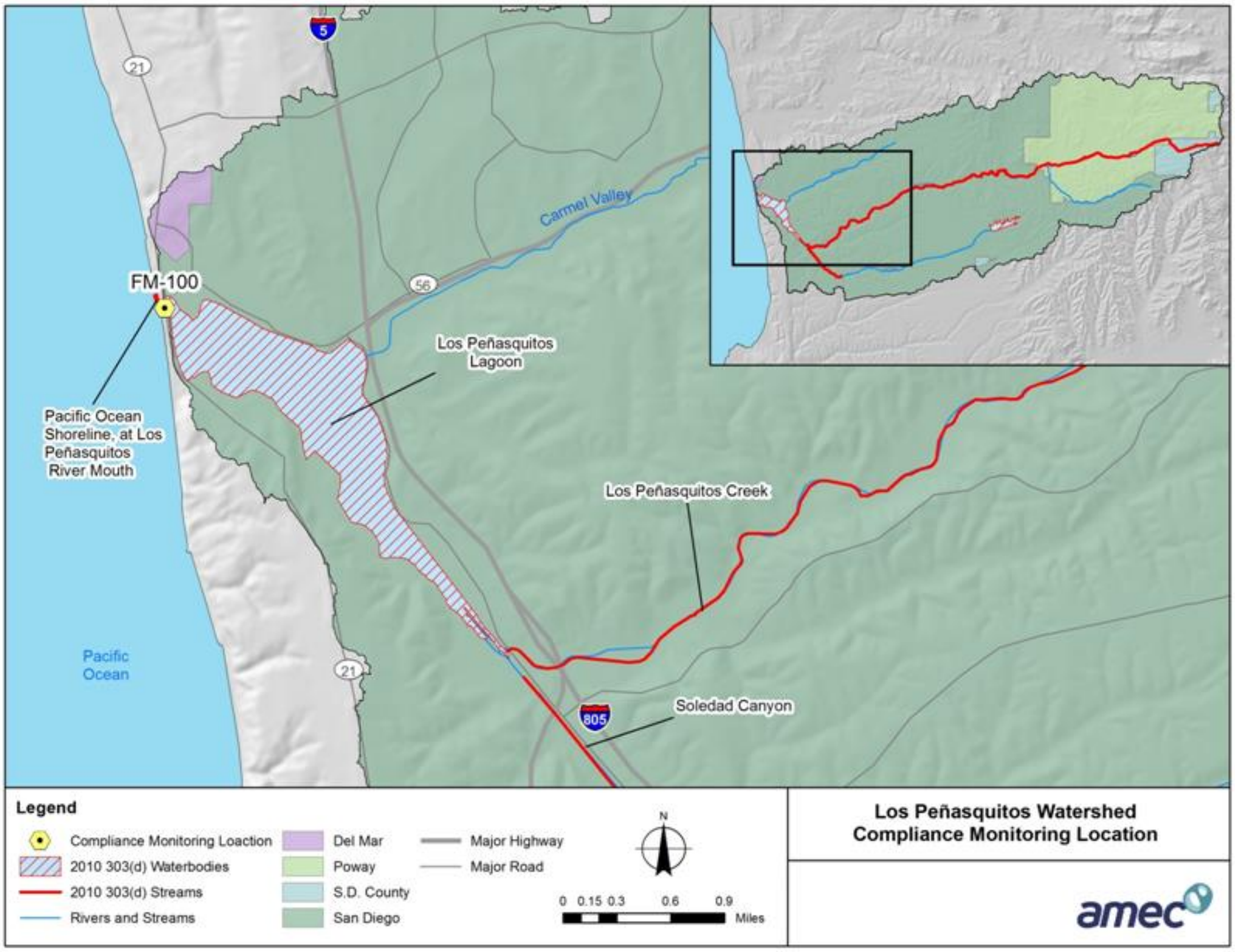

Figure 1-1.
Los Peñasquitos River WMA Compliance Monitoring Location, FM-100

1.1 Document Overview

This report has five sections that contain the following information:

- **Section 1—Introduction:** Information on purpose of report, the Bacteria TMDL, compliance monitoring location, numeric targets, and schedule.
- **Section 2—Monitoring and Analytical Methodology:** Overview of the compliance monitoring conducted during the reporting period, including any changes to monitoring or analytical methods, hydrology summaries, event data and observations, and FIB concentrations in wet and dry weather during 2015—2016, along with an evaluation of seasonal patterns in FIB concentrations.
- **Section 3—Compliance Evaluation:** Evaluation of current receiving water conditions and a comparison with the Bacteria TMDL receiving water limitations (RWLs) based on 2015–2016 data.

- **Section 4—Summary:** Program objectives and ongoing efforts.
- **Section 5—References:** Sources used to prepare this report.

1.2 Compliance Requirements for Bacteria Total Maximum Daily Load

As described in the Los Peñasquitos River WMA Water Quality Improvement Plan, the basis for Bacteria TMDL compliance is demonstrated through interim and final water quality-based effluent limitations (WQBELs). The WQBELs include RWLs for the Los Peñasquitos River Outlet/Beach compliance monitoring location and are provided in Table 1-2.

Table 1-2.
Final Receiving Water Limitations for Beaches

(Maximum Bacteria Densities and Allowable Exceedance Frequencies)

Constituent	Wet Weather Days [a]		Dry Weather Days [b]	
	Single-Sample Maximum (MPN/100mL) [c]	Single-Sample Maximum Allowable Exceedance Frequency [d]	30-Day Geometric Mean (MPN/100mL) [e]	30-Day Geometric Mean Allowable Exceedance Frequency
Total Coliform	10,000	22%	1,000	0%
Fecal Coliform	400	22%	200	0%
Enterococcus	104	22%	35	0%

Notes:
% = percent; mL = milliliters; MPN = most probable number
Source (including footnotes): Bacteria TMDL, Regional Board, Order No. R9-2010-0001, 2010.

a. Wet weather days are defined as days with rainfall events of 0.2 inch or greater, plus the following 72 hours.

b. Dry weather days are defined as days with less than 0.2 inch of rainfall observed on each of the previous 3 days.

c. Wet weather numeric objectives are based on the single-sample maximum (or equivalent) water quality objectives in the *California Ocean Plan* (State Water Resources Control Board [SWRCB], 2012). Compliance with the wet weather TMDLs in the receiving water is based on the frequency of the wet weather days in any given year exceeding the wet weather numeric objective, but the 30-day geometric mean must also be met.

d. The wet weather allowable exceedance frequency is set at 22%. In the calculation of the wet weather TMDLs, the Regional Board chose to apply the 22% allowable exceedance frequency as determined for Leo Carrillo Beach in Los Angeles County. At the time the wet weather watershed model was developed, this 22% exceedance frequency was the only reference beach exceedance frequency that was available. The 22% allowable exceedance frequency that is used to calculate the wet weather TMDLs is justified because the San Diego region watersheds' exceedance frequencies will likely be close to the value calculated for Leo Carrillo Beach, and are consistent with the exceedance frequency that was applied by the Los Angeles Regional Board.

e. Dry weather numeric objectives are based on the 30-day geometric mean (or equivalent) water quality objectives in the *California Ocean Plan* (SWRCB, 2012). Compliance with the dry weather TMDLs in the receiving water is based on the frequency of the dry weather geometric mean exceeding the dry weather numeric objective.

The Los Peñasquitos River WMA Water Quality Improvement Plan provides the compliance timeline for the Bacteria TMDL, which outlines the interim and final reduction milestones for both dry and wet weather. Per Attachment E.6.c(1) of the MS4 Permit, interim compliance dates may be modified by an accepted Water Quality Improvement Plan. Full dry weather compliance requires a 0% exceedance frequency for all dry weather periods by 2021, and full wet weather compliance requires a 22% allowable exceedance frequency during wet weather periods by 2031.

The "existing" or historical exceedance frequency is used to calculate 50% interim milestones for both wet and dry weather. Progress toward achieving dry weather and wet weather milestones is demonstrated through comparison with interim and final allowable exceedance frequencies. Table 1-3 presents dry weather existing, interim, and final allowable exceedance frequencies. Per the Water Quality Improvement Plan, the 50% reduction milestone is to be met in 2019 for the Cities of Del Mar, Poway, and San Diego and in 2020 for the County of San Diego, with a 100% reduction milestone in 2021 for all RAs.

Table 1-3.
Los Peñasquitos WMA Bacteria TMDL Compliance Reduction Milestones—Dry Weather

Constituent	"Existing" Exceedance Rate	Interim Milestone [a]	2021 Final Compliance
Total Coliform	1%	1%	0%
Fecal Coliform	4%	2%	0%
Enterococcus	19%	10%	0%

Notes:
% = percent
a. Interim dry weather goals are a 50% reduction of existing dry weather exceedance frequencies, based on available historical data from the years 1996 to 2002. Source: Los Peñasquitos WMA Bacteria TMDL Compliance Monitoring Plan (Responsible Agencies, 2015). For reporting purposes, values are rounded to the nearest whole percent.

Table 1-4 presents wet weather existing, interim, and final allowable exceedance frequencies. Per the Water Quality Improvement Plan, the 50% reduction milestone is to be met in 2024 for the Cities of Del Mar, Poway, and San Diego and in 2028 for the County of San Diego, with a 100% reduction milestone in 2031 for all RAs.

Table 1-4.
Los Peñasquitos WMA Bacteria TMDL Compliance Reduction Milestones—Wet Weather

Constituent	"Existing" Exceedance Rate [a]	Interim Milestone [b]	2031 Final Compliance [c]
Total Coliform	30%	26%	22%
Fecal Coliform	30%	26%	22%
Enterococcus	30%	26%	22%

Notes:
a. Interim wet weather goals are provided in the Bacteria TMDL (Regional Board, 2010).
b. Interim wet weather goals are provided in Attachment E of the MS4 Permit (Regional Board, 2013).
c. The final milestone is a 100% reduction from the existing exceedance frequency to the allowable exceedance frequency.

1.3 Monitoring and Analytical Methods

The Pacific Ocean Shoreline at Los Peñasquitos River Mouth segment named in the Bacteria TMDL was removed from the Clean Water Act 303(d)-List for REC-1 impairment in 2010 and is considered de-listed. Per Attachment E of the MS4 Permit, because of the de-listed status of their segment, the Los Peñasquitos WMA RAs have the flexibility to propose alternative monitoring procedures (such as reduced monitoring) for Bacteria TMDL compliance monitoring as part of the Water Quality Improvement Plan and its updates. For their first year of implementation, the RAs elected to monitor more frequently than the minimum monitoring requirements described in Attachment E of the MS4 Permit.

The Compliance Monitoring Plan describes the monitoring and analytical methods (Sections 3 and 4) and data management methods (Section 5.1). Compliance monitoring was performed in accordance with the Compliance Monitoring Plan, except as noted in Sections 1.3.1 and 1.3.2.

1.3.1 Dry Weather Monitoring

Per the Compliance Monitoring Plan, weekly dry weather monitoring was scheduled so that five samples were collected in each calendar month. However, in May 2016 and September 2016, only four samples were collected in each of these months because of wet weather interference.

1.3.2 Precipitation Data

Per the MS4 Permit, rainfall precipitation data are not a requirement for Bacteria TMDL compliance monitoring. Per the Compliance Monitoring Plan, precipitation data from the National Weather Service (NWS) Del Mar rain gauge were to be used to track the total number of wet weather days as defined in the MS4 Permit. However, the NWS Del Mar rain gauge was relocated in September 2015, and was also missing data for a portion of the 2015–2016 monitoring year. To provide a more complete dataset, the NWS Miramar Naval Air Station (MNAS) gauge was used in its place. Because MNAS officially became Marine Corps Air Station Miramar (Miramar) in 1999, this gauge is referred to as the Miramar gauge in this report (Shettle, 2001). The Miramar gauge is technically within the Mission Bay WMA; however, it is less than 1 mile from the Los Peñasquitos WMA and is the nearest gauge that is representative of rainfall in the middle of watershed. Historical daily rainfall amounts generated by the NWS will be used to assess the annual rainfall and historical average for San Diego County.

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2.0 MONITORING RESULTS SUMMARY

This section outlines hydrology summaries, event data and observations, and FIB concentrations for both wet and dry weather conditions.

Precipitation data from the NWS Miramar rain gauge were used to track the total number of wet weather days as defined in the Compliance Monitoring Plan. Historical daily rainfall amounts generated by the NWS at the Miramar gauge were used to compare the annual rainfall and historical averages for San Diego County.

A summary of quality assurance and quality control data is provided in Appendix A. Field measurements and analytical results for wet weather are presented in Appendix B. Field measurements and analytical results for dry weather are presented in Appendix C.

2.1 Wet Weather Compliance Monitoring

Wet weather monitoring was conducted at the compliance monitoring location by Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) for three storm events during the 2015–2016 wet season. The RAs elected to monitor during wet weather at a higher frequency than required by the Compliance Monitoring Plan to provide additional baseline data. Storms resulting in greater than 0.2 inch of precipitation were targeted for analysis. One grab sample was collected per storm event along with *in situ* field measurements within 72 hours after the end of precipitation. Event field data, including atmospheric conditions, sample characteristics, sampling times, field measurements, and other notable observations, were documented. Bacteria grab samples were submitted to the City of San Diego Environmental Monitoring and Technical Services (EM&TS) Laboratory or Weck Laboratories, Inc., for analysis.

2.1.1 Wet Weather Hydrology Summary

Precipitation data from Miramar were used to track the total number of wet weather days. To assess rainfall for the current monitoring year, measured precipitation values at Miramar are compared with the 1893–2016 historical rainfall average for Poway Valley, located approximately 6 miles northeast of Miramar. This comparison will support future evaluations of annual precipitation and potential effects on FIB concentrations or the assessment of exceedances. The historical data were obtained through the Western Regional Climate Center (WRCC) website, which maintains climate data collected by the National Oceanic and Atmospheric Administration (NOAA), the National Climatic Data Center, and the NWS.

Total precipitation recorded at Miramar for the 2015–2016 wet season was 10.74 inches, which was below the historical average of 12.5 inches at Poway Valley (WRCC, 2016). Below-average rainfall was observed in November and December, 2015, and February and March 2016. Above-average rainfall was observed in January 2016 (including an extreme 25-year storm event[6]) and April 2016. The total rainfall observed in January 2016 was largely from one storm event in early January 2016 that produced 5.39 inches of rainfall at the Miramar gauge.

Table 2-1 summarizes wet weather monthly precipitation data for Miramar for the 2015–2016 wet season, along with the historical Poway Valley data for comparison.

Table 2-1.
Wet Weather Monthly Rainfall Summary

Month	Miramar Rainfall (inches)	
	Miramar 2015–2016 Monitoring Season	Poway Valley 1893–2016 Historical Average
October 2015	0.53	0.52
November 2015	0.47	1.36
December 2015	1.30	1.87
January 2016	6.00	2.80
February 2016	0.06	2.70
March 2016	1.29	2.30
April 2016	1.09	0.95
Total Rainfall	**10.74**	**12.50**

Source: National Oceanic and Atmospheric Administration (NOAA); Western Regional Climate Center (WRCC)

Three storm events were successfully captured at the compliance monitoring location. The monitored storms represent three sizes. Wet Weather Event 1 was the smallest storm, with 0.35 inch of rainfall; Wet Weather Event 2 was the largest, with 5.39 inches observed; and Wet Weather Event 3 was moderate in size, with 0.59 inch observed. Wet Weather Events 1 and 3 depict the usual range of events that may occur during a typical wet season, while Wet Weather Event 2 was exceptionally large and was not representative of wet weather events in the region.

The watershed response also varies throughout the wet season, based on factors such as antecedent soil moisture conditions, impervious area, rainfall amount, and rainfall intensity. During larger storms, runoff from previously pervious surfaces can increase after soils are completely saturated. Earlier in the season, soil conditions are drier, increasing infiltration and therefore decreasing runoff. Later in the season, the ground is more saturated, resulting in greater discharge volumes to ocean receiving waters.

Precipitation values for the three storm events as recorded at the Miramar gauge are presented in Table 2-2. Each monitored storm event is described in detail in the following sections.

[6] According to the NWS NOAA ATLAS 14 Point Precipitation Frequency Estimate for Miramar MCAS (http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca). Accessed November 3, 2016.

Table 2-2.
Total Rainfall for 2015–2016 Monitored Events

Event	Event Start Date	Event End Date	Sampling Date	Rainfall Miramar (inches)
Wet Weather Event 1	11/2/2016	11/4/2016	11/6/2015	0.35
Wet Weather Event 2	1/4/2016	1/11/2016	1/9/2016	5.39
Wet Weather Event 3	1/30/2016	2/3/2016	2/3/2016	0.59

2.1.1.1 Wet Weather Event 1 – November 6, 2015

A qualifying wet weather event (greater than or equal to 0.2 inch of rainfall preceded by at least 72 hours of less than 0.1 inch of rainfall) occurred from November 2–4, 2015. A total of 0.07 inch of rainfall was recorded on November 2, 2015, followed by the majority of event rainfall (0.27 inch) on November 3, 2015. A total of 0.01 inch of rainfall was measured on November 4, 2015, for a total of 0.35 inch for Wet Weather Event 1, as recorded by the Miramar gauge.

Wet weather samples were collected at the compliance monitoring location approximately 57 hours after the end of the storm event. Samples were submitted to Weck Laboratories, Inc. for analysis within prescribed holding times. Conductivity in the receiving water at the time of sample collection was the highest of all three monitored wet weather events (44,000 microSiemens per centimeter [µS/cm]), and turbidity was the lowest of all three monitored wet weather events (1.44 nephelometric turbidity units [NTU]). This relationship is expected, considering that Wet Weather Event 1 was the smallest monitored storm and discharge from the lagoon and upper drainage area was likely limited compared with conditions for other storm events.

2.1.1.2 Wet Weather Event 2 – January 9, 2016

The second monitored storm event occurred from January 4–9, 2016. This event was the largest storm event of the 2015–2016 wet season, with a total of 5.39 inches of rainfall. The greatest amount of rainfall occurred on January 6, 2016 (2.03 inches), followed by January 5, 2016 (1.87 inches) and January 7, 2016 (1.26 inches), with lesser amounts recorded on January 4, 8, and 9, 2016 (0.08 inch, 0.14 inch, and 0.01 inch, respectively). The intensity of this event dislodged concrete-lined channels, caused flooding, and mobilized large amounts of sediment and debris (City of San Diego, 2016).

Wet weather samples were collected at the compliance monitoring location approximately 32 hours after the end of the storm event. Samples were submitted to Weck Laboratories, Inc. for analysis within prescribed holding times. Conductivity in the receiving water at the time of sample collection was the lowest of all three monitored wet weather events (20,700 µS/cm), and turbidity was the highest of all three monitored wet weather events (55 NTU), as would be expected, considering the size of the storm and increased discharge from the lagoon and upper drainage area.

2.1.1.3 Wet Weather Event 3 – February 3, 2016

The third and final monitored event for the 2015–2016 wet season occurred from January 30 through February 3, 2016, and generated a total of 0.59 inch of rainfall. On January 30, 2016, 0.02 inch of rainfall was measured, followed by 0.57 inch on January 31, 2016, as recorded at the Miramar gauge.

Wet weather samples were collected at the compliance monitoring location approximately 70 hours after the end of the storm event. Bacteria grab samples were submitted to the City EM&TS Laboratory for analysis within prescribed holding times. Conductivity in the receiving water at time of sample collection was 32,300 µS/cm and turbidity was 15.3 NTU.

2.1.2 Wet Weather FIB Concentrations

Generally, FIB concentrations at FM-100 during wet weather were below single-sample maximum thresholds. Elevated FIB concentrations during wet weather were observed once in 2015–2016, following the exceptionally large wet weather event in early January 2016 that produced over 5 inches of precipitation. *Enterococcus* and total coliform concentrations exceeded single-sample maximum thresholds in samples collected immediately following the exceptionally large wet weather event (Wet Weather Event 2). Note that field measurements for this event reflected increased freshwater discharge from the lagoon and upper drainage area: conductivity values were lower (20,700 µS/cm) and turbidity values were higher (55 NTU) than those observed during any other wet weather event.

Table 2-3 presents 2015–2016 wet weather analytical results for compliance constituents (total coliform, fecal coliform, and *Enterococcus*). Figure 2-1 illustrates 2015–2016 wet weather bacteria densities compared with the single-sample maximum numeric targets. Optional field measurements for 2015–2016 wet weather monitoring are in Appendix B.

Wet weather laboratory reports for the 2015–2016 monitoring year are in Appendix D. Wet weather field data sheets for 2015–2016 are in Appendix E.

Table 2-3.
Wet Weather Analytical Results for Los Peñasquitos WMA

Analyte	Unit	Numeric Target	Method	MDL [a]	RL [a]	Analytical Results – Site ID FM-100		
						Wet Weather Event 1 11/6/15 [b]	Wet Weather Event 2 1/9/16 [b]	Wet Weather Event 3 2/3/16 [b]
Total Coliform	CFU/100mL	10,000	SM 9222B	2	20 [c] 200 [d] 2 [e]	940	**44,000**	1,800
Fecal Coliform	CFU/100mL	400	SM 9222D	2	2	38	190	<20
Enterococcus	CFU/100mL	104	USEPA 1600	1	1 [c] 10 [d] 2 [e]	19	**570**	72

Notes:
% = percent; CFU = colony-forming unit; FM-100 = Los Peñasquitos River Outlet/Beach; ID = identification; mL = milliliters; MDL = method detection limit; RL = reporting limit; SM = USEPA Standard Method; TMDL = total maximum daily load; USEPA = United States Environmental Protection Agency
Bolded value = concentration exceeds the single-sample maximum numeric target.
a. MDL/RL values vary with the dilutions used to generate plates within the countable range.
b. Date sample was collected.
c. Reporting limit used for Wet Weather Event 1.
d. Reporting limit used for Wet Weather Event 2.
e. Reporting limit used for Wet Weather Event 3.

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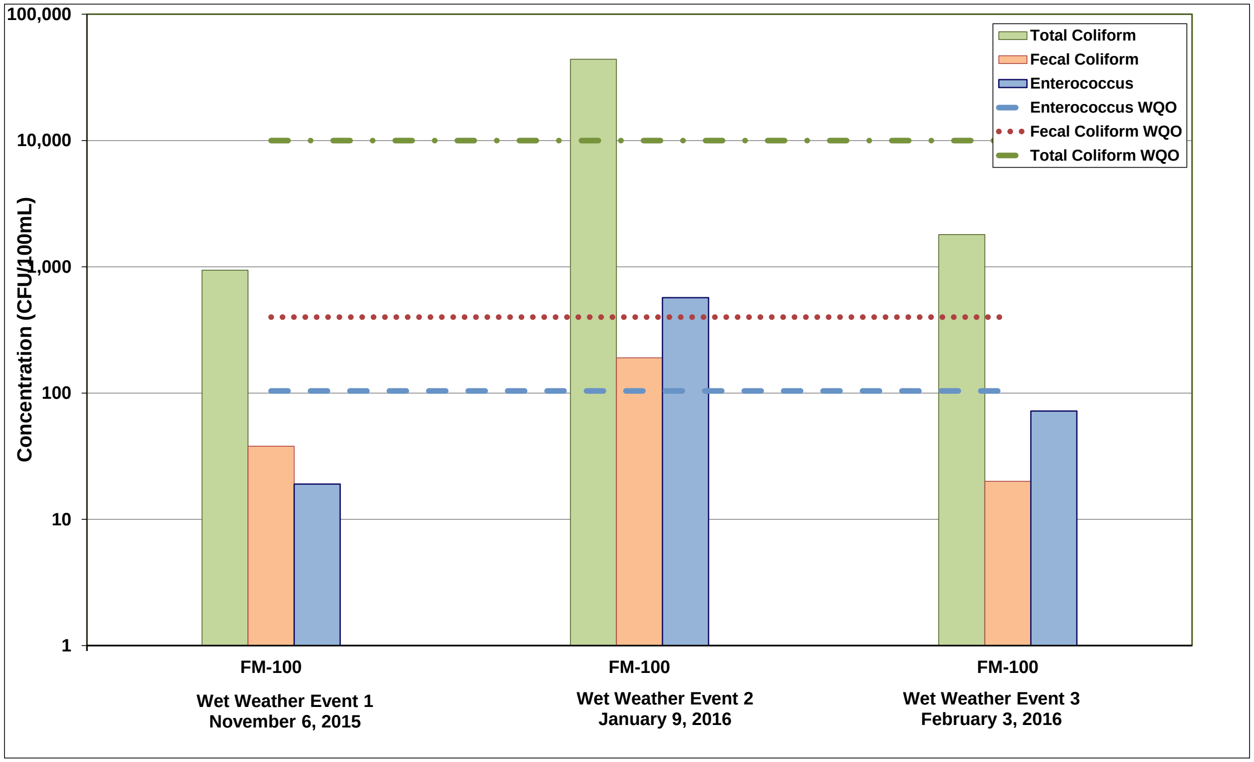

Figure 2-1.
2015–2016 Wet Weather Fecal Indicator Bacteria Concentrations – FM-100

2.2 Dry Weather Compliance Monitoring

Dry weather monitoring was performed during both the wet season (October 1, 2015, through April 30, 2016) and the dry season (May 1 through September 30, 2016) by the City of San Diego. As specified in the Compliance Monitoring Plan, the following sampling was conducted:

- Weekly dry weather monitoring in October 2015 and from April 2016 through September 2016.
  - RAs elected to perform weekly monitoring during October 2015 and from April 2016 through September 2016 to capture potential conditions with more recreational activities, consistent with the recreational monitoring season of the California Assembly Bill 411 (the Beach Safety Act, or AB 411) program. Weekly dry weather sampling is also above and beyond the requirements of Attachment E of the MS4 Permit: only monthly sampling is required.
  - At least five samples were collected in each calendar month, except during May 2016 and September 2016, when only four samples were collected because of wet weather interference.
- Monthly dry weather monitoring from November 2015 through March 2016.

Dry weather events, as defined by the Compliance Monitoring Plan, may occur on dry weather days with an antecedent dry period of 72 hours with less than 0.1 inch of rainfall. All dry weather samples were collected by City Storm Water Department staff. Bacteria samples were submitted to the City of San Diego EM&TS Laboratory for analysis.

2.2.1 Dry Weather Monitoring Summary

Dry weather monitoring was conducted from May 2016 through September 2016. During each successful dry weather event, water grab samples were collected in the receiving waters at the compliance monitoring location. Tables presenting dry weather FIB concentrations and field measurements for the 2015–2016 monitoring year are provided in Appendix C. During the wet season, a total of 15 dry weather events took place at the compliance monitoring location. During the dry season, City of San Diego field scientists were unable to collect a fifth monthly sample in May 2016 and September 2016 because of storm events. Thus, only 23 (of 25 targeted) dry weather events were captured in the dry season.

Visual observations were noted by the City of San Diego field scientists during each dry weather sampling event. In general, field observations such as seaweed, sea grass, and shorebirds were recorded. Table 2-4 presents sampling event information (approximate tidal stage and total antecedent dry weather days before each event), with wet season dry weather sampling dates highlighted in blue.

Table 2-4.
Dry Weather Sampling Summary and Antecedent Dry Days

Date Visited	Tide Height [a] (feet)	Antecedent Dry Days [b]	
		<0.1 inch	<0.2 inch
10/12/2015	3	6	6
10/13/2015	6	7	7
10/19/2015	3.5	13	13
10/20/2015	3.7	14	14
10/28/2015	7	22	22
11/19/2015	3.19	16	16
12/1/2015	4	28	28
1/13/2016	5.8	5	6
2/16/2016	0.1	16	16
3/1/2016	1.5	30	30
4/5/2016	6	25	25
4/13/2016	0	3 [c]	3 [c]
4/19/2016	2	9	9
4/20/2016	3	10	10
4/26/2016	2	16	16
5/2/2016	2	22	22
5/3/2016	1	23	23
5/16/2016	3.5	10	10
5/31/2016	0.6	25	25
6/6/2016	4	31	31
6/9/2016	2	34	34
6/13/2016	1.1	38	38
6/20/2016	4	45	45
6/30/2016	2	55	55
7/5/2016	4.3	60	60
7/7/2016	3.8	62	62
7/11/2016	1.65	66	66
7/19/2016	3.995	74	74
7/26/2016	1.878	81	81
8/1/2016	3.772	87	87
8/9/2016	3.268	95	95
8/16/16	4.245	102	102
8/23/16	2.218	109	109
8/30/16	3.668	116	116
9/6/16	4.405	123	123
9/15/16	3.261	132	132
9/27/16	3.384	6	7
9/30/16	3.706	9	10

Notes:
Source: National Oceanographic and Atmospheric Administration (NOAA)
Blue-shading indicates dry weather events during the wet season.
a. Tide height is approximate, as reported by City of San Diego field staff.
b. National Weather Service (NWS) archived rain gauge data for Miramar were used to determine antecedent dry days.
c. 4/13/16 was defined as a wet weather day based on precipitation >0.2 inch on 4/10/16. However, hourly weather observations at the MCAS Miramar KNKX rain gauge place the end of measureable precipitation on 4/10/16 at 04:55 PDT, before the first sampling time. Thus, samples collected on 4/13/16 were collected >72 hours after the end of precipitation and are considered dry weather samples.

Although total measured rainfall during the wet season was below average, above-average rainfall was recorded throughout the 2016 dry season. From May 1, 2016, through September 30, 2016, a total of 0.95 inch of precipitation was measured at the Miramar gauge. Table 3-3 summarizes total monthly rainfall for the 2016 dry season. Above-average rainfall during the dry season was also observed in 2015. These consecutive elevated dry season rainfall totals may because of the influence of a strong El Niño event in late 2015.

Table 2-5.
Dry Season Monthly Rainfall Summary

Month	Rainfall (inches)	
	Miramar 2015–2016 Monitoring Season	Poway Valley 1893–2016 Historical Average
May 2016	0.59	0.37
June 2016	0.00	0.08
July 2016	0.00	0.04
August 2016	0.00	0.07
September 2016	0.36	0.19
Total Rainfall	**0.95**	**0.75**

Notes:
Source: National Oceanic and Atmospheric Administration (NOAA); Western Regional Climate Center (WRCC)

2.2.2 Dry Weather FIB Concentrations

Dry weather samples were collected during the 2015–2016 wet season and the 2016 dry season. Dry weather samples collected during the 2016 dry season consistently displayed lower bacteria concentrations than dry weather samples collected during the wet season.

FIB concentrations were generally low, with frequent non-detects. No correlation between duration of the antecedent dry period and FIB concentrations was observed. Elevated *Enterococcus* results were found on only one occasion, in June 2016. The source of the elevated *Enterococcus* value is not known; potential sources include land areas draining directly to the Bacterial TMDL-listed segment, upstream sources in the Los Peñasquitos WMA, and natural sources (regrowth and marine life). Note that the lagoon was not flowing into the ocean during this sampling event. Under dry weather conditions, the lagoon occasionally discharges to the ocean receiving water. In the 2015–2016 monitoring year, the lagoon was observed flowing into the ocean during only 8 dry weather events, 5 of which were at the end of the monitoring year (August through September 2016). According to the Southern California Bight 2008 Regional Monitoring Program (Bight '08) Shoreline Microbiology Study conducted by the Southern California Coastal Water Research Project (SCCWRP) at southern California beaches (SCCWRP, 2012), resident bird populations are natural sources of FIB; FIB regrowth on beach wrack and beach sand is a potential source of increased FIB densities.

Figure 2-2 depicts FIB concentrations for each dry weather monitored event between October 1, 2015, and September 30, 2016. The blue-shaded areas indicate dry weather results of sampling during the wet season, when elevated FIB densities are more likely to occur.

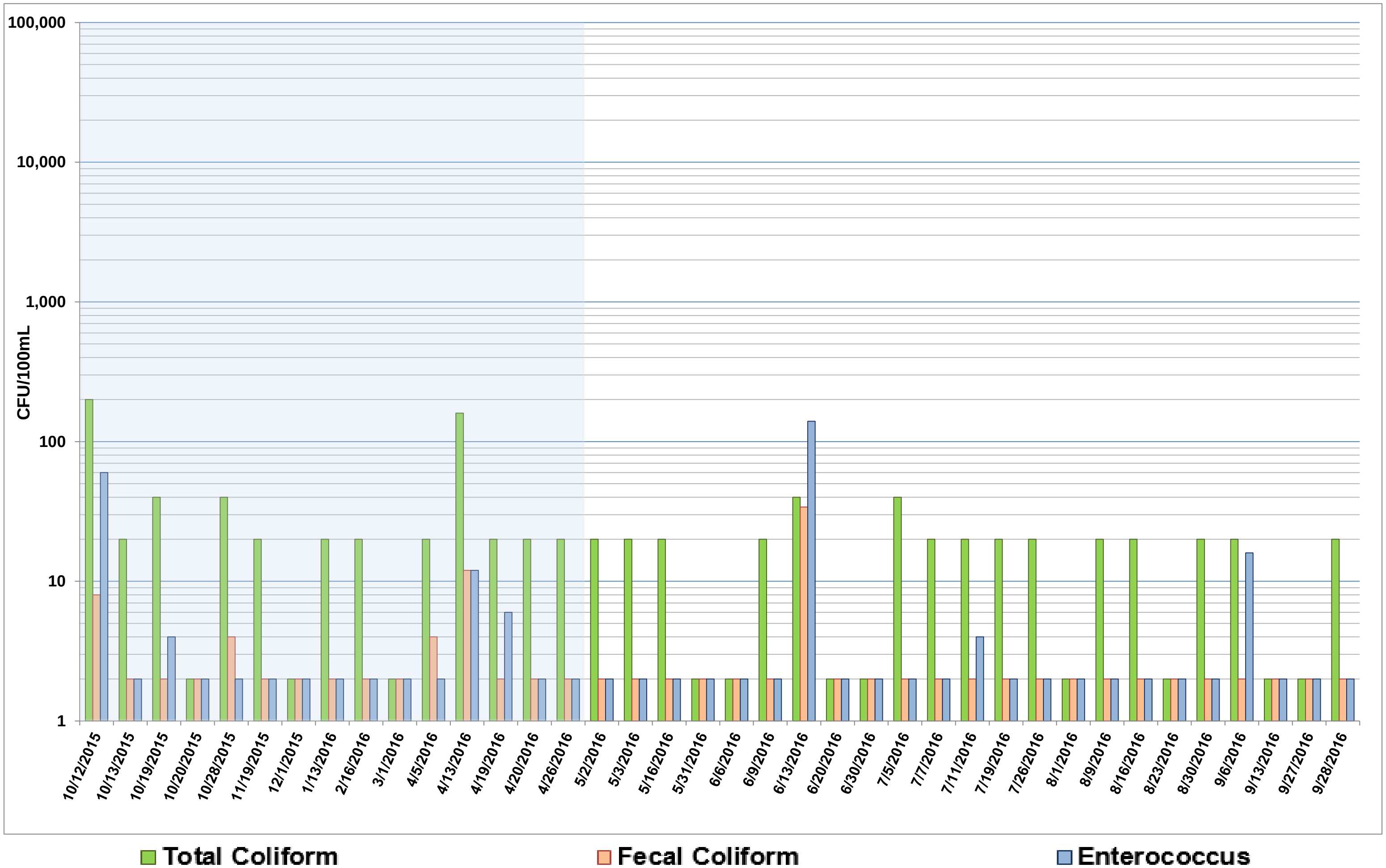

Figure 2-2.
2015–2016 Dry Weather Fecal Indicator Bacteria Concentrations – FM-100

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3.0 COMPLIANCE EVALUATION

This section presents the results of the compliance evaluation for dry and wet seasons in accordance with the assessment requirements of Attachment E of the MS4 Permit.

3.1 Compliance Evaluation Methods

Separate evaluations were completed using geometric means for dry season dry weather and wet season combined all weather, and single-sample maximums for wet weather results as described in this report. FIB data collected between October 2015 and September 2016 in accordance with the Compliance Monitoring Plan were used in the compliance assessments.

Several inconsistencies were identified in Attachment E.6.6 of the MS4 Permit that may affect the interpretation of compliance; these inconsistencies are explained in detail in Appendix F.

3.1.1 Wet Weather Single-Sample Maximum Exceedance Frequency

Wet weather exceedances are based on a comparison of the rate of exceedances of the single-sample maximum numeric target with the allowable 22% exceedance frequency. Wet weather events include the storm day(s) (0.2 inch of rainfall or more) and the following 72 hours, resulting in a minimum wet weather event duration of 4 days. Per of Attachment E of the MS4 Permit, for monitored storm events, the highest reported result from a storm event is applied to each non-monitored day for the duration of that event. An inferred exceedance rate must also be calculated to account for non-monitored storm events.

For the remaining wet weather days that are not associated with a monitored event, the average (interpreted as geometric mean) of the highest reported results from each of the three monitored wet weather events is assigned to the remaining wet weather days in the wet season:

$$\text{Geometric Mean} = \quad n^{th} \text{ root of } (X_1)(X_2)_{\dots} X_n$$

where: n is the number of monitored storm events
X_n is sample n result (e.g., X_1 = Wet Weather 1 Result)

The wet weather exceedance frequency is then determined by dividing the number of wet weather days that exceeded the single-sample maximum numeric target by the total number of wet weather days observed during the 2015–2016 wet season.

$$\text{Wet Weather Exceedance Frequency (\%)} = 100 * \frac{\Sigma(\text{WWD} > \text{Wet Weather RWL})}{\Sigma\text{WWD}}$$

where: ΣWWD is the sum of wet weather days (0.2 inch of rainfall or more) and the following 72 hours

A list of observed wet weather days for the 2015–2016 wet season, both monitored and observed, is presented in Appendix B.

3.1.2 Wet Season Geometric Mean and Exceedance Frequency

Per of Attachment E of the MS4 Permit, a wet season exceedance frequency was calculated using the combined wet and dry weather results between October 1 and April 30, and was compared with dry weather RWLs. During the wet season, the amount of time summarized by each geometric mean varies. Dry weather sampling was conducted weekly during the wet season in October 2015 and April 2016, and monthly from November 2015 through March 2016. In addition, three wet weather events were monitored during the wet season; one sample was collected for each wet weather event. A rolling geometric mean calculation was calculated from the five most recent wet season samples. With each subsequent sample collected, the first sample from the preceding five-sample geometric mean was dropped. The wet season geometric mean is calculated as follows:

$$\text{5-Sample Geometric Mean} = n\sqrt{(X_1)(X_2)(X_3)(X_4)(X_5)}$$

where: n is the number of individual results used in the calculation
X_n is sample *n* result (e.g., X_1 = November result, X_2 = Wet Weather 1 Result)

A wet season exceedance occurs when a geometric mean exceeds the dry weather numeric target. The first geometric mean was calculated after the fifth sample in October 2015.

To determine the wet season exceedance frequency, the number of wet season geometric means that exceed the dry weather numeric target was divided by the total number of calculated wet season geometric means, expressed as follows:

$$\text{Wet Season Exceedance Frequency (\%)} = 100 * \frac{\text{Wet Season } G_n > \text{DW NT}}{\text{Wet Season } G_n}$$

where: Wet Season G_n is the number of wet season geometric means
DW NT is the dry weather numeric target

3.1.3 Dry Season Geometric Mean and Exceedance Frequency

Attachment E of the MS4 Permit states that the geometric mean calculation should be consistent with the requirements in the Ocean Plan (SWRCB, 2012). A 30-day rolling geometric mean calculation was based on a minimum of five samples for any 30-day period. Geometric means were calculated as follows:

$$\text{30-Day Geometric Mean} = n\sqrt{(X_1)(X_2)(X_3)(X_4)(X_5)}$$

where: n is the number of individual results used in the calculation
X_n is week *n* result (e.g., X_1 = week 1 result)

Dry season dry weather monitoring began in early May 2016; the first geometric mean was calculated after the fifth sample, in early June 2016. With each subsequent sample collected, the first sample from the preceding five-sample geometric mean was dropped outside of a

30-day window. Samples collected between May 1 and September 30, 2016, are used in this calculation.

A dry weather exceedance occurs when the geometric mean exceeds the dry weather numeric target. The first exceedance rate was calculated in early June 2016, after the first geometric mean calculation. The number of geometric means that exceed the dry weather numeric target is divided by the total number of calculated dry season geometric means to determine the dry season exceedance frequency, as follows:

$$\text{Dry Season Exceedance Frequency (\%)} = 100 * \frac{\text{Dry Season } G_n > \text{DW NT}}{\text{Dry Season } G_n}$$

where: Dry Season G_n is the number of dry season geometric means
DW NT is the dry weather numeric target

3.2 Wet Weather Exceedance Rates and Compliance Evaluation

Per MS4 Permit Attachment E assessment requirements, the wet weather exceedance rate is inferred for the wet season, based on the three sampled wet weather events. A wet weather day is defined as any wet weather event with 0.2 inch of rainfall or more, plus the following 72 hours. Using this criterion, 45 wet weather days were observed during the 2015–2016 wet season, as recorded at the Miramar gauge. Results for wet weather days in 2015–2016 are presented in Appendix B. This assessment applies the average (applied as a geometric mean) of the three wet weather sampling results to each day of non-sampled wet weather events. A total of 14 of the 45 wet weather days were associated with sampled storm events (three storm events plus the following 72 hours per event); the geometric mean of the results was assigned to each of the remaining 31 non-sampled wet weather days.

A 0% exceedance frequency for fecal coliform and a 13% exceedance frequency for total coliform and *Enterococcus* were achieved at FM-100 during wet weather. The exceedances observed for total coliform and *Enterococcus* were driven by one sample collected following an exceptionally large rain event in early January 2016: over 5 inches of precipitation were observed on the Miramar gauge. Without this sample, the 2015–2016 exceedance frequency for all compliance constituents would have been 0%. Regardless, based on current monitoring, FM-100 is meeting both interim and final RWLs for all compliance constituents.

Table 3-1 presents wet weather single-sample maximum exceedance frequencies for the compliance monitoring location. The geometric mean is presented in the table to illustrate the average derived from the three sampled events applied to the remaining non-sampled wet weather days, as compared with the numeric target.

Table 3-2 compares 2015–2016 exceedance frequencies with historical exceedance rates, and interim and final RWLs.

Table 3-1.
2015–2016 Wet Weather Single-Sample Maximum Exceedance Rates

Site ID	Analyte	Single-Sample Maximum (CFU/100mL)		Number of Results	Number of Exceedances	2015–2016 Wet Weather Exceedance Rate
		Numeric Target	Geometric Mean			
FM-100	Total Coliform	10,000	4,207	3	1	13%
	Fecal Coliform	400	53	3	0	0%
	Enterococcus	104	93	3	1	13%

Notes:
% = percent; CFU = colony-forming unit; ID = identification; mL = milliliters
Site ID: FM-100 = Los Peñasquitos River Outlet/Beach
Bolded values = Geometric mean or exceedance rate is greater than the final allowable limit established in the Bacteria TMDL

Table 3-2.
2015–2016 Wet Weather Exceedance Rates and Compliance Reduction Milestones

Site ID	Analyte	Existing Exceedance Rate [a]	2015–2016 Exceedance Rate	50% Reduction Milestone	50% Reduction Achieved?	Final Allowable RWLs	100% Reduction Achieved?
FM-100	Total Coliform	30%	13%	26%	Yes	22%	Yes
	Fecal Coliform	30%	0%	26%	Yes	22%	Yes
	Enterococcus	30%	13%	26%	Yes	22%	Yes

Notes:
% = percent; ID = identification; RWL = receiving water limitation
Site ID: FM-100 = Los Peñasquitos River Outlet/Beach
Bolded value = Geometric mean or exceedance rate is greater than the final allowable limit established in the Bacteria TMDL.
a. Existing exceedance rate for wet season is a modeled estimate established in the Bacteria TMDL.

3.3 Wet Season Geometric Mean Exceedance Rates

The overall wet season evaluation combines bacteria results during both dry weather and wet weather events. Higher exceedance rates are expected during the wet season, with the inclusion of storm samples that reflect high-flow conditions. However, for the 2015–2016 wet season, geometric mean exceedance rates were 0% for all compliance constituents. Thus, both interim and final RWLs are being achieved at the compliance monitoring location.

Table 3-3 presents the wet season geometric mean exceedance rates for all compliance constituents, based on the available data, including the number of geometric means calculated from the results, the number of geometric means that exceeded the numeric target, and the maximum geometric mean.

Table 3-4 compares current wet season geometric exceedance frequencies with the existing dry weather exceedance rates and the status of progress compared with interim and final RWLs.

Table 3-3.
2015–2016 Wet Season Geometric Mean Exceedance Rates

Site ID	Analyte	5-Sample Geometric Mean (CFU/100mL)		Number of Geomeans	Number of Exceedances	Wet Season Exceedance Rate
		Numeric Target	Maximum Geomean			
FM-100	Total Coliform	1,000	146	14	0	0%
	Fecal Coliform	200	10	14	0	0%
	Enterococcus	35	13	14	0	0%

Notes:
% = percent; CFU = colony-forming unit; ID = identification; mL = milliliters
Site ID: FM-100 = Los Peñasquitos River Outlet/Beach

Table 3-4.
2015–2016 Wet Season Exceedance Rates and Compliance Reduction Milestones

Site ID	Analyte	Existing Exceedance Rate [a]	2015–2016 Exceedance Rate	50% Reduction Milestone	50% Reduction Achieved?	Final Allowable RWLs	100% Reduction Achieved?
FM-100	Total Coliform	1%	0%	1%	Yes	0%	Yes
	Fecal Coliform	4%	0%	2%	Yes	0%	Yes
	Enterococcus	19%	0%	10%	Yes	0%	Yes

Notes:
% = percent; ID = identification; RWL = receiving water limitation; TMDL = total maximum daily load
Site ID: FM-100 = Los Peñasquitos River Outlet/Beach
a. Existing exceedance rate is based on available 1996–2002 historical data.

3.4 Dry Season Exceedance Rates

The overall dry season evaluation combines bacteria results during dry weather events from May 1, 2016, through September 30, 2016. Lower exceedance rates are typically expected during the dry season, which does not include the influence of wet weather events that reflect high-flow conditions.

Dry season monitoring occurred approximately weekly, and exceedances were based on a 30-day geometric mean composed of the preceding five samples. Of the 23 monitored events during the dry season at the compliance monitoring location, the *Enterococcus* concentration was elevated on one occasion. However, the geometric mean did not exceed dry weather numeric objectives at the compliance monitoring location during the dry season for the FIB compliance constituents.

Table 3-5 presents the dry season geometric mean exceedance rates for all compliance constituents, including the number of geometric means calculated from the results, the number of geometric means that exceeded the numeric target, and the maximum geometric mean.

Table 3-6 compares current dry season geometric exceedance frequencies with the existing dry weather exceedance rates, and provides the status of progress as compared with interim and final RWLs.

Table 3-5.
2016 Dry Season Geometric Mean Exceedance Rates

Site ID	Analyte	30-Day Geometric Mean (CFU/100mL)		Number of Geomeans	2015 Number of Exceedances	2015 Dry Season Exceedance Rate
		Dry Numeric Target	Maximum Geomean			
FM-100	Total Coliform	1,000	23	16	0	0%
	Fecal Coliform	200	4	16	0	0%
	Enterococcus	35	5	16	0	0%

Notes:
% = percent; CFU = colony-forming units; ID = identification; mL = milliliters

Table 3-6.
Dry Season Exceedance Rates and Compliance Reduction Milestones

Site ID	Analyte	Existing Exceedance Rate [a]	2015–2016 Exceedance Rate	50% Reduction Milestone	50% Reduction Achieved?	100% Reduction Final RWLs	100% Reduction Achieved?
FM-100	Total Coliform	1%	0%	1%	Yes	0%	Yes
	Fecal Coliform	4%	0%	2%	Yes	0%	Yes
	Enterococcus	19%	0%	10%	Yes	0%	Yes

Notes:
% = percent; ID = identification; RWL = receiving water limitation
a. Existing exceedance rate is based on available 1996–2002 historical data.

3.5 Wet and Dry Season Overview

Figure 3-1 presents the 2015–2016 rolling geometric means throughout the wet and dry seasons from October 1, 2015, through September 30, 2016. Wet season geometric means are illustrated with a blue line with blue markers throughout the blue areas (wet season), which reflect the rolling geometric mean using the previous five samples. Wet weather numeric targets are illustrated with a blue dashed line. FIB concentrations in dry and wet weather are indicated with gold circles and blue triangles, respectively. The red line with green markers illustrates the rolling 30-day geometric means throughout the dry season (May through September 2016). Dry weather TMDL numeric targets are illustrated with an orange dashed line.

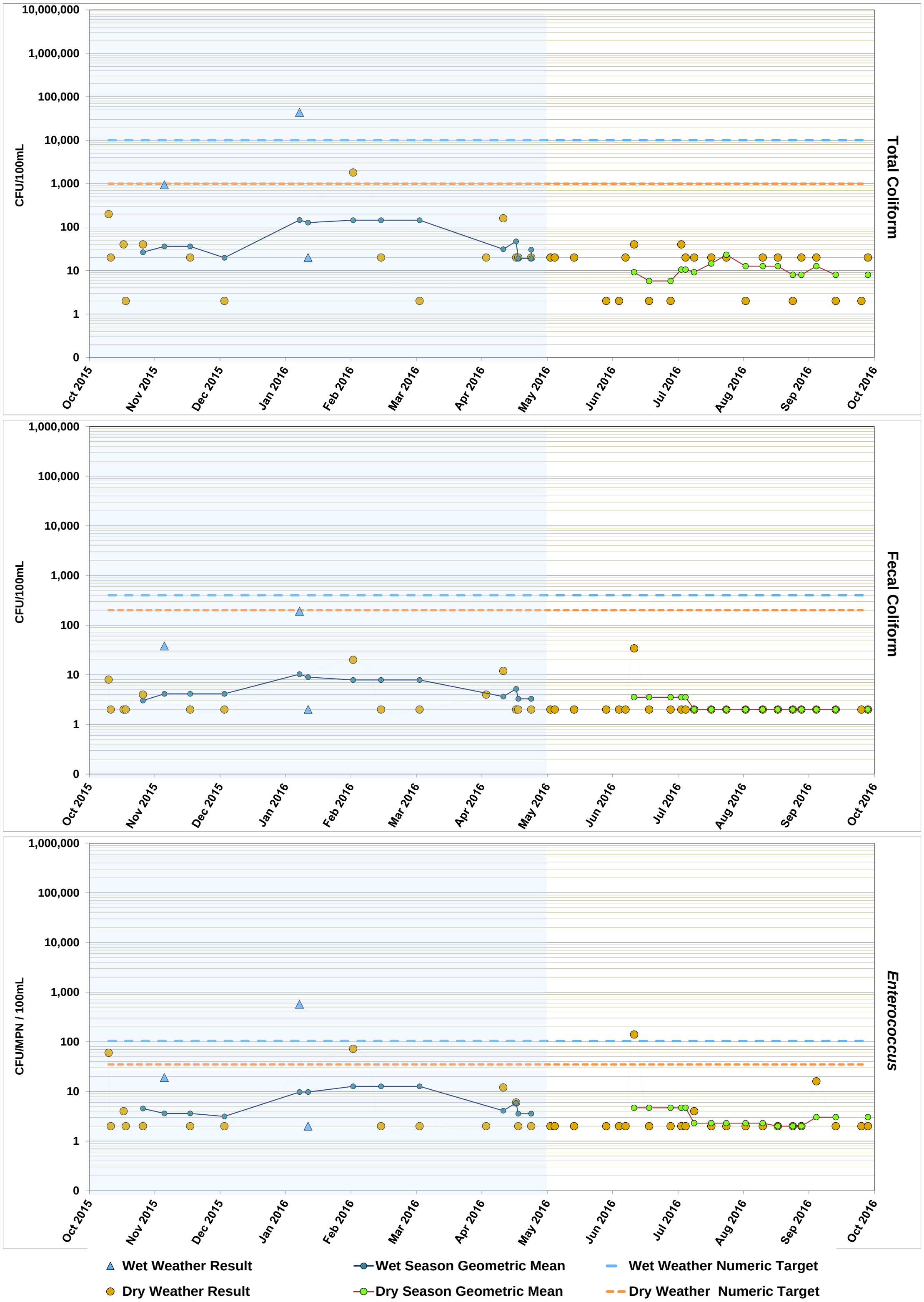

Figure 3-1.
FIB Densities and Geometric Means, 2015–2016 Wet and Dry Season – FM-100

3.6 Progress Toward Attaining Interim and Final Receiving Water Limitations

Table 3-7 depicts the general progress toward meeting interim and final numeric targets by season for the compliance monitoring location in the Los Peñasquitos WMA. This table indicates whether targets for collective FIB have been met (●), have been partially met (**O**), or have not yet been met (**X**). A partially met goal means that at least one of the FIB constituents is meeting the RWL.

**Table 3-7.
General Progress Toward Interim and Final Targets
for Los Peñasquitos Watershed Management Area, 2015–2016**

2015–2016 Wet Weather Single-Sample Maximum		2015–2016 Wet Season Geomeans		2016 Dry Season Geomeans	
Interim	**Final**	**Interim**	**Final**	**Interim**	**Final**
●	●	●	●	●	●

Notes:

● = Currently, interim or final receiving water limitations (RWLs) have been fully achieved.

O = Currently, interim or final RWLs have been partially achieved, but not all compliance constituents have attained the RWL.

X = Currently, no fecal indicator bacteria (FIB) constituents meet Bacteria Total Maximum Daily Load (TMDL) RWL.

4.0 SUMMARY

This section describes current receiving water conditions in the Los Peñasquitos WMA related to the project goals. Dry and wet weather data collected during the 2015–2016 wet season and dry weather data collected during the 2016 dry season were used to evaluate compliance on the basis of current conditions.

4.1 Characterization of Current FIB Concentrations

Overall, full compliance with both interim and final wet weather RWLs was achieved for 2015–2016 wet weather samples. Observed exceedance rates were below the final allowable wet weather exceedance rate of 22% for all compliance constituents.

During the wet season, which evaluates a combination of both wet and dry weather samples using dry weather geometric mean RWLs, 0% exceedance frequencies were achieved for all compliance constituents. Full compliance with both interim and final dry weather RWLs was achieved for the 2015–2016 wet season.

During the dry season, when recreational activities occur with more regularity, 0% exceedance frequencies were achieved for all compliance constituents.

Collectively, these data sets suggest that bacteria densities support water contact recreation beneficial use (REC-1) conditions in the Los Peñasquitos WMA year-round. The 2015–2016 monitoring results are summarized below.

Wet Weather Single-Sample Maximum Comparison

The compliance monitoring location is achieving interim and final wet weather RWLs for all three compliance constituents.

Wet Season Geometric Mean Comparison

The compliance monitoring location is achieving interim and final dry weather RWLs for all three compliance constituents during the wet season.

Dry Season Geometric Mean Comparison

The compliance monitoring location is achieving interim and final dry weather RWLs for all three compliance constituents during the dry season.

Table 4-1 presents the 2015–2016 exceedance rate frequency results by season in the Los Peñasquitos WMA.

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Table 4-1.
2015–2016 Bacteria TMDL Exceedance Frequency Results for Los Peñasquitos River WMA

Site ID	Bacteria TMDL Constituent	Wet Weather [a] Single-Sample Maximum (CFU/100mL)			Wet Season [a, c] 5-Sample Geometric Mean (CFU/100mL)			Dry Season [b] 30-Day Geometric Mean (CFU/100mL)		
		2015–2016 [d] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency	2015–2016 [e] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency	2015–2016 [e] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency
FM-100	Total Coliform	13%	26%	22%	0%	1%	0%	0%	1%	0%
	Fecal Coliform	0%	26%	22%	0%	2%	0%	0%	2%	0%
	Enterococcus	13%	26%	22%	0%	10%	0%	0%	10%	0%

Notes:
% = percent; CFU = colony-forming unit; ID = identification; mL = milliliters; Site ID: FM-100 = Los Peñasquitos River Outlet/Beach; TMDL = total maximum daily load
Green shaded cells show the 2015-2016 observed exceedance frequency.
a. October 1, 2015–April 30, 2016
b. May 1, 2016–September 30, 2016
c. In accordance with the Compliance Monitoring Plan, wet and dry weather FIB data were combined to calculate geometric means for the wet season and compared with dry weather RWLs, as shown in Table ES-1.
d. The exceedance frequency was derived by dividing the total number of wet weather days (days with 0.2 inch of rainfall or greater plus the following 72 hours) that exceeded the single-sample maximum numeric target divided by the total number of wet weather days during the wet season. To determine exceedances for non-sampled wet weather days, the average (interpreted as the geometric mean) of the analytical results from three monitored storm events was applied to the remaining observed wet weather days that were not sampled. The results from the total number of wet weather days, with either assigned averages or analyzed result values, were then compared with single-sample maximum numeric targets.
e. The exceedance frequency was derived by dividing the total number of geometric exceedances by the total number of geometric means calculated during the season.

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APPENDIX A

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

A. QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

This appendix describes the quality assurance/quality control (QA/QC) activities associated with compliance and special study monitoring for the Bacteria TMDL. Some measurement quality objectives (MQOs) and QA/QC activities were fulfilled jointly for the Los Peñasquitos, Scripps, Tecolote Creek, Chollas Creek Compliance, and Chollas Creek Special Study Bacteria TMDL monitoring programs due to the overlapping nature of the five programs. Laboratory QA/QC activities provide information needed to assess laboratory contamination, analytical precision, and analytical accuracy. The QA/QC program includes both field and laboratory components.

A.1 Field Sampling Quality Assurance and Quality Control (QA/QC)

Monitoring and analyses followed Surface Water Ambient Monitoring Program (SWAMP) Quality Assurance (QA) guidelines. SWAMP requires the collection of field blanks in order to evaluate potential contamination and sampling errors, and recommends collection of field duplicates. These samples isolate errors related to grab sampling prior to submittal of the samples to the analytical laboratory. Field sampling protocols can be found in the Bacteria TMDL Project Monitoring Plans and QAPPs[1] for each watershed.

A brief summary of each measurement type is provided below:

Field Blanks

Field blanks verify that field conditions, field sampling activities, and air deposition are not sources of contamination. Field blanks were taken by filling sample bottles with reagent grade, analyte-free deionized water in the field during a sampling event. The samples were then submitted blind to the laboratory for analysis. The project QAPP outlined frequency for field blanks is at least 5 percent of the total sample count. Results of field blank analysis should be below the reporting limit for each analyte.

For the 2015-2016 monitoring year, field blank data for the joint program fulfilled MQOs for accuracy and frequency. All field blank indicator bacteria concentrations were below the reporting limit, which fulfilled the accuracy MQO. Field blank samples were collected at a frequency of 10 percent for *Enterococcus,* fecal coliform, and total coliform and at a frequency of 19 percent for *E. coli*, which fulfilled the frequency MQO. Field blank data are provided in Table A-1.

Table A-1.
Field Blank Results

Analyte	Accuracy MQO	Result	Accuracy MQO Met	Frequency MQO	Frequency Achieved	Frequency MQO Met
Enterococcus	<RL for target analyte	ND	Yes	5% of total project sample count	10%	Yes
Fecal Coliform		ND	Yes		10%	Yes
Total Coliform		ND	Yes		10%	Yes
E. coli		ND	Yes		19%	Yes

[1] Note: The Los Peñasquitos Bacteria TMDL program does not have a standalone QAPP: instead, quality control and quality assurance procedures are defined in the monitoring plan.

Field Duplicates

Field duplicates measure precision and evaluate error introduced by field sampling. Duplicate samples consist of two replicates (an original and a duplicate) of the same matrix collected at the same time and location using the same sampling technique. The project QAPPs outlined frequency for field duplicates is at least 5 percent of the total sample count. The relative percent difference (RPD) was calculated to determine the precision between duplicate samples. This calculation is shown below:

$$RPD = \frac{abs[log(x_1) - log(x_2)]}{0.5 * [log(x_1) + log(x_2)]}$$

Where: abs is the absolute value
x_1 is measurement 1 (primary sample, log-transformed)
x_2 is measurement 2 (e.g., duplicate sample, log-transformed)

Field duplicate samples for the joint program were collected at the following frequencies, all of which satisfied the MQO of 5 percent: 10 percent for *Enterococcus*, fecal coliform, and total coliform*,* and 20 percent for *E. coli*.

For the Los Peñasquitos program, field duplicate RPDs were as follows: average RPD results were 2 percent and 1 percent for *Enterococcus* and fecal coliform, respectively, and average RPD results were 76% for total coliform. *E. coli* was not an analytical constituent for the Los Peñasquitos monitoring location. Though the average RPD for total coliform did not meet the precision MQO of RPD<25%, the duplicate sample pairs responsible for the elevated RPDs were all non-detects, and the elevated RPD was a function of different detection limits between the two duplicate samples, not real results. Thus, the data should not be qualified.

Field duplicate RPD and frequency data are provided in Table A-2 for wet and dry weather samples collected from October 1, 2015 – September 30, 2016.

Table A-2.
Field Duplicate Results

Analyte	Precision MQO	Average RPD Result[a]	Precision MQO Met[a]	Frequency Data Quality Objective	Frequency Achieved	Frequency MQO Met
Enterococcus	RPD<25%[b]	2%	Yes	5% of total project sample count	10%	Yes
Fecal Coliform		1%	Yes		10%	Yes
Total Coliform		76%	No[c]		10%	Yes
E. coli		NA[d]	NA[d]		20%	Yes

Notes:
NA = not analyzed
a. Evaluated using field duplicates collected at the Los Peñasquitos monitoring location only
b. USEPA studies suggest a RPD of less than or equal to 50 percent for field duplicates would be more appropriate for bacteriological methods given the spatial variability of bacteria concentrations in surface waters.
c. The precision MQO was not met because of 3 duplicate pairs where both results in the pair were non-detects, but had different detection limits, which generated an RPD of 125%. Because the sample sets were all in agreement regarding the non-detect, the data are considered valid.
d. *E. coli* is not an analytical constituent for the Los Peñasquitos monitoring location, but was analyzed for some duplcates as part of the joint program.

A.2 Laboratory Quality Assurance and Quality Control (QA/QC)

Laboratory QC samples include laboratory replicates, positive and negative controls as described below. Table A-3 describes the planned frequency and types of quality control samples as outlined in the QAPPs.

Laboratory Replicate – For a laboratory replicate, a sample is prepared and analyzed twice to assess the repeatability (precision). Precision is evaluated by calculating the running mean between the two sets of results for each specific type. A minimum of one laboratory replicate was to be analyzed from each batch per the QAPP.

Per the SWAMP requirements for Indicator Bacteria in Fresh Water published in 2013 and revised in 2015, precision will be measured using the following calculation:

$$R_{log} \leq 3.27 \times \bar{R}$$

To calculate the precision for bacterial analyses, the results from the preceding 15 positive samples of a specific type (matrix) are used to calculate a running mean. The results used to calculate the running mean must all correspond to the same quality control parameter (such as laboratory duplicates). The results of different quality control parameters such as laboratory and field duplicates must not both be used t
o calculate a single running mean.

Step 1:
Record the results from duplicate analyses (these results are here designated as D_1 and D_2).

Step 2:
Calculate the logarithm (here designated as L_1 and L_2) of each duplicate result.
Note: If either of the values D_1 or D_2 are less than 1, add 1 to both values before calculating the logarithms.

$$L_1 = \log D_1$$
$$L_2 = \log D_2$$

Step 3:
Calculate the range of logarithms (R_{log}) for each pair of duplicates. (R_{log}) is equal to the absolute value of the difference between the two numbers.

$$(R_{log}) = |L_1 - L_2|$$

Step 4:
Calculate the mean of R_{log} $(\bar{R})$ for the duplicates analyzed

$$\bar{R} = \frac{\sum R_{log}}{n}$$

where

$\sum R_{log}$ = the sum of the ranges of logarithms calculated for each pair of duplicates *n* = the number of pairs of duplicates (in this case, *n* = 15)

Step 5:
Assess the precision of the duplicate analyses.

In order for the laboratory to demonstrate an acceptable level of precision, the range of logarithms for a particular duplicate must be less than the mean of the range of logarithms multiplied by 3.27.

$$R_{log} \leq 3.27 \times \bar{R}$$

Positive and Negative Controls –A positive control is generated by analyzing a matrix known to contain the target bacteria (such as wastewater influent), which is filtered and incubated the same way as a sample. Target bacteria growth should be observed on the filter after incubation. A positive control is used to detect procedural errors or the presence of contaminants in the laboratory analysis that might inhibit bacteria growth (USEPA, 2012). A negative control is generated by analyzing the buffered rinse water, which is filtered and incubated the same way as a sample. There should be no growth on the negative control plates after incubation. A negative control is used to detect laboratory contamination of the analyses.

Table A-3.
Laboratory QC

Constituent Category	Method Blanks	
	Frequency	Acceptance Limits
Laboratory Replicate	One per 20 samples or analytical batch, whichever is more frequent	$R_{log} \leq 3.27 \times \bar{R}$
Positive and Negative Controls	Per batch of bottles or reagents	Positive Control = Growth on filter; Negative Control = No growth on filter

Laboratory QC–Dry Weather:

Dry weather sample analyses were conducted in full by the City of San Diego Environmental & Technical Services (EM&TS) Laboratory. Dry weather QA/QC data were generated daily for each method used, including laboratory replicates and positive and negative controls (including dilution blanks and media controls), unless otherwise noted. Additional sample volume was collected in the field at the discretion of the City of San Diego field staff and submitted to the EM&TS Laboratory for replicate analyses throughout the monitoring program. Dry weather QA/QC data, sample types and results for the joint program are summarized in Table A-4.

Table A-4.
Dry Weather Quality Control Results

Analyte	Accuracy			
	Positive Control	Negative Control	Dilution Blank	Media Control
Enterococcus[a]	100% Pass	100% Pass	100% Pass	100% Pass
Fecal Coliform[b]	100% Pass	100% Pass	Not Analyzed	100% Pass
Total Coliform[b]	100% Pass	100% Pass	100% Pass	100% Pass
E. coli[c]	100% Pass	98% Pass[d]	Not Analyzed	100% Pass

a. 2 batches not run for EPA 1600 controls
b. 6 batches not run for SM 9222B/D controls
c. 3 batches not run for SM 9223B controls.
d. One lab batch (9/7/16) failed negative control tests. Contaminated tests were re-run and passed.

Laboratory QC–Wet Weather:

Wet weather sample analyses were conducted by Weck Laboratories and the City of San Diego EM&TS Laboratory. Wet weather laboratory QA/QC for the joint program included laboratory replicates, positive and negative controls, and method blanks.

Weck Laboratories analyzed positive controls, negative controls, and filter blanks as method blanks for wet weather events on November 4 and November 6, 2015, and January 9, 2016. The City of San Diego EM&TS Laboratory analyzed media and dilution blanks as method blanks for all other wet weather events. Method blanks were analyzed during each wet weather event (batch) and reported with the analytical results. All method blank QA/QC data for Weck Laboratories and EM&TS Laboratory were reported as below the reporting limit. Wet weather QA/QC data, sample types and results are summarized in Table A-5.

Table A-5.
Wet Weather Quality Control Results

Analyte	Accuracy		
	Positive[a] Control	Negative[a] Control	Method[a] Blank
Enterococcus	100% Pass	100% Pass	100% Pass
Fecal Coliform	100% Pass	100% Pass	100% Pass
Total Coliform	100% Pass	100% Pass	100% Pass
E. coli	100% Pass	100% Pass	100% Pass

Notes:
a. Data is combined from both Weck Laboratories and City of San Diego EM&TS Laboratory.

Laboratory QC–Precision:

Per recent updates to the SWAMP QA guidelines for indicator bacteria in freshwater, and as described above, log-transformation has been incorporated into laboratory precision MQOs for Bacteria TMDL analyses. The precision results for combined dry and wet weather laboratory replicates are presented in Table A-6. The acceptance rates for laboratory precision were 86, 88, 88, and 95 percent for *Enterococcus*, fecal coliform, and total coliform, and *E. coli*, respectively.

The higher precision observed for *E. coli* compared to the other constituents is potentially related to the method type. *Enterococcus,* fecal coliform, and total coliform are all analyzed by membrane filtration methods, where the bacteria are cultured and counted directly: thus, any positive integer result is possible. The *E. coli* method is a most probable number (MPN) method, where the sample is mixed with media and incubated in a multi-celled tray. The tray cells are then counted as positive or negative: an MPN table converts the number of positive cells into a result. Because of the use of the MPN table, the number of possible results is limited and may explain the higher precision. Laboratory replicates that did not meet precision criteria typically had low concentrations near the reporting limit, where variability is higher than normal.

Table A-6.
Lab Replicate Precision Acceptance Results

Analyte	Precision Acceptance Rate
Enterococcus	86%
Fecal Coliform	88%
Total Coliform	88%
E. coli	95%

APPENDIX B

2015–2016 WET WEATHER ANALYTICAL RESULTS

Table B-1.
2015–2016 Wet Weather Field Parameters and Analytical Results for FM-100

Analyte	Units	WQO	Method	MDL/RL[a]	FM-100 WW1 11/6/2015	FM-100 WW2 01/09/2016	FM-100 WW3 02/03/2016
Field Measurements [b]							
Specific Conductivity	µS/cm	-	-	-	44,000	20,700	32,300
pH	pH Units	-	-	-	7.47	7.81	7.98
Temperature	°C	-	-	-	20.08	16.51	16.81
Turbidity	NTU	-	-	-	1.44	55	15.3
Compliance Constituents							
Total Coliform	CFU/100mL	10,000	SM 9222B	2-200	940	**44,000**	1,800
Fecal Coliform	CFU/100mL	400	SM 9222D	2	38	190	<20
Enterococcus	CFU/100mL	104	USEPA 1600	1-10	19	**570**	72

Notes:
WQO = Water Quality Objective; °C = degree Celsius; NTU = Nephelometric Turbidity Units; µS/cm = microsiemens per centimeter; MDL = Method Detection Limit; RL = Reporting Limit; WW = Wet Weather
Bold values indicate a value above the WQO.
a. MDL/RL values vary with the dilutions used to generate plates within the countable range.
b. Field measurements were collected using a calibrated Horiba U-53.

**Table B-2.
2015-2016 Wet Weather Days**

Wet Weather Day No.	2015-2016 Wet Weather Days	
	Date	Rainfall (inches)
1	10/4/2015	0.25
2	10/5/2015	0.25
3	10/6/2015	0
4	10/7/2015	0
5	10/8/2015	0
6	11/3/2015	0.27
7	11/4/2015	0.01
8	11/5/2015	0
9	11/6/2015	0
10	12/11/2015	0.28
11	12/12/2015	0
12	12/13/2015	0.24
13	12/14/2015	0
14	12/15/2015	0
15	12/16/2015	0
16	12/22/2015	0.48
17	12/23/2015	0.05
18	12/24/2015	0
19	12/25/2015	0.01
20	1/5/2016	1.87
21	1/6/2016	2.03
22	1/7/2016	1.26
23	1/8/2016	0.14
24	1/9/2016	0.01
25	1/10/2016	0
26	1/31/2016	0.57
27	2/1/2016	0
28	2/2/2016	0
29	2/3/2016	0
30	3/6/2016	0.26
31	3/7/2016	0.56
32	3/8/2016	0
33	3/9/2016	0
34	3/10/2016	0
35	3/11/2016	0.24
36	3/12/2016	0
37	3/13/2016	0.04
38	3/14/2016	0.02
39	4/7/2016	0.41
40	4/8/2016	0.12
41	4/9/2016	0
42	4/10/2016	0.49

Table B-2. (cont.)
2015-2016 Wet Weather Days

Wet Weather Day No.	2015-2016 Wet Weather Days	
	Date	Rainfall (inches)
43	4/11/2016	0
44	4/12/2016	0
45	4/13/2016	0

Notes: Blue shaded = Sampled wet weather events.
Non-shaded = Non-sampled wet weather days.
Actual sampling dates: 11/06/2015; 01/09/2016; 02/03/2016.
Wet Weather day is defined as precipitation ≥0.2” + 72 hours

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APPENDIX C

2015–2016 DRY WEATHER ANALYTICAL RESULTS

Table C-1.
2015–2016 Dry Weather Field Measurements and Analytical Results at Los Peñasquitos

Dry Weather Event	Date	Field Measurements / Observations					Compliance Constituents		
		Flow To Ocean (Y/N)	Temp (ºC)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Total Coliform (CFU/100mL)	Fecal Coliform (CFU/100mL)	Enterococcus (CFU/ 100mL)
1*	10/12/2015	N	23.7	8.0	55.2	5.40	200	8	60
2	10/13/2015	N	25.50	8.1	53.0	7.85	<20	<2	2
3	10/19/2015	N	22.3	8.0	57.6	3.17	40	<2	4
4	10/20/2015	N	23.7	8.0	52.7	14.01	<2	<2	<2
5	10/28/2015	N	22.7	8.1	51.0	2.45	40	4	<2
6*	11/19/2015	N	20.9	8.1	56.2	1.45	<20	<2	<2
7	12/1/2015	N	18.40	8.1	49.8	1.25	<2	<2	<2
8	1/13/2016	N	15.9	8.0	45.0	8.57	<20	<2	2
9	2/16/2016	N	21.0	8.1	57.2	14.44	<20	<2	<2
10*	3/1/2016	N	18.2	8.1	55.0	7.01	<2	<2	<2
11	4/5/2016	Y	18.1	8.0	54.4	5.16	<20	4	<2
12*	4/13/2016	N	20.0	7.9	43.9	9.89	160	12	12
13	4/19/2016	N	19.6	8.1	52.8	11.07	<20	<2	6
14	4/20/2016	N	20.2	8.0	51.1	9.93	<20	<2	<2
15	4/26/2016	N	18.7	8.1	48.3	10.44	<20	<2	2
16	5/2/2016	N	20.7	8.1	51.4	7.89	<20	<2	<2
17	5/3/2016	N	20.0	7.9	53.9	6.63	<20	<2	<2
18	05/16/2016	N	19.2	8.0	53.6	3.50	<20	<2	<2
19	05/31/2016	N	19.2	8.2	53.6	2.82	<2	<2	<2
20	06/06/2016	Y	19.5	8.0	57.9	2.31	<2	<2	<2
21	06/09/2016	NR	18.8	8.1	52.8	1.11	<20	<2	<2
22	06/13/2016	NR	19.8	8.0	52.4	0.00	40	34	140
23	06/20/2016	Y	21.1	8.1	50.9	3.29	<2	<2	<2
24	06/30/2016	N	23.6	8.1	54.3	5.48	<2	<2	<2
25	07/05/2016	N	23.1	8.2	53.3	1.99	40	<2	<2
26	07/07/2016	N	22.8	8.2	44.6	0.00	<20	<2	<2
27	07/11/2016	N	22.8	8.1	57.8	9.11	<20	<2	4
28	07/19/2016	N	25.0	8.2	45.5	2.36	<20	<2	2
29	07/26/2016	N	25.3	8.1	44.3	0.93	<20	<2	<2
30	08/01/2016	N	25.6	8.2	52.7	0.00	<2	<2	<2
31	08/09/2016	N	23.3	8.0	51.2	1.62	<20	2	<2
32*	08/16/2016	N	21.0	7.8	52.4	0.00	<20	2	<2
33	08/23/2016	N	20.4	7.4	53.5	1.30	<2	<2	<2
34*	08/30/2016	Y	23.1	7.8	47.8	1.72	<20	<2	2
35	09/06/2016	Y	22.8	8.1	51.5	0.00	16	<2	16
36	09/13/2016	Y	20.0	7.9	53.4	2.44	<2	<2	<2
37	09/27/2016	Y	23.5	7.9	52.7	2.30	2	2	2
38	09/28/2016	Y	21.9	7.3	52.4	2.16	20	<2	<2

Notes:
* indicates sample that was taken at point zero (as opposed to 75 feet north)
NR= Not recorded
No flow to the ocean depicts when a naturally occurring sand berm prevents tidal exchange between the Los Penasquitos Lagoon and Pacific Ocean.

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APPENDIX D

WET WEATHER ANALYTICAL LABORATORY REPORTS

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	12/14/15 12:51
		Received Date:	11/06/15 15:55
		Turn Around:	Normal
Attention:	Roshan Christoph	**Client Project:**	5025-15-1111
Phone:	(858) 278-3600		
Fax:	(858) 278-5300	**PO Number:**	C013105334
Work Order(s):	5K06083		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Roshan Christoph :

Enclosed are the results of analyses for samples received 11/06/15 15:55 with the Chain of Custody document. The samples were received in good condition, at 3.8 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:
Quality Controls ran on 11/6/15 are as follows:
Total and Fecal Coliform ws spiked with E. coli was positive
Enterococcus was spiked with E. faecalis was positive
Blanks were all Non-Detected

Reviewed by:

haivannguyen

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 11/06/15 15:55
Date Reported: 12/14/15 12:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
1516-W1-FM-100-G-01	Client	5K06083-01	Water	11/06/15 10:15
1516-W1-FM-100-G-02	Client	5K06083-02	Water	11/06/15 10:15

ANALYSES

Microbiological Parameters by Standard Methods

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 11/06/15 15:55
Date Reported: 12/14/15 12:51

5K06083-01 **1516-W1-FM-100-G-01**

Sampled: 11/06/15 10:15 **Sampled By:** Client **Matrix:** Water

Microbiological Parameters by Standard Methods

Method: EPA 1600 Batch: W5L0779 Prepared: 11/06/15 16:30 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Enterococcus	**19**	1.0	1.0	CFU/100 ml	1	11/07/15 16:40	

Method: SM 9222B/D Batch: W5L0775 Prepared: 11/06/15 17:26 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Fecal Coliform	**38**	2.0	2.0	CFU/100 ml	2	11/07/15 17:30	
Total Coliform	**940**	20	20	CFU/100 ml	20	11/07/15 16:45	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 11/06/15 15:55
Date Reported: 12/14/15 12:51

5K06083-02 **1516-W1-FM-100-G-02**

Sampled: 11/06/15 10:15 **Sampled By:** Client **Matrix:** Water

Microbiological Parameters by Standard Methods

Method: EPA 1600 Batch: W5L0779 Prepared: 11/06/15 16:30 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Enterococcus	**25**	1.0	1.0	CFU/100 ml	1	11/07/15 16:40	

Method: SM 9222B/D Batch: W5L0775 Prepared: 11/06/15 17:26 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Fecal Coliform	**50**	2.0	2.0	CFU/100 ml	2	11/07/15 17:30	
Total Coliform	**1600**	20	20	CFU/100 ml	20	11/07/15 16:55	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 11/06/15 15:55
Date Reported: 12/14/15 12:51

QUALITY CONTROL SECTION

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 11/06/15 15:55
Date Reported: 12/14/15 12:51

Microbiological Parameters by Standard Methods - Quality Control

Batch W5L0775 - SM 9222B/D

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W5L0775-BLK1)					Analyzed: 11/07/15 16:45						
Fecal Coliform	ND	1.0	1.0	CFU/100 ml							
Total Coliform	ND	1.0	1.0	CFU/100 ml							

Batch W5L0779 - EPA 1600

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W5L0779-BLK1)					Analyzed: 11/07/15 16:40						
Enterococcus	ND	1.0	1.0	CFU/100 ml							

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 11/06/15 15:55
Date Reported: 12/14/15 12:51

Notes and Definitions

ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	02/01/16 12:46
		Received Date:	01/09/16 16:58
		Turn Around:	Normal
Attention:	Roshan Christoph	**Client Project:**	Los Penasquitos Bacteria TMDL 5025-15-1111
Phone:	(858) 278-3600		
Fax:	(858) 278-5300		
Work Order(s):	6A11005		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Roshan Christoph :

Enclosed are the results of analyses for samples received 01/09/16 16:58 with the Chain of Custody document. The samples were received in good condition, at 3.8 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:
Quality Controls ran on 1/09/16 are as follows:
Total and Fecal Coliform ws spiked with E. coli was positive
Enterococcus was spiked with E. faecalis was positive
Blanks were all Non-Detected

Reviewed by:

hanguyen

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/09/16 16:58
Date Reported: 02/01/16 12:46

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
1516-W2-FM-100-G-01	PS,DE	6A11005-01	Water	01/09/16 12:55

ANALYSES

Microbiological Parameters by Standard Methods

Weck Laboratories, Inc 14859 East Clark Avenue, City of Industry, California 91745-1396 (626) 336-2139 FAX (626) 336-2634

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/09/16 16:58
Date Reported: 02/01/16 12:46

6A11005-01 **1516-W2-FM-100-G-01**

Sampled: 01/09/16 12:55 **Sampled By:** PS,DE **Matrix:** Water

Microbiological Parameters by Standard Methods

Method: EPA 1600 Batch: W6B0039 Prepared: 01/09/16 20:00 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Enterococcus	**570**	10	10	CFU/100 ml	10	01/10/16 20:00	

Method: SM 9222B/D Batch: W6B0019 Prepared: 01/09/16 19:20 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Coliform	**44000**	200	200	CFU/100 ml	200	01/10/16 19:00	

Method: SM 9222B/D Batch: W6B0029 Prepared: 01/09/16 18:25 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Fecal Coliform	**190**	2.0	2.0	CFU/100 ml	2	01/10/16 19:00	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/09/16 16:58
Date Reported: 02/01/16 12:46

QUALITY CONTROL SECTION

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/09/16 16:58
Date Reported: 02/01/16 12:46

Microbiological Parameters by Standard Methods - Quality Control

Batch W6B0019 - SM 9222B/D

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0019-BLK1)					Analyzed: 01/10/16 19:00						
Total Coliform	ND	1.0	1.0	CFU/100 ml							

Batch W6B0029 - SM 9222B/D

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0029-BLK1)					Analyzed: 01/10/16 19:00						
Fecal Coliform	ND	1.0	1.0	CFU/100 ml							

Batch W6B0039 - EPA 1600

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0039-BLK1)					Analyzed: 01/10/16 20:00						
Enterococcus	ND	1.0	1.0	CFU/100 ml							

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/09/16 16:58
Date Reported: 02/01/16 12:46

Notes and Definitions

ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

Public Utilities

Environmental Monitoring and Technical Services
2392 Kincaid Rd. MS 45A, San Diego, CA 92101
Tel (619) 758-2361 Fax (619) 758-2309

TMDL Bacteriological Results

11/01/2016

Source			Total Coliforms	Fecal Coliforms	Enterococcus
Sample Date	Station	Time	CFU/100 mL	CFU/100 mL	CFU/100 mL
02/03/2016	**FM-100-RW-G-01**	955	1,800e	<20	72
02/03/2016	**FM-100-RW-G-03**	955	<1	<1	<1

e, estimated value, plate count falls outside recommended reporting limits per EPA method guidelines.
ND, No data; the total number of bacterial colonies, coliforms plus non-coliform exceed 200 colonies per plate

APPENDIX E

WET WEATHER FIELD DATA FORMS

Bacteria TMDL Monitoring
FIELD DATA SHEET

Site ID: FM-100 Date: 11/6/15 Time: 1015
Watershed: Los Pen [X] Receiving Water [] Storm Drain
Field Crew: KB, CE Photos Collected? [X] Yes [] No Photo Count#: 3-4
Observed Land Use: [X] Residential [X] Commercial [] Industrial [] Agricultural [X] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle	
Tide	[] N/A	[] Low	[] Incoming	[] High	[X] Outgoing	Tide Height: 2.5 ft.	
Last Rain	[] > 72 hours	[X] < 72 hours					
Rainfall	[] None	[] < 0.1"	[X] > 0.1"				

BEACH CHARACTERISTICS

Biology	[X] None	[] Insects	[] Algae	[] Mollusk	[] Snails	[] Crustacean	[] Other
Deposits	[X] None	[] Sediment/Gravel	[] Oily Deposits	[] Stains	[] Fine Particulates	[] Other	
Vegetation	[] None	[] Limited	[] Excessive	[X] Normal		[] Other	

RUNOFF CHARACTERISTICS N/A

Composition: CE N/A	[X] Sandy	[] Rocky	[] Grass				
Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other	
Beach Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other	
Beach Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other	
Beach Clarity	[] Clear	[] Slightly Cloudy	[] Opaque			[] Other	

ACTIVITIES/INDICATORS

[] Evidence Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments #
[] Waste Water Discharge	[] Leaking Trashcan	[] Dom. Animals #
[] Sewer Overflow	[] Food Waste/scraps	[X] Birds # 5
[] Trash Accumulation	[X] Seaweed Accumulation	[] Wildlife #
[] Organic Matter	[] Children (Diapers) #	[] Other

FLOW CONDITIONS N/A

Outfall Reaches Receiving Waters? [] Yes [] No [] N/A [] Dry [] Ponded [] Trickle [] Tidal
Flow Estimation:
Width | Diameter ___ ft. | in. Depth ___ ft. | in. Velocity ___ ft/sec. Flow ___ cfs | gpm

FIELD MEASUREMENTS

pH: 7.47 Temp(°C): 20.08 Turbidity (NTU): 1.44 Sp Conductivity (µS/cm): 44,000

SAMPLE COLLECTION [] Visited, Not Sampled

Grab Sample Collected? [X] Yes [] No QAQC Sample Collected? [X] Yes [] No QAQC Type:
Sample ID: 1516-W1-FM100-G01 Sample ID: 1516-W1-FM100-G02 [X] DUP
Date: 11/6/15 Time: 1015 Date: 11/6/15 Time: 1015 [] FB

SAMPLE CHARACTERISTICS [] N/A

Floatables	[X] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other	
Sample Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other	
Sample Color	[X] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other	
Sample Clarity	[X] Clear	[] Slightly Cloudy	[] Opaque			[] Other	

COMMENTS:

Salinity was 28.6 ppt which indicates sample was collected within mixing zone.

Lagoon discharging to ocean

Bacteria TMDL Monitoring
FIELD DATA SHEET

Site ID: FM-100 Date: 1/9/16 Time: 1255

Watershed: Los Pen [X] Receiving Water [] Storm Drain

Field Crew: PS DE Photos Collected? [X] Yes [] No Photo Count#: 2

Observed Land Use: [X] Residential [X] Commercial [] Industrial [] Agricultural [X] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[] N/A	[] Low	[] Incoming	[] High	[X] Outgoing	Tide Height: 0.5 ft.
Last Rain	[] > 72 hours	[X] < 72 hours				
Rainfall	[] None	[] < 0.1"	[X] > 0.1"			

BEACH CHARACTERISTICS

Biology	[X] None	[] Insects	[] Algae	[] Mollusk	[] Snails	[] Crustacean	[] Other
Deposits	[] None	[] Sediment/Gravel	[] Oily Deposits	[] Stains	[X] Fine Particulates	[X] Other sand	
Vegetation	[] None	[] Limited	[] Excessive	[X] Normal		[] Other	

RUNOFF CHARACTERISTICS

→ N/A

Composition:	[] Sandy	[] Rocky	[] Grass				
Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other	
Beach Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other	
Beach Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other	
Beach Clarity	[] Clear	[] Slightly Cloudy	[] Opaque			[] Other	

ACTIVITIES/INDICATORS

[] Evidence Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments #
[] Waste Water Discharge	[] Leaking Trashcan	[] Dom. Animals #
[] Sewer Overflow	[] Food Waste/scraps	[X] Birds # 150
[] Trash Accumulation	[] Seaweed Accumulation	[] Wildlife #
[] Organic Matter	[] Children (Diapers) #	[] Other

FLOW CONDITIONS

→ N/A

Outfall Reaches Receiving Waters? [] Yes [] No [] N/A [] Dry [] Ponded [] Trickle [] Tidal

Flow Estimation:

Width | Diameter ___ ft. | in. Depth ___ ft. | in. Velocity ___ ft/sec. Flow ___ cfs | gpm

FIELD MEASUREMENTS

pH: 7.81 Temp(°C): 16.51 Turbidity (NTU): 55 Sp Conductivity (µS/cm): 20,700

SAMPLE COLLECTION

[] Visited, Not Sampled

Grab Sample Collected? [X] Yes [] No QAQC Sample Collected? [] Yes [X] No QAQC Type:

Sample ID: W2-FM100-G01 Sample ID: [] DUP

Date: 1/9/16 Time: 1255 Date: Time: [] FB

SAMPLE CHARACTERISTICS

[] N/A

Floatables	[X] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other	
Sample Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other	
Sample Color	[X] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other	
Sample Clarity	[X] Clear	[] Slightly Cloudy	[] Opaque			[] Other	

COMMENTS: ongoing bridge (Railroad) construction

Lagoon flow reaching ocean

Bacteria TMDL Monitoring
FIELD DATA SHEET

Site ID: FM-100 Date: 2/3/16 Time: 0955

Watershed: Los Pen [X] Receiving Water [] Storm Drain

Field Crew: PS, DA Photos Collected? [X] Yes [] No Photo Count#: 3

Observed Land Use: [X] Residential [X] Commercial [] Industrial [] Agricultural [X] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[] N/A	[] Low	[] Incoming	[] High	[X] Outgoing	Tide Height: 2 ft.
Last Rain	[] > 72 hours	[X] < 72 hours				
Rainfall	[] None	[] < 0 .1"	[X] > 0 .1"			

BEACH CHARACTERISTICS

Biology	[] None	[] Insects	[] Algae	[] Mollusk	[] Snails	[] Crustacean	[X] Other NR
Deposits	[] None	[] Sediment/Gravel	[] Oily Deposits	[] Stains	[] Fine Particulates		[X] Other Sand
Vegetation	[] None	[] Limited	[] Excessive	[] Normal			[X] Other NR

RUNOFF CHARACTERISTICS

N/A

Composition:	[] Sandy	[] Rocky	[] Grass			
Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other
Beach Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other
Beach Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other
Beach Clarity	[] Clear	[] Slightly Cloudy	[] Opaque			[] Other

ACTIVITIES/INDICATORS

[] Evidence Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments #
[] Waste Water Discharge	[] Leaking Trashcan	[] Dom. Animals #
[] Sewer Overflow	[] Food Waste/scraps	[X] Birds # 15
[] Trash Accumulation	[] Seaweed Accumulation	[] Wildlife #
[] Organic Matter	[] Children (Diapers) #	[] Other

FLOW CONDITIONS

N/A

Outfall Reaches Receiving Waters? [] Yes [] No [] N/A [] Dry [] Ponded [] Trickle [] Tidal

Flow Estimation:

Width | Diameter ___ ft. | in. Depth ___ ft. | in. Velocity ___ ft/sec. Flow ___ cfs | gpm

FIELD MEASUREMENTS

pH: 7.98 Temp(°C): 16.81 Turbidity (NTU): 15.3 Sp Conductivity (µS/cm): 32,300

SAMPLE COLLECTION

[] Visited, Not Sampled

Grab Sample Collected? [X] Yes [] No

Sample ID: 1516-W3-FM100-G01

Date: 2/3/16 Time: 0955

QAQC Sample Collected? [X] Yes [] No QAQC Type: [] DUP [X] FB

Sample ID: 1516-W3-FM100-G03

Date: 2/3/16 Time: 0955

SAMPLE CHARACTERISTICS

[] N/A

Floatables	[X] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other
Sample Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other
Sample Color	[X] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other
Sample Clarity	[X] Clear	[] Slightly Cloudy	[] Opaque			[] Other

COMMENTS: lagoon discharging to ocean

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APPENDIX F

BACTERIA TMDL AND MS4 PERMIT DISCREPANCIES

F.1 Inconsistencies in Bacteria Total Maximum Daily Load (TMDL) Requirements (Attachment E.6)

The Bacteria TMDL Compliance Monitoring Program and this compliance monitoring report are designed to address the monitoring and assessment requirements defined in Attachment E.6.6 of the MS4 Permit. A number of inconsistencies were identified that may affect the interpretation of compliance.

<u>MS4 Permit Monitoring and Assessment</u>:

This report includes three compliance evaluations outlined in Sections 2.7 through 2.9, based on the MS4 Permit assessment requirements *(*San Diego Regional Water Quality Control Board [Regional Board], 2013*,* page E-49).

There is discrepancy between Table 6.2b–*Final Receiving Water Limitations Expressed as Bacteria Densities and Allowable Exceedance Frequencies for Creeks (Regional Board, 2013,* page E-32) and Table 6.5–*Interim Wet Weather Receiving Water Limitations Expressed as Interim Wet Weather Allowable Exceedance Frequencies (Regional Board, 2013,* page E-44).

As a clarification to the TMDLs, Table 6.2b in the MS4 Permit clarifies the final receiving water limitations (RWLs) for fecal coliform and *Enterococcus* and removes total coliform as a numeric target for creeks. However, Table 6.5 still includes a 41 percent interim wet weather allowable exceedance frequency for total coliform.

There is discrepancy between the monitoring procedures and assessment requirements. The sampling frequency defined in the monitoring procedures would provide insufficient data to complete the dry season geometric mean assessment requirement. The following are summaries of the MS4 Permit requirements and how the monitoring program addressed the discrepancies:

- The monitoring procedures of MS4 Permit Attachment E.6 require dry weather samples at creeks to be consistent with those of receiving monitoring stations in accordance with Provision D of the MS4 Permit as stated in Provision E.6.d(2)b.(i) (Regional Board, 2013, page E-50). Provision D of the MS4 Permit requires three dry weather monitoring events at receiving water stations.
- The assessment requirements for dry weather geometric mean exceedance frequencies state that the method and number of samples must be consistent with the requirements of the Basin Plan, which requires 5 samples per 30 days (Regional Board, 2010). The wet season geometric mean evaluation requirements do not stipulate that the Basin Plan methodology be applied.
- The Bacteria TMDL Monitoring Program was designed to generate the data needed to complete the assessment requirements. Dry weather monitoring was conducted at a higher frequency than required by the Bacteria TMDL monitoring procedures. Dry weather monitoring was conducted weekly during the dry season and monthly during the wet season to compare results with the dry weather geometric mean numeric targets.

There is an inconsistency between RWLs and assessment requirements that is traced back to inconsistencies between written requirements and tables in the Bacteria TMDL. The assessment section does not require a calculation of single-sample maximum (SSM) exceedances for dry weather. The following are summaries of the MS4 Permit requirements and how the monitoring program addressed the discrepancies:

- The assessment section requires exceedance frequencies to be calculated for dry season geometric means, wet season geometric means, and wet weather SSMs. The assessment requirements of the MS4 Permit are reinforced by the table of RWLs for creeks and the discussion of numeric targets, as presented in the Bacteria TMDL (Regional Board, 2010, pages A52 and A13, respectively).
- The footnotes of Table 6.2b of the MS4 Permit state that for "*dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved" and "wet weather days, only the single sample maximum receiving water limitations are required to be achieved" (*Regional Board, 2013, page E-32). These are not consistent with the footnotes for the same table presented in the Bacteria TMDL. The footnotes in the MS4 Permit are reinforced by the discussion of compliance with dry weather TMDLs described in the Bacteria TMDL, which states that, "*In addition to geometric means, the bacteria densities must be consistent with the SSM REC-1 WQOs in the Basin Plan for creeks.*"
- The Bacteria TMDL Compliance Monitoring Program was designed to generate the data needed to complete the assessment requirements.

The MS4 Permit assessment section clearly defines an evaluation of wet season geometric means that includes wet weather sampling results and dry weather sampling results. This assessment applies the dry weather numeric target to a data set that includes storm samples.

Attachment C – Los Peñasquitos Lagoon TMDL Vegetation Acreage

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Table C-1
Los Peñasquitos Lagoon TMDL Vegetation Acreage

TMDL Vegetation and Baseline Vegetation	Baseline Area (Acres)	October 2016 Area (Acres)	Difference from Baseline to 2016 (acres)
Developed			
Channel	0.52	0.52	0
Developed	429.14	429.14	0
Developed Total	**429.66**	**429.66**	**0**
Freshwater Marsh			
Bolboschoenus maritimus Association	1.01	0.98	-0.03
Channel	3.78	3.78	0
Schoenoplectus acutus Association	0.51	0.51	0
Schoenoplectus americanus Association	5.38	5.32	-0.06
Schoenoplectus californicus Association	12.08	11.85	-0.23
Typha Alliance	41.66	40.83	-0.83
Freshwater Marsh Total	**64.42**	**63.27**	**-1.15**
Herbaceous Wetland			
Iva hayesiana Special Stands	2.11	2.11	0
Juncus xiphioides Association	0.99	1.03	+0.04
Naturalized Warm-Temperate Riparian and Semi-Natural Stands	4.85	4.85	0
Herbaceous Wetland Total	**7.95**	**7.99**	**+0.04**
Non-Tidal Saltmarsh			
Arthrocnemum subterminale Association	1.03	1.03	0
Arthrocnemum subterminale-Salicornia pacifica Association	6.06	5.99	-0.07
Brackish Pond	0.10	0.10	0
Distichlis spicata-Annual Grasses Association	9.72	9.76	+0.04
Frankenia salina Alliance	18.64	18.68	+0.04
Frankenia salina-Distichlis spicata Association	11.51	11.21	-0.30
Isocoma menziesii/Distichlis spicata Association	9.19	9.01	-0.18
Jaumea carnosa	0.03	0.03	0
Juncus acutus Provisional Association	0.93	1.09	+0.16
Juncus acutus-Jaumea carnosa Provisional Association	1.23	1.31	+0.08
Mudflat	0.10	0.10	0
Salicornia pacifica Association	8.33	8.36	+0.03
Salicornia pacifica-Frankenia salina Association	29.93	30.09	+0.16
Salicornia pacifica-Jaumea carnosa Association	1.72	1.89	+0.17

Table C-1 (continued)
Los Peñasquitos Lagoon TMDL Vegetation Acreage

TMDL Vegetation and Baseline Vegetation	Baseline Area (Acres)	October 2016 Area (Acres)	Difference from Baseline to 2016 (acres)
Salicornia pacifica-Jaumea carnosa-Frankenia salina	5.32	5.48	+0.16
Salt Panne	2.69	2.69	0
Non-Tidal Saltmarsh Total	**106.53**	**106.82**	**+0.29**
Non-Tidal Saltmarsh with Lolium			
Arthrocnemum subterminale-Salicornia pacifica Association	2.05	2.05	0
Baccharis salicifolia Association	0.27	0.27	0
Frankenia salina Alliance	1.66	1.71	+0.05
Frankenia salina-Distichlis spicata Association	3.34	3.34	0
Lolium perenne Semi-Natural Stands	27.82	27.82	0
Naturalized Warm-Temperate Riparian and Semi-Natural Stands	0.39	0.39	0
Salicornia pacifica Association	1.24	1.24	0
Salicornia pacifica-Frankenia salina Association	23.04	22.88	-0.16
Salicornia pacifica-Jaumea carnosa-Frankenia salina	0.65	0.65	0
Non-Tidal Saltmarsh with Lolium Total	**60.46**	**60.35**	**-0.11**
Southern Willow Scrub			
Arundo donax	3.35	3.35	0
Baccharis salicifolia Association	17.99	17.83	-0.16
Fraxinus uhdei	0.04	0.04	0
Mixed Salix spp./Platanus racemosa	18.16	18.39	+0.23
Myoporum spp.	0.06	0.06	0
Pluchea sericea Association	0.62	0.62	0
Salix gooddingii Association	2.09	2.09	0
Salix lasiolepsis Association	98.40	98.38	-0.02
Salix lucida ssp. lasiandra Association	0.08	0.08	0
Washingtonia sp./Phoenix canariensis	0.03	0.03	0
Southern Willow Scrub Total	**140.82**	**140.87**	**+0.05**
Tidal Saltmarsh			
Arthrocnemum subterminale-Salicornia pacifica Association	0.60	0.60	0
Frankenia salina Alliance	1.85	1.85	0
Frankenia salina-Distichlis spicata Association	11.22	11.14	-0.08
Jaumea carnosa	0.20	0.20	0
Juncus acutus Provisional Association	0.60	0.60	0

Table C-1 (continued)
Los Peñasquitos Lagoon TMDL Vegetation Acreage

TMDL Vegetation and Baseline Vegetation	Baseline Area (Acres)	October 2016 Area (Acres)	Difference from Baseline to 2016 (acres)
Juncus acutus-Jaumea carnosa Provisional Association	3.83	3.83	0
Mudflat	2.90	2.90	0
Salicornia pacifica Association	29.81	29.81	0
Salicornia pacifica-Frankenia salina Association	41.58	41.55	-0.03
Salicornia pacifica-Jaumea carnosa Association	31.04	31.76	+0.72
Salicornia pacifica-Jaumea carnosa-Frankenia salina	18.32	18.42	+0.10
Salt Panne	0.43	0.43	0
Water	44.23	44.27	+0.04
Tidal Saltmarsh Total	**186.61**	**187.36**	**+0.75**
Upland			
Ambrosia chamissonis-Abronia maritima-Cakile maritima Association	1.25	1.60	+0.35
Beach	8.83	8.83	0
Carpobrotus edulis	1.66	1.66	0
Cortaderia selloana	0.36	0.36	0
Disturbed	6.45	6.45	0
Eucalyptus sp.	1.75	1.75	0
Isocoma menziesii Provisional Association	6.69	6.58	-0.11
Upland	176.71	176.81	+0.1
Upland Total	**203.70**	**204.04**	**+0.34**
Water			
Water	3.53	3.53	0
Water Total	**3.53**	**3.53**	**0**
Grand Total	**1203.68**	**1203.89**	**+0.21**

Attachment D – Dry Weather Outfall Information

Attachment D.1 – MS4 Outfall Dry Weather Monitoring Data
Attachment D.2 – MS4 Outfall Dry Weather Visual Observations Data
Attachment D.3 – Dry Weather Assessment Methodology
Attachment D.4 – Dry Weather Volumes and Pollutant Loads

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Attachment D.1 – Dry Weather Outfall Analytical Results

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Table D.1-1
2015-2016 Los Peñasquitos WMA Dry Weather Outfall Monitoring Analytical Results

Analyte	Units	City of San Diego										City of Del Mar		City of Poway									
Location		DW0024		DW0025		DW0036		DW0247		DW0429		S-12		282-1749, 2		282-1749, 3		282-1749, 4	294-1749,2	298-1749, 2		298-1749, 5	
Date		2/4/16	4/25/16	2/4/16	4/25/16	2/4/16	4/25/16	3/16/16	4/25/16	3/16/16	4/25/16	6/30/16	8/12/16	7/28/16	8/1/16	7/28/16	8/1/16	7/28/16	8/1/16	8/1/16	8/2/16	7/28/16	8/2/16
Conventional Parameters																							
Dissolved Oxygen	mg/L	10.00	9.31	9.65	8.87	10.78	7.38	9.53	9.12	9.37	9.03	7.62	6.8	16	8.4	19.4	10.1	16.9	9	9.1	8.4	11.4	8.4
Outfall Hardness (Total)	mg CaCO3/L	490	380	410	380	490	530	380	350	280	350	1150	1170	745	714	346	402	341	658	655	677	2880	2440
MBAS	mg/L	0.19	0.15	0.20	0.29	0.14	0.15	< 0.050	< 0.050	0.069 J	0.19	< 0.1	< 0.1	< 0.1	< 0.1	0.4 J	0.1 J	0.1 J	< 0.1	< 0.1	< 0.1	0.1 J	< 0.1
pH	pH units	8.8	8.6	8.5	8.7	8.0	7.9	8.4	8.9	8.6	8.6	8.41	8.3	6.6	6.5	6.5	6.8	6.5	7.2	6.8	7.5	6.5	7.3
Specific Conductivity	mS/cm	2.16	1.87	1.944	1.663	3.38	2.18	1.373	1.28	1.289	1.528	5.874	5.54	3.13	3.0	1.32	1.34	1.17	2.68	2.53	2.56	7.73	6.41
Temperature	°C	13.5	16.3	13.8	17.0	11.1	17.7	17.3	17.0	17.8	17.2	20.42	23.4	24.9	26.1	23.5	22.6	25.9	25.4	25.8	24	31.4	27.1
Turbidity	NTU	1.64	5.9	5.83	17.92	6.89	2.55	0.04	1.23	2.96	8.64	1.54	2.22	1.66	1.28	13.11	0.31	8.1	1.97	0.88	1.21	13.17	18.11
Receiving Water Hardness (Total)	mg $CaCO_3$/L	550	740	550	740	1300	1700	550	740	550	740	Not Applicable. CTR not used for NAL determination		817	817	346	402	817	1260	1260	1260	373	373
Receiving Water Station		LPCMLS		LPCMLS		LPCTWAS3		LPCMLS		LPCMLS				282-1749, 2 - RW		282-1749, 3		282-1749, 2 - RW	298-1749, 2 - RW	298-1749, 2 - RW		298-1749, 5 - RW	
Indicator Bacteria																							
Enterococcus	MPN/100 mL	100* e	1,300* e	11,000*	340* e	1,000*	2,800* e	< 20*	200* e	100*	580*	1,600	500	900	3,000	17,000	5,000	900	3,000	1,700	1,700	1,300	22,000
Fecal Coliform	MPN/100 mL	< 20*	460	1,100*	310	80* e	7,900	< 20*	< 18	< 20*	< 18	50	< 20	1700	5,000	13,000	23,000	3,000	23,000	13,000	13,000	8,000	300,000
Total Coliform	MPN/100 mL	2,200* e	49,000	>1,600,000*	1,400	6,000* e	33,000	1,200* e	110	10,000* e	3,300	1,600	30,000	5,000	5,000	110,000	30,000	80,000	50,000	30,000	50,000	50,000	500,000
Total Metals																							
Cadmium	µg/L	< 2	0.14 J	< 2	0.26 J	< 2	< 0.14	< 2	0.21 J	< 2	0.24 J	< 0.2	< 0.2	0.2 J	0.2 J	0.4 J	< 0.2	0.2 J	0.4 J	2	0.5 J	0.2 J	0.4 J
Chromium	µg/L	< 2.5	1.3 J	< 2.5	1.4 J	< 2.5	1.2 J	< 2.5	0.84 J	< 2.5	2.6 J	NR***	NR***	0.8 J	0.3 J	2 J	0.8 J	1 J	0.2 J	0.3 J	< 0.2	1 J	1 J
Chromium (III)**	µg/L	See Dissolved Chromium (III) and Dissolved Chromium (VI)**										NR***	NR***	0.8 J	0.3 J	2	0.8 J	1	< 0.3	0.3 J	< 0.3	1	1
Chromium (VI)**	µg/L											NR***	NR***	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Copper	µg/L	21	12 J	8 J	13 J	16	27	< 5	< 1.9	6 J	5.8 J	2	2	4 J	5 J	20	9 J	8 J	8 J	4 J	3 J	11	13
Iron	µg/L	460	1500	990	1200	350	140	51	< 13	890	970	107	362	108	128	479	116	150	358	95	48 J	925	1070
Lead	µg/L	< 2.5	< 1.9	< 2.5	< 1.9	< 2.5	< 1.9	< 2.5	< 1.9	< 2.5	< 1.9	< 0.06	0.3	0.2 J	0.9 J	2 J	0.3 J	0.4 J	0.2 J	0.3 J	0.2 J	0.6 J	0.9 J
Manganese	µg/L	39	160	52	47	96	79	< 10	0.83 J	< 10	41	39	56	3 J	3 J	31	4 J	6	61	53	28	19	38
Nickel	µg/L	< 5	3.8 J	< 5	3.6 J	< 5	2.7 J	< 5	< 0.76	< 5	2.6 J	NR***	NR***	3 J	1 J	7	2 J	4 J	2 J	1 J	2 J	5	4 J
Selenium	µg/L	13	< 4	< 6.1	< 4	7.5 J	< 4	< 6.1	< 4	< 6.1	< 4	8	8	3	3	0.7 J	0.6 J	0.4 J	1	0.8 J	0.8 J	7	6
Silver	µg/L	< 5	< 0.92	< 5	< 0.92	< 5	< 0.92	< 5	< 0.92	< 5	< 0.92	NR***	NR***	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2 J
Zinc	µg/L	17 J	25 J	37	31 J	36	37 J	< 10	< 9.6	28	45 J	1	14	10 J	10 J	341	27	29	7 J	10 J	10 J	17 J	28

Table D.1-1 (continued)
2015-2016 Los Peñasquitos WMA Dry Weather Outfall Monitoring Analytical Results

Analyte	Units	City of San Diego										City of Del Mar		City of Poway									
Location		DW0024		DW0025		DW0036		DW0247		DW0429		S-12		282-1749, 2		282-1749, 3		282-1749, 4	294-1749,2	298-1749, 2		298-1749, 5	
Date		2/4/16	4/25/16	2/4/16	4/25/16	2/4/16	4/25/16	3/16/16	4/25/16	3/16/16	4/25/16	8/12/16	6/30/16	7/28/16	8/1/16	7/28/16	8/1/16	7/28/16	8/1/16	8/1/16	8/2/16	7/28/16	8/2/16
Dissolved Metals																							
Cadmium	µg/L	< 2	< 0.14	< 2	0.18 J	< 2	0.16 J	< 2	0.22 J	< 2	< 0.14	< 0.07	< 0.07	< 0.2	< 0.2	0.4 J	< 0.2	0.9 J	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	µg/L	< 2.5	1.2 J	< 2.5	1.0 J	< 2.5	2.8 J	< 2.5	0.92 J	< 2.5	0.96 J	NR***	NR***	0.2 J	< 0.2	0.4 J	< 0.2	0.6 J	< 0.2	< 0.2	< 0.2	0.2 J	< 0.2
Chromium (III)**	µg/L	< 0.5	1.3	< 0.5	1.4	< 0.5	1.2	< 0.5	0.84 J	< 0.5	2.6	NR***	NR***	0.2 J	<0.06	0.4 J	<0.06	0.6 J	<0.06	<0.06	<0.06	0.2 J	<0.06
Chromium (VI)**	µg/L	< 0.25	< 0.25	< 0.25	< 0.25	0.29 J	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	NR***	NR***	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Copper	µg/L	22	8.8 J	6.6 J	6.4 J	< 5	13 J	< 5	< 1.9	5.5 J	3.7 J	0.5	0.6	3	4	13	7	5	5	2	1	8	9
Iron	µg/L	140	89 J	50	91 J	28 J	59 J	< 10	< 13	120	15 J	5	< 4	2 J	2 J	58	17 J	27 J	31 J	12 J	9 J	10 J	9 J
Lead	µg/L	< 2.5	< 1.9	< 2.5	< 1.9	< 2.5	< 1.9	< 2.5	< 1.9	< 2.5	< 1.9	< 0.2	< 0.06	3	0.4 J	2	0.1 J	0.1 J	< 0.06	0.1 J	0.6 J	< 0.06	< 0.06
Manganese	µg/L	39	78	37	8.5 J	260	79	< 10	< 0.46	< 10	1.5 J	8	15	1 J	0.8 J	21	2 J	0.6 J	40	26	18	2 J	9
Nickel	µg/L	< 5	2.9 J	< 5	3.3 J	< 5	2.3 J	< 5	< 0.76	< 5	1.7 J	NR***	NR***	2 J	< 0.2	4 J	0.2 J	2 J	< 0.2	< 0.2	0.8 J	3 J	3 J
Selenium	µg/L	12	< 4	< 6.1	< 4	< 6.1	< 4	< 6.1	< 4	< 6.1	< 4	7	7	3	2	0.8 J	0.6 J	0.4 J	1	0.7 J	0.8 J	7	5
Silver	µg/L	< 5	< 0.92	< 5	< 0.92	< 5	< 0.92	< 5	< 0.92	< 5	< 0.92	NR***	NR***	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Zinc	µg/L	11 J	< 9.6	13 J	9.8 J	< 10	19 J	< 10	< 9.6	23	12 J	7	3	6 J	7 J	329	19 J	20	1 J	3 J	2 J	3 J	4 J
Nutrients																							
Ammonia as N	mg/L	< 0.10	0.15 J	0.12 J	0.12 J	< 0.10	0.22	0.23	0.13 J	0.40	0.10 J	0.19	0.17	0.2	0.2	0.54	0.4	0.36	0.23	0.06	0.1	0.4	0.18
Nitrite as N****	mg/L	< 0.070	< 0.070	< 0.070	< 0.070	< 0.14	< 0.070	< 0.070	< 0.070	< 0.070	< 0.070	0.02	0.008	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nitrate as N****	mg/L	5.3	3.5	5.5	2.1	0.28	0.75	0.14	0.16	0.60	0.65	1.02	1.90	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nitrate/Nitrite as N****	mg/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	1.04	1.90	4.16	9.72	2.78	2.02	3.66	1.14	0.62	0.52	12.2	8.75
Total Nitrogen	mg/L	6.6	4.0	6.6	3.3	0.87	1.7	1.4	0.16	1.4	0.99	4.7	3.1	5.8	11.3	7.7	7	53.1	2.3	12.5	7.9	15.3	9.1
TKN	mg/L	1.3	0.47	1.1	1.2	0.59	0.91	1.3	< 0.10	0.75	0.34	3.7	1.2	1.6	1.6	4.9	5	49.4	1.2	11.9	7.4	3.1	0.3
Phosphorus, Total	mg/L	0.17	0.27	0.13	0.22	0.14	0.22	0.027 J	< 0.025	0.12	0.073	0.14	0.05	0.09	0.23	0.5	0.63	0.98	0.62	0.24	0.84	0.86	0.66
Orthophosphate as P	mg/L	< 0.080	0.18	< 0.080	0.095	< 0.16	0.16	0.022 J	0.028 J	0.082	0.045 J	0.10	< 0.007	0.07	0.2	0.42	0.59	0.87	0.59	0.2	0.83	0.81	0.65
Solid Parameters																							
Total Dissolved Solids	mg/L	1500	1200	1200	1100	1900	1100	850	830	800	920	3610	3660	2060	2030	897	872	799	1820	1720	1730	5160	4570
Total Suspended Solids	mg/L	8.5	11	5.2	6.8	12	3.4	< 0.53	3.4	1.9	35	2.0	62.0	< 1	2 J	8 J	2 J	2 J	3 J	1 J	< 1	23	37

Notes:
< = Analyte not detected at method detection limit shown; J = Analyte detected above the method detection limit but below the reporting limit; e = CFU/100mL, estimated value, plate count falls outside recommended reporting limits per EPA method guidelines; NA = Not Analyzed; NR = Not Required, * = CFU; ** = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal; ***NAL analyte not required for Ocean Receiving Waters; **** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Attachment D.2 – Major MS4 Outfall Dry Weather Visual Observation Data

(Electronic Submittal)

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Major MS4 Outfall Dry Weather Monitoring Data Files

The following dry weather MS4 outfall data files are included in this attachment:

- County of San Diego Non-Major MS4 Outfall Dry Weather Visual Observation Data (County of San Diego has no major MS4 outfalls in Los Peñasquitos WMA)
- City of Del Mar Major MS4 Outfall Dry Weather Visual Observation Data
- City of Poway Major MS4 Outfall Dry Weather Visual Observation Data
- City of San Diego Major MS4 Outfall Dry Weather Visual Observation Data

All data files are referenced in the Monitoring Results and Assessment Appendix C.

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Attachment D.3 – Dry Weather Assessment Methodology

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1 Assessment of Dry Weather Outfall Monitoring Results

In 2013 the San Diego Regional Water Quality Control Board (Regional Board) issued *Order No. R9-2013-0001 (amended by Order Nos. R9-2015-0001 and R9-2015-0100), National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region*, herein referred to as the MS4 Permit, regulating MS4 discharges throughout the San Diego Region. The MS4 Permit requires a series of dry weather MS4 outfall assessments be performed annually to assess and report the progress of each Copermittee toward effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction. This Attachment describes the methodology used to perform these required assessments.

Dry weather monitoring requirements are not discussed here, and can be found in the MS4 outfall monitoring plan for each Watershed Management Area (WMA). MS4 outfall monitoring plans are available through Project Clean Water (www.projectcleanwater.org).

Per MS4 Permit Provision D.4.b(1)(b), Copermittees will annually assess and/or report the following, beginning in the Transitional Monitoring Annual Reports and continuing in the Water Quality Improvement Plan Annual Reports:

(i) The known and suspected controllable sources (e.g. facilities, areas, land uses, pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area;

(ii) Sources of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area that have been reduced or eliminated; and

(iii) Modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.

The following additional assessments, listed in Permit Provision D.4.b(1)(c), are required in the Water Quality Improvement Plan Annual Reports:

(i) The assessments listed in Provision D.4.b.(1)(b);

(ii) Based on the data collected and applicable NALs [non-storm water action levels] in the Water Quality Improvement Plan, rank the MS4 outfalls in the Copermittee's jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan, with the goal of eliminating persistent flow non-storm water discharges and/or pollutant loads in order of the ranked priority list through targeted programmatic actions and source investigations;

(iii) For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identify the known and suspected sources within the Copermittee's jurisdiction in the Watershed Management Area that may cause or contribute to the NAL exceedances;

(iv) Each Copermittee must analyze the data collected pursuant to Provision D.2.b, and utilize a model or other method, to calculate or estimate the non-storm water

volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually.

[a] Each Copermittee must calculate or estimate the annual non-storm water volumes and pollutant loads collectively discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall; and

[b] Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters.

The sections that follow describe the assessments in greater detail. Within each section are references to the data sources used in each assessment; these are suggestions for regional consistency, and additional supporting data may be used as necessary. Data sources are provided [within brackets] and include the following:

- Jurisdictional MS4 outfall inventory;
- Jurisdictional Illicit Discharge Detection and Elimination (IDDE) investigation results and follow-up actions;
- Jurisdictional Runoff Management Program (JRMP) Annual Report Forms; and
- Dry Weather MS4 Data Sharing Template (Data Sharing Template) results.

2 Provision D.4.b.(1)(b) Assessments

2.1 Persistent Flow Classification

As part of the MS4 Outfall Discharge Monitoring Station Inventory required by Permit Provision D.2.a(1), each Copermittee must identify all major outfalls that discharge directly to receiving waters within its jurisdiction in the WMA. Each Copermittee must maintain the following information for each major MS4 outfall:

- Latitude and longitude of MS4 outfall point of discharge;
- Watershed Management Area;
- Hydrologic subarea;
- Outlet size;
- Accessibility (i.e. safety and without disturbance of critical habitat);
- Approximate drainage area; and
- Classification of whether the MS4 outfall is known to have persistent dry weather flows, transient dry weather flows, no dry weather flows, or unknown dry weather flows.

Copermittees regularly update this information and include the geo-located outfalls on an MS4 map as part of their JRMP. The accuracy of the MS4 map must be confirmed during field screening monitoring. The frequency with which each Copermittee must field screen the MS4 outfalls in its inventory varies according to the number of major MS4 outfalls discharging from a Copermittee's jurisdiction to receiving waters within the region and within each WMA. The frequency of required field screening is outlined in MS4 Permit Provision D.2.a.(2)(a).

A summary of the updated persistent flow classification will also be reported in the Water Quality Improvement Plan Annual Report. This information will include the number of persistent, transient, dry, and unknown dry weather flow sites for each jurisdiction [Data Sharing Template, "Station Information" tab, "Current Flow Classification" column]. These flow classifications can be defined as the following:

- Persistent - having flowing, pooled, or ponded water more than 72 hours after a measurable rainfall event of 0.1 inch or greater during the three consecutive most recent monitoring and/or inspection events;
- Transient - having flowing, pooled, or ponded water during at least one but not on all three most recent consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation ≥ 0.1 inch;
- Tidal - persistent or transient flow with ocean tides as the source;
- Dry - having no flowing, pooled, or ponded water during the last three consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation ≥ 0.1 inch; and
- Unknown - site cannot be evaluated, or has not been visited enough times to determine flow status.

2.2 Known and Controllable Source Categorization

As described in Provision E.2 of the MS4 Permit, each Copermittee must seek to identify the source(s) of non-storm water discharge from their MS4, where there is evidence of non-storm water having been discharged into or from the MS4 [i.e., ponding or flow, in the absence of wet weather]. In the Water Quality Improvement Plan Annual Reports, the Copermittees will categorize the known and suspected controllable sources of transient and persistent flows within their jurisdiction in the WMA. As part of this categorization, each Copermittee will report the number of major outfalls within its jurisdiction in the WMA, the number of dry weather visual inspections performed in the monitoring year (October 1 through September 30), and the following additional information:

1) The number of sites with flowing or ponded observations in the monitoring year [Data Sharing Template, “Visual Observation” tab, “Flow Status” column];
2) Whether the sources of flow at the identified flowing and/or ponded sites are known or suspected [Data Sharing Template, “Runoff Sources” tab, “Runoff Sources Suspected or Known?” column];
3) If the source of flow is known or suspected, whether it is:
    a. Authorized by a separate NPDES Permit [Data Sharing Template, “Runoff Sources” tab, “NPDES Allowable Discharge”/ column];
    b. Identified as a category of non-storm water discharge that must be addressed as an illicit discharge, based on Provision E.2.a of the MS4 Permit [Data Sharing Template, “Runoff Sources” tab, “Unpermitted Discharge” column]; or
    c. Identified as a category of non-storm water discharge that is not controllable by the Copermittee (e.g., ground water seepage) [Data Sharing Template, “Runoff Sources” tab, “Unpermitted Discharge” column].

It should be noted that a site with flowing or ponded observations may have multiple known or suspected sources of flow. For example, a site may be impacted by both irrigation runoff and groundwater seepage.

2.3 Dry Weather Flow Elimination Assessment

As described in their Jurisdictional Runoff Management Plans (JRMPs), each Copermittee must initiate the implementation of procedures, in a timely manner, to eliminate all detected and identified illicit discharges and connections within its jurisdiction. If the Copermittee identifies the source of illicit discharge or connection as controllable, the Copermittee must implement its Enforcement Response Plan as described in its JRMP. Copermittees will submit a summary of the non-storm water discharges and illicit discharges and connections eliminated within its jurisdiction in the previous monitoring year as part of the JRMP Annual Report Form (Permit Attachment D, Section IV). Specific investigations initiated through monitoring are compiled [Data Sharing Template, “Runoff Sources” tab, “Was Flow Source Eliminated” column; Jurisdictional IDDE investigation forms (optional)] and summarized in the Water Quality Improvement Plan Annual Report Monitoring and Assessment Appendix.

2.4 Field Screening Modifications

Copermittees will identify modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.

Modifications to the field screening monitoring locations will be reported in the Water Quality Improvement Plan Annual Reports [Data Sharing Template, "Station Information" tab, "Modifications to Locations and Frequencies Necessary to Identify and Eliminate Sources of Flow D.4.b.(1).(b).(iii)" column].

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3 Provision D.4.b.(1)(c) Assessments

3.1 Dry Weather MS4 Outfall Prioritization

Based on the data collected and applicable NALs in the Water Quality Improvement Plan, each Copermittee will rank the MS4 outfalls in the their jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action. The prioritization will be conducted annually by each Copermittee and will include at least five highest priority major MS4 outfalls with non-storm water persistent flows, per WMA, that will be monitored in the subsequent monitoring year. If a Copermittee has fewer than five major MS4 outfalls with non-storm water persistent flows in the WMA, all the Copermittee's persistently flowing sites in the WMA will be monitored. For Copermittee's identified as responsible parties to a TMDL in Attachment E of the MS4 Permit, additional highest priority outfall monitoring locations may be selected if five sites are not sufficient to determine compliance with the TMDL.

Each Copermittee's prioritization methodology may differ. Data that will be used in the prioritization may include but are not limited to:

- Persistent flow status (defined as evidence of flow in each of the 3 most recent visual inspections) [Data Sharing Template, "Station Information" tab, "Current Flow Classification" column];
- Receiving water connectivity [Data Sharing Template, "Visual Observations" tab, "Flow Reaches Receiving Water" column];
- Potential to contribute to Highest Priority Water Quality Condition [Data Sharing Template, "Laboratory Data" tab];
- NAL exceedance [Data Sharing Template, "Laboratory Data" tab];
- Historical data; and
- Data not collected by the Copermittees.

The updated prioritization will be included in the Water Quality Improvement Plan Annual Reports, with explanations for any sites that have been added or removed from the Copermittee's list of highest priority outfalls. Once a site has been identified as highest priority, it may only be removed from the prioritization for one of the following reasons identified in Provision D.2.B.(2).(b).(ii) of the MS4 Permit:

- The non-storm water discharges have been effectively eliminated (i.e. no flowing, pooled, or ponded water) for three consecutive dry weather monitoring events; or
- The source(s) of the persistent flows has been identified as a category of non-storm water discharges that does not require an NPDES permit and does not have to be addressed as an illicit discharge because it was not identified as a source of pollutants (i.e. constituents in non-storm water discharge do not exceed NALs), and the persistent flow can be re-prioritized to a lower priority; or
- The constituents in the persistent flow non-storm water discharge do not exceed NALs, and the persistent flow can be re-prioritized to a lower priority; or

- The source(s) of the persistent flows has been identified as a non-storm water discharge authorized by a separate NPDES permit.

If a site has been removed from the list of five highest priority outfalls, it will be replaced with the Copermittee's next highest priority major MS4 outfall in the WMA, unless there are fewer than five persistently flowing major MS4 outfalls remaining.

3.2 Analysis of NAL Exceedance

Each major MS4 outfall identified as a highest priority persistently flowing outfall will be monitored under dry conditions at least semi-annually. The semi-annual monitoring event includes field observations, field monitoring, and analytical monitoring, including monitoring of NAL constituents. NALs are based on the receiving water type, and different NALs will be applicable to different outfalls in each WMA, depending on whether the outfall discharges to ocean receiving waters, bays, harbors, lagoons, estuaries, or inland streams and rivers. The NALs are presented in tables in the MS4 Permit by receiving water type, as follows:

- Ocean Surf Zone:
  - Table C-1: total coliform, fecal coliform, and *Enterococcus*.
- Bays, Harbors, and Lagoons/Estuaries:
  - Table C-2: turbidity, pH, fecal coliform, *Enterococcus*, and priority pollutants from Table C-3 (cadmium, copper, chromium III, chromium VI, lead, nickel, silver, and zinc).
- Inland Surface Waters:
  - MS4 Permit Table C-4: dissolved oxygen, turbidity, pH, fecal coliform, *Enterococcus*, total nitrogen, total phosphorus, methylene blue active substance (MBAS), iron, manganese, and priority pollutants from Table C-3 (cadmium, copper, chromium III, chromium VI, lead, nickel, silver, and zinc).

The NALs from the MS4 Permit tables are replicated in Tables 3-1 through 3-4. The Water Quality Improvement Plans may include additional WMA-specific NALs related to the highest priority water quality conditions in that WMA, or any applicable TMDLs in Attachment E of the MS4 Permit.

Table C.2-1
Non-Storm Water Action Levels for Discharges from MS4s to Ocean Surf Zone

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Total Coliform	MPN/100mL	1,000	–	10,000/1,000[1]	OP
Fecal Coliform	MPN/100mL	200[2]	–	400	OP
Enterococcus	MPN/100mL	35	–	104[3]	OP

AMAL = average monthly action level; MDAL = maximum daily action level; OP = Ocean Plan water quality objective; MPN/100mL = most probable number per 100 milliliters

1. Total coliform density NAL is 1,000 MPN/100 mL when the fecal/total coliform ratio exceeds 0.1.
2. Fecal coliform density NAL is 200 MPN/100mL during any 30 day period.
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas."

Table C.2-2
Non-Storm Water Action Levels for Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Turbidity	NTU	75	–	225	OP
pH	Units	Within limit of 6.0 to 9.0 at all times.			OP
Fecal Coliform	MPN/100mL	200[1]	–	400[2]	BP
Enterococcus	MPN/100mL	35	–	104[3]	BP
Priority Pollutants	µg/L	See Table 3-4			

BP = Basin Plan water quality objective; µg/L = microgram per liter.

1. Based on a minimum of not less than five samples for any 30-day period.
2. The NAL is reached if more than 10 percent of total samples exceed 400 MPN/100mL during any 30 day period.
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas" and is not applicable to water bodies that are not designated with the water contact recreation (REC-1) beneficial use.

Table C.2-3
Non-Storm Water Action Levels for Discharges from MS4s to Inland Surface Waters

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters.			BP
Turbidity	NTU	–	20	See MDAL	BP
pH	Units	Within limit of 6.5 to 8.5 at all times.			BP
Fecal Coliform	MPN/100mL	200[1]	–	400[2]	BP
Enterococcus	MPN/100mL	33	–	61[3]	BP
Total Nitrogen	mg/L	–	1.0	See MDAL	BP
Total Phosphorus	mg/L	–	0.1	See MDAL	BP
MBAS	mg/L	–	0.5	See MDAL	BP
Iron	mg/L	–	0.3	See MDAL	BP
Manganese	mg/L	–	0.05	See MDAL	BP
Priority Pollutants	µg/L	See Table 3-4			

WARM = warm freshwater habitat beneficial use; COLD = cold freshwater habitat beneficial use;

MBAS = Methylene Blue Active Substance

1. Based on a minimum of not less than five samples for any 30-day period.
2. The NAL is reached if more than 10 percent of total samples exceed 400 MPN/100mL during any 30 day period.
3. This value has been set to the Basin Plan water quality objective for saltwater “designated beach areas” and is not applicable to water bodies that are not designated with the water contact recreation (REC-1) beneficial use.

Table C.2-4
Non-Storm Water Action Levels for Priority Pollutants

Parameter	Units	Freshwater (CTR)		Saltwater (CTR)	
		MDAL	AMAL	MDAL	AMAL
Cadmium	µg/L	**	**	16	8
Copper	µg/L	*	*	5.8	2.9
Chromium III	µg/L	**	**	–	–
Chromium VI	µg/L	16	8.1	83	41
Lead	µg/L	*	*	14	2.9
Nickel	µg/L	**	**	14	6.8
Silver	µg/L	*	*	2.2	1.1
Zinc	µg/L	*	*	95	47

CTR = California Toxics Rule

* Action levels developed on a case-by-case basis (see below).

** Action levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels (MCLs) under the California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

The Cadmium, Copper, Chromium (III), Lead, Nickel, Silver, and Zinc NALs for MS4 discharges to freshwater receiving waters will be developed on a case-by-case basis based on site-specific water quality data (receiving water hardness). For these priority pollutants, refer to 40 CFR 131.38(b)(2).

For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, Copermittees will identify the known and suspected sources within the Copermittee's jurisdiction in the WMA that may cause or contribute to the NAL exceedances [Data Sharing Template, "Runoff Sources" tab; Jurisdictional IDDE forms].

3.3 Non-Storm Water Volume and Pollutant Load Assessment

Each Copermittee must analyze the data collected under the Dry Weather MS4 Outfall Discharge Monitoring program, and utilize a model or other method to calculate or estimate the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually.

3.3.1 Identification of Dry Weather Days

The first step in calculating annual non-storm water volumes and pollutant loads is to determine the number of dry weather days in the monitoring year. The number of dry weather days will be determined using County of San Diego ALERT Station Data (https://sandiego.onerain.com). A single ALERT Station will be selected to represent rainfall conditions in each WMA. This representative ALERT Station will be the same station utilized in Wet Weather MS4 Outfall Discharge Monitoring Assessments, and will be the station that is closest to a majority of wet weather MS4 outfall discharge monitoring stations. This station may vary each year, depending on the wet weather MS4 outfall discharge stations monitored and the availability of ALERT Station data.

A wet weather day is defined as any day with at least 0.1 inches of measurable rainfall within a 24-hour period, and the subsequent 72 hours. A dry weather day will be defined as all other days during the monitoring year (October 1-September 30).

3.3.2 Non-Storm Water Volume Assessment

An annual non-storm water volume will be assigned to each persistently flowing major MS4 outfall station in the Copermittee's jurisdiction in the WMA. This annual non-storm water volume will be calculated by summing a daily flow volume for each persistently flowing major MS4 outfall station across each dry weather day. The following guidelines will be applied:

- ❖ Scenario A: If a major MS4 outfall station was visited once during the monitoring year, and a single discrete flow rate was measured, this flow rate will be applied across all dry weather days within the year. In Scenario A, the following equations will be applied.

$$V_{Daily} = Q \times 86{,}400$$
$$V_{Annual\_Outfall} = V_{Daily} \times (\#Dry\ Days)$$

Where:

V_{Daily} = Daily flow volume from MS4 Outfall (cubic feet)

Q = Monitored outfall flow rate (cfs)

86,400 = Conversion Factor, seconds per day

$V_{Annual\_Outfall}$ = Annual flow volume from MS4 Outfall (cubic feet)

$\#Dry\ Days$ = Number of dry weather days as assessed at the applicable County ALERT Station

- ❖ Scenario B: If a major MS4 outfall station was visited more than once during the monitoring year, and more than one discrete flow rate was measured, monthly dry weather flow volumes will be calculated. The monthly flow volume calculation method will vary based on whether a flow measurement was logged at the outfall during that month. For calendar months in which the outfall was visited one or more times, the mean of the measured flow rates will be applied to all dry weather days within the month. For calendar months in which the outfall was not visited, the mean of all flow rates observed at that site during the calendar year will be applied. In Scenario B, the following equations will be applied.

For each month in the monitoring year with at least one site visit and corresponding instantaneous flow estimate:

$$V_{Month\_Mon} = \frac{\sum Q_{n\_Month}}{n_{Month}} \times 86{,}400 \times (\#Dry\ Days/month)$$

For each month in the monitoring year with no site visits or instantaneous flow estimates:

$$V_{Month\_NonMon} = \frac{\sum Q_{n\_Year}}{n_{Year}} \times 86{,}400 \times (\#Dry\ Days/month)$$

To calculate an annual dry weather flow volume:

$$V_{Annual\_Outfall} = \sum V_{Month\_Mon} + \sum V_{Month\_NonMon}$$

Where:

V_{Month_Mon} = Monthly flow volume from MS4 Outfall during month when outfall was visited one or more times (cubic feet)

Q_{n_Month} = Monitored outfall flow rate during visual observation event "n", during month when outfall was visited one or more times (cfs)

n_{Month} = Number of site visits with instantaneous flow measurements during month when outfall was visited one or more times

86,400 = Conversion Factor, seconds per day

$\#Dry\ Days$ = Number of dry weather days as assessed at the applicable County ALERT Station

V_{Month_NonMon} = Monthly flow volume from MS4 Outfall during month when outfall was not visited (cubic feet)

Q_{n_Year} = Monitored outfall flow rate during visual observation event "n", during monitoring year (cfs)

n_{Year} = Number of site visits with instantaneous flow measurements during monitoring year

$V_{Annual\_Outfall}$ = Annual flow volume from MS4 Outfall (cubic feet)

❖ Scenario C: If a major MS4 outfall station was monitored continuously for a period of time longer than a day, a measured daily flow volume will be calculated for each monitored day. The mean of these daily flow volumes will be applied to all non-monitored dry days. In Scenario C, the following equations will be applied.

$$V_{Daily\_n} = Measured\ Daily\ Flow\ Volume$$

$$V_{Daily\_Mean} = \frac{\sum V_{Daily_n}}{n}$$

$$V_{Annual\_Outfall} = \sum V_{Daily\_n} + V_{Daily\_Mean} \times (\#Dry\ Days - n)$$

Where:

V_{Daily_n} = Daily flow volume from MS4 Outfall during dry weather day with a continuous flow monitoring event (cubic feet)

V_{Daily_Mean} = Mean of measured daily outfall flow volumes (cubic feet)

n = number of dry days of continuous flow data at the outfall

$V_{Annual\_Outfall}$ = Annual flow volume from MS4 Outfall (cubic feet)

$\#Dry\ Days$ = Number of dry weather days as assessed at the applicable County ALERT Station

- Scenario D: If a major MS4 outfall station was not visited during the monitoring year, the mean of annual outfall flow volumes for all monitored stations in the jurisdiction in the WMA will be applied.

When the annual dry weather flow volume has been calculated for each persistently flowing major MS4 outfall within the jurisdiction within the WMA, a Copermittee's annual non-storm water volume will be calculated by summing the annual dry weather flow volume for each persistently flowing outfall.

Within all the above scenarios, observations of ponding (i.e., evidence of non-storm water in the MS4, with no connectivity to the receiving water) will be assigned a flow rate of zero.

The methodology above assumes that a persistently flowing major MS4 outfall is flowing on 100% of dry weather days. This assumption is highly conservative.

3.3.3 Non-Storm Water Pollutant Load Assessment

The Copermittees will estimate the annual non-storm water pollutant loads collectively discharged from their persistently flowing major MS4 outfalls to receiving waters in the MS4. A load will be calculated for each pollutant analyzed at each high priority outfall, based on the arithmetic mean of the analytical results from the two dry weather outfall monitoring events at that outfall during the monitoring year. The following equation will be applied:

$$Pollutant\ Load_{Annual} =$$
$$\left(V_{Annual} \times \frac{Pollutant\ Concentration_{Event1} + Pollutant\ Concentration_{Event2}}{2}\right) \times \mathrm{UC}$$

Where:
$Pollutant\ Load_{Annual}$ = Annual dry weather pollutant load from monitored outfall (lb or MPN)
V_{Annual} = Annual flow volume from MS4 outfall (cubic feet)
$Pollutant\ Concentration_{Event1}$ = Pollutant concentration measured at the outfall during dry weather monitoring event 1 (units vary)
$Pollutant\ Concentration_{Event2}$ = Pollutant concentration measured at the outfall during dry weather monitoring event 2 (units vary)
UC = Unit Conversion. Varies according to units used to express pollutant concentration, but common conversions are:

a. mg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\,g}{1000mg}\right)\left(\frac{1\,lb}{453.592\,g}\right)$
b. µg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\,g}{1{\times}10^6\mu g}\right)\left(\frac{1\,lb}{453.592\,g}\right)$
c. MPN/100mL: $UC = \left(\frac{100mL}{0.1L}\right)\left(\frac{28.317L}{1ft^3}\right)$

For each non-high priority persistently flowing outfall in a Copermittee's jurisdiction in the WMA, the mean of that Copermittee's monitored outfall results for each pollutant will be applied. It should be noted that only analytical data for outfalls that were identified as persistently flowing during the monitoring year will be included in the mean. In this case, the following equation will be applied:

$$Pollutant\ Load_{Annual} = \left(V_{Annual} \times Pollutant\ Concentration_{Mean}\right) \times \mathrm{UC}$$

Where:

$Pollutant\ Load_{Annual}$ = Annual dry weather pollutant load from non-monitored outfall (lb or MPN)

V_{Annual} = Annual flow volume from MS4 outfall (cubic feet)

$Pollutant\ Concentration_{Mean}$ = Mean pollutant concentration measured across high priority persistently flowing outfalls within the Copermittee's jurisdiction in the WMA during the monitoring year (units vary)

UC = Unit Conversion. Varies according to units used to express pollutant concentration, but common conversions are:

a. mg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\ g}{1000mg}\right)\left(\frac{1\ lb}{453.592\ g}\right)$
b. µg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\ g}{1\times10^6 \mu g}\right)\left(\frac{1\ lb}{453.592\ g}\right)$
c. MPN/100mL: $UC = \left(\frac{100mL}{0.1L}\right)\left(\frac{28.317L}{1ft^3}\right)$

For any pollutants not detected at the method detection limit (MDL), a concentration of MDL/2 will be applied in calculating loads.

3.4 Non-Storm Loads Not Subject to Copermittee's Legal Authority

Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters. If a Copermittee has identified a source of non-storm water not subject to their jurisdiction during field screening events or IDDE inspections, the volumes and loads for this source will be quantified according to the methodology outlined in Section 3.3.

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4 Dry Weather Assessment Methodology Assumptions and Limitations

The calculation of the MS4 Permit required assessments necessitates a number of assumptions be made to translate the monitoring data into conclusions regarding flow volume and load for the entire WMA. This may introduce potential sources of error, while propagating potential errors inherent to the monitoring data. A summary of these assumptions and sources of error follows:

- Monitoring Error—Annual non-storm water volumes and pollutants loads are based on the results from dry weather visual observations and dry weather outfall monitoring events. Error in the monitoring data could have the effect of propagating error in all subsequent calculations. Potential sources of error in the monitoring data include the following:
  - *Monitored Flow Selection*—The pollutant loading estimations rely on monitoring data from one or more non-storm water visual observations per major MS4 outfall per year. The 2015-2016 monitoring year is the first year of dry weather flow volume and load calculation, and this period generally has represented a drought condition. This can affect the type and volume of non-storm water sources such as irrigation and ground water. The potential for inter-annual variability is a source of error in both the flow and chemistry data.
  - *Flow Measurement Method*—The MS4 Outfall Monitoring Plans provides different options to determine the non-storm water volume: (1) field-based estimation methods (e.g., “float method” or “bucket and stopwatch method”) and (2) equipment-based flow measurements. The method chosen varies among outfalls and Copermittees, introducing inter-site variability in volume estimations. The field-based estimation methods introduce various amounts of human error with the use of stopwatches and error in determining volume amounts in non-graduated buckets. Consistent equipment-based flow monitoring approach is more accurate and precise compared to the field-based estimation methods. However, this approach introduces variability through the flow measurement device and sensor type used to account for site-specific conditions, and can also be cost and time prohibitive across the number of outfalls monitored. Each measurement device and sensor type has an inherent accuracy range (e.g., ±2% accuracy for sub-AV probes). Additionally, each flow measurement device and sensor type can produce slightly different values for the same event, adding a layer of inter-site variability.
  - *Rainfall Measurement*—The accuracy of determining the number of dry days relies on the accuracy of the rainfall measurements representing that outfall. Rainfall measurements were based on the County of San Diego ALERT rain gauge closest to the majority of wet weather outfalls in each WMA, and not site specific rain data. Rainfall totals across the San Diego area can vary widely within a given storm.

- *Chemistry Results*—An attempt to maintain regional consistency in reporting limits (RLs) and method detection limits (MDLs) was made. However, differences in lab capabilities can sometimes lead to different RLs and MDLs. This can introduce error if constituent concentrations are near or below the MDL for one monitoring event or Copermittee, and the MDL differs for another monitoring event or Copermittee. An attempt was made to account for this type of error by assigning constituents that were not detected a value of MDL/2 for the purposes of the assessment calculations.

❖ Assessment Methodology Error—The assessments require a series of assumptions and extrapolations be made regarding the determination of annual volumes and pollutant loadings. Each assumption carries the possibility of error, including the following:

- *Annual Volume Estimation Representativeness*—Regardless of the flow measurement method utilized, error is introduced when utilizing the median of more than one field measurement to determine an annual volume estimation. It is assumed these field measurements are representative of "typical" non-storm water conditions since persistently flowing non-storm water flows are relatively consistent through the year. However, this may not be the case, and error could be introduced into these estimations. For example, groundwater base flows can increase during the wet season, increasing dry weather flow rates. Or, alternatively, irrigation and irrigation runoff may increase during the dry season, increasing dry weather flow rates. Unless flow observations are made throughout the year under a variety of conditions, this seasonal variation may not be captured.
- *Annual Volume Estimation Confidence*—Based on availability of data, multiple calculation methods are used to estimate annual flow volume. The confidence associated with each estimate varies because differing amounts of data go into each estimate. That is to say, volumes calculated based on continuous flow data are associated with a higher confidence than volumes based on one or two instantaneous flow measurements.
- *Annual Pollutant Load Estimations*—The annual volume estimation error introduced previously disseminates into the annual pollutant load estimations through calculations discussed in Section 3.3.3. Although persistent non-storm water flows are relatively consistent throughout the year, collecting two grab samples in one year provides a very brief snapshot in time of the pollutant concentration at an outfall, which may not be indicative of typical conditions or pollutant loadings. Additionally, using an arithmetic mean as a "typical" value of pollutant concentrations to estimate pollutant loads can introduce error if the sample size of the mean is too small, as means are sensitive to sample size.

Attachment D.4 – Dry Weather Volumes and Pollutant Loads

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Table D.4-1
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part I

Analyte	Units	City of San Diego													
Site ID		DW0017	DW0024	DW0025	DW0027	DW0034	DW0036	DW0037	DW0247	DW0266	DW0281	DW0308	DW0375	DW0422	DW0426
Highest Priority Outfall		N	Y	Y	N	N	Y	N	Y	N	N	N	N	N	N
Annual Flow Volume	cf	125,048	1,227,234	1,388,057	139,563	0	0	0	369,710	51,988	200,412	247,864	350,610	41,590	0
Conventional Parameters															
Hardness (Total)	lb	3,154	33,327	34,228	3,520	0	0	0	8,424	1,311	5,055	6,251	8,843	1,049	0
MBAS	lb	1.116	13.0244	21.23	1.245	0	0	0	0.5770	0.4638	1.788	2.2112	3.1278	0.3710	0
Indicator Bacteria															
Enterococcus	MPN	6.17E+12	2.43E+13	2.23E+14	6.89E+12	0	0	0	1.10E+12	2.57E+12	9.89E+12	1.22E+13	1.73E+13	2.05E+12	0
Fecal Coliform	MPN	3.50E+12	8.17E+12	2.77E+13	4.34E+12	0	0	0	9.95E+10	1.62E+12	6.24E+12	6.95E+12	9.83E+12	1.17E+12	0
Total Coliform	MPN	6.04E+14	8.90E+14	3.15E+16	6.74E+14	0	0	0	6.86E+12	2.51E+14	9.68E+14	1.20E+15	1.69E+15	2.01E+14	0
Total Metals															
Cadmium	lb	0.0046	0.0437	0.0546	0.0052	0	0	0	0.0140	0.0019	0.0074	0.0092	0.0130	0.0015	0
Chromium	lb	0.0106	0.0977	0.1148	0.0118	0	0	0	0.0241	0.0044	0.0170	0.0210	0.0297	0.0035	0
Chromium (III)*	lb	See Dissolved Chromium (III) and Dissolved Chromium (VI)*													
Chromium (VI)*	lb														
Copper	lb	0.0876	1.264	0.9099	0.0978	0	0	0	0.0398	0.0364	0.1404	0.1737	0.2457	0.0291	0
Iron	lb	5.119	75.08	94.89	5.713	0	0	0	0.6636	2.128	8.204	10.1469	14.3531	1.7026	0
Lead	lb	0.0086	0.0843	0.0953	0.0096	0	0	0	0.0254	0.0036	0.0138	0.0170	0.0241	0.0029	0
Manganese	lb	0.4097	7.623	4.289	0.4573	0	0	0	0.0673	0.1703	0.6566	0.8121	1.1487	0.1363	0
Nickel	lb	0.0200	0.2413	0.2643	0.0223	0	0	0	0.0332	0.0083	0.0320	0.0396	0.0560	0.0066	0
Selenium	lb	0.0310	0.5746	0.2188	0.0345	0	0	0	0.0583	0.0129	0.0496	0.0614	0.0868	0.0103	0
Silver	lb	0.0116	0.1134	0.1282	0.0129	0	0	0	0.0342	0.0048	0.0185	0.0229	0.0324	0.0038	0
Zinc	lb	0.2075	1.609	2.946	0.2316	0	0	0	0.1131	0.0863	0.3326	0.4113	0.5818	0.0690	0
Dissolved Metals															
Cadmium	lb	0.0044	0.0410	0.0511	0.0050	0	0	0	0.0141	0.0018	0.0071	0.0088	0.0125	0.0015	0
Chromium	lb	0.0103	0.0939	0.0975	0.0114	0	0	0	0.0250	0.0043	0.0164	0.0203	0.0287	0.0034	0
Chromium (III)*	lb	0.0067	0.0594	0.0715	0.0075	0	0	0	0.0126	0.0028	0.0107	0.0133	0.0188	0.0022	0
Chromium (VI)*	lb	0.0011	0.0096	0.0108	0.0012	0	0	0	0.0029	0.0005	0.0018	0.0022	0.0031	0.0004	0
Copper	lb	0.0562	1.180	0.5633	0.0627	0	0	0	0.0398	0.0234	0.0900	0.1113	0.1575	0.0187	0
Iron	lb	0.4711	8.772	6.109	0.5258	0	0	0	0.1327	0.1959	0.7551	0.9338	1.3209	0.1567	0
Lead	lb	0.0086	0.0843	0.0953	0.0096	0	0	0	0.0254	0.0036	0.0138	0.0170	0.0241	0.0029	0
Manganese	lb	0.4007	4.482	1.971	0.4472	0	0	0	0.0604	0.1666	0.6421	0.7942	1.1234	0.1333	0
Nickel	lb	0.0180	0.2069	0.2513	0.0201	0	0	0	0.0332	0.0075	0.0289	0.0357	0.0505	0.0060	0
Selenium	lb	0.0267	0.5363	0.2188	0.0298	0	0	0	0.0583	0.0111	0.0428	0.0529	0.0749	0.0089	0
Silver	lb	0.0116	0.1134	0.1282	0.0129	0	0	0	0.0342	0.0048	0.0185	0.0229	0.0324	0.0038	0
Zinc	lb	0.0838	0.6053	0.9879	0.0936	0	0	0	0.1131	0.0349	0.1344	0.1662	0.2351	0.0279	0

Table D.4-1 (continued)
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part I

Analyte	Units	City of San Diego													
Site ID		DW0017	DW0024	DW0025	DW0027	DW0034	DW0036	DW0037	DW0247	DW0266	DW0281	DW0308	DW0375	DW0422	DW0426
Highest Priority Outfall		N	Y	Y	N	N	Y	N	Y	N	N	N	N	N	N
Annual Flow Volume	cf	125,048	1,227,234	1,388,057	139,563	0	0	0	369,710	51,988	200,412	247,864	350,610	41,590	0
Nutrients															
Ammonia N	lb	1.226	7.661	10.40	1.368	0	0	0	4.154	0.5095	1.964	2.429	3.4364	0.4076	0
Nitrite as N**	lb	0.3006	2.681	3.033	0.3354	0	0	0	0.8078	0.1250	0.4817	0.5957	0.8427	0.1000	0
Nitrate as N**	lb	14.82	337.1	329.3	16.54	0	0	0	3.462	6.160	23.75	29.37	41.54	4.928	0
Nitrate/Nitrite N**	lb	NR	NR	NR	NR	0	0	0	NR	NR	NR	NR	NR	NR	0
Total Nitrogen	lb	21.09	406.1	428.9	23.54	0	0	0	18.00	8.769	33.81	41.81	59.14	7.015	0
TKN	lb	6.253	67.80	99.65	6.979	0	0	0	15.58	2.600	10.02	12.39	17.53	2.079	0
Phosphorus, Total	lb	1.079	16.86	15.16	1.205	0	0	0	0.4558	0.4487	1.730	2.139	3.026	0.3590	0
Orthophosphate as P	lb	0.6027	8.428	5.849	0.6726	0	0	0	0.5770	0.2506	0.9659	1.195	1.689	0.2004	0
Solid Parameters															
TDS	lb	8,899	103,429	99,652	9,932	0	0	0	19,388	3,700	14,263	17640	24952	2960	0
TSS	lb	68.28	747.0	519.9	76.21	0	0	0	42.29	28.39	109.4	135.34	191.44	22.71	0

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Table D.4-2
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part II

Analyte	Units	City of San Diego													
Site ID		DW0428	DW0429	DW0435	DW0478	DW0481	DW0554	DW0638	DW0643	DW0839	DW0884	DW0887	DW0903	DW0910	DW0911
Highest Priority Outfall		N	Y	N	N	N	N	N	N	N	N	N	N	N	N
Annual Flow Volume	cf	31,317	54,023	0	250,543	0	3,342,253	0	0	3,907	166,917	501,310	167,475	44,101	0
Conventional Parameters															
Hardness (Total)	lb	790	1,062	0	6,319	0	84,295	0	0	99	4,210	12,644	4,224	1,112	0
MBAS	lb	0.2794	0.4368	0	2.2351	0	29.8163	0	0	0.0349	1.4891	4.4722	1.4941	0.3934	0
Indicator Bacteria															
Enterococcus	MPN	1.55E+12	5.20E+11	0	1.24E+13	0	1.65E+14	0	0	1.93E+11	8.24E+12	2.47E+13	8.27E+12	2.18E+12	0
Fecal Coliform	MPN	8.78E+11	1.45E+10	0	7.79E+12	0	1.04E+14	0	0	1.22E+11	5.19E+12	1.56E+13	5.21E+12	1.37E+12	0
Total Coliform	MPN	1.51E+14	1.02E+13	0	1.21E+15	0	1.61E+16	0	0	1.89E+13	8.06E+14	2.42E+15	8.09E+14	2.13E+14	0
Total Metals															
Cadmium	lb	0.0012	0.0021	0	0.0093	0	0.1235	0	0	0.0001	0.0062	0.0185	0.0062	0.0016	0
Chromium	lb	0.0027	0.0065	0	0.0213	0	0.2836	0	0	0.0003	0.0142	0.0425	0.0142	0.0037	0
Chromium (III)*	lb	See Dissolved Chromium (III) and Dissolved Chromium (VI)*													
Chromium (VI)*	lb														
Copper	lb	0.0219	0.0199	0	0.1756	0	2.3421	0	0	0.0027	0.1170	0.3513	0.1174	0.0309	0
Iron	lb	1.2821	3.1365	0	10.2566	0	136.8	0	0	0.1600	6.8332	20.52	6.856	1.805	0
Lead	lb	0.0022	0.0037	0	0.0172	0	0.2295	0	0	0.0003	0.0115	0.0344	0.0115	0.0030	0
Manganese	lb	0.1026	0.0776	0	0.8209	0	10.95	0	0	0.0128	0.5469	1.6425	0.5487	0.1445	0
Nickel	lb	0.0050	0.0086	0	0.0400	0	0.5337	0	0	0.0006	0.0267	0.0801	0.0267	0.0070	0
Selenium	lb	0.0078	0.0085	0	0.0620	0	0.8273	0	0	0.0010	0.0413	0.1241	0.0415	0.0109	0
Silver	lb	0.0029	0.0050	0	0.0231	0	0.3088	0	0	0.0004	0.0154	0.0463	0.0155	0.0041	0
Zinc	lb	0.0520	0.1231	0	0.4157	0	5.546	0	0	0.0065	0.2770	0.8318	0.2779	0.0732	0
Dissolved Metals															
Cadmium	lb	0.0011	0.0018	0	0.0089	0	0.1189	0	0	0.0001	0.0059	0.0178	0.0060	0.0016	0
Chromium	lb	0.0026	0.0037	0	0.0205	0	0.2740	0	0	0.0003	0.0137	0.0411	0.0137	0.0036	0
Chromium (III)*	lb	0.0017	0.0048	0	0.0134	0	0.1792	0	0	0.0002	0.0090	0.0269	0.0090	0.0024	0
Chromium (VI)*	lb	0.0003	0.0004	0	0.0022	0	0.0295	0	0	0.0000	0.0015	0.0044	0.0015	0.0004	0
Copper	lb	0.0141	0.0155	0	0.1125	0	1.5012	0	0	0.0018	0.0750	0.2252	0.0752	0.0198	0
Iron	lb	0.1180	0.2276	0	0.9439	0	12.59	0	0	0.0147	0.6289	1.8887	0.6310	0.1662	0
Lead	lb	0.0022	0.0037	0	0.0172	0	0.2295	0	0	0.0003	0.0115	0.0344	0.0115	0.0030	0
Manganese	lb	0.1003	0.0110	0	0.8027	0	10.71	0	0	0.0125	0.5348	1.6062	0.5366	0.1413	0
Nickel	lb	0.0045	0.0071	0	0.0361	0	0.4816	0	0	0.0006	0.0241	0.0722	0.0241	0.0064	0
Selenium	lb	0.0067	0.0085	0	0.0535	0	0.7136	0	0	0.0008	0.0356	0.1070	0.0358	0.0094	0
Silver	lb	0.0029	0.0050	0	0.0231	0	0.3088	0	0	0.0004	0.0154	0.0463	0.0155	0.0041	0
Zinc	lb	0.0210	0.0590	0	0.1680	0	2.241	0	0	0.0026	0.1119	0.3361	0.1123	0.0296	0

Table D.4-2 (continued)
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part II

Analyte	Units	City of San Diego													
Site ID		DW0428	DW0429	DW0435	DW0478	DW0481	DW0554	DW0638	DW0643	DW0839	DW0884	DW0887	DW0903	DW0910	DW0911
Highest Priority Outfall		N	Y	N	N	N	N	N	N	N	N	N	N	N	N
Annual Flow Volume	cf	31,317	54,023	0	250,543	0	3,342,253	0	0	3,907	166,917	501,310	167,475	44,101	0
Nutrients															
Ammonia N	lb	0.3070	0.8431	0	2.456	0	32.76	0	0	0.0383	1.636	4.913	1.641	0.4323	0
Nitrite as N**	lb	0.0753	0.1180	0	0.6022	0	8.033	0	0	0.0094	0.4012	1.204	0.4025	0.1060	0
Nitrate as N**	lb	3.7108	2.1079	0	29.69	0	396.0	0	0	0.4630	19.77	59.39	19.84	5.225	0
Nitrate/Nitrite N**	lb	NR	NR	0	NR	0	NR	0	0	NR	NR	NR	NR	NR	0
Total Nitrogen	lb	5.2828	4.0302	0	42.26	0	563.8	0	0	0.6592	28.15	84.56	28.25	7.439	0
TKN	lb	1.5661	1.8381	0	12.53	0	167.1	0	0	0.1954	8.346	25.06	8.374	2.205	0
Phosphorus, Total	lb	0.2703	0.3255	0	2.162	0	28.85	0	0	0.0337	1.440	4.326	1.445	0.3806	0
Orthophosphate as P	lb	0.1509	0.2142	0	1.207	0	16.11	0	0	0.0188	0.8045	2.416	0.8071	0.2125	0
Solid Parameters															
TDS	lb	2229	2900	0	17831	0	237,863	0	0	278.1	11,879	35,677	11,919	3,139	0
TSS	lb	17.10	62.22	0	136.8	0	1825	0	0	2.134	91.14	273.7	91.45	24.08	0

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Table D.4-3
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part III

Analyte	Units	City of San Diego													
Site ID		DW0915	DW0923	DW0924	DW0928	DW0931	DW0932	DW0944	DW0945	DW0950	DW0958	DW0959	DW0968	DW0969	DW0971
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	N	N	N
Annual Flow Volume	cf	0	40,194	0	125,048	751,406	375,703	4,019,413	292,523	332,718	62,635	20,097	125,271	0	0
Conventional Parameters															
Hardness (Total)	lb	0	1,014	0	3,154	18,951	9,476	101,374	7,378	8,392	1,580	507	3,159	0	0
MBAS	lb	0	0.3586	0	1.1156	6.7033	3.3517	35.8572	2.6096	2.9682	0.5588	0.1793	1.1176	0	0
Indicator Bacteria															
Enterococcus	MPN	0	1.98E+12	0	6.17E+12	3.71E+13	1.85E+13	1.98E+14	1.44E+13	1.64E+13	3.09E+12	9.92E+11	6.18E+12	0	0
Fecal Coliform	MPN	0	1.25E+12	0	3.89E+12	2.34E+13	1.17E+13	1.25E+14	9.10E+12	1.04E+13	1.95E+12	6.25E+11	3.90E+12	0	0
Total Coliform	MPN	0	1.94E+14	0	6.04E+14	3.63E+15	1.82E+15	1.94E+16	1.41E+15	1.61E+15	3.03E+14	9.71E+13	6.05E+14	0	0
Total Metals															
Cadmium	lb	0	0.0015	0	0.0046	0.0278	0.0139	0.1485	0.0108	0.0123	0.0023	0.0007	0.0046	0	0
Chromium	lb	0	0.0034	0	0.0106	0.0637	0.0319	0.3410	0.0248	0.0282	0.0053	0.0017	0.0106	0	0
Chromium (III)*	lb	See Dissolved Chromium (III) and Dissolved Chromium (VI)*													
Chromium (VI)*	lb														
Copper	lb	0	0.0282	0	0.0876	0.5266	0.2633	2.8166	0.2050	0.2332	0.0439	0.0141	0.0878	0	0
Iron	lb	0	1.6454	0	5.1192	30.7606	15.3803	164.5443	11.9752	13.6206	2.5641	0.8227	5.1283	0	0
Lead	lb	0	0.0028	0	0.0086	0.0516	0.0258	0.2760	0.0201	0.0228	0.0043	0.0014	0.0086	0	0
Manganese	lb	0	0.1317	0	0.4097	2.4619	1.2310	13.1693	0.9584	1.0901	0.2052	0.0658	0.4104	0	0
Nickel	lb	0	0.0064	0	0.0200	0.1200	0.0600	0.6419	0.0467	0.0531	0.0100	0.0032	0.0200	0	0
Selenium	lb	0	0.0099	0	0.0310	0.1860	0.0930	0.9949	0.0724	0.0824	0.0155	0.0050	0.0310	0	0
Silver	lb	0	0.0037	0	0.0116	0.0694	0.0347	0.3714	0.0270	0.0307	0.0058	0.0019	0.0116	0	0
Zinc	lb	0	0.0667	0	0.2075	1.2468	0.6234	6.6696	0.4854	0.5521	0.1039	0.0333	0.2079	0	0
Dissolved Metals															
Cadmium	lb	0	0.0014	0	0.0044	0.0267	0.0134	0.1430	0.0104	0.0118	0.0022	0.0007	0.0045	0	0
Chromium	lb	0	0.0033	0	0.0103	0.0616	0.0308	0.3295	0.0240	0.0273	0.0051	0.0016	0.0103	0	0
Chromium (III)*	lb	0	0.0022	0	0.0067	0.0403	0.0201	0.2155	0.0157	0.0178	0.0034	0.0011	0.0067	0	0
Chromium (VI)*	lb	0	0.0004	0	0.0011	0.0066	0.0033	0.0355	0.0026	0.0029	0.0006	0.0002	0.0011	0	0
Copper	lb	0	0.0181	0	0.0562	0.3375	0.1688	1.8054	0.1314	0.1494	0.0281	0.0090	0.0563	0	0
Iron	lb	0	0.1514	0	0.4711	2.8310	1.4155	15.1433	1.1021	1.2535	0.2360	0.0757	0.4720	0	0
Lead	lb	0	0.0028	0	0.0086	0.0516	0.0258	0.2760	0.0201	0.0228	0.0043	0.0014	0.0086	0	0
Manganese	lb	0	0.1288	0	0.4007	2.4075	1.2038	12.8782	0.9372	1.0660	0.2007	0.0644	0.4014	0	0
Nickel	lb	0	0.0058	0	0.0180	0.1083	0.0541	0.5791	0.0421	0.0479	0.0090	0.0029	0.0180	0	0
Selenium	lb	0	0.0086	0	0.0267	0.1604	0.0802	0.8582	0.0625	0.0710	0.0134	0.0043	0.0267	0	0
Silver	lb	0	0.0037	0	0.0116	0.0694	0.0347	0.3714	0.0270	0.0307	0.0058	0.0019	0.0116	0	0
Zinc	lb	0	0.0269	0	0.0838	0.5038	0.2519	2.6949	0.1961	0.2231	0.0420	0.0135	0.0840	0	0

Table D.4-3 (continued)
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part III

Analyte	Units	City of San Diego													
Site ID		DW0915	DW0923	DW0924	DW0928	DW0931	DW0932	DW0944	DW0945	DW0950	DW0958	DW0959	DW0968	DW0969	DW0971
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	N	N	N
Annual Flow Volume	cf	0	40,194	0	125,048	751,406	375,703	4,019,413	292,523	332,718	62,635	20,097	125,271	0	0
Nutrients															
Ammonia N	lb	0	0.3940	0	1.2256	7.3647	3.6824	39.3953	2.8671	3.2611	0.6139	0.1970	1.2278	0	0
Nitrite as N**	lb	0	0.0966	0	0.3006	1.8060	0.9030	9.6606	0.7031	0.7997	0.1505	0.0483	0.3011	0	0
Nitrate as N**	lb	0	4.7626	0	14.8169	89.0335	44.5167	476.2563	34.6609	39.4234	7.4217	2.3813	14.8433	0	0
Nitrate/Nitrite N**	lb	0	NR	0	NR	NR	NR	NR	NR	NR	NR	NR	NR	0	0
Total Nitrogen	lb	0	6.7800	0	21.0933	126.7484	63.3742	678.0003	49.3434	56.1234	10.5655	3.3900	21.1310	0	0
TKN	lb	0	2.0099	0	6.2531	37.5742	18.7871	200.9912	14.6277	16.6376	3.1321	1.0050	6.2642	0	0
Phosphorus, Total	lb	0	0.3469	0	1.0793	6.4852	3.2426	34.6904	2.5247	2.8716	0.5406	0.1735	1.0812	0	0
Orthophosphate as P	lb	0	0.1937	0	0.6027	3.6214	1.8107	19.3714	1.4098	1.6035	0.3019	0.0969	0.6037	0	0
Solid Parameters															
TDS	lb	0	2861	0	8,899	53,476	26,738	286,055	20,818	23,679	4,458	1,430	8,915	0	0
TSS	lb	0	21.95	0	68.28	410.3	205.1	2,195	159.7	181.7	34.20	10.97	68.40	0	0

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Table D.4-4

Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part IV

Analyte	Units	City of San Diego													
Site ID		DW0976	DW0978	DW0981	DW0987	DW0988	DW0990	DW1003	DW1004	DW1005	DW1006	DW1007	DW1009	DW1011	DW1016
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	N	N	N
Annual Flow Volume	cf	0	82,621	2,079,488	2,255,337	0	751,407	0	32,044	0	0	464,801	2,254,779	0	501,310
Conventional Parameters															
Hardness (Total)	lb	0	2,084	52,447	56,882	0	18,951	0	808	0	0	11,723	56,868	0	12,644
MBAS	lb	0	0.7371	18.5511	20.1199	0	6.7033	0	0.2859	0	0	4.1465	20.1149	0	4.4722
Indicator Bacteria															
Enterococcus	MPN	0	4.08E+12	1.03E+14	1.11E+14	0	3.71E+13	0	1.58E+12	0	0	2.29E+13	1.11E+14	0	2.47E+13
Fecal Coliform	MPN	0	2.57E+12	6.47E+13	7.02E+13	0	2.34E+13	0	9.97E+11	0	0	1.45E+13	7.01E+13	0	1.56E+13
Total Coliform	MPN	0	3.99E+14	1.00E+16	1.09E+16	0	3.63E+15	0	1.55E+14	0	0	2.25E+15	1.09E+16	0	2.42E+15
Total Metals															
Cadmium	lb	0	0.0031	0.0769	0.0834	0	0.0278	0	0.0012	0	0	0.0172	0.0833	0	0.0185
Chromium	lb	0	0.0070	0.1764	0.1913	0	0.0637	0	0.0027	0	0	0.0394	0.1913	0	0.0425
Chromium (III)*	lb	See Dissolved Chromium (III) and Dissolved Chromium (VI)*													
Chromium (VI)*	lb														
Copper	lb	0	0.0579	1.4572	1.5804	0	0.5266	0	0.0225	0	0	0.3257	1.5801	0	0.3513
Iron	lb	0	3.3823	85.1288	92.32	0	30.76	0	1.311	0	0	19.02	92.30	0	20.52
Lead	lb	0	0.0057	0.1428	0.1549	0	0.0516	0	0.0022	0	0	0.0319	0.1548	0	0.0344
Manganese	lb	0	0.2707	6.8133	7.3894	0	2.4619	0	0.1050	0	0	1.5229	7.3876	0	1.6425
Nickel	lb	0	0.0132	0.3321	0.3602	0	0.1200	0	0.0051	0	0	0.0742	0.3601	0	0.0801
Selenium	lb	0	0.0205	0.5147	0.5583	0	0.1860	0	0.0079	0	0	0.1151	0.5581	0	0.1241
Silver	lb	0	0.0076	0.1921	0.2084	0	0.0694	0	0.0030	0	0	0.0429	0.2083	0	0.0463
Zinc	lb	0	0.1371	3.4506	3.7424	0	1.2468	0	0.0532	0	0	0.7713	3.7415	0	0.8318
Dissolved Metals															
Cadmium	lb	0	0.0029	0.0740	0.0803	0	0.0267	0	0.0011	0	0	0.0165	0.0802	0	0.0178
Chromium	lb	0	0.0068	0.1705	0.1849	0	0.0616	0	0.0026	0	0	0.0381	0.1848	0	0.0411
Chromium (III)*	lb	0	0.0044	0.1115	0.1209	0	0.0403	0	0.0017	0	0	0.0249	0.1209	0	0.0269
Chromium (VI)*	lb	0	0.0007	0.0184	0.0199	0	0.0066	0	0.0003	0	0	0.0041	0.0199	0	0.0044
Copper	lb	0	0.0371	0.9340	1.0130	0	0.3375	0	0.0144	0	0	0.2088	1.0128	0	0.2252
Iron	lb	0	0.3113	7.8346	8.4971	0	2.8310	0	0.1207	0	0	1.7512	8.4950	0	1.8887
Lead	lb	0	0.0057	0.1428	0.1549	0	0.0516	0	0.0022	0	0	0.0319	0.1548	0	0.0344
Manganese	lb	0	0.2647	6.6627	7.2261	0	2.4075	0	0.1027	0	0	1.4892	7.2243	0	1.6062
Nickel	lb	0	0.0119	0.2996	0.3250	0	0.1083	0	0.0046	0	0	0.0670	0.3249	0	0.0722
Selenium	lb	0	0.0176	0.4440	0.4815	0	0.1604	0	0.0068	0	0	0.0992	0.4814	0	0.1070
Silver	lb	0	0.0076	0.1921	0.2084	0	0.0694	0	0.0030	0	0	0.0429	0.2083	0	0.0463
Zinc	lb	0	0.0554	1.3943	1.5122	0	0.5038	0	0.0215	0	0	0.3116	1.5118	0	0.3361

Table D.4-4 (continued)
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part IV

Analyte	Units	City of San Diego													
Site ID		DW0976	DW0978	DW0981	DW0987	DW0988	DW0990	DW1003	DW1004	DW1005	DW1006	DW1007	DW1009	DW1011	DW1016
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	N	N	N
Annual Flow Volume	cf	0	82,621	2,079,488	2,255,337	0	751,407	0	32,044	0	0	464,801	2,254,779	0	501,310
Nutrients															
Ammonia N	lb	0	0.8098	20.3816	22.1051	0	7.3647	0	0.3141	0	0	4.5556	22.0997	0	4.9135
Nitrite as N*	lb	0	0.1986	4.9980	5.4207	0	1.8060	0	0.0770	0	0	1.1171	5.4193	0	1.2049
Nitrate as N*	lb	0	9.7897	246.3965	267.2327	0	89.0335	0	3.7968	0	0	55.0738	267.1666	0	59.3997
Nitrate/Nitrite N*	lb	0	NR	NR	NR	0	NR	0	NR	0	0	NR	NR	0	NR
Total Nitrogen	lb	0	13.9367	350.7710	380.4335	0	126.7484	0	5.4052	0	0	78.4033	380.3393	0	84.5617
TKN	lb	0	4.1315	103.9850	112.7784	0	37.5742	0	1.6023	0	0	23.2424	112.7505	0	25.0681
Phosphorus, Total	lb	0	0.7131	17.9475	19.4652	0	6.4852	0	0.2766	0	0	4.0116	19.4604	0	4.3267
Orthophosphate as P	lb	0	0.3982	10.0220	10.8695	0	3.6214	0	0.1544	0	0	2.2401	10.8668	0	2.4160
Solid Parameters															
TDS	lb	0	5,880	147,994	160,509	0	53,476	0	2,280	0	0	33,079	160,469	0	35,677
TSS	lb	0	45.11	1,135	1,231	0	410.3	0	17.50	0	0	253.8	1,231	0	273.7

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Table D.4-5
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part V

Analyte	Units	City of San Diego													
Site ID		DW1026	DW1049	DW1051	DW1079	DW1083	DW1084	DW1085	DW1086	DW1087	DW1088	DW1091	DW1092	DW1093	DW1094
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	N	N	N
Annual Flow Volume	cf	375,815	62524	1,002,062	753,640	61,408	1,507,280	122,815	189,806	61,408	189,806	0	831,795	1,503,372	10,607
Conventional Parameters															
Hardness (Total)	lb	9,478	1,577	25,273	19,008	1,549	38,015	3,098	4,787	1,549	4,787	0	20,979	37,917	268
MBAS	lb	3.3527	0.5578	8.9394	6.7232	0.5478	13.4465	1.0956	1.6933	0.5478	1.6933	0	7.4205	13.4116	0.0946
Indicator Bacteria															
Enterococcus	MPN	1.85E+13	3.09E+12	4.95E+13	3.72E+13	3.03E+12	7.44E+13	6.06E+12	9.37E+12	3.03E+12	9.37E+12	0	4.11E+13	7.42E+13	5.24E+11
Fecal Coliform	MPN	1.17E+13	1.95E+12	3.12E+13	2.34E+13	1.91E+12	4.69E+13	3.82E+12	5.91E+12	1.91E+12	5.91E+12	0	2.59E+13	4.68E+13	3.30E+11
Total Coliform	MPN	1.82E+15	3.02E+14	4.84E+15	3.64E+15	2.97E+14	7.28E+15	5.93E+14	9.17E+14	2.97E+14	9.17E+14	0	4.02E+15	7.26E+15	5.12E+13
Total Metals															
Cadmium	lb	0.0139	0.0023	0.0370	0.0279	0.0023	0.0557	0.0045	0.0070	0.0023	0.0070	0	0.0307	0.0556	0.0004
Chromium	lb	0.0319	0.0053	0.0850	0.0639	0.0052	0.1279	0.0104	0.0161	0.0052	0.0161	0	0.0706	0.1275	0.0009
Chromium (III)*	lb	See Dissolved Chromium (III) and Dissolved Chromium (VI)*													
Chromium (VI)*	lb														
Copper	lb	0.2634	0.0438	0.7022	0.5281	0.0430	1.0562	0.0861	0.1330	0.0430	0.1330	0	0.5829	1.0535	0.0074
Iron	lb	15.3849	2.5596	41.0218	30.8521	2.5139	61.7041	5.0277	7.7701	2.5139	7.7701	0	34.0515	61.5441	0.4342
Lead	lb	0.0258	0.0043	0.0688	0.0518	0.0042	0.1035	0.0084	0.0130	0.0042	0.0130	0	0.0571	0.1032	0.0007
Manganese	lb	1.2313	0.2049	3.2832	2.4692	0.2012	4.9385	0.4024	0.6219	0.2012	0.6219	0	2.7253	4.9257	0.0348
Nickel	lb	0.0600	0.0100	0.1600	0.1204	0.0098	0.2407	0.0196	0.0303	0.0098	0.0303	0	0.1328	0.2401	0.0017
Selenium	lb	0.0930	0.0155	0.2480	0.1865	0.0152	0.3731	0.0304	0.0470	0.0152	0.0470	0	0.2059	0.3721	0.0026
Silver	lb	0.0347	0.0058	0.0926	0.0696	0.0057	0.1393	0.0113	0.0175	0.0057	0.0175	0	0.0769	0.1389	0.0010
Zinc	lb	0.6236	0.1037	1.6628	1.2505	0.1019	2.5011	0.2038	0.3150	0.1019	0.3150	0	1.3802	2.4946	0.0176
Dissolved Metals															
Cadmium	lb	0.0134	0.0022	0.0357	0.0268	0.0022	0.0536	0.0044	0.0068	0.0022	0.0068	0	0.0296	0.0535	0.0004
Chromium	lb	0.0308	0.0051	0.0821	0.0618	0.0050	0.1235	0.0101	0.0156	0.0050	0.0156	0	0.0682	0.1232	0.0009
Chromium (III)*	lb	0.0202	0.0034	0.0537	0.0404	0.0033	0.0808	0.0066	0.0102	0.0033	0.0102	0	0.0446	0.0806	0.0006
Chromium (VI)*	lb	0.0033	0.0006	0.0089	0.0067	0.0005	0.0133	0.0011	0.0017	0.0005	0.0017	0	0.0073	0.0133	0.0001
Copper	lb	0.1688	0.0281	0.4501	0.3385	0.0276	0.6770	0.0552	0.0853	0.0276	0.0853	0	0.3736	0.6753	0.0048
Iron	lb	1.4159	0.2356	3.7753	2.8394	0.2314	5.6788	0.4627	0.7151	0.2314	0.7151	0	3.1338	5.6640	0.0400
Lead	lb	0.0258	0.0043	0.0688	0.0518	0.0042	0.1035	0.0084	0.0130	0.0042	0.0130	0	0.0571	0.1032	0.0007
Manganese	lb	1.2041	0.2003	3.2106	2.4147	0.1968	4.8293	0.3935	0.6081	0.1968	0.6081	0	2.6651	4.8168	0.0340
Nickel	lb	0.0541	0.0090	0.1444	0.1086	0.0088	0.2172	0.0177	0.0273	0.0088	0.0273	0	0.1198	0.2166	0.0015
Selenium	lb	0.0802	0.0133	0.2139	0.1609	0.0131	0.3218	0.0262	0.0405	0.0131	0.0405	0	0.1776	0.3210	0.0023
Silver	lb	0.0347	0.0058	0.0926	0.0696	0.0057	0.1393	0.0113	0.0175	0.0057	0.0175	0	0.0769	0.1389	0.0010
Zinc	lb	0.2520	0.0419	0.6719	0.5053	0.0412	1.0106	0.0823	0.1273	0.0412	0.1273	0	0.5577	1.0080	0.0071

Table D.4-5 (continued)
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part V

Analyte	Units	City of San Diego													
Site ID		DW1026	DW1049	DW1051	DW1079	DW1083	DW1084	DW1085	DW1086	DW1087	DW1088	DW1091	DW1092	DW1093	DW1094
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	N	N	N
Annual Flow Volume	cf	375,815	62524	1,002,062	753,640	61,408	1,507,280	122,815	189,806	61,408	189,806	0	831,795	1,503,372	10,607
Nutrients															
Ammonia N	lb	3.683	0.6128	9.821	7.386	0.6019	14.77	1.2037	1.8603	0.6019	1.8603	0	8.1526	14.7349	0.1040
Nitrite as N**	lb	0.9033	0.1503	2.408	1.811	0.1476	3.6227	0.2952	0.4562	0.1476	0.4562	0	1.9992	3.6133	0.0255
Nitrate as N**	lb	44.53	7.4084	118.7	89.29	7.276	178.59	14.5523	22.4899	7.2761	22.4899	0	98.5586	178.1331	1.2568
Nitrate/Nitrite N**	lb	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0	NR	NR	NR
Total Nitrogen	lb	63.39	10.54	169.0	127.1	10.35	254.2	20.7167	32.0167	10.3583	32.0167	0	140.3084	253.5909	1.7892
TKN	lb	18.79	3.1265	50.10	37.68	3.0707	75.3717	6.1414	9.4913	3.0707	9.4913	0	41.5940	75.1763	0.5304
Phosphorus, Total	lb	3.243	0.5396	8.648	6.504	0.5300	13.0089	1.0600	1.6382	0.5300	1.6382	0	7.1790	12.9752	0.0915
Orthophosphate as P	lb	1.811	0.3013	4.829	3.632	0.2960	7.2643	0.5919	0.9148	0.2960	0.9148	0	4.0088	7.2455	0.0511
Solid Parameters															
TDS	lb	26746	4450	71315	53635	4370	107271	8741	13508	4370	13508	0	59197	106992	754.9
TSS	lb	205.2	34.1	547.2	411.5	33.5	823.0	67.1	103.6	33.5	103.6	0	454.2	820.9	5.792

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Table D.4-6
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part VI

Analyte	Units	City of San Diego											
Site ID		DW1103	DW1105	DW1106	DW1107	DW1108	DW1114	DW1122	DW1124	DW1126	DW1128	DW1174	**Jurisdictional Total**
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	**NA**
Annual Flow Volume	cf	83,180	0	189,806	626,359	1,002,062	1,879,076	0	3,758,151	2,061,624	80,388	0	**39,623,712**
Conventional Parameters													
Hardness (Total)	lb	2,098	0	4,787	15,797	25,273	47,392	0	94,785	51,996	2,027	0	**999,747**
MBAS	lb	0.7420	0	1.6933	5.5878	8.9394	16.7633	0	33.5265	18.3918	0.7171	0	**361.6408**
Indicator Bacteria													
Enterococcus	MPN	4.11E+12	0	9.37E+12	3.09E+13	4.95E+13	9.27E+13	0	1.85E+14	1.02E+14	3.97E+12	0	**2.05E+15**
Fecal Coliform	MPN	2.59E+12	0	5.91E+12	1.95E+13	3.12E+13	5.85E+13	0	1.17E+14	6.41E+13	2.50E+12	0	**1.18E+15**
Total Coliform	MPN	4.02E+14	0	9.17E+14	3.03E+15	4.84E+15	9.08E+15	0	1.82E+16	9.96E+15	3.88E+14	0	**2.09E+17**
Total Metals													
Cadmium	lb	0.0031	0	0.0070	0.0231	0.0370	0.0694	0	0.1389	0.0762	0.0030	0	**1.4664**
Chromium	lb	0.0071	0	0.0161	0.0531	0.0850	0.1594	0	0.3188	0.1749	0.0068	0	**3.3470**
Chromium (III)*	lb	See Dissolved Chromium (III) and Dissolved Chromium (VI)*											
Chromium (VI)*	lb												
Copper	lb	0.0583	0	0.1330	0.4389	0.7022	1.3168	0	2.6336	1.4447	0.0563	0	**27.8707**
Iron	lb	3.4052	0	7.7701	25.6415	41.0218	76.9245	0	153.8489	84.3975	3.2909	0	**1,671.4499**
Lead	lb	0.0057	0	0.0130	0.0430	0.0688	0.1290	0	0.2581	0.1416	0.0055	0	**2.7210**
Manganese	lb	0.2725	0	0.6219	2.0522	3.2832	6.1567	0	12.3133	6.7548	0.2634	0	**131.9244**
Nickel	lb	0.0133	0	0.0303	0.1000	0.1600	0.3001	0	0.6001	0.3292	0.0128	0	**6.3897**
Selenium	lb	0.0206	0	0.0470	0.1550	0.2480	0.4651	0	0.9302	0.5103	0.0199	0	**9.9160**
Silver	lb	0.0077	0	0.0175	0.0579	0.0926	0.1736	0	0.3472	0.1905	0.0074	0	**3.6610**
Zinc	lb	0.1380	0	0.3150	1.0393	1.6628	3.1180	0	6.2361	3.4209	0.1334	0	**65.4980**
Dissolved Metals													
Cadmium	lb	0.0030	0	0.0068	0.0223	0.0357	0.0669	0	0.1337	0.0734	0.0029	0	**1.4098**
Chromium	lb	0.0068	0	0.0156	0.0513	0.0821	0.1540	0	0.3080	0.1690	0.0066	0	**3.2189**
Chromium (III)*	lb	0.0045	0	0.0102	0.0336	0.0537	0.1008	0	0.2015	0.1106	0.0043	0	**2.1101**
Chromium (VI)*	lb	0.0007	0	0.0017	0.0055	0.0089	0.0166	0	0.0332	0.0182	0.0007	0	**0.3469**
Copper	lb	0.0374	0	0.0853	0.2813	0.4501	0.8440	0	1.6881	0.9260	0.0361	0	**18.2313**
Iron	lb	0.3134	0	0.7151	2.3598	3.7753	7.0795	0	14.1590	7.7673	0.3029	0	**153.0765**
Lead	lb	0.0057	0	0.0130	0.0430	0.0688	0.1290	0	0.2581	0.1416	0.0055	0	**2.7210**
Manganese	lb	0.2665	0	0.6081	2.0069	3.2106	6.0206	0	12.0412	6.6055	0.2576	0	**123.7423**
Nickel	lb	0.0120	0	0.0273	0.0902	0.1444	0.2707	0	0.5415	0.2970	0.0116	0	**5.7698**
Selenium	lb	0.0178	0	0.0405	0.1337	0.2139	0.4012	0	0.8024	0.4402	0.0172	0	**8.6329**
Silver	lb	0.0077	0	0.0175	0.0579	0.0926	0.1736	0	0.3472	0.1905	0.0074	0	**3.6610**
Zinc	lb	0.0558	0	0.1273	0.4200	0.6719	1.2599	0	2.5198	1.3823	0.0539	0	**26.2945**

Table D.4-6 (continued)
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part VI

Analyte	**Units**	**City of San Diego**											
Site ID		DW1103	DW1105	DW1106	DW1107	DW1108	DW1114	DW1122	DW1124	DW1126	DW1128	DW1174	**Jurisdictional Total**
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	**NA**
Annual Flow Volume	cf	83,180	0	189,806	626,359	1,002,062	1,879,076	0	3,758,151	2,061,624	80,388	0	**39,623,712**
Nutrients													
Ammonia N	lb	0.8153	0	1.860	6.139	9.821	18.41	0	36.83	20.20	0.7879	0	**381.6332**
Nitrite as N**	lb	0.1999	0	0.4562	1.505	2.408	4.516	0	9.0327	4.955	0.1932	0	**94.5712**
Nitrate as N**	lb	9.855	0	22.48	74.21	118.7	222.6	0	445.2	244.2	9.5251	0	**5,006.8413**
Nitrate/Nitrite N**	lb	NR	0	NR	NR	NR	NR	0	NR	NR	NR	0	**NR**
Total Nitrogen	lb	14.03	0	32.01	105.6	169.0	316.9	0	633.9	347.7	13.56	0	**7,028.1823**
TKN	lb	4.159	0	9.491	31.32	50.10	93.96	0	187.9	103.0	4.019	0	**2,014.2944**
Phosphorus, Total	lb	0.7179	0	1.638	5.405	8.648	16.21	0	32.4	17.79	0.6938	0	**348.5531**
Orthophosphate as P	lb	0.4009	0	0.9148	3.018	4.829	9.056	0	18.11	9.935	0.3874	0	**191.3866**
Solid Parameters													
TDS	lb	5,920	0	13,508	44,577	71,315	133,731	0	267,461	146,722	5,721	0	**2,829,040**
TSS	lb	45.42	0	103.6	342.0	547.2	1,026	0	2,052	1,126	43.89	0	**21,347**

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Table D.4-7
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of Del Mar and City of Poway

Analyte	Units	City of Del Mar		City of Poway											
Site ID		S12	**Jurisdictional Total**	278-1749, 2	282-1749, 2	282-1749, 3 (DW Site 2)	282-1749, 4(S)	286-1749, 1	294-1749, 2	298-1749, 2	298-1749, 5	290-1749, 2	290-1755, 1	298-1749, 3	**Jurisdictional Total**
Highest Priority Outfall		Y	**NA**	N	Y	Y	Y	N	Y	Y	Y	N	N	N	**NA**
Annual Flow Volume	cf	48,421	**48,421**	27,913	262,378	117,233	27,913	245,631	251,213	34,891	0	0	223,301	27,913	**1,218,385**
Conventional Parameters															
Hardness (Total)	lb	3,506	**3,506**	1,718	11,949	2,737	594	15,117	10,319	1,451	0	0	13,742	1,718	**59,345**
MBAS	lb	0.1511	**0.1511**	0.1655	0.8190	1.8297	0.1743	1.5334	0.7841	0.1089	0	0	1.3940	0.1743	**6.9919**
Indicator Bacteria															
Enterococcus	MPN	1.44E+12	**1.44E+12**	4.47E+12	1.45E+13	3.65E+13	7.11E+11	3.93E+13	2.13E+13	1.68E+12	0	0	3.57E+13	4.47E+12	**1.59E+14**
Fecal Coliform	MPN	4.11E+10	**4.11E+10**	3.18E+13	2.49E+13	5.98E+13	2.37E+12	2.80E+14	1.64E+14	1.28E+13	0	0	2.55E+14	3.18E+13	**8.62E+14**
Total Coliform	MPN	2.17E+13	**2.17E+13**	7.19E+13	3.71E+13	2.32E+14	6.32E+13	6.33E+14	3.56E+14	3.95E+13	0	0	5.75E+14	7.19E+13	**2.08E+15**
Total Metals															
Cadmium	lb	0.0003	**0.0003**	0.0008	0.0033	0.0018	0.0003	0.0071	0.0063	0.0027	0	0	0.0064	0.0008	**0.0295**
Chromium	lb	NR**	**NR****	0.0013	0.0090	0.0102	0.0017	0.0115	0.0031	0.0004	0	0	0.0105	0.0013	**0.0491**
Chromium (III)	lb	NR**	**NR****	0.0013	0.0090	0.0102	0.0017	0.0115	0.0024	0.0005	0	0	0.0105	0.0013	**0.0484**
Chromium (VI)	lb	NR**	**NR****	0.0017	0.0164	0.0073	0.0017	0.0153	0.0157	0.0022	0	0	0.0139	0.0017	**0.0761**
Copper	lb	0.0060	**0.0060**	0.0148	0.0737	0.1061	0.0139	0.1303	0.1255	0.0076	0	0	0.1185	0.0148	**0.6053**
Iron	lb	0.7089	**0.7089**	0.6059	1.9328	2.1773	0.2614	5.3317	5.6145	0.1557	0	0	4.8470	0.6059	**21.5322**
Lead	lb	0.0005	**0.0005**	0.0010	0.0090	0.0084	0.0007	0.0092	0.0031	0.0005	0	0	0.0084	0.0010	**0.0415**
Manganese	lb	0.1436	**0.1436**	0.0429	0.0491	0.1281	0.0105	0.3772	0.9567	0.0882	0	0	0.3429	0.0429	**2.0384**
Nickel	lb	NR**	**NR****	0.0054	0.0328	0.0329	0.0070	0.0475	0.0314	0.0033	0	0	0.0432	0.0054	**0.2089**
Selenium	lb	0.0242	**0.0242**	0.0041	0.0491	0.0048	0.0007	0.0357	0.0157	0.0017	0	0	0.0325	0.0041	**0.1483**
Silver	lb	NR**	**NR****	0.0002	0.0016	0.0007	0.0002	0.0017	0.0016	0.0002	0	0	0.0015	0.0002	**0.0079**
Zinc	lb	0.0227	**0.0227**	0.0852	0.1638	1.3466	0.0505	0.7498	0.1098	0.0218	0	0	0.6817	0.0852	**3.2945**
Dissolved Metals															
Cadmium	lb	0.0001	**0.0001**	0.0004	0.0016	0.0018	0.0016	0.0032	0.0016	0.0002	0	0	0.0029	0.0004	**0.0137**
Chromium	lb	NR**	**NR****	0.0003	0.0025	0.0018	0.0010	0.0029	0.0016	0.0002	0	0	0.0026	0.0003	**0.0133**
Chromium (III)	lb	NR**	**NR****	0.0003	0.0019	0.0016	0.0010	0.0024	0.0005	0.0001	0	0	0.0022	0.0003	**0.0102**
Chromium (VI)	lb	NR**	**NR****	0.0017	0.0164	0.0073	0.0017	0.0153	0.0157	0.0022	0	0	0.0139	0.0017	**0.0761**
Copper	lb	0.0017	**0.0017**	0.0099	0.0573	0.0732	0.0087	0.0874	0.0784	0.0033	0	0	0.0795	0.0099	**0.4076**
Iron	lb	0.0106	**0.0106**	0.0308	0.0328	0.2744	0.0470	0.2714	0.4862	0.0229	0	0	0.2467	0.0308	**1.4431**
Lead	lb	0.0002	**0.0002**	0.0011	0.0278	0.0077	0.0002	0.0098	0.0005	0.0008	0	0	0.0089	0.0011	**0.0579**
Manganese	lb	0.0453	**0.0453**	0.0210	0.0147	0.0842	0.0010	0.1846	0.6273	0.0479	0	0	0.1678	0.0210	**1.1696**
Nickel	lb	NR**	**NR****	0.0027	0.0172	0.0154	0.0035	0.0235	0.0016	0.0010	0	0	0.0213	0.0027	**0.0887**
Selenium	lb	0.0212	**0.0212**	0.0037	0.0409	0.0051	0.0007	0.0327	0.0157	0.0016	0	0	0.0297	0.0037	**0.1339**
Silver	lb	NR**	**NR****	0.0001	0.0008	0.0004	0.0001	0.0008	0.0008	0.0001	0	0	0.0007	0.0001	**0.0038**
Zinc	lb	0.0151	**0.0151**	0.0687	0.1065	1.2734	0.0349	0.6042	0.0157	0.0054	0	0	0.5492	0.0687	**2.7266**

Table D.4-7 (continued)
Los Peñasquitos WMA Dry Season Flow Volume and Pollutant Loads: City of Del Mar and City of Poway

Analyte	Units	City of Del Mar		City of Poway											
Site ID		S12	**Jurisdictional Total**	278-1749, 2	282-1749, 2	282-1749, 3 (DW Site 2)	282-1749, 4(S)	286-1749, 1	294-1749, 2	298-1749, 2	298-1749, 5	290-1749, 2	290-1755, 1	298-1749, 3	**Jurisdictional Total**
Highest Priority Outfall		Y	**NA**	N	Y	Y	Y	N	Y	Y	Y	N	N	N	**NA**
Annual Flow Volume	cf	48,421	**48,421**	27,913	262,378	117,233	27,913	245,631	251,213	34,891	0	0	223,301	27,913	**1,218,385**
Nutrients															
Ammonia N	lb	0.5441	**0.5441**	0.4653	3.2760	3.4398	0.6273	4.0943	3.6071	0.1743	0	0	3.7221	0.4653	**19.8712**
Nitrite as N*	lb	0.0423	**0.0423**	NR	NR	NR	NR	NR	NR	NR	0	0	NR	NR	**0.0000**
Nitrate as N*	lb	4.4133	**4.4133**	NR	NR	NR	NR	NR	NR	NR	0	0	NR	NR	**0.0000**
Nitrate/Nitrite N*	lb	4.4436	**4.4436**	7.9407	113.6762	17.5648	6.3777	69.8785	17.8784	1.2416	0	0	63.5259	7.9407	**306.0245**
Total Nitrogen	lb	11.7891	**11.7891**	23.0015	140.0477	53.7921	92.5287	202.41	36.0705	22.2173	0	0	184.0119	23.0015	**777.0844**
TKN	lb	7.4060	**7.4060**	15.0555	26.2078	36.2273	86.0813	132.49	18.8194	21.0194	0	0	120.4442	15.0555	**471.3990**
Phosphorus, Total	lb	0.2872	**0.2872**	0.9845	2.6208	4.1350	1.7077	8.6639	9.7234	1.1762	0	0	7.8763	0.9845	**37.8723**
Orthophosphate as P	lb	0.1564	**0.1564**	0.9113	2.2113	3.6959	1.5160	8.0199	9.2529	1.1218	0	0	7.2908	0.9113	**34.9312**
Solid Parameters															
TDS	lb	10,988	**10,988**	3,774	33,497	6,473	1,392	33,211	28,543	3,757	0	0	30,192	3,774	**144,613**
TSS	lb	96.73	**96.73**	13.77	20.47	36.59	3.485	121.1	47.05	1.634	0	0	110.1	13.766	**368**

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit); ** NAL analyte not required for Ocean Receiving Waters.

Attachment E – Data Quality Objectives and Quality Control

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1 Data Quality Objectives

This attachment addresses Quality Assurance/Quality Control (QA/QC) activities associated with the Los Peñasquitos Watershed Management Area Monitoring Program for both wet and dry weather monitoring activities and the relevant data quality objectives (DQOs). The QA/QC program included both field and laboratory procedures.

DQOs are quantitative and qualitative statements that define project objectives and specify the acceptable ranges of field sampling and laboratory performance. Results that did not meet data quality objectives were qualified and may be considered estimates. Data quality objectives for this project included the following:

- Precision
- Frequency

Precision describes how well repeated measurements agree. The evaluation of precision described here relates to repeated measurements/samples collected in the field (field duplicates). Precision measurements were determined by comparing results from field duplicates to the precision objectives. Relative percent differences (RPDs) were calculated to determine the precision between duplicate samples. This calculation is shown below:

$$RPD = \frac{abs[x_1 - x_2]}{0.5 * (x_1 + x_2)}$$

Where:

abs is the absolute value.

x1 is measurement 1 (e.g., Sample).

x2 is measurement 2 (e.g., Duplicate).

Frequency is the rate at which a required analysis is performed. The frequency of field QC samples and laboratory QC samples is verified with stated DQOs. The field QC frequency DQOs were five percent. Laboratory frequency DQOs were dependent upon the QC sample type.

DQO results for precision and frequency are presented in the following sections.

2 Field Quality Assurance/Quality Control

This section addresses QA/QC activities associated with field sampling. The field QA/QC samples were used to evaluate potential contamination and sampling errors applicable to field sampling introduced prior to submittal of the samples to the analytical laboratory. Field QA/QC procedures utilized field blanks and field duplicates. A brief summary of each measurement type is described below, followed by a summary of their respective DQOs, and frequencies in Table E-1:

- **Field Blank** – Field blanks were collected to check for cross-contamination. A field blank sample was prepared during a non-storm water monitoring event and for each type of grab sample collected as part of a storm water monitoring event. A field blank was not conducted for composite samples during the storm water monitoring event per the Monitoring Plan. The field blanks were created by pouring laboratory-grade distilled, deionized water into laboratory supplied bottles at one of the monitoring locations.

- **Field Duplicates** – Field duplicates were collected to check the reproducibility of both laboratory procedures and field collection procedures. A field duplicate sample was collected during two non-storm water events and for each type of grab sample collected as part of a storm water monitoring event. A field duplicate was not collected for composite samples during the storm water monitoring event. A field duplicate of in-situ parameters was not performed per the Monitoring Plan.

Table E-1
Field Quality Control Samples

Constituent Category	Measurement Quality Objectives		Frequency of Analysis
	Field Blank	Field Duplicate	
Conventionals	<RL for target analyte	RPD < 25%[(a)]	5% of total project sample count
Indicator Bacteria	<RL for target analyte	RPD < 25%[(b)]	5% of total project sample count
Metals	<RL for target analyte	RPD < 25%[(a)]	5% of total project sample count
Nutrients	<RL for target analyte	RPD < 25%[(a)]	5% of total project sample count
Solid Parameters	<RL for target analyte	RPD < 25%[(a)]	5% of total project sample count
Organics	<RL for target analyte	Per method	5% of total project sample count

Notes: NA= Not applicable; RL = reporting limit; RPD = relative percent difference.
(a) NA if native concentration of either sample <RL.
(b) Field duplicates are not a current SWAMP requirement for indicator bacteria. However, the collection and analysis of a field duplicate is recommended.

Analytical results from the field QA/QC sampling program are summarized below.

2.1 Wet Weather Results

A field blank was collected from MS4-LPC-2 during Wet Weather Event 2 for fecal indicator bacteria analytes. No analytes were detected above their reporting limits. Table E-2 presents the reported results of the field blanks below.

Table E-2
Wet Weather Field Blank Results

Analyte	Units	Reporting Limit	MS4-LPC-2
			3/6/16
Enterococcus	MPN/100 mL	1	< 1
Fecal Coliform	MPN/100 mL	18	< 18
Total Coliform	MPN/100 mL	18	< 18

A precision goal of less than twenty-five percent RPD was assessed using results obtained from a field duplicate sample taken at RW-LPC-3 during Wet Weather Event 2. Because microbiological constituents have an exponential growth curve, their RPDs are typically higher than chemical constituents. To give an accurate representation, their results are log transformed prior to calculating the RPD value. Parameters met this DQO for both the conventional parameters and indicator bacteria. Relative percent difference values calculated from field duplicate data are provided below in Table E-3.

Table E-3
Wet Weather Field Duplicate Results

Relative Percent Difference					
Analyte	Units	MS4-LPC-03-01	MS4-LPC-03-02	3/6/2016	DQO
Conventional Parameters					
Total Calcium	mg/L	77.9	70.6	9.8%	< 25%
Total Magnesium	mg/L	50.3	45.9	9.1%	< 25%
Hardness as CaCO3	mg/L	401	365	9.4%	< 25%
Indicator Bacteria					
Enterococcus	log(MPN/100mL)	3.6	3.3	9.4%	< 25%
Fecal Coliform	log(MPN/100mL)	4.0	3.5	13.8%	< 25%
Total Coliform	log(MPN/100mL)	4.5	4.5	0.0%	< 25%

2.2 Dry Weather Results

Of the 22 dry weather samples taken within 3 jurisdictions, only one field blank was collected, which was from Outfall 282-1749, 3 (DW Site 2) on 8/31/16. No analytes were detected above their reporting limits in this field blank, as shown in Table E-4 below.

Table E-4
Dry Weather Field Blank Results

Analyte	Units	Reporting Limit	282-1749, 3 (DW Site 2)
			8/31/2016
Conventional Parameters			
Chloride	mg/L	0.05	< 0.05
Color, True	Color Units	1	< 1
Hardness as CaCO3	mg/L	10	< 10
MBAS	mg/L	0.5	< 0.5
Indicator Bacteria			
Enterococcus	MPN/100 mL	20	< 20
Coliform, Fecal	MPN/100 mL	20	< 20
Coliform, Total	MPN/100 mL	20	< 20
Total Metals			
Aluminum	ug/L	10	< 10
Cadmium	ug/L	1	< 1
Chromium	ug/L	5	< 5
Chromium (III)	ug/L	1	< 1
Chromium VI	ug/L	20	< 20
Copper	ug/L	10	< 10
Iron	ug/L	50	< 50
Lead	ug/L	5	< 5
Manganese	ug/L	5	< 5
Mercury	ug/L	0.1	< 0.1
Nickel	ug/L	5	< 5
Selenium	ug/L	1	< 1
Silver	ug/L	1	< 1
Zinc	ug/L	20	< 20

Table E-4
Dry Weather Field Blank Results (continued)

Analyte	Units	Reporting Limit	282-1749, 3 (DW Site 2)
Dissolved Metals			
Aluminum	ug/L	10	< 10
Cadmium	ug/L	1	< 1
Chromium	ug/L	5	< 5
Chromium (III)	ug/L	1	< 1
Chromium VI	ug/L	20	< 20
Copper	ug/L	1	< 1
Iron	ug/L	50	< 50
Lead	ug/L	1	< 1
Manganese	ug/L	5	< 5
Mercury	ug/L	0.1	< 0.1
Nickel	ug/L	5	< 5
Selenium	ug/L	1	< 1
Silver	ug/L	1	< 1
Zinc	ug/L	20	< 20
Nutrients			
Ammonia as N	mg/L	0.1	< 0.1
Nitrate + Nitrite as N	mg/L	0.05	< 0.05
Nitrogen, Total	mg/L	0.5	< 0.5
Nitrogen, Total Kjeldahl	mg/L	0.5	< 0.5
Dissolved Phosphorus	mg/L	0.05	< 0.05
Total Phosphorus as P	mg/L	0.05	< 0.05
OrthoPhosphate as P	mg/L	0.05	< 0.05
Sulfate	mg/L	5	< 5
Solid Parameters			
Total Dissolved Solids	mg/L	20	< 20
Total Suspended Solids	mg/L	20	< 20
Synthetic Organics			
Pentachlorophenol	ug/L	5	< 5

A precision goal of less than twenty-five percent RPD was assessed using results obtained from field duplicate samples taken at S-12 on 6/30/16, and 282-1749-3 on 8/1/16 during non-storm events. Again, the fecal indicator bacteria was log transformed prior to RPD calculation. Analyzed parameters met this DQO with the exception of iron, manganese, dissolved zinc, TKN, total nitrogen, total phosphorous, orthophosphate, and total suspended solids at S-12, and fecal indicator bacteria, chromium, magnesium, dissolved nickel, and total suspended solids at 282-1749-3. Relative percent difference values calculated from field duplicate data are provided in Table E-5 below.

Table E-5
Dry Weather Field Duplicate Results

Relative Percent Difference			
Analyte	**S-12**	**282-1749, 3**	**DQO**
	6/30/2016	**8/1/2016**	
Conventional Parameters			
Hardness (Total)	2.6%	7.5%	< 25%
MBAS	NA	0.0%	< 25%
Indicator Bacteria			
Enterococcus	8.1%	17.2%	< 25%
Fecal Coliform	21.8%	5.8%	< 25%
Total Coliform	0.0%	2.6%	< 25%
Total Metals			
Cadmium	NA	NA	< 25%
Chromium	NA	**46.2%**	< 25%
Chromium (III)	NA	**46.2%**	< 25%
Chromium (VI)	NA	NA	< 25%
Copper	0.0%	11.8%	< 25%
Iron	**26.7%**	9.0%	< 25%
Lead	NA	0.0%	< 25%
Manganese	**26.7%**	**66.7%**	< 25%
Nickel	NA	0.0%	< 25%
Selenium	13.3%	0.0%	< 25%
Silver	NA	NA	< 25%
Zinc	**166.7%**	7.7%	< 25%
Dissolved Metals			
Cadmium	NA	NA	< 25%
Chromium	NA	NA	< 25%
Chromium (III)	NA	NA	< 25%
Chromium (VI)	NA	NA	< 25%
Copper	18.2%	15.4%	< 25%
Iron	0.0%	11.1%	< 25%
Lead	NA	0.0%	< 25%
Manganese	13.3%	0.0%	< 25%
Nickel	NA	**40.0%**	< 25%
Selenium	13.3%	0.0%	< 25%
Silver	NA	NA	< 25%
Zinc	**111.1%**	11.1%	< 25%

Table E-5
Dry Weather Field Duplicate Results (continued)

Relative Percent Difference			
Analyte	**S-12**	**282-1749, 3**	**DQO**
	6/30/2016	**8/1/2016**	
Nutrients			
Ammonia as N	NA	9.5%	< 25%
Nitrate as N	4.0%	NA	< 25%
Nitrite as N	0.0%	NA	< 25%
Nitrate+Nitrite	3.9%	4.0%	< 25%
Total Nitrogen	**35.0%**	9.0%	< 25%
TKN	**46.7%**	10.5%	< 25%
Phosphorus, Total	**30.3%**	10.0%	< 25%
Orthophosphate as P	**62.1%**	5.2%	< 25%
Solid Parameters			
Total Dissolved Solids	2.2%	1.4%	< 25%
Total Suspended Solids	**127.3%**	**66.7%**	< 25%

3 Laboratory Analyses Holding Times

All wet weather samples were analyzed within the required holding time limits. Fecal Indicator Bacteria exceeded the 8-hour hold time for the dry weather samples. Nitrate and Nitrite exceeded the 48-hour hold time for samples taken at SB-12. Total Dissolved Solids analyses exceeded the 7 day hold time for dry weather samples taken. All other samples were analyzed within the required holding time, as shown in Table E-6 below. The results were within the historical range, and thus are considered valid. Details of hold time exceedances are shown in Table E-7. The laboratory reports are included in Appendix C.

Table E-6
Dry Weather Holding Time Results

Analyte	Holding Time Limits	QA/QC Results
Conventional Parameters		
Hardness (Total)	6 months	Samples analyzed within holding time.
MBAS	7 days until extraction; 40 days after extraction	Samples analyzed within holding time.
Indicator Bacteria		
Enterococcus	8 hours	**Dry weather samples exceeded hold time.**
Fecal Coliform	8 hours	**Dry weather samples exceeded hold time.**
Total Coliform	8 hours	**Dry weather samples exceeded hold time.**
Total Metals		
Cadmium	6 months at room temp following acidification	Samples analyzed within holding time.
Chromium	6 months at room temp following acidification	
Chromium (III)	6 months at room temp following acidification	
Chromium (VI)	28 days at 6°C; 24 hours without preservation	
Copper	6 months at room temp following acidification	
Iron	6 months at room temp following acidification	
Lead	6 months at room temp following acidification	
Manganese	6 months at room temp following acidification	
Nickel	6 months at room temp following acidification	
Selenium	6 months at room temp following acidification	
Silver	6 months at room temp following acidification	
Zinc	6 months at room temp following acidification	
Dissolved Metals		
Cadmium	6 months at room temp following acidification	Samples analyzed within holding time.
Chromium	6 months at room temp following acidification	
Chromium (III)	6 months at room temp following acidification	
Chromium (VI)	28 days at 6°C; 24 hours without preservation	
Copper	6 months at room temp following acidification	
Iron	6 months at room temp following acidification	
Lead	6 months at room temp following acidification	
Manganese	6 months at room temp following acidification	
Nickel	6 months at room temp following acidification	
Selenium	6 months at room temp following acidification	
Silver	6 months at room temp following acidification	
Zinc	6 months at room temp following acidification	

Table E-6
Dry Weather Holding Time Results (continued)

Analyte	Holding Time Limits	QA/QC Results
Nutrients		
Ammonia N	48 hours; 28 days if acidified	Samples analyzed within holding time.
Nitrate as N	48 hours	**Dry weather samples exceeded hold time.**
Nitrite as N	48 hours	Samples analyzed within holding time.
Nitrogen, Total	28 days	Samples analyzed within holding time.
TKN	7 days; 28 days if acidified	Samples analyzed within holding time.
Phosphorus, Total	28 days	Samples analyzed within holding time.
Orthophosphate as P	48 hours	Samples analyzed within holding time.
Solid Parameters		
TDS	7 days	**Dry weather samples exceeded hold time.**
TSS	7 days	Samples analyzed within holding time.
Synthetic Organics		
Pentachlorophenol	7 days until extraction; 40 days after extraction	Samples analyzed within holding time.

Table E-7
Dry Weather Holding Time Exceedances

Analyte	Station ID	Sample Date	Analysis Date	Holding Days	Holding Time Limit
Indicator Bacteria					
Enterococcus	282-1749, 2	7/28/2016	8/1/2016	4	8 hours
	282-1749, 2	8/1/2016	8/5/2016	4	
	282-1749, 3 (DW Site 2)	7/28/2016	8/1/2016	4	
	282-1749, 3 (DW Site 2)	8/1/2016	8/5/2016	4	
	282-1749, 3 (DW Site 2)-A	8/1/2016	8/5/2016	4	
	282-1749, 3 (DW Site 2)-B	8/1/2016	8/3/2016	2	
	282-1749, 4(S)	7/28/2016	8/1/2016	4	
	294-1749, 2	8/1/2016	8/5/2016	4	
	298-1749, 2	8/1/2016	8/5/2016	4	
	298-1749, 2	8/2/2016	8/6/2016	4	
	298-1749, 5	7/28/2016	8/1/2016	4	
	298-1749, 5	8/2/2016	8/6/2016	4	
	S-12 - 06-30-16 - 001	6/30/2016	7/4/2016	4	
	S-12 - 08-12-16 - 001	8/12/2016	8/16/2016	4	
	S-12-06-30-16 - 501	6/30/2016	7/4/2016	4	
Fecal Coliforms	282-1749, 2	7/28/2016	7/31/2016	3	8 hours
	282-1749, 2	8/1/2016	8/4/2016	3	
	282-1749, 3 (DW Site 2)	7/28/2016	7/31/2016	3	
	282-1749, 3 (DW Site 2)	8/1/2016	8/4/2016	3	
	282-1749, 3 (DW Site 2)-A	8/1/2016	8/4/2016	3	
	282-1749, 3 (DW Site 2)-B	8/1/2016	8/3/2016	2	
	282-1749, 4(S)	7/28/2016	7/31/2016	3	
	294-1749, 2	8/1/2016	8/4/2016	3	
	298-1749, 2	8/1/2016	8/4/2016	3	
	298-1749, 2	8/2/2016	8/5/2016	3	
	298-1749, 5	7/28/2016	7/31/2016	3	
	298-1749, 5	8/2/2016	8/5/2016	3	
	S-12 - 06-30-16 - 001	6/30/2016	7/3/2016	3	
	S-12 - 08-12-16 - 001	8/12/2016	8/15/2016	3	
	S-12-06-30-16 - 501	6/30/2016	7/3/2016	3	

Table E-7
Dry Weather Holding Time Exceedances (continued)

Analyte	Station ID	Sample Date	Analysis Date	Holding Days	Holding Time Limit
Indicator Bacteria					
Total Coliforms	282-1749, 2	7/28/2016	8/1/2016	4	8 hours
	282-1749, 2	8/1/2016	8/5/2016	4	
	282-1749, 3 (DW Site 2)	7/28/2016	8/1/2016	4	
	282-1749, 3 (DW Site 2)	8/1/2016	8/5/2016	4	
	282-1749, 3 (DW Site 2)-A	8/1/2016	8/5/2016	4	
	282-1749, 3 (DW Site 2)-B	8/1/2016	8/3/2016	2	
	282-1749, 4(S)	7/28/2016	8/1/2016	4	
	294-1749, 2	8/1/2016	8/5/2016	4	
	298-1749, 2	8/1/2016	8/5/2016	4	
	298-1749, 2	8/2/2016	8/6/2016	4	
	298-1749, 5	7/28/2016	8/1/2016	4	
	298-1749, 5	8/2/2016	8/6/2016	4	
	S-12 - 06-30-16 - 001	6/30/2016	7/4/2016	4	
	S-12 - 08-12-16 - 001	8/12/2016	8/16/2016	4	
	S-12-06-30-16 - 501	6/30/2016	7/4/2016	4	
Nutrients					
Nitrate as N	S-12 - 06-30-16 - 001	6/30/2016	7/7/2016	7	48 hours
	S-12 - 08-12-16 - 001	8/12/2016	8/17/2016	5	
	S-12-06-30-16 - 501	6/30/2016	7/7/2016	7	
Solid Parameters					
Total Dissolved Solids	282-1749, 2	7/28/2016	8/8/2016	11	7 days
	282-1749, 2	8/1/2016	8/9/2016	8	
	282-1749, 3 (DW Site 2)	7/28/2016	8/8/2016	11	
	282-1749, 3 (DW Site 2)	8/1/2016	8/9/2016	8	
	282-1749, 3 (DW Site 2)-A	8/1/2016	8/9/2016	8	
	282-1749, 3 (DW Site 2)-B	8/1/2016	8/9/2016	8	
	282-1749, 4(S)	7/28/2016	8/8/2016	11	
	294-1749, 2	8/1/2016	8/9/2016	8	
	298-1749, 2	8/1/2016	8/9/2016	8	
	298-1749, 2	8/2/2016	8/10/2016	8	
	298-1749, 5	7/28/2016	8/8/2016	11	
	298-1749, 5	8/2/2016	8/10/2016	8	
	S-12 - 08-12-16 - 001	8/12/2016	8/22/2016	10	

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Attachment F – Wet Weather Outfall Information

Attachment F.1 – Wet Weather Outfall Hydrographs
Attachment F.2 – Wet Weather Outfall Analytical Results
Attachment F.3 – Wet Weather Assessment Methodology
Attachment F.4 – Wet Weather HSA Storm Water Volumes and Pollutant Loads

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Attachment F.1 – Wet Weather Outfall Hydrographs

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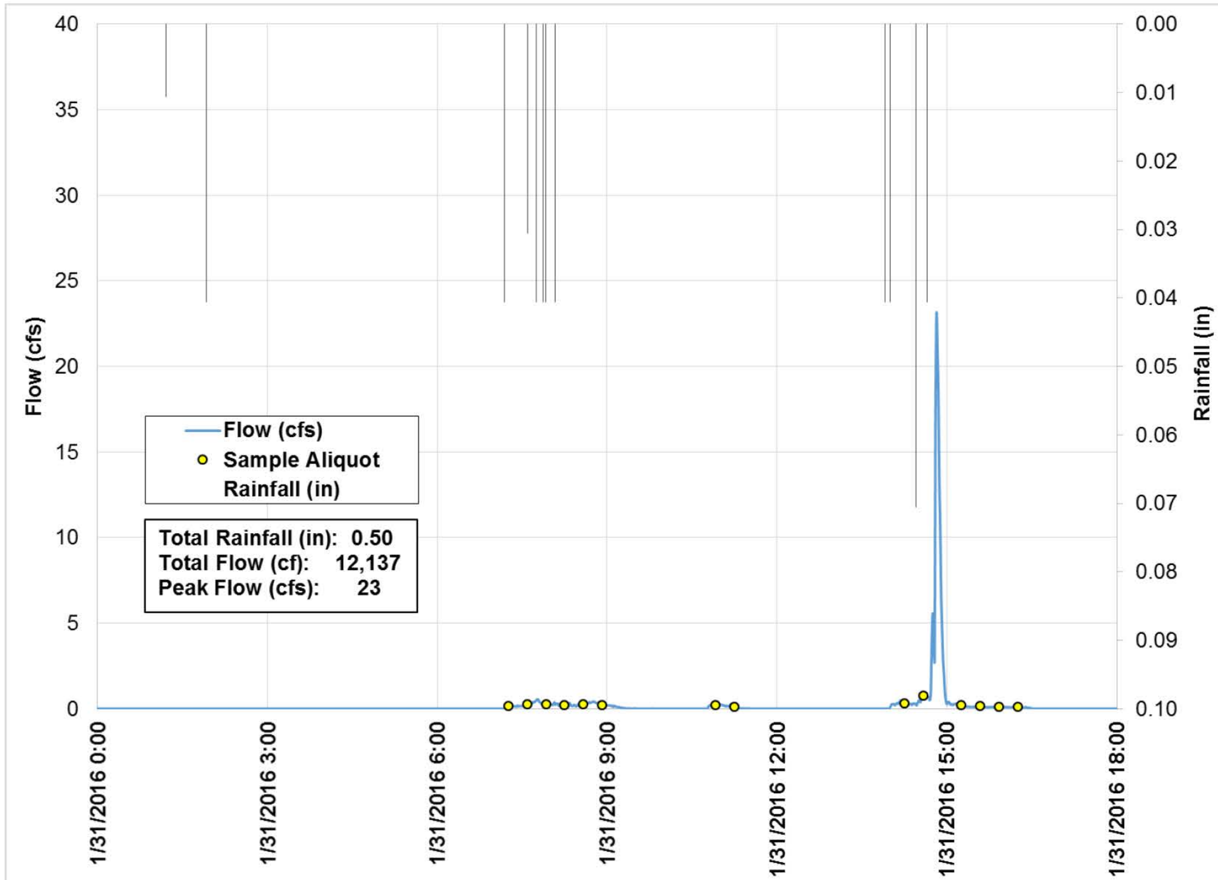

Figure F.1-1: MS4-LPC-1 Event Hydrograph

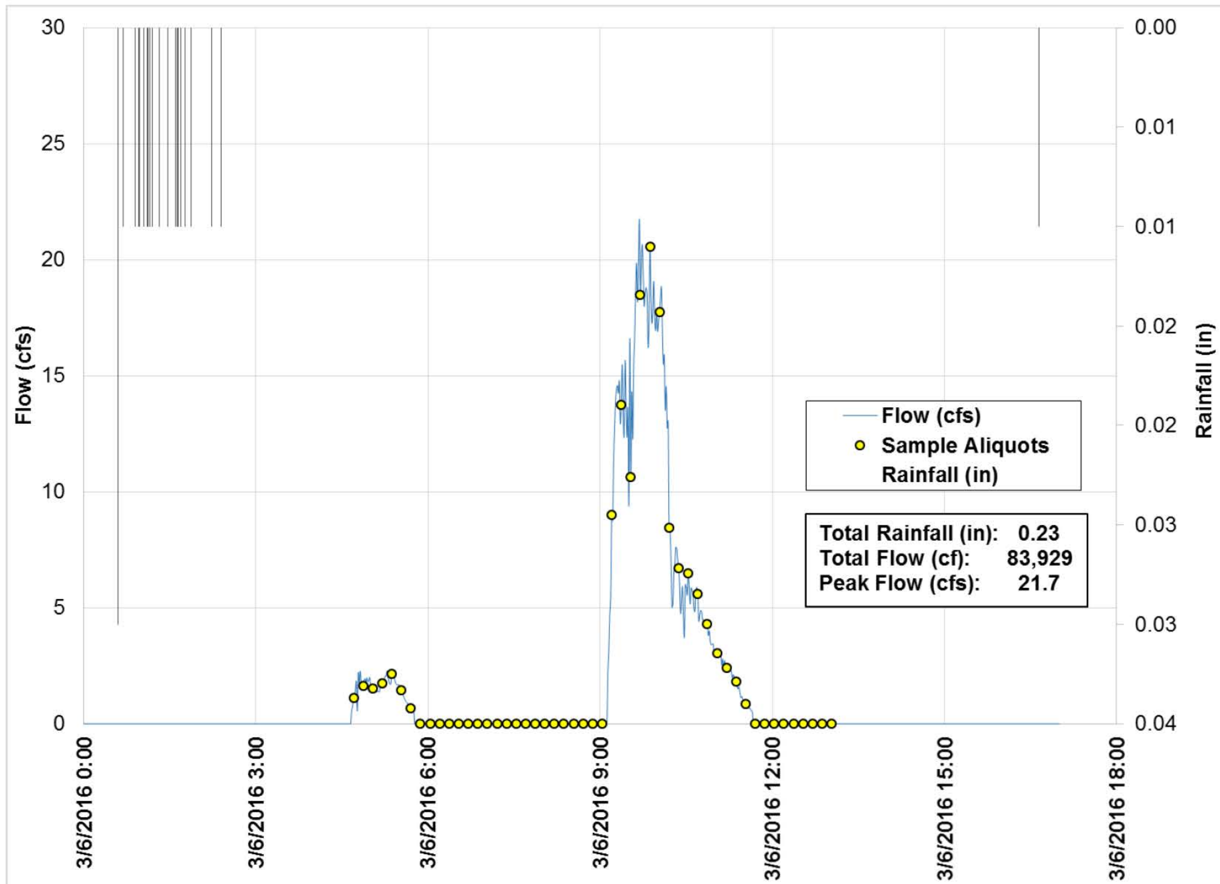

Figure F.1-2: MS4-LPC-2 Event Hydrograph

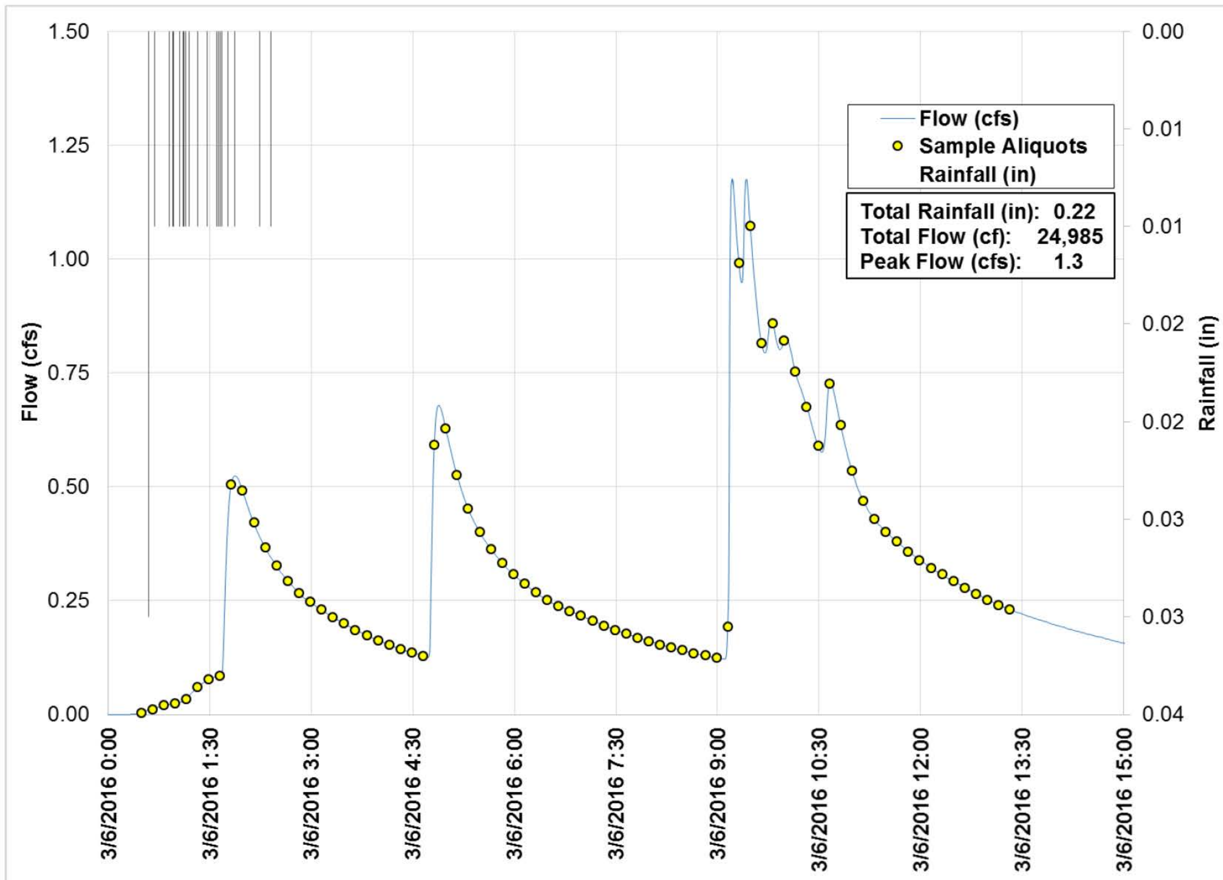

Figure F.1-3: MS4-LPC-3 Event Hydrograph

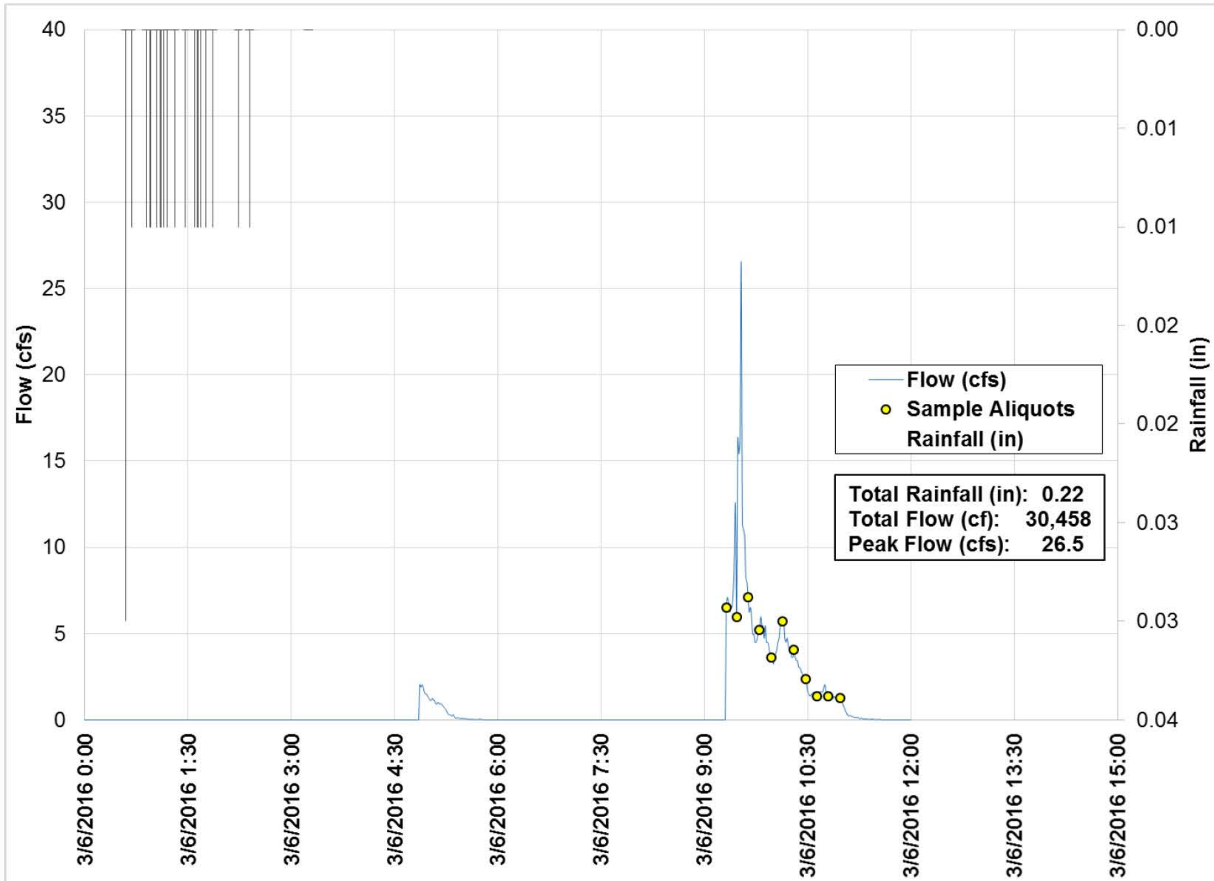

Figure F.1-4: MS4-LPC-4 Event Hydrograph

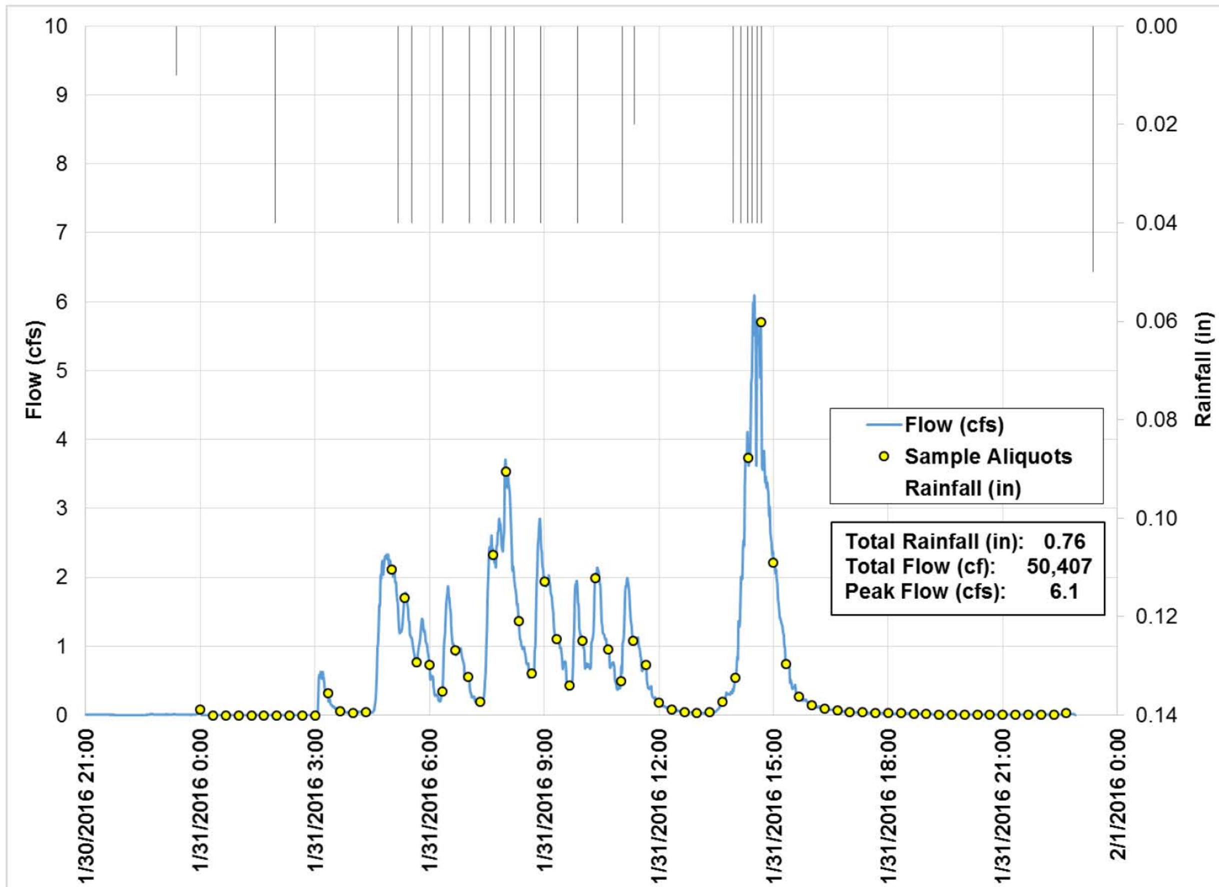

Figure F.1-5: MS4-LPC-5 Event Hydrograph

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Attachment F.2 – Wet Weather Outfall Analytical Results

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Table F.2-1
2015-2016 Los Peñasquitos WMA Wet Weather Outfall Monitoring Analytical Results

Analyte	Units	MS4-LPC-1	MS4-LPC-2	MS4-LPC-3	MS4-LPC-4	MS4-LPC-5
Conventional Parameters						
Dissolved Oxygen	mg/L	8.26	7.13	4.9	6.34	10.81
pH	pH units	7.68	8.27	8.18	8.22	7.52
Specific Conductivity	µS/cm	277	464	293	650	1,060
Temperature	°C	16.01	18.9	19.9	19.2	15.2
Turbidity	NTU	546	9.7	9.25	10.6	42
Indicator Bacteria						
Enterococcus	MPN/100mL	42,000	8,164	3,873	26,030	34,000
Fecal Coliform	MPN/100mL	2,000	11,000	11,000	1,600,000	7,200
Total Coliform	MPN/100mL	60,000	17,000	33,000	1,600,000	280,000
Total Metals						
Cadmium	µg/L	0.097 J	0.092 J	0.13	0.1	0.53
Copper	µg/L	89	20	35	22	28
Lead	µg/L	6.4	2.4	1.7	4.5	1.1
Selenium	µg/L	0.25 J	0.31 J	0.37 J	0.19 J	1.5
Zinc	µg/L	110	140	130	72	130
Selenium	µg/L	0.17 J	0.28 J	0.3 J	< 0.14	1.4
Nutrients						
Ammonia	mg/L	0.35	0.26	0.78	0.37	0.079 J
Nitrate as N	mg/L	1.7	1.6	1.5	0.88	2.3
Nitrite as N	mg/L	0.033 J	0.051 J	0.19	0.1	0.17
TKN	mg/L	2.2	2	5.6	2.1	29
Total Nitrogen	mg/L	3.9	3.6	7.3	3.1	31
Total Phosphorus as P	mg/L	0.54	0.27	0.58	0.42	0.64
Solid Parameters						
TSS	mg/L	110	24	22	130	57
TDS	mg/L	230	220	350	70	940

Notes:
< = Analyte not detected at method detection limit shown.
J = Analyte detected above the method detection limit but below the reporting limit.

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Attachment F.3 – Wet Weather Assessment Methodology

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1 Assessment of Wet Weather Outfall Results

In 2013 the San Diego Regional Water Quality Control Board (Regional Board) issued *Order No. R9-2013-0001 (amended by Order Nos. R9-2015-0001 and R9-2015-0100), National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region*, herein referred to as the MS4 Permit, regulating MS4 discharges throughout the San Diego Region. The MS4 Permit requires a series of wet weather MS4 outfall assessments be performed annually to assess and report the progress of water quality improvement strategies toward reducing pollutants in storm water discharges from the MS4. This Attachment describes the methodology used to perform these required assessments. The methodology outlined here is largely based on the transitional methodology described in the Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan (San Diego Regional Copermitees, 2015). Areas where the methodology differs from the transitional methodology are described in the relevant section, and also summarized in Section 5.0

Per MS4 Permit Provision D.4.b.(2)(b), Copermittees will annually assess and report the following:

- ❖ The average storm water runoff coefficient for each land use type within the Watershed Management Area (WMA);
- ❖ The volume of storm water and pollutant loads discharged from each of the Copermittee's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch;
- ❖ The total flow volume and pollutant loadings discharged from the Copermittee's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls;
- ❖ The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch; and
- ❖ Modifications to the wet weather MS4 outfall discharge monitoring locations and frequencies necessary to identify pollutants in storm water discharges from the MS4s in the Watershed Management Area.

Following acceptance of the Water Quality Improvement Plans and completion of the first year of Water Quality Improvement Plan Wet Weather MS4 Outfall Discharge Monitoring (2015-2016), annual assessments will also include comparison to applicable storm water action levels (SALs) in each Watershed Management Area as required by MS4 Permit Provision D.4.b.(2)(c). Compliance with applicable SALs will be used to evaluate whether the analyses and assumptions used to develop the Water Quality Improvement Plan should be updated as a component of the adaptive management process (MS4 Permit Provision B.5).

Table 1-1 provides the equations used in this methodology and lists the input and output variables for each equation. The sections that follow describe the application of these equations in greater detail.

Table 1-1
MS4 Wet Weather Outfall Assessment Equations

Permit Provision	Equation Reference	Equation	Inputs	Outputs
D.4.b.(2)(b)(1)[a]	A.1	$C_{Outfall\_Actual} = \frac{V_{Outfall\_Event}}{A_{Outfall} \times d_{Outfall\_Event}} \times \frac{12in}{1ft} \times \frac{1acre}{43{,}560\ ft^2}$	$V_{Outfall\_Event}$ (cf) $A_{Outfall}$ (acre) $d_{Outfall\_Event}$ (in)	$C_{Outfall\_Actual}$ (dimensionless)
	A.1a (Optional) [1]	$C_{Outfall\_His} = \frac{\sum_{Yr=1}^{n} C_{Outfall\_Actual\_Yr}}{n}$	$C_{Outfall\_Actual\_Yr}$ (dimensionless) n (year)	$C_{Outfall\_His}$ (dimensionless)
	A.2	$C_{Outfall\_HM} = \frac{\sum(A_{Outfall\_LU} \times C_{HM\_LU})}{\sum A_{Outfall\_LU}}$	$A_{Outfall\_LU}$ (acre) C_{HM_LU} (dimensionless)	$C_{Outfall\_HM}$ (dimensionless)
	A.3	$CF_{Outfall\_C} = \frac{C_{Outfall\_Actual}}{C_{Outfall\_HM}}$	$C_{Outfall\_Actual}$ (dimensionless) $C_{Outfall\_HM}$ (dimensionless)	$CF_{Outfall\_C}$ (dimensionless)
	A.4	$C_{Outfall\_LU} = CF_{Outfall\_C} \times C_{HM\_LU}$	$CF_{Outfall\_C}$ (dimensionless) C_{HM_LU} (dimensionless)	$C_{Outfall\_LU}$ (dimensionless)
	A.5[2]	$C_{WMA\_LU} = \frac{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU})}{\sum A_{Outfall\_LU}}$	$A_{Outfall\_LU}$ (acre) $C_{Outfall\_LU}$ (dimensionless)	C_{WMA_LU} (dimensionless)
D.4.b.(2)(b)(1)[b]	B.1	$V_{Outfall\_Annual} = (A_{Outfall} \times C_{Outfall\_Actual}) \times \sum d_{Outfall\_Annual} \times \frac{1ft}{12in} \times \frac{43{,}560ft^2}{1acre}$	$C_{Outfall\_Actual}$ (dimensionless) $A_{Outfall}$ (acre) $d_{Outfall\_Annual}$ (inches)	$V_{Outfall\_Annual}$ (cf)
	B.2[3]	$Pollutant\ Load_{Outfall} = (V_{Outfall\_Annual} \times Pollutant\ Concentration_{Outfall}) \times \mathrm{UC}$	$V_{Outfall\_Annual}$ (cf) Pollutant $Concentration_{Outfall}$ (units vary)	Pollutant $Load_{Outfall}$ (lb or MPN)
D.4.b.(2)(b)(1)[c]	C.1	$V_{WMA\_Juris\_LU} = (A_{WMA\_Juris\_LU} \times C_{WMA\_LU}) \times \sum d_{Outfall\_Annual} \times \frac{1ft}{12in} \times \frac{43{,}560ft^2}{1acre}$	C_{WMA_LU} (dimensionless) $A_{WMA\_Juris\_LU}$ (acre) $d_{Outfall\_Annual}$ (inches)	$V_{WMA\_Juris\_LU}$ (cf)
	C.2	$V_{WMA\_Juris} = \sum V_{WMA\_Juris\_LU}$	$V_{WMA\_Juris\_LU}$ (cf)	V_{WMA_Juris} (cf)
	C.3	$EMC_{Outfall\_Actual} = Pollutant\ Concentration_{Outfall}$	Pollutant $Concentration_{Outfall}$ (units vary)	$EMC_{Outfall\_Actual}$ (units vary)
	C.4	$EMC_{Outfall\_Calculated} = \frac{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU} \times EMC_{Typical\_LU})}{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU})}$	$A_{Outfall\_LU}$ (acre) $C_{Outfall\_LU}$ (dimensionless) $EMC_{Typical\_LU}$ (units vary)	$EMC_{Outfall\_Calculated}$ (units vary)
	C.5	$CF_{Outfall\_EMC} = \frac{EMC_{Outfall\_Actual}}{EMC_{Outfall\_Calculated}}$	$EMC_{Outfall\_Actual}$ (units vary) $EMC_{Outfall\_Calculated}$ (units vary)	$CF_{Outfall\_EMC}$ (units vary)
	C.6	$EMC_{Outfall\_LU} = CF_{Outfall\_EMC} \times EMC_{Typical\_LU}$	$CF_{Outfall\_EMC}$ (units vary) $EMC_{Typical\_LU}$ (units vary)	$EMC_{Outfall\_LU}$ (units vary)
	C.7	$EMC_{WMA\_LU} = \frac{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU} \times EMC_{Outfall\_LU})}{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU})}$	$C_{Outfall\_LU}$ (dimensionless) $A_{Outfall\_LU}$ (acre) $EMC_{Outfall\_LU}$ (units vary)	EMC_{WMA_LU} (units vary)

Permit Provision	Equation Reference	Equation	Inputs	Outputs
	C.8[4]	$EMC_{WMA\_LU\_HIS} = \frac{\sum_{Yr=1}^{n}\sum(EMC_{WMA\_LU\_Yr})}{n}$	$EMC_{WMA\_LU\_Yr}$ (units vary) n (years)	$EMC_{WMA\_LU\_HIS}$ (units vary)
	C.9[3]	$Pollutant\ Load_{WMA\_Juris} = \sum(V_{WMA\_Juris\_LU} \times EMC_{WMA\_LU\_HIS} \times \mathrm{UC})$	$V_{WMA\_Juris\_LU}$ (cf) $EMC_{WMA\_LU\_HIS}$ (units vary)	Pollutant $Load_{WMA\_Juris}$ (lb or MPN)
D.4.b.(2)(b)(1)[d]	D.1	$V_{HSA\_Juris\_LU} = (A_{HSA\_Juris\_LU} \times C_{WMA\_LU}) \times \sum d_{Outfall\_Annual} \times \frac{1ft}{12in} \times \frac{43{,}560ft^2}{1acre}$	C_{WMA_LU} (dimensionless) $d_{Outfall\_Annual}$ (inches) $A_{HSA\_Juris\_LU}$ (acre)	$V_{HSA\_Juris\_LU}$ (cf)
	D.2	$V_{HSA\_Juris} = \sum V_{HSA\_Juris\_LU}$	$V_{HSA\_Juris\_LU}$ (cf)	V_{HSA_Juris} (cf)
	D.3	$\%V_{HSA\_Juris} = \frac{V_{HSA\_Juris}}{V_{WMA\_Juris}} \times 100$	V_{HSA_Juris} (cf) V_{WMA_Juris} (cf)	$\%V_{HSA\_Juris}$ (dimensionless)
	D.4[3]	$Pollutant\ Load_{HSA\_Juris} = \sum(V_{HSA\_Juris\_LU} \times EMC_{WMA\_LU\_HIS} \times \mathrm{UC})$	$V_{HSA\_Juris\_LU}$ (cf) $EMC_{WMA\_LU\_HIS}$ (units vary)	Pollutant $Load_{HSA\_Juris}$ (lb or MPN)
	D.5	$\%Pollutant\ Load_{HSA\_Juris} = \frac{Pollutant\ Load_{HSA\_Juris}}{Pollutant\ Load_{WMA\_Juris}} \times 100$	Pollutant $Load_{HSA\_Juris}$ (lb or MPN) Pollutant $Load_{WMA\_Juris}$ (lb or MPN)	%Pollutant $Load_{HSA\_Juris}$ (lb or MPN)

Notes:

1) For those outfalls monitored for more than one monitoring year, the outfall runoff "C" ($C_{outfall\_Actual}$) will be averaged across all years of monitoring. This average value ($C_{outfall\_His}$) is to be substituted for the calculated outfall runoff "C" ($C_{outfall\_Actual}$) in all subsequent calculations.
2) Historical data are included in this calculation. The WMA land use runoff "C" (C_{WMA_LU}) is calculated based on the area-weighted average of all years of outfall monitoring data.
3) Unit conversion (UC) varies by units used to express pollutant concentration. Common unit conversions include:
   a. mg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\ g}{1000mg}\right)\left(\frac{1\ lb}{453.592\ g}\right)$
   b. µg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\ g}{1\times10^6\mu g}\right)\left(\frac{1\ lb}{453.592\ g}\right)$
   c. MPN/100mL: $UC = \left(\frac{100mL}{0.1L}\right)\left(\frac{28.317L}{1ft^3}\right)$
4) The WMA land use EMC is averaged across all years of monitoring. This average EMC (EMCWMA_LU_HIS) is included in all subsequent calculations.

V=Runoff Volume; A=Area; d=depth; C=Runoff Coefficient
HM=County of San Diego Hydrology Manual; LU=Land Use; CF=Correction Factor; WMA=Watershed Management Area; EMC=Event Mean Concentration; HSA=Hydrologic SubArea; Juris=Jurisdictional; UC=Unit Conversion
in = inches; cf=cubic feet; lb=pounds

2 Land Use Analysis

2.1 Land Use Categorization

The process of calculating average storm water runoff coefficients for land use types first requires defining land use types within the WMA and locating the boundaries of each type. Geographic Information Systems (GIS) can be used to locate the boundaries and measure the area of each land use type. Grouping specific land use types into larger categories simplifies the calculation of average storm water runoff coefficients within the WMA. The categorizations used are based on the updated land use categorizations in the Transitional Monitoring and Assessment Program Report for the San Diego River WMA (2014-2015) (San Diego County MS4 Copermittees, 2016). These categories differ slightly from the categories presented in the Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan (San Diego Regional Copermitees, 2015).

Table 2-1 lists each San Diego Geographic Information Source (SanGIS) land use type and the corresponding land use category used in the wet weather MS4 assessments. The latest SanGIS land use GIS data layer can be downloaded from the SanGIS website (www.sangis.org).

Table 2-1
Land Use Types and Categories for Wet Weather MS4 Outfall Assessments

Land Use Category	SanGIS Land Use Type	SanGIS Land Use Code
Agriculture	Golf course	7204
	Orchard and Vineyard	8001
	Intensive Agriculture	8002
	Field Crops	8003
Commercial	Jail/Prison	1401
	Hotel/Motel (Low-Rise)	1501
	Hotel/Motel (High-Rise)	1502
	Resort	1503
	Rail Station/Transit Station	4111
	Parking Lot - Surface	4114
	Parking Lot - Structure	4115
	Park and Ride Lot	4116
	Wholesale Trade	5001
	Regional Shopping Center	5002
	Community Shopping Center	5003
	Neighborhood Shopping Center	5004
	Specialty Commercial	5005

Land Use Category	SanGIS Land Use Type	SanGIS Land Use Code
	Automobile Dealership	5006
	Arterial Commercial	5007
	Service Station	5008
	Other Retail Trade and Strip Commercial	5009
	Office (High-Rise)	6001
	Office (Low-Rise)	6002
	Government Office/Civic Center	6003
	Cemetery	6101
	Religious Facility	6102
	Library	6103
	Post Office	6104
	Fire/Police Station	6105
	Mission	6108
	Other Public Services	6109
	UCSD/VA Hospital/Balboa Hospital	6501
	Hospital - General	6502
	Other Health Care	6509
	Tourist Attraction	7201
	Stadium/Arena	7202
	Racetrack	7203
	Golf Course Clubhouse	7205
	Convention Center	7206
	Marina	7207
	Casino	7209
	Residential Under Construction	9501
	Commercial Under Construction	9502
	Office Under Construction	9504
	Olympic Training Center	7208
	Other Recreation - High	7210
	Residential Recreation	7607
Educational	SDSU/CSU San Marcos/UCSD	6801
	Other University or College	6802
	Junior College	6803
	Senior High School	6804

Land Use Category	SanGIS Land Use Type	SanGIS Land Use Code
	Junior High School or Middle School	6805
	Elementary School	6806
	School District Office	6807
	Other School	6809
	School Under Construction	9505
Industrial	Heavy Industry	2001
	Industrial Park	2101
	Light Industry - General	2103
	Warehousing	2104
	Public Storage	2105
	Extractive Industry	2201
	Junkyard/Dump/Landfill	2301
	Commercial Airport	4101
	Military Airport	4102
	General Aviation Airport	4103
	Airstrip	4104
	Communications and Utilities	4113
	Marine Terminal	4120
	Industrial Under Construction	9503
	Freeway	4112
Mixed Use	Mixed Use	9700
Residential: Multi-Family	Multi-Family Residential	1200
	Single Room Occupancy Units (SRO's)	1280
	Multi-Family Residential Without Units	1290
	Mobile Home Park	1300
	Dormitory	1402
	Military Barracks	1403
	Monastery	1404
	Other Group Quarters Facility	1409
Residential: Rural	Spaced Rural Residential	1000
Residential: Single-Family	Single Family Residential	1100
	Single Family Detached	1110

Land Use Category	SanGIS Land Use Type	SanGIS Land Use Code
	Single Family Multiple-Units	1120
	Single Family Residential Without Units	1190
Open Space	Military Use	6701
	Military Training	6702
	Weapons Facility	6703
	Other Recreation - Low	7211
	Park - Active	7601
	Open Space Park or Preserve	7603
	Beach - Active	7604
	Beach - Passive	7605
	Landscape Open Space	7606
	Undevelopable Natural Area	7609
	Vacant and Undeveloped Land	9101
Transportation	Freeway Under Construction	9507
	Railroad Right of Way	4117
	Road Right of Way	4118
	Other Transportation	4119
	Road Under Construction	9506
Water[1]	Water	9200
	Bay or Lagoon	9201
	Lake/Reservoir/Large Pond	9202

Source: San Diego County MS4 Copermittees, 2016
Notes:
1) Water land uses excluded from MS4 outfall assessments. Water land uses assumed to be a sink for runoff storage.

The Agriculture and Open Space land use categories were further subdivided based on hydrologic soil group (i.e., Soil Group A, B, C, or D). Any Agriculture or Open Space areas with an undefined soil group were classified as belonging to Soil Group D.

Federal, State, and Indian Reservation land uses were excluded from the load calculations. MS4 Permit Copermittees have limited jurisdiction over these land uses. Categorization of these land uses was based on the SanGIS LAND_OWNERSHIP_SG shape file. The following categories were excluded:

- Bureau of Land Management
- California Department of Fish and Game
- Indian Reservations

- Military Reservations
- Other Federal
- State
- State (Caltrans)
- State Parks
- U.S. Fish & Wildlife Service
- U.S. Forest Service

2.2 Expected Runoff Coefficients

Each land use category was assigned an expected runoff coefficient (Runoff "C") based on values listed in the San Diego County Hydrology Manual (County of San Diego, 2003). The Runoff "C" is a unitless coefficient representing fraction of rainfall that runs off a given land area rather than infiltrating. A larger Runoff "C" (approaching one) corresponds to a higher fraction of runoff, and typically corresponds to areas of low permeability (e.g., parking lots). A smaller Runoff "C" is often associated with undeveloped areas or other areas of high permeability.

Table 2-2 lists the expected runoff coefficients for each land use category (San Diego Regional Copermitees, 2015).

Table 2-2
Expected Runoff "C" Values by Land Use Category

Land Use Category	Runoff Coefficient
Agriculture[1]	0.2, 0.25, 0.3, OR 0.35
Commercial	0.82
Educational	0.58
Industrial	0.87
Mixed Use	0.66
Residential: Multi-Family	0.6
Residential: Rural	0.41
Residential: Single-Family	0.49
Open Space[1]	0.2, 0.25, 0.3, OR 0.35
Transportation	0.71

Notes:
1) Runoff coefficient varies by hydrologic soil group. Values presented are for soil groups A, B, C, and D, respectively.
Source: County of San Diego, 2003

2.3 Volumes and Loads of Storm Water Discharges

2.3.1 Land Use Storm Water Runoff Coefficient (D.4.b.(2)(b)(i)[a])

MS4 Permit Provision D.4.b.(2)(b)(i) requires calculation of the average storm water runoff coefficient (Runoff "C") for each land use type within the WMA. This calculation is based on the measured flow and rainfall values for each monitored outfall, along with the outfall drainage area characteristics.

The average Runoff "C" is calculated according to the following steps. The corresponding equation or equations for each step, as listed in Table 1-1, are provided in brackets.

1) Calculate the observed (actual) runoff coefficient for each monitored outfall. The observed runoff coefficient for each outfall ($C_{Outfall\_Actual}$) is calculated based on the observed runoff volume, size of the outfall drainage area, and depth of observed rainfall for the monitored storm. Rainfall data for each event is obtained from the County of San Diego Automatic Local Evaluation in Real Time (ALERT) System rain gauge closest to each monitoring station. [Equation A.1]. This is repeated for each monitored outfall in the WMA. For those outfalls monitored during more than one monitoring year (e.g., during 2014-2015 and 2015-2016), the observed runoff coefficient is averaged across all years of monitoring. This new value ($C_{Outfall\_His}$) is used in place of $C_{Outfall\_Actual}$ in all subsequent calculations [Equation A.1.a].

2) Calculate the expected Runoff "C" for each monitored outfall. The expected Runoff "C" ($C_{Outfall\_HM}$) for each outfall is calculated based on the areas of each land use category in the outfall drainage area and the expected Runoff "C" for each land use category from the San Diego County Hydrology Manual, as listed in Table 1-2. [Equation A.2]. This is repeated for each monitored outfall in the WMA.

3) Calculate a Runoff "C" correction factor ($CF_{Outfall\_C}$) for each monitored outfall. The Runoff "C" Correction Factor is calculated by dividing the observed runoff coefficient ($C_{Outfall\_Actual}$) by the expected runoff coefficient ($C_{Outfall\_HM}$) [Equation A.3]. This is repeated for each monitored outfall in the WMA.

4) Calculate a land use Runoff "C" for each land use represented in the drainage area of each monitored outfall. A unique Runoff "C" ($C_{Outfall\_LU}$) is calculated for each land use category represented in each outfall drainage area [Equation A.4]. This is repeated for each land use category in each monitored outfall drainage area.

5) Calculate a WMA Runoff "C" for each land use category in the WMA. The WMA Runoff "C" (C_{WMA_LU}) is calculated as the area-weighted average of the outfall land use Runoff "C" values calculated in Step 4. In order to improve the accuracy of the resulting WMA Runoff "C" over time, results from each year of MS4 Outfall Monitoring are incorporated into the average [Equation A.5]. This equation is repeated for each land uses category in the WMA.

2.3.2 Monitored MS4 Outfall Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[b])

MS4 Permit Provision D.4.b.(2)(b)(i)[b] requires calculation of the storm water volume and pollutant loads discharged from each of the Responsible Agency's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area, for each storm event with measurable rainfall greater than 0.1 inch. This calculation is based on the actual Runoff "C" values, the size of each outfall drainage area, ALERT rain data for the rain gauge closest to each outfall, and the observed chemistry data.

The wet season storm water volume and pollutant loads are calculated according to the following steps. The corresponding equation or equations for each step, as listed in Table 1-1, are provided in brackets.

1) Calculate the annual storm water volume from each outfall. The storm water volume ($V_{Outfall\_Annual}$) is calculated using the actual runoff coefficient for each outfall ($C_{Outfall\_Actual}$ from Equation A.1) and the area of each outfall, multiplied by the total rainfall for the wet season. Total rainfall is calculated as the sum of rainfall from qualifying wet season rain events, based on the closest ALERT system gauge for each outfall. A qualifying storm event is defined as a wet season storm event with measureable rainfall greater than 0.1 inch. [Equation B.1]. This equation is repeated for each monitored outfall.

2) Calculate annual pollutant loads for each pollutant at each monitored outfall. The monitored event analytical result for each pollutant at each outfall is used to calculate an annual pollutant load ($PollutantLoad_{Outfall}$). [Equation B.2]. This equation is repeated for each pollutant at each monitored outfall.

2.3.3 Jurisdictional Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[c])

MS4 Permit Provision D.4.b.(2)(b)(i)[c] requires calculation of the total flow volume and pollutant loadings discharged from each Responsible Agency's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls. The WMA Runoff "C" values, calculated as described in Section 3.1, will be used in combination with land use area data and ALERT rainfall data to calculate a total flow volume for each jurisdiction. The annual volumes will be applied to pollutant event mean concentrations (EMCs) to calculate annual jurisdictional pollutant loadings.

The jurisdictional flow volume and pollutant loads are calculated according to the following steps. The corresponding equation or equations for each step, as listed in Table 1-1, are provided in brackets.

1) Calculate the wet season flow volume from each land use area in each jurisdiction in the WMA. An annual flow volume for each land use type in each jurisdiction ($V_{WMA\_Jurisd\_LU}$) is calculated using the land use Runoff "C" (C_{WMA_LU}), calculated as described in Section 3.1, the area of each land use type in each jurisdiction within the WMA, and the total qualifying wet season rainfall. The total qualifying wet season rainfall (sum of rainfall from events with rainfall totals exceeding >0.1inch) is calculated using a representative ALERT station from each WMA. If more than one ALERT station is present in a WMA, the station closest to the majority of monitoring locations will be used. [Equation C-1]. This equation is repeated for each land use type for each Responsible Agency.

2) Calculate the wet season flow volume from each jurisdiction in the WMA. The wet season flow volume from each land use in a jurisdiction will be summed to generate the wet season jurisdictional flow volume (V_{WMA_Juris}). [Equation C.2]. This equation is repeated for each Responsible Agency in the WMA.

3) Define the event mean concentration (EMC) for each monitored event. The event mean concentration (EMC) for each constituent ($EMC_{Outfall\_Actual}$) for each monitored outfall is defined as the measured constituent concentration for the outfall [Equation C.3].

4) Calculate the expected (calculated) EMC for each pollutant at each monitored outfall. An expected (calculated) EMC ($EMC_{Outfall\_Calculated}$) for each constituent at a monitored outfall will be calculated as the area-weighted average of literature EMC values for each land use type represented by the monitored outfall drainage area. The literature EMC values, based on literature EMCs provided in the San Diego River WMA Water Quality Improvement Plan (LWA & Amec Foster Wheeler, 2016) are provided in Table 2-3. [Equation C.4]. This equation is repeated for each pollutant at each monitored outfall.

5) Calculate an EMC correction factor for each pollutant measured from each monitored outfall. A ratio, or correction factor for the Estimated Mean Concentration ($CF_{Outfall\_EMC}$), is calculated using the actual EMC and the expected (calculated) EMC for each constituent at each outfall [Equation C.5]. This equation is repeated for each pollutant at each monitored outfall.

6) Calculate a land use EMC for each land use represented in the drainage area of each monitored outfall. The EMC correction factor is multiplied by the expected EMC (Table 2-3) for each constituent at each monitored outfall [Equation C.6], resulting in a corrected EMC for each constituent for each outfall ($EMC_{Outfall\_LU}$). This equation is repeated for each pollutant and each land use at each outfall.

7) Calculate a WMA EMC for each pollutant and each land use category. An EMC for each monitored constituent in the WMA by each land use type (EMC_{WMA_LU}) is then calculated as the area-weighted average of the outfall land use EMC [Equation C.7]. This equation is repeated for each pollutant and each land use in the WMA.

8) Calculate the historical average WMA EMC for each pollutant and each land use category. Each EMC calculated using Equation C.7 is averaged with the historical EMCs for that constituent and land use, to derive the historical average WMA EMC ($EMC_{WMA\_LU\_HIS}$) [Equation C.8]. This equation is repeated for each pollutant and each land use in the WMA.

9) Calculate the annual pollutant load for each pollutant from each Responsible Agency in the WMA. Wet season jurisdictional pollutant loads ($Pollutant\ Load_{WMA\_Juris}$) are calculated for each constituent by summing the load from each land use in the jurisdiction [Equation C.9]. This equation is repeated for each pollutant and each Responsible Agency.

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Table 2-3
Literature EMCs by Land Use Type

Constituent	Agriculture (Row Crop)[6]	Orchard[6]	Commercial[7]	Educational	Industrial	Vacant/ Open Space	Residential: Multi-Family[7]	Residential: Rural	Residential: Single Family	Transportation
Dissolved Oxygen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Color[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Dissolved Color[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
pH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductivity[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Sulfates[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Temperature	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Hardness[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Turbidity[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Enterococcus[1]	60300	1344	51600	2148	26703	484	11800	6684	35557	1680
Fecal Coliform	60300	1344	51600	2148	26703	484	11800	6684	35557	1680
Total Coliform[1]	60300	1344	51600	2148	26703	484	11800	6684	35557	1680
Aluminum (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Aluminum (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Beryllium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Beryllium (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Cadmium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Cadmium(Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Copper (Dissolved)	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Copper (Total)	100.1	100.1	54.84	12.02	53.54	10.6	12.1	8.36	25.96	52.2
Iron (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Iron (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Lead (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Lead (Total)	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Manganese (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Manganese (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Mercury (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Mercury (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Molybdenum (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Molybdenum (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Nickel (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Nickel (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Selenium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Selenium (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Silver (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Silver (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Thallium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Thallium (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Titanium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Titanium (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Zinc (Dissolved)	40.1	40.1	224.4	73.13	214.58	28.1	77.5	14.99	50.02	222
Zinc (Total)	274.8	274.8	483.7	174.1	428.39	26.3	125.1	39.19	153.29	292.9
Ammonia	1.65	0.04	1.21	0.4	0.6	0.11	0.5	0.11	0.49	0.37

Constituent	Agriculture (Row Crop)[6]	Orchard[6]	Commercial[7]	Educational	Industrial	Vacant/ Open Space	Residential: Multi-Family[7]	Residential: Rural	Residential: Single Family	Transportation
Nitrate	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Nitrite[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Total Orthophosphate[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
TKN	7.32	2.31	3.44	1.71	2.87	0.96	1.8	2.65	2.51	1.84
Total Nitrogen2	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Dissolved Phosphorus	1.41	0.13	0.29	0.26	0.26	0.09	0.2	0.12	0.45	0.56
Total Phosphorus	3.34	0.36	0.32	0.46	0.45	0.12	0.23	1.59	0.49	0.68
TDS[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
TSS	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
SSC[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Trash	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDT[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
PCP[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Chlordane[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Diazanon[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
MBAS[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
PAHs[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
PCBs[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Organophosphorus Pesticides[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Pesticides/PCBs[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Pyrethroid Pesticides[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Nitrogen Pesticides[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
di(2-ethylhexyl) adipate[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
di(2-ethylhexyl phthalate[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
hexachlorobenzene[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
hexachlorocyclopentadiene (HEX)[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8

Notes:
NA=Not applicable. EMCs not provided because annual load not calculated for these constituents.
1. Distribution of constituent EMCs based on values listed for fecal coliform
2. Distribution of constituent EMCs based on values listed for nitrate as N
3. Distribution of constituent EMCs based on values listed for total lead
4. Distribution of constituent EMCs based on values listed for dissolved copper.
5. Distribution of constituent EMCs based on values listed for total suspended solids.
6. Values for Agricultural land use based on average of Agriculture (Row Crop) and Orchard values.
7. Values for Mixed Use land use based on average of Commercial and Residential: Multi-Family values.

2.3.4 Land Use Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[d])

MS4 Permit Provision D.4.b.(2)(b)(i)[d] requires calculating the percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea (HSA) with a major MS4 outfall to receiving waters, or within each major MS4 outfall to receiving waters, in the Responsible Agency's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch. The methods used to perform these calculations are similar to those used to calculate the WMA jurisdictional storm water volumes and pollutant loads described in Section 2.4.3, except HSAs without a major outfall are excluded.

The HSA flow volume and pollutant loads are calculated according to the following steps. The corresponding equation or equations for each step, as listed in Table 1-1, are provided in brackets.

1) Calculate the wet season flow volume from each land use area in each HSA with a major outfall in the WMA. An annual flow volume for each land use type in each HSA ($V_{HSA\_Juris\_LU}$) is calculated using the land use Runoff "C" (C_{WMA_LU}), calculated as described in Section 2.4.1, the area of each land use type in each HSA in each jurisdiction within the WMA, and the total qualifying wet season rainfall. [Equation D.1]. This equation is repeated for each land use type in each HSA for each jurisdiction in the WMA.
2) Calculate the wet season flow volume from each jurisdiction in each HSA with a major outfall in the WMA. The wet season flow volume from each land use in the HSA (by jurisdiction) is added to calculate the total storm water volume by HSA (V_{HSA_Juris}) for the jurisdiction [Equation D.2]. This equation is repeated for each Responsible Agency.
3) Calculate the percent of storm water volume discharged from each HSA, by jurisdiction. A percent volume for each jurisdiction ($\%V_{HSA\_Juris}$) can be calculated by dividing the wet season flow volume from the HSA by the total jurisdictional runoff volume in the WMA [Equation D.3]. This equation is repeated for each Responsible Agency.
4) Calculate the annual pollutant load for each pollutant from each Responsible Agency in the WMA, by HSA. Pollutant loads by HSA by jurisdiction (Pollutant $Load_{HSA\_Juris}$) are calculated for each constituent by summing the load from each land use area in the HSA [Equation D.4]. This equation is repeated for each pollutant, each Responsible Agency, and each HSA in which that Responsible Agency has a major outfall.
5) Calculate the percent pollutant load contribution for each pollutant from each HSA. The percent contribution of pollutant load for each jurisdiction (%Pollutant $Load_{HSA\_Juris}$) can be calculated by dividing the HSA pollutant load for each jurisdiction by the WMA pollutant load for that jurisdiction [Equation D.5]. This equation is repeated for each pollutant, each Responsible Agency, and each HSA in which that Responsible Agency has a major outfall.

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3 Storm Water Action Level Comparison

Per MS4 Permit Provision D.4.b.(2)(c), Responsible Agencies must compare pollutant concentrations from monitored wet weather outfalls to applicable Storm Water Action Levels (SALs). The Responsible Agencies will include this comparison in each Water Quality Improvement Plan Annual Report. The SALs listed in Provision C.2 of the MS4 Permit are provided in Table 3-1. Additional SALs may apply, on a WMA-specific basis, for pollutants that cause or contribute to a receiving water condition associated with the highest priority water quality condition. These SALs will be provided in the applicable Water Quality Improvement Plan Annual Report.

Table 3-1
Storm Water Action Levels (SALs) for Discharges from MS4s to Receiving Waters

Parameter	Units	Action Level
Turbidity	NTU	126
Nitrate & Nitrite (Total)	mg/L	2.6
Phosphorus (Total P)	mg/L	1.46
Cadmium (Total Cd)[1]	µg/L	3.0
Copper (Total Cu)[1]	µg/L	127
Lead (Total Pb)[1]	µg/L	250
Zinc (Total Zn)[1]	µg/L	976

Notes:
NTU= Nephelometric Turbidity Units; mg/L = milligrams per liter; µg/L = micrograms per liter
1) If a total metals concentration exceeds the listed action level, the concentration must be compared to the California Toxics Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If the sample does not exceed the USEPA 1-hr maximum concentration criterion for the measured level of hardness, the sample results will not be considered above the SAL.

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4 Summary of Changes from Transitional Methodology

The methodology presented is largely identical to the transitional methodology outlined in the Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan (San Diego Regional Copermitees, 2015). Differences from the transitional work plan include the following:

- Land use categorization, presented in Table 2-1, is based on the revised categorization presented in the San Diego River Transitional Monitoring Annual Report.
- For the purposes of calculating land use areas, agricultural and open space land uses of an undefined soil group are classified as soil group D.
- Literature EMCs are based on values listed in the San Diego River WMA Water Quality Improvement Plan (LWA & Amec Foster Wheeler, 2016). Literature EMCs for constituents not described in that document are estimated as described in Table 2-3.
- For outfalls monitored during more than one monitoring season, the outfall runoff coefficient (Runoff “C”) is averaged based on all years of monitoring.
- The WMA land use Runoff “C” is an area-weighted average across all years of monitoring.
- The land use EMC values are based on an average of the land use EMC values for all years of monitoring.
- The assessment excludes State, Federal, and Indian Reservation lands from the WMA and HSA load calculations. The transitional monitoring and assessment program excluded Federal and Indian Reservation lands only. These land uses are often outside the jurisdiction of the Copermittees.

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5 References

County of San Diego. 2003. San Diego County Hydrology Manual. Prepared by the County of San Diego Department of Public Works Flood Control Section. June 2003.

Larry Walker and Associates (LWA) & Amec Foster Wheeler. 2016. San Diego River Watershed Management Area Water Quality Improvement Plan. January 2016.

San Diego County MS4 Copermittes. 2016. Transitional Monitoring and Assessment Program Report for the San Diego River WMA (2014-2015) Prepared by Weston Solutions. January 2016.

San Diego County Regional Copermittees. 2015. 2013-2014 and 2014-2015 Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan. Prepared by Weston Solutions. January 2015.

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Attachment F.4 – Wet Weather HA Storm Water Volumes and Pollutant Loads

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Table F.4-1
Los Peñasquitos WMA Wet Season Flow Volume and Pollutant Loads: City of Del Mar HA 906.1

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	0	0	16,918	0	6,805	0	22,272	12,232	0	58,353	79,936	19,660	559,048	546,625	1,321,848
% Contribution	%	0%	0%	0%	0%	1%	0%	1%	0%	2%	1%	0%	4%	6%	1%	42%	41%	100%
Indicator Bacteria																		
Enterococcus	MPN	0	0	0	0	2.73E+13	0	7.21E+11	0	5.45E+09	2.05E+09	0	2.39E+11	0	0	2.61E+14	4.67E+12	2.94E+14
Fecal Coliform	MPN	0	0	0	0	1.93E+13	0	2.49E+11	0	4.81E+08	8.20E+08	0	1.43E+12	0	0	7.66E+14	1.70E+13	8.04E+14
Total Coliform	MPN	0	0	0	0	3.82E+13	0	4.44E+12	0	1.74E+10	4.61E+09	0	1.81E+12	0	0	1.05E+15	2.35E+13	1.12E+15
Total Metals																		
Cadmium	lb	0	0	0	0	1.04E-04	0	6.01E-05	0	6.39E-07	2.21E-07	0	1.30E-05	0	0	0.0010	2.97E-04	0.0015
Copper	lb	0	0	0	0	0.0299	0	0.0026	0	9.12E-04	2.14E-04	0	0.0061	0	0	0.2191	0.1745	0.4333
Lead	lb	0	0	0	0	0.0020	0	1.94E-04	0	3.04E-05	7.85E-06	0	3.75E-04	0	0	0.0242	0.0066	0.0334
Selenium	lb	0	0	0	0	3.49E-04	0	1.19E-04	0	2.56E-06	9.65E-07	0	1.73E-04	0	0	0.0073	0.0024	0.0104
Zinc	lb	0	0	0	0	0.2427	0	0.0145	0	3.04E-04	1.47E-04	0	0.0096	0	0	0.9183	0.6577	1.843
Dissolved Metals																		
Selenium	lb	0	0	0	0	2.95E-04	0	9.82E-05	0	4.54E-06	9.45E-08	0	8.82E-06	0	0	0.0043	0.0054	0.0101
Nutrients																		
Ammonia	lb	0	0	0	0	0.9870	0	0.0387	0	0.0035	0.0014	0	0.1038	0	0	5.541	1.594	8.269
Nitrate as N	lb	0	0	0	0	0.5633	0	0.2105	0	0.0509	0.0194	0	1.007	0	0	20.47	3.869	26.19
Nitrite as N	lb	0	0	0	0	0.0281	0	0.0155	0	0.0013	6.34E-04	0	0.0477	0	0	1.014	0.2015	1.309
TKN	lb	0	0	0	0	4.163	0	1.400	0	0.0271	0.0112	0	0.7072	0	0	29.30	9.421	45.03
Total Nitrogen	lb	0	0	0	0	3.250	0	4.657	0	0.1016	0.0386	0	2.306	0	0	50.54	15.89	76.78
Total Phosphorus as P	lb	0	0	0	0	0.1967	0	0.0790	0	0.0038	0.0012	0	0.0619	0	0	3.658	2.067	6.067
Solid Parameters																		
TSS	lb	0	0	0	0	13.1	0	5.336	0	4.228	0.8656	0	28.35	0	0	255.4	66.12	373.4
TDS	lb	0	0	0	0	109.5	0	78.58	0	5.032	2.282	0	211.4	0	0	3868	809.4	5084

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation; TSS = total suspended solids

Table F.4-2
Los Peñasquitos WMA Wet Season Flow Volume and Percent Pollutant Loads: City of Del Mar HA 906.1

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	0	0	16,918	0	6,805	0	22,272	12,232	0	58,353	79,936	19,660	559,048	546,625	1,321,848
% Contribution	%	0%	0%	0%	0%	1%	0%	1%	0%	2%	1%	0%	4%	6%	1%	42%	41%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%	4%	1%	86%	5%	100%
Fecal Coliform	%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	5%	2%	88%	5%	100%
Total Coliform	%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	5%	2%	87%	5%	100%
Total Metals																		
Cadmium	%	0%	0%	0%	0%	2%	0%	3%	0%	0%	0%	0%	1%	2%	3%	48%	39%	100%
Copper	%	0%	0%	0%	0%	1%	0%	0%	0%	2%	0%	0%	2%	2%	0%	31%	62%	100%
Lead	%	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	2%	3%	4%	53%	36%	100%
Selenium	%	0%	0%	0%	0%	2%	0%	3%	0%	0%	0%	0%	1%	2%	2%	49%	39%	100%
Zinc	%	0%	0%	0%	0%	3%	0%	1%	0%	0%	0%	0%	1%	4%	0%	33%	59%	100%
Dissolved Metals																		
Selenium	%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	2%	0%	22%	72%	100%
Nutrients																		
Ammonia	%	0%	0%	0%	0%	3%	0%	0%	0%	1%	0%	0%	1%	5%	0%	51%	38%	100%
Nitrate as N	%	0%	0%	0%	0%	1%	0%	1%	0%	2%	1%	0%	4%	8%	1%	56%	27%	100%
Nitrite as N	%	0%	0%	0%	0%	1%	0%	1%	0%	1%	1%	0%	4%	5%	2%	56%	30%	100%
TKN	%	0%	0%	0%	0%	4%	0%	5%	0%	1%	0%	0%	2%	3%	1%	41%	44%	100%
Total Nitrogen	%	0%	0%	0%	0%	1%	0%	4%	0%	1%	1%	0%	3%	5%	1%	47%	36%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%	2%	3%	37%	55%	100%
Solid Parameters																		
TSS	%	0%	0%	0%	0%	1%	0%	1%	0%	11%	1%	0%	7%	1%	21%	33%	23%	100%
TDS	%	0%	0%	0%	0%	1%	0%	2%	0%	1%	1%	0%	3%	6%	1%	52%	32%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table F.4-3
Los Peñasquitos WMA Wet Season Flow Volume and Pollutant Loads: City of Poway HA 906.2

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	207,875	468,104	484,248	7,942,478	1,995,982	18,041,952	0	0	1,670,329	3,329,163	22,537,842	2,389,260	10,272,036	24,226,155	14,835,513	108,400,940
% Contribution	%	0%	0%	0%	0%	7%	2%	17%	0%	0%	2%	3%	21%	2%	9%	22%	14%	100%
Indicator Bacteria																		
Enterococcus	MPN	0	3.79E+12	1.87E+13	1.15E+13	1.99E+16	1.76E+14	5.03E+15	0	0	2.01E+13	1.06E+14	4.85E+14	1.46E+15	4.55E+15	4.07E+16	1.08E+15	7.35E+16
Fecal Coliform	MPN	0	1.07E+12	7.23E+12	6.26E+13	1.40E+16	5.39E+13	1.74E+15	0	0	8.06E+12	4.74E+13	2.91E+15	4.36E+15	3.58E+16	1.19E+17	3.94E+15	1.82E+17
Total Coliform	MPN	0	6.87E+12	1.41E+13	8.13E+13	2.77E+16	4.61E+14	3.10E+16	0	0	4.53E+13	9.07E+13	3.67E+15	5.05E+15	3.75E+16	1.64E+17	5.45E+15	2.75E+17
Total Metals																		
Cadmium	lb	0	2.70E-04	5.96E-04	5.78E-04	0.0753	0.0064	0.4189	0	0	0.0022	0.0052	0.0265	0.0061	0.1010	0.1591	0.0689	0.8710
Copper	lb	0	0.3274	0.2852	0.2630	21.71	0.9273	17.79	0	0	2.100	1.879	12.46	1.502	5.084	34.15	40.50	139.0
Lead	lb	0	0.0088	0.0152	0.0131	1.469	0.1430	1.350	0	0	0.0772	0.1254	0.7627	0.1625	2.896	3.775	1.527	12.33
Selenium	lb	0	0.0012	0.0026	0.0077	0.2540	0.1046	0.8294	0	0	0.0095	0.0173	0.3519	0.0228	0.3558	1.144	0.5639	3.665
Zinc	lb	0	0.1879	0.5820	0.3548	176.4	11.36	101.3	0	0	1.440	4.108	19.49	14.88	16.35	143.1	152.6	642.2
Dissolved Metals																		
Selenium	lb	0	1.58E-04	4.06E-04	0.0010	0.2148	0.0503	0.6846	0	0	9.28E-04	0.0022	0.0179	0.0100	0.0535	0.6673	1.256	2.959
Nutrients																		
Ammonia	lb	0	2.318	4.678	4.708	717.6	46.92	269.9	0	0	13.54	30.41	210.8	93.10	119.5	863.6	369.9	2747
Nitrate as N	lb	0	29.53	55.29	43.28	409.6	103.9	1467	0	0	191.0	365.2	2045	316.6	1227	3191	897.6	10342
Nitrite as N	lb	0	0.9274	2.487	2.007	20.40	4.248	107.8	0	0	6.226	15.88	96.82	13.79	60.91	158.1	46.75	536.4
TKN	lb	0	16.33	40.22	27.88	3027	189.9	9758	0	0	109.8	273.7	1437	367.2	2246	4567	2186	24245
Total Nitrogen	lb	0	47.26	104.0	102.3	2363	235.1	32460	0	0	379.2	690.0	4685	615.7	2091	7877	3687	55337
Total Phosphorus as P	lb	0	1.477	2.490	2.355	143.0	37.36	550.4	0	0	11.71	18.99	125.7	29.31	794.8	570.1	479.6	2767
Solid Parameters																		
TSS	lb	0	1062	821.2	903.1	9513	2127	37193	0	0	8506	7873	57597	1403	265116	39802	15341	447256
TDS	lb	0	3012	7546	9341	79642	25770	547728	0	0	22422	54402	429412	51437	160582	602896	187794	2181985

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation; TSS = total suspended solids

Table F.4-4
Los Peñasquitos WMA Wet Season Flow Volume and Percent Pollutant Loads: City of Poway HA 906.2

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	207,875	468,104	484,248	7,942,478	1,995,982	18,041,952	0	0	1,670,329	3,329,163	22,537,842	2,389,260	10,272,036	24,226,155	14,835,513	108,400,940
% Contribution	%	0%	0%	0%	0%	7%	2%	17%	0%	0%	2%	3%	21%	2%	9%	22%	14%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	14%	0%	37%	0%	0%	0%	0%	1%	1%	7%	39%	1%	100%
Fecal Coliform	%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	2%	3%	21%	67%	2%	100%
Total Coliform	%	0%	0%	0%	0%	6%	0%	14%	0%	0%	0%	0%	1%	2%	17%	57%	2%	100%
Total Metals																		
Cadmium	%	0%	0%	0%	0%	7%	1%	58%	0%	0%	0%	0%	3%	0%	9%	14%	7%	100%
Copper	%	0%	0%	0%	0%	12%	1%	21%	0%	0%	1%	1%	10%	1%	3%	23%	28%	100%
Lead	%	0%	0%	0%	0%	8%	1%	10%	0%	0%	0%	1%	8%	1%	27%	30%	13%	100%
Selenium	%	0%	0%	0%	0%	8%	1%	59%	0%	0%	0%	0%	3%	0%	7%	14%	7%	100%
Zinc	%	0%	0%	0%	0%	20%	2%	24%	0%	0%	0%	1%	3%	2%	2%	21%	24%	100%
Dissolved Metals																		
Selenium	%	0%	0%	0%	0%	8%	1%	60%	0%	0%	0%	0%	0%	1%	1%	10%	20%	100%
Nutrients																		
Ammonia	%	0%	0%	0%	0%	20%	1%	5%	0%	0%	0%	1%	9%	3%	4%	39%	18%	100%
Nitrate as N	%	0%	0%	0%	0%	4%	1%	28%	0%	0%	2%	3%	16%	3%	8%	27%	8%	100%
Nitrite as N	%	0%	0%	0%	0%	4%	0%	32%	0%	0%	1%	2%	16%	2%	9%	26%	9%	100%
TKN	%	0%	0%	0%	0%	9%	0%	67%	0%	0%	0%	0%	3%	0%	3%	10%	6%	100%
Total Nitrogen	%	0%	0%	0%	0%	4%	0%	61%	0%	0%	1%	1%	8%	1%	4%	13%	6%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	5%	1%	28%	0%	0%	0%	1%	4%	1%	21%	20%	19%	100%
Solid Parameters																		
TSS	%	0%	0%	0%	0%	3%	0%	14%	0%	0%	1%	1%	15%	0%	55%	7%	3%	100%
TDS	%	0%	0%	0%	0%	4%	1%	50%	0%	0%	1%	2%	10%	1%	4%	19%	7%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation; TSS = total suspended solids

Table F.4-5
Los Peñasquitos WMA Wet Season Flow Volume and Pollutant Loads: City of San Diego HA 906.1

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	3,887	324,578	9,922	988,432	26,029,292	13,894,446	94,379,768	44,939	2,097,099	2,229,546	539,095	51,384,478	9,927,521	379,152	56,172,805	51,921,581	310,326,541
% Contribution	%	0%	0%	0%	0%	8%	4%	30%	0%	1%	1%	0%	17%	3%	0%	18%	17%	100%
Indicator Bacteria																		
Enterococcus	MPN	9.56E+10	5.92E+12	3.97E+11	1.80E+13	6.39E+16	1.07E+15	2.04E+16	5.05E+12	1.97E+13	2.10E+13	1.50E+13	1.01E+15	5.94E+15	1.68E+14	9.31E+16	3.60E+15	1.89E+17
Fecal Coliform	MPN	1.49E+10	1.68E+12	1.53E+11	9.80E+13	4.50E+16	3.28E+14	7.06E+15	5.70E+13	1.74E+12	8.42E+12	6.67E+12	6.05E+15	1.77E+16	1.32E+15	2.73E+17	1.31E+16	3.63E+17
Total Coliform	MPN	1.60E+11	1.07E+13	2.99E+11	1.27E+14	8.92E+16	2.81E+15	1.26E+17	7.21E+13	6.30E+13	4.73E+13	1.28E+13	7.62E+15	2.05E+16	1.38E+15	3.76E+17	1.81E+16	6.41E+17
Total Metals																		
Cadmium	lb	5.15E-06	4.22E-04	1.26E-05	9.05E-04	0.2419	0.0391	1.700	8.74E-05	0.0023	0.0023	7.31E-04	0.0550	0.0246	0.0037	0.3636	0.2290	2.664
Copper	lb	0.0076	0.5111	0.0060	0.4119	69.78	5.648	72.21	0.0176	3.299	2.194	0.2648	25.88	6.100	0.1877	78.04	134.5	399.1
Lead	lb	2.45E-04	0.0137	3.22E-04	0.0205	4.722	0.8712	5.479	0.0015	0.1101	0.0806	0.0177	1.585	0.6599	0.1069	8.627	5.073	27.37
Selenium	lb	2.07E-05	0.0018	5.54E-05	0.0120	0.8163	0.6373	3.366	2.70E-04	0.0093	0.0099	0.0024	0.7311	0.0927	0.0131	2.615	1.873	10.18
Zinc	lb	0.0035	0.2933	0.0123	0.5555	567.0	69.20	411.0	0.1311	1.100	1.504	0.5788	40.49	60.42	0.6036	327.1	506.9	1987
Dissolved Metals																		
Selenium	lb	2.47E-06	2.46E-04	8.62E-06	0.0016	0.6904	0.3061	2.779	2.39E-04	0.0164	0.0010	3.10E-04	0.0372	0.0405	0.0020	1.525	4.170	9.570
Nutrients																		
Ammonia	lb	0.0455	3.620	0.0992	7.373	2306	285.8	1095	0.3434	12.49	14.14	4.285	438.1	378.0	4.412	1973	1229	7752
Nitrate as N	lb	0.5275	46.11	1.172	67.77	1316	633.1	5955	1.198	184.2	199.6	51.45	4249	1285	45.28	7292	2982	24309
Nitrite as N	lb	0.0151	1.448	0.0527	3.144	65.57	25.87	437.7	0.0521	4.727	6.505	2.237	201.2	56.01	2.248	361.2	155.3	1323
TKN	lb	0.3121	25.50	0.8525	43.66	9727	1157	39608	4.030	98.11	114.7	38.56	2985	1491	82.92	10435	7260	73072
Total Nitrogen	lb	0.8195	73.80	2.205	160.1	7594	1432	131754	12.50	367.6	396.2	97.22	9733	2500	77.18	18001	12246	184447
Total Phosphorus as P	lb	0.0311	2.306	0.0528	3.688	459.5	227.5	2234	0.1652	13.63	12.24	2.675	261.2	119.0	29.34	1303	1593	6261
Solid Parameters																		
TSS	lb	31.18	1658	17.41	1414	30576	12956	150962	12.28	15290	8887	1109	119667	5694	9786	90951	50955	499966
TDS	lb	53.26	4703	160.0	14628	255968	156962	2223175	195.1	18198	23427	7665	892175	208828	5927	1377670	623764	5813499

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation; TSS = total suspended solids

Table F.4-6
Los Peñasquitos WMA Wet Season Flow Volume and Percent Pollutant Loads: City of San Diego HA 906.1

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	3,887	324,578	9,922	988,432	26,029,292	13,894,446	94,379,768	44,939	2,097,099	2,229,546	539,095	51,384,478	9,927,521	379,152	56,172,805	51,921,581	310,326,541
% Contribution	%	0%	0%	0%	0%	8%	4%	30%	0%	1%	1%	0%	17%	3%	0%	18%	17%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	13%	0%	57%	0%	0%	0%	0%	1%	1%	0%	26%	1%	100%
Fecal Coliform	%	0%	0%	0%	0%	8%	0%	1%	0%	0%	0%	0%	2%	5%	0%	79%	4%	100%
Total Coliform	%	0%	0%	0%	0%	8%	0%	30%	0%	0%	0%	0%	1%	4%	0%	54%	3%	100%
Total Metals																		
Cadmium	%	0%	0%	0%	0%	6%	1%	76%	0%	0%	0%	0%	2%	0%	0%	8%	6%	100%
Copper	%	0%	0%	0%	0%	11%	1%	33%	0%	1%	0%	0%	7%	1%	0%	16%	30%	100%
Lead	%	0%	0%	0%	0%	12%	4%	22%	0%	1%	0%	0%	8%	2%	0%	31%	20%	100%
Selenium	%	0%	0%	0%	0%	6%	1%	76%	0%	0%	0%	0%	2%	0%	0%	8%	6%	100%
Zinc	%	0%	0%	0%	0%	19%	4%	36%	0%	0%	0%	0%	2%	2%	0%	14%	23%	100%
Dissolved Metals																		
Selenium	%	0%	0%	0%	0%	6%	1%	72%	0%	0%	0%	0%	0%	1%	0%	5%	15%	100%
Nutrients																		
Ammonia	%	0%	0%	0%	0%	23%	3%	8%	0%	0%	0%	0%	7%	4%	0%	31%	22%	100%
Nitrate as N	%	0%	0%	0%	0%	4%	2%	47%	0%	1%	1%	0%	12%	3%	0%	20%	9%	100%
Nitrite as N	%	0%	0%	0%	0%	4%	1%	52%	0%	0%	0%	0%	12%	2%	0%	19%	10%	100%
TKN	%	0%	0%	0%	0%	7%	1%	80%	0%	0%	0%	0%	2%	0%	0%	5%	5%	100%
Total Nitrogen	%	0%	0%	0%	0%	3%	1%	77%	0%	0%	0%	0%	4%	1%	0%	7%	5%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	5%	3%	49%	0%	0%	0%	0%	3%	1%	0%	16%	22%	100%
Solid Parameters																		
TSS	%	0%	0%	0%	0%	6%	2%	46%	0%	3%	1%	0%	22%	0%	1%	11%	7%	100%
TDS	%	0%	0%	0%	0%	4%	1%	69%	0%	0%	0%	0%	6%	2%	0%	11%	7%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation; TSS = total suspended solids

Table F.4-7
Los Peñasquitos WMA Wet Season Flow Volume and Pollutant Loads: City of San Diego HA 906.2

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	52,947	148,217	974,832	5,897,687	2,247,352	13,591,762	0	36,650	246,498	457,001	20,502,732	5,341,354	190,338	15,896,016	14,630,500	80,213,884
% Contribution	%	0%	0%	0%	1%	7%	3%	17%	0%	0%	0%	1%	26%	7%	0%	20%	18%	100%
Indicator Bacteria																		
Enterococcus	MPN	0	9.65E+11	5.94E+12	2.31E+13	1.31E+16	1.98E+14	1.24E+15	0	4.14E+11	2.97E+12	1.56E+13	4.03E+14	3.27E+15	8.43E+13	2.68E+16	1.07E+15	4.62E+16
Fecal Coliform	MPN	0	2.73E+11	2.29E+12	1.26E+14	9.25E+15	6.07E+13	4.30E+14	0	3.66E+10	1.19E+12	6.95E+12	2.42E+15	9.75E+15	6.63E+14	7.84E+16	3.88E+15	1.05E+17
Total Coliform	MPN	0	1.75E+12	4.46E+12	1.64E+14	1.83E+16	5.19E+14	7.66E+15	0	1.32E+12	6.69E+12	1.33E+13	3.04E+15	1.13E+16	6.95E+14	1.08E+17	5.37E+15	1.55E+17
Total Metals																		
Cadmium	lb	0	6.89E-05	1.89E-04	0.0012	0.0497	0.0072	0.1037	0	4.86E-05	3.21E-04	7.61E-04	0.0220	0.0135	0.0019	0.1045	0.0679	0.3730
Copper	lb	0	0.0834	0.0903	0.5295	14.33	1.044	4.404	0	0.0694	0.3102	0.2757	10.34	3.359	0.0942	22.43	39.92	97.28
Lead	lb	0	0.0022	0.0048	0.0264	0.9696	0.1610	0.3342	0	0.0023	0.0114	0.0184	0.6331	0.3634	0.0537	2.480	1.505	6.566
Selenium	lb	0	3.01E-04	8.27E-04	0.0155	0.1676	0.1178	0.2053	0	1.95E-04	0.0014	0.0025	0.2921	0.0511	0.0066	0.7516	0.5559	2.169
Zinc	lb	0	0.0478	0.1843	0.7141	116.4	12.79	25.07	0	0.0231	0.2127	0.6026	16.18	33.27	0.3030	94.00	150.4	450.3
Dissolved Metals																		
Selenium	lb	0	4.02E-05	1.29E-04	0.0021	0.1418	0.0566	0.1695	0	3.45E-04	1.37E-04	3.23E-04	0.0149	0.0223	0.0010	0.4383	1.238	2.085
Nutrients																		
Ammonia	lb	0	0.5905	1.481	9.478	473.6	52.83	66.81	0	0.2625	2.000	4.461	175.0	208.1	2.215	567.2	364.6	1929
Nitrate as N	lb	0	7.521	17.51	87.12	270.3	117.0	363.2	0	3.872	28.22	53.56	1697	707.7	22.73	2096	884.8	6357
Nitrite as N	lb	0	0.2362	0.7874	4.041	13.46	4.783	26.70	0	0.0994	0.9198	2.329	80.37	30.84	1.129	103.8	46.08	315.6
TKN	lb	0	4.159	12.73	56.12	1997	213.8	2416	0	2.063	16.21	40.15	1193	821.0	41.63	2999	2155	11967
Total Nitrogen	lb	0	12.04	32.94	205.8	1559	264.7	8036	0	7.728	56.03	101.2	3889	1376	38.74	5174	3634	24387
Total Phosphorus as P	lb	0	0.3761	0.7884	4.741	94.36	42.06	136.2	0	0.2865	1.731	2.785	104.3	65.53	14.73	374.4	472.7	1315
Solid Parameters																		
TSS	lb	0	270.5	260.0	1818	6278	2395	9207	0	321.5	1257	1155	47812	3135	4913	26142	15121	120085
TDS	lb	0	767.2	2389	18805	52557	29015	135594	0	382.6	3312	7980	356462	114990	2976	395975	185109	1306315

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation; TSS = total suspended solids

Table F.4-8
Los Peñasquitos WMA Wet Season Flow Volume and Percent Pollutant Loads: City of San Diego HA 906.2

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	52,947	148,217	974,832	5,897,687	2,247,352	13,591,762	0	36,650	246,498	457,001	20,502,732	5,341,354	190,338	15,896,016	14,630,500	80,213,884
% Contribution	%	0%	0%	0%	1%	7%	3%	17%	0%	0%	0%	1%	26%	7%	0%	20%	18%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	15%	0%	41%	0%	0%	0%	0%	1%	4%	0%	37%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	6%	0%	1%	0%	0%	0%	0%	3%	10%	1%	76%	4%	100%
Total Coliform	%	0%	0%	0%	0%	8%	0%	17%	0%	0%	0%	0%	2%	8%	1%	61%	3%	100%
Total Metals																		
Cadmium	%	0%	0%	0%	0%	8%	1%	63%	0%	0%	0%	0%	4%	1%	0%	13%	10%	100%
Copper	%	0%	0%	0%	1%	11%	1%	20%	0%	0%	0%	0%	11%	2%	0%	19%	35%	100%
Lead	%	0%	0%	0%	1%	10%	2%	13%	0%	0%	0%	0%	12%	4%	1%	34%	22%	100%
Selenium	%	0%	0%	0%	0%	8%	1%	62%	0%	0%	0%	0%	4%	1%	0%	13%	10%	100%
Zinc	%	0%	0%	0%	0%	19%	3%	23%	0%	0%	0%	0%	4%	5%	0%	17%	29%	100%
Dissolved Metals																		
Selenium	%	0%	0%	0%	0%	8%	1%	57%	0%	0%	0%	0%	0%	2%	0%	8%	24%	100%
Nutrients																		
Ammonia	%	0%	0%	0%	0%	19%	2%	4%	0%	0%	0%	0%	10%	8%	0%	32%	23%	100%
Nitrate as N	%	0%	0%	0%	1%	4%	1%	29%	0%	0%	0%	1%	20%	8%	0%	24%	11%	100%
Nitrite as N	%	0%	0%	0%	1%	4%	1%	33%	0%	0%	0%	0%	21%	5%	0%	23%	12%	100%
TKN	%	0%	0%	0%	0%	9%	1%	67%	0%	0%	0%	0%	4%	1%	0%	8%	9%	100%
Total Nitrogen	%	0%	0%	0%	0%	4%	1%	61%	0%	0%	0%	0%	10%	3%	0%	12%	8%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	6%	2%	33%	0%	0%	0%	0%	6%	3%	1%	21%	29%	100%
Solid Parameters																		
TSS	%	0%	0%	0%	2%	5%	1%	28%	0%	0%	0%	0%	36%	1%	3%	13%	9%	100%
TDS	%	0%	0%	0%	1%	4%	1%	51%	0%	0%	0%	0%	12%	4%	0%	16%	9%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation; TSS = total suspended solids

Attachment G – Sediment Special Study Report

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LOS PEÑASQUITOS WATERSHED MANAGEMENT AREA
SEDIMENT LOAD SPECIAL STUDY
FINAL MONITORING REPORT

Submitted to:
City of San Diego
Transportation & Storm Water Department
9370 Chesapeake Drive, Suite 100
San Diego, California 92123

Submitted by:
Amec Foster Wheeler, Inc.
San Diego, California

November 2016

IMPORTANT NOTICE

EXECUTIVE SUMMARY

Los Peñasquitos Lagoon (Lagoon) has been historically impacted by anthropogenic disturbances. These have caused excessive sedimentation leading to the gradual degradation and loss of estuarine habitat. As a result, the Lagoon was placed on the Clean Water Act Section 303(d) List of Water Quality Limited Segments for sedimentation and siltation. To address these water quality impairments, the San Diego Regional Water Quality Control Board (Regional Board) adopted Resolution Number R9-2012-0033: *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate the Total Maximum Daily Load (TMDL) for Sedimentation in Los Peñasquitos Lagoon* (referred to as the Sediment TMDL) (Regional Board, 2012).

More recently, the Sediment TMDL has been adopted into Order Number R9-2013-0001, as Amended by Order No. R9-2015-0001*, NPDES No. CAS010266 National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region* (Regional Board, 2015) (referred to as the MS4 Permit).

Prior to adoption of the Sediment TMDL into the MS4 Permit, the City of San Diego (City) developed a special study to assess source areas of sediment within the subwatersheds of the Los Peñasquitos Watershed Management Area (WMA) (referred to as the Watershed Special Study). Phase I of the Watershed Special Study focused on the Carroll Canyon Creek subwatershed based on previous data identifying Carroll Canyon Creek as the largest contributor of suspended sediment load to the Lagoon. It also included aerial deposition monitoring to determine alternate inputs of sediment to the subwatershed. Phase I was conducted during Fiscal Year 2015 (FY15) (July 1 2014 – June 30, 2015) and is summarized in this report.

The MS4 Permit required development of a Water Quality Improvement Plan (WQIP) for each WMA. The MS4 permit required that WQIP Monitoring and Assessment program include a special study to address the highest priority water quality condition or conditions in that WMA. For the Los Peñasquitos WMA, the highest priority water quality condition is the impairment of the Estuarine and Biological beneficial uses in the Lagoon. During wet weather condition this impairment is caused by hydromodification and siltation/sedimentation. Phase I of the Watershed Special Study was enhanced by including the Carmel Valley Creek and Los Peñasquitos Creek subwatersheds and designated as the special study for the Los Peñasquitos WMA. The second year (Phase II) of the Watershed Special Study was conducted during Fiscal Year 2016 (FY16) (July 1 2015 – June 30, 2016).

Project Objectives. The Watershed Special Study looks to characterize upland sources of sediment that might be transported into the Lagoon. It was conducted concurrently with the Los Peñasquitos WMA Sediment TMDL Compliance Monitoring Program (TMDL Monitoring Program). The TMDL Monitoring Program includes monitoring at the base of the three subwatersheds and focused on assessing sediment load to the Lagoon. By monitoring both the upland portions of the subwatersheds (Watershed Special Study) and what was is being transported into the lagoon (TMDL Monitoring Program), the system can be assessed as a whole. Both monitoring programs were designed to provide data on suspended sediment concentration (SSC) during wet weather conditions, estimated sediment loads, and delivery potential within storm flows.

Monitoring Elements. Monitoring took place prior to and during the wet season

Pre-wet-season (prior to October 1, 2015) monitoring consisted of:

- Volumetric streambed sampling for particle-size distribution;
- Pebble counts;
- Cross-section surveys; and
- Photodocumentation.

Wet season (October 1, 2015 – April 30, 2016) monitoring consisted of:

- Pollutograph sampling for SSC;
- Bedload sampling for particle-size distribution;
- Post-storm pebble counts and photodocumentation;
- Instantaneous flow measurements; and
- Long-term flow monitoring.

FY16 Aerial Deposition during dry weather (September 1, 2015 – April 30, 2016) monitoring consisted of:

- Aerial deposition sampling for particulate matter equal to or less than 10 microns in diameter (PM_{10});
- Monitoring using optical sensors and Federal Reference Method (FRM); and
- Comparison of the two methods.

Load Estimation and Comparison. Data collected during the 2015–2016 wet season showed fluctuations of SSC that generally correlated with changes in water flow; SSC was higher at or just after the times when higher flows were recorded and during the rising limb of the hydrograph, as expected for sediment transport influenced by supply limits. During Phase I, the highest suspended sediment loads were calculated at the Arizona Crossing location (CC-AC) in the Carroll Canyon Creek subwatershed, which is at the downstream end of a stream reach that is dominated by highly erodible features and gravel mining operations. However, during Phase II, the highest sediment loads were calculated at the North City (LP-NC) location in the upper Los Peñasquitos Creek subwatershed, near the border of the Cities of Poway and San Diego.

The storms monitored during the two phases were vastly different in size and intensity, which makes comparisons challenging. Phase I occurred during drought conditions and storms were generally characterized by light to moderate, consistent rainfall. Phase II occurred during an El Niño year. Although rainfall totals were below annual averages, storms were generally intense and brief. There was a series of three particular intense storms that occurred over three days in early January 2016 (the first of which was monitored). Certain stream reaches may warrant further investigation to clarify potential sources and sinks of sediment. This includes a reach of Carroll Canyon Creek running through gravel mine operations (potential source area) and the immediate downstream reach (potential sink area). The sink area stores material that can be mobilized during large, intense storms, which are the types of storms that the data indicate occurred this year. Another area of interest is the reaches near the LP-NC site and downstream through the Los Peñasquitos Creek subwatershed. Load estimates at LP-NC are of magnitude similar to those measured at the base of the creek. This may also be another source reach followed by a large sink. However, there is only one year of data for this subwatershed; therefore, these results and assessments are preliminary.

Aerial Deposition Monitoring. Based on the results of aerial deposition monitoring, the contribution of airborne particles to the sediment loads in the WMA is not significant. PM_{10} analytical results from three monitoring events were generally low, either at or near the reporting limits. There were marginal increases in concentrations around anthropogenic activities, particularly in the Carroll Canyon Creek subwatershed relative to other monitored locations; however, these slight increases were not consistent or significant. Monitoring results from the two types of monitoring equipment (federal reference method and optical sensors) indicated that results were similar in that results from both types of equipment were low or negligible. However, within the low ranges of concentrations, results did not correlate well and showed a mean relative percent difference of 108 percent. Although the RPD is high, this is due to very low concentrations measured that are within 10 times the laboratory reporting limit and standard flow volume. RPD calculations for low concentrations such as those measured during this program mischaracterize what are actually very small differences in concentration.

Visual observations at the Carroll Canyon Creek downwind monitoring location, near the Black Mountain SSC monitoring location, discovered a large amount of dirt and dust deposited on the surface of vehicles, roads, and buildings and other surrounding structures. This observed dust and dirt deposition may be due to the high volume of truck traffic in the mining operations adjacent to the monitoring location, which may trigger turbulent diffusion and transport sediment from the road and vehicles to the proximate surroundings. However, this finding is more likely attributable to track-out from trucks directly to the road surfaces, and contributes only locally to aerial suspension and deposition, rather than as particles becoming airborne and being transported over longer distances throughout the subwatershed. Monitoring equipment placed on the nearby roof of a fire department did not show high concentrations of PM_{10}.

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ACRONYMS AND ABBREVIATIONS

303(d) List	CWA Section 303(d), List of Water Quality Limited Segments
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc. (formerly AMEC)
BMP	best management practice
City	City of San Diego
EMC	event mean concentration
FRM	Federal Reference Methodology
FY	fiscal year
ID	identification
Lagoon	Los Peñasquitos Lagoon
LID	low-impact development
mg/L	milligrams per liter
MS4	municipal separate storm sewer system
MS4 Permit	Order Number R9-2013-0001, as Amended by Order No. R9-2015-0001*, NPDES No. CAS010266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region*
NPDES	National Pollutant Discharge Elimination System
OAL	California Office of Administrative Law
PM_{10}	particulate matter equal to or less than 10 microns
RA	Responsible Agency
Regional Board	San Diego Regional Water Quality Control Board
Sediment TMDL	Resolution Number R9-2012-0033: *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Total Maximum Daily Load for Sedimentation in Los Peñasquitos Lagoon* (Regional Board, 2012)
SSC	suspended sediment concentration
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load
Watershed Special Study	Los Peñasquitos Watershed Management Area Sediment Load Special Study
USEPA	United States Environmental Protection Agency
WLA	Waste Load Allocation
WMA	Watershed Management Area
WQIP	Water Quality Improvement Plan

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1.0 INTRODUCTION

This report summarizes monitoring and sampling activities conducted during Phase II of the Los Peñasquitos Watershed Management Area (WMA) Sediment Load Special Study (Watershed Special Study) that took place during Fiscal Year 2016 (FY16) (July 1, 2015 – June 30, 2016). Results discussed in this report will incorporate findings from Phase I of this study, which occurred during Fiscal Year 2015 (FY15) (July 1, 2014 – June 30, 2015), to provide an assessment based on the complete dataset. The purpose of this study is to (a) assess the sediment transport characteristics of the WMA that contributes sediment load to the Los Peñasquitos Lagoon (Lagoon), (b) assess potential for load contribution from aerial deposition, and (c) incorporate summarized findings from the concurrent Los Peñasquitos WMA Sediment TMDL Compliance Monitoring Program (TMDL Monitoring Program) (Amec Foster Wheeler, 2016).

1.1 BACKGROUND

The Lagoon is a coastal salt marsh lagoon in west-central San Diego County, in southern California. The WMA is approximately 60,500 acres and contains portions of the cities of Poway and Del Mar, unincorporated areas of San Diego County, and the communities of Mira Mesa, Scripps Ranch, Carmel Valley, and Sorrento Valley within the City of San Diego (City). The WMA is drained by three major creeks, Carroll Canyon Creek, Carmel Valley Creek, and Los Peñasquitos Creek, which ultimately discharge into the Lagoon.

The Lagoon has incurred a number of anthropogenic disturbances that have caused excessive sedimentation and the gradual degradation and loss of estuarine habitat. As a result, the Lagoon was placed on the Clean Water Act Section 303(d) List of Water Quality Limited Segments (303(d) List) for sedimentation and siltation. To address these water quality impairments, the San Diego Regional Water Quality Control Board (Regional Board) adopted Resolution Number R9-2012-0033: *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate the Total Maximum Daily Load (TMDL) for Sedimentation in Los Peñasquitos Lagoon* (referred to as the Sediment TMDL) (Regional Board, 2012).[1] More recently, the Sediment TMDL has been adopted into Order Number R9-2013-0001, as Amended by Order No. R9-2015-0001*, NPDES No. CAS010266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region* (Regional Board, 2015) (referred to as the MS4 Permit).

Prior to adoption of the Sediment TMDL into the MS4 Permit and based on previous data identifying Carroll Canyon Creek as the largest contributor of sediment load to the Lagoon, the City developed a special study to assess source areas of sediment within the Carroll Canyon Creek subwatershed (referred to as the Watershed Special Study, Phase I), which took place during the 2014–2015 wet season.

[1] The Sediment TMDL has been approved by the State Water Resources Control Board (SWRCB), the California Office of Administrative Law (OAL), and the United States Environmental Protection Agency (USEPA).

The MS4 Permit required development of a Water Quality Improvement Plan (WQIP) for each WMA. The MS4 permit required that WQIP Monitoring and Assessment program include a special study to address the highest priority water quality condition or conditions in that WMA. For the Los Peñasquitos WMA, the highest priority water quality condition is the impairment of the Estuarine and Biological beneficial uses in the Lagoon. During wet weather condition this impairment is caused by hydromodification and siltation/sedimentation. Phase I of the Watershed Special Study was enhanced by including the Carmel Valley Creek and Los Peñasquitos Creek subwatersheds and designated as the special study for the Los Peñasquitos WMA. The second year (Phase II) of the Watershed Special Study was conducted during Fiscal Year 2016 (FY16) (July 1 2015 – June 30, 2016). The WQIP is being implemented by the Cities of San Diego, Poway, and Del Mar, and the County of San Diego, collectively referred to as the Responsible Agencies (RAs).

1.2 CURRENT STUDY

The City of San Diego initiated Phase I of the Watershed Special Study during FY 15 that comprised sediment sampling and characterization before and throughout the 2014–2015 wet season (October 1 – April 30) in the upper reaches of the Carroll Canyon Creek subwatershed. This Phase I monitoring was coordinated with monitoring at the TMDL Monitoring Program for FY15.

Amec Foster Wheeler conducted monitoring for Phase II of the Watershed Special Study during FY 16 that comprised sediment sampling and characterization before and throughout the 2015–2016 wet season (October 1 – April 30) in the upper reaches of the three subwatersheds. Phase II monitoring was coordinated with monitoring at the TMDL compliance monitoring sites. The goal of the Watershed Special Study is to preliminarily identify source and sink areas within the Watershed, and to provide insight as to which areas may require further investigation and/or management measures by the RAs, in order to address the highest priority water quality condition in the Los Peñasquitos WMA.

1.3 PROJECT OBJECTIVES

The objective of Phase II of the Watershed Special Study was to monitor the upper regions of the Carroll Canyon Creek, Los Peñasquitos Creek, and Carmel Valley Creek subwatersheds, both within the riverine water column during storm events and for aerial deposition during ambient dry conditions. Phase II included air and water monitoring locations in the Carmel Valley and Los Peñasquitos Creeks subwatersheds (Phase I took place in the Carroll Canyon Creek subwatershed only). The purpose of the riverine monitoring was to (a) measure flows, (b) monitor suspended sediment concentration (SSC) during three storm events, (c) assess changes in streambed composition throughout the season, (d) estimate wet weather sediment loads from the various stream reaches, and (e) assess whether aerial deposition of airborne particulates contributes significantly to sediment loading in the subwatershed.

This monitoring program was designed to answer the following questions:

- Wet Season Riverine Monitoring
    - What is the sediment concentration at discrete times throughout a wet weather event hydrograph at points throughout the subwatersheds?
    - What are current sediment load estimates at points throughout the subwatersheds? Is there a greater load from a potential source area?
    - How do the wet weather sediment delivery potentials of each creek compare with each other?
- Dry Weather Aerial Deposition Monitoring
    - What are the aerial contributions of sediment to the subwatersheds within the WMA?
    - Can these airborne particles be associated with specific sources or land uses?
    - What is the contribution of aerial deposition relative to wet weather suspended sediment concentrations observed in the subwatersheds?

These data will allow comparison of the current sediment transport conditions within the WMA and relative to the Sediment TMDL waste load allocation (WLA). It will also help the RAs evaluate potential management measures, such as best management practices (BMPs) and low-impact development (LID).

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2.0 MONITORING APPROACH AND ANALYTICAL METHODS

The Watershed Special Study complements the TMDL Monitoring Program described in the final report (Amec Foster Wheeler, 2016), which is a continuation of previous monitoring using the same monitoring approach and analyses.[2] The Watershed Special Study's monitoring elements are:

<u>Before the wet season:</u>

- Volumetric streambed samples for particle-size distribution
- Initial pebble counts and photodocumentation
- Channel cross-sectional surveys

<u>Wet season:</u>

- Continuous flow and rainfall measurements
  - Sampling during three wet weather events
  - SSC pollutograph sampling
- Bedload sampling for particle-size distribution
- Post-storm pebble counts and photodocumentation
  - Field flow measurements to calibrate head-versus-flow table
- Site identification (ID) and descriptions (See Figure 2-1 for locations of sites)
  - Carroll Canyon Creek Subwatershed
    - CC-TC – Carroll Canyon – Trapezoidal Channel
    - CC-BM – Carroll Canyon – Black Mountain
    - CC-ML – Carroll Canyon – Maya Linda
    - CC-AC – Carroll Canyon – Arizona Crossing
    - CC-NR – Carroll Canyon – Nancy Ridge
  - Los Peñasquitos Creek Subwatershed
    - LP-HV – Los Peñasquitos – Hidden Valley
    - LP-NC – Los Peñasquitos – North City
  - Carmel Valley Creek Subwatershed
    - CV-CV – Carmel Valley – Carmel Valley

<u>Aerial deposition:</u>

[2] For brevity, this monitoring report does not include the details of the individual monitoring elements; they are given in the final *Los Peñasquitos Watershed Management Area Sediment Load Special Study Monitoring Plan* (Amec Foster Wheeler, 2015) provided in Appendix A.

- Three sampling events
  - 2015–2016 monitoring events took place in fall and mid-winter because of planned (February 2016) destruction of Del Mar City Hall, where the reference station was located
- Sampling events consist of three 24-hour sample collection periods at each site: two during weekdays and one during the weekend
- Sampling with both USEPA Federal Reference Methodology (FRM) sampling equipment and optical sensor sampling equipment
  - Comparison between the results of both equipment types for future aerial deposition monitoring consideration
- Site IDs and descriptions:
  - CC-CC – Carroll Canyon Optical
  - CC-DM – Reference - Del Mar (Optical and FRM site)
  - CC-DW – Carroll Canyon – Downwind (Optical and FRM site)
  - CC-SR – Carroll Canyon – Scripps Ranch
  - CC-UP – Carroll Canyon – Upwind (Optical and FRM site)
  - CV-CD – Carmel Valley – Camino Del Sur
  - LP-PO – Los Peñasquitos – Poway
  - LP-PR – Los Peñasquitos – Preserve

Figures 2-1 and 2-2 show the project's monitoring locations, and also depicts the Sediment TMDL compliance monitoring sites. These monitoring locations are described in detail in the Los Peñasquitos Watershed Management Area Sediment Load Special Study Monitoring Plan (Monitoring Plan) (Amec Foster Wheeler, 2015) (Appendix A).

Deviations from the Monitoring Plan:

Three additional aerial deposition monitoring locations were added by the City in the Carroll Canyon Creek subwatershed that were monitored in conjunction with the planned locations. Resources for these locations were provided by the City, and not through funding approved by the RAs (see Figure 2-2 for monitoring locations). The additional sites were:

- CC-ER – Carroll Canyon – Eco Rentals
- CC-MP – Carroll Canyon – Maddox Park
- CC-SF – Carroll Canyon – Camino Santa Fe

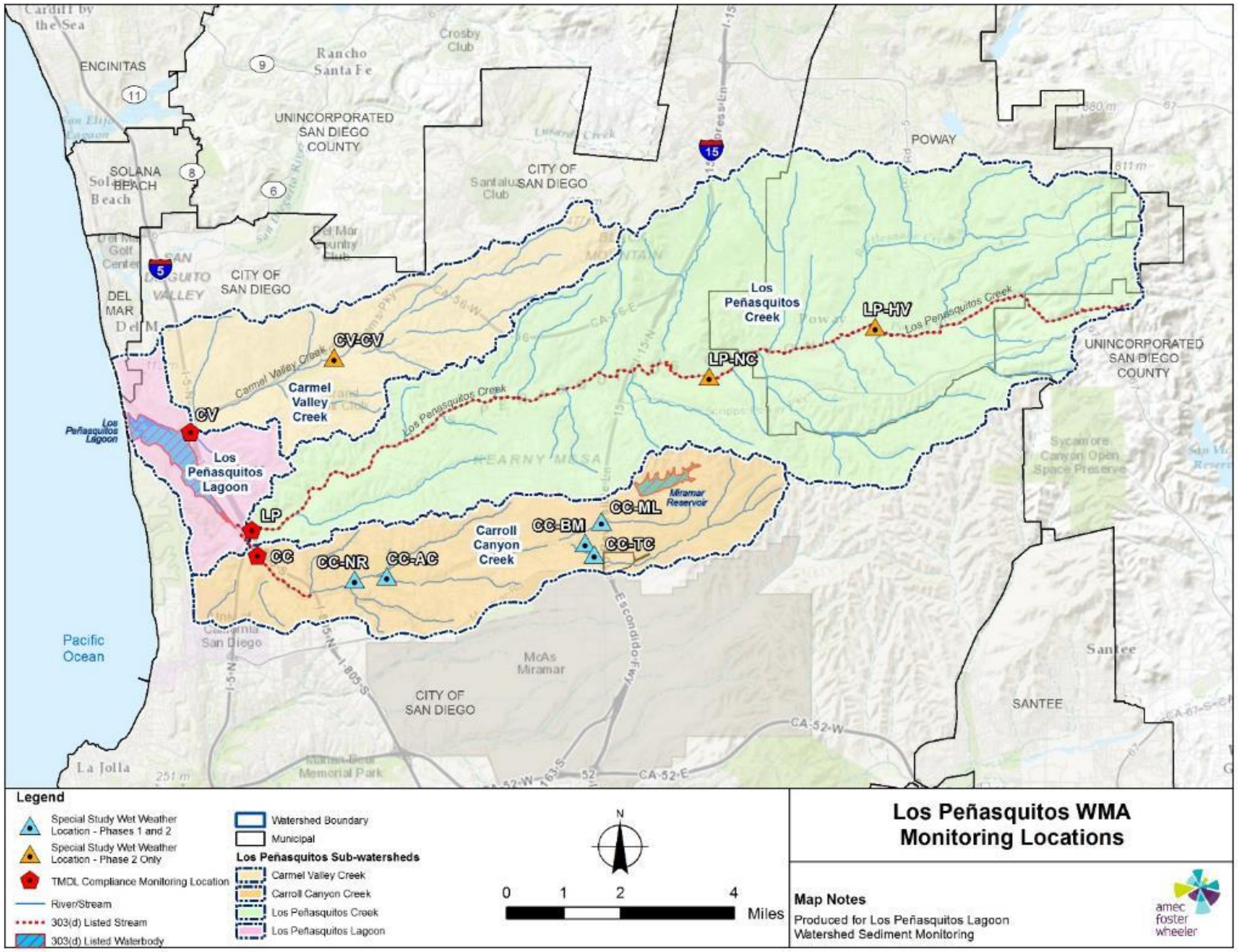


Figure 2-1.
Los Peñasquitos WMA Wet Season Monitoring Locations

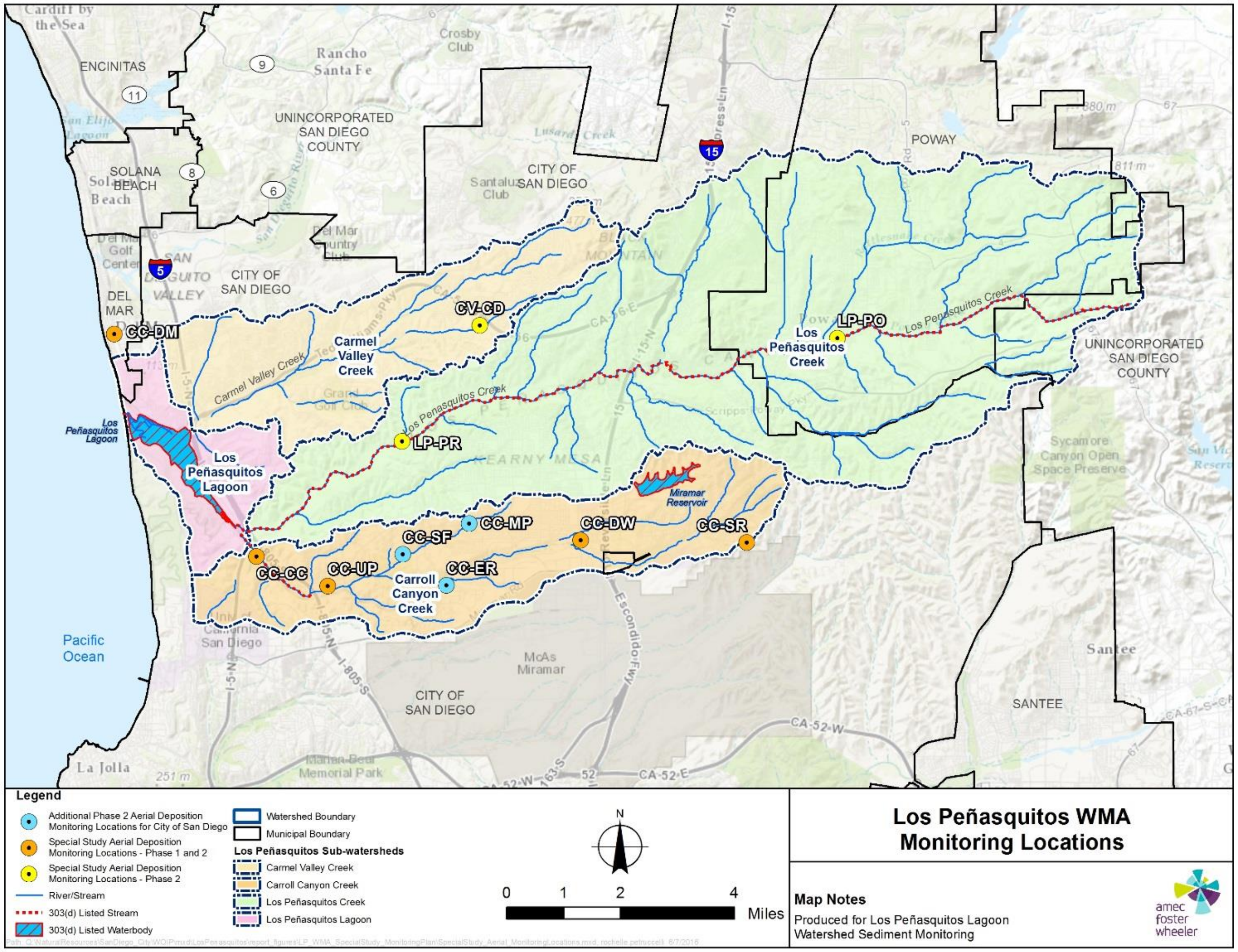


Figure 2-2.
Los Peñasquitos WMA
Aerial Deposition Monitoring Locations

3.0 RESULTS AND DISCUSSION

This section presents the data collected during Phase II and discusses the results of both Phase I and II of the Watershed Special Study.

3.1 WET WEATHER MONITORING

Wet weather monitoring was conducted for a total of three storm events during Phase II of the Watershed Special Study. Table 3-1 presents the dates and rainfall totals for monitored events. Rainfall totals recorded at the Carmel Valley (CV-CV) monitoring location were used for as the Watershed Special Study project rainfall data. Based on the *San Diego County Hydrology Manual* (County of San Diego, 2003), the 85th percentile, 24-hour storm for the project area is approximately 0.65 to 0.75 inch. The first monitored rainfall event was greater than the 85th percentile threshold, while the second and third were approximately at the 85th percentile threshold.

Table 3-1
Summary of Monitored Wet Weather Events

Event	Date	Rainfall Total[a] (inches)
1	January 4–6, 2016	1.58
2	January 31, 2016	0.65
3	March 6–8, 2016	0.70

a. Rainfall for the upper WMA areas monitored for the Watershed Special Study was measured at the CV-CV monitoring location.

3.1.1 Hydrology

Table 3-2 presents the monthly rainfall totals from the onsite rain gauge at the CV-CV monitoring location. The CC-TC monitoring location was used for rainfall measurement during Phase I; however, equipment failures at CC-TC during Phase II, where data was not reported during known rain events and other periods of non-reported data, did not allow for a reliable continuous data set. The rainfall data presented are representative of the upper WMA rainfall totals, where the majority of the Watershed Special Study sites are located. Lower WMA rainfall data are presented in the Los Peñasquitos Lagoon WMA Sediment TMDL Compliance Monitoring Report (Amec Foster Wheeler, 2016). Rainfall data were also used to determine the number of "wet" days throughout the year. For the purposes of this project, a wet day is defined as a 24-hour period with at least 0.1 inch of rainfall. A total of 22 wet days were recorded during the 2015–2016 wet season at CV-CV, compared to 21 wet days recorded for the TMDL Compliance Program. This is because the upper WMA area received more rainfall overall, primarily due to orographic factors. For load estimates and comparability with the TMDL Compliance Program monitoring locations, a total of 21 wet days (number of wet days in the lower WMA) was used in the annual load estimation.

**Table 3-2.
Monthly Rainfall Totals
2015–2016 Wet Weather Season**

Month	Rainfall Total (inches)
October 2015	0.90
November 2015	0.71
December 2015	1.67
January 2016	4.77
February 2016	0.16
March 2016	1.26
April 2016	0.86
Season Total	10.33

3.1.2 Analytical Results

The final number of pollutograph samples selected for analysis for each monitored wet weather event at each monitoring locations varied. The number selected depended on the characteristics of each storm event. Table 3-3 summarizes the number of pollutograph samples submitted per monitoring location during the monitored wet weather events.

**Table 3-3.
Number of Samples Collected
During Wet Weather Monitoring Events**

Site	Number of Samples Submitted		
	Event 1	Event 2	Event 3
Hidden Valley (LP-HV)	10	12	19
North City (LP-NC)	10	20	24
Upper Carmel Valley (CV-CV)	16	14	15
Black Mountain (CC-BM)	13	16	15
Trap Channel (CC-TC)	18	6	7
Arizona Crossing (CC-AC)	8	15	21
Maya Linda (CC-ML)	15	18	20
Nancy Ridge (CC-NR)	18	13	19

Figures 3-1 through 3-21 present the event hydrographs that show flow and analytical results for SSC analysis at each monitoring location. Data show that peaks in SSC generally correlate with peaks in storm flow. Although peak flow typically is most strongly associated with increased SSC, other factors also affect SSC, such as rainfall intensity and the associated rate of rise in flow, supply limitations, the preceding baseline flow, sample timing, and duration of storm flow.

The flow meter at CC-AC reported valid data for the majority of the 2015-2016 wet season; however, early in the third wet weather monitoring event field crews noticed the flow meter was reporting, erroneous data. The flow meter was replaced at that time with another flow meter. Once installed, the meter was watched for a period of approximately 20 minutes and appeared to be functioning properly. At some point after the field crew had departed, the second flow meter also malfunctioned, reporting flat-lined data (i.e., one single value) for most of the night, followed by erratic data. This was caught be field crews after storm flows had started. A third flow meter was placed on site at this time. By the time the third flow meter was in place, too much of the storm flows had passed to reconstruct a hydrograph. Therefore, total event flow was estimated and a hydrograph could not be graphed for CC-AC for the third wet weather monitoring event.

Summarized SSC analytical results and laboratory reports are provided in Appendix B.

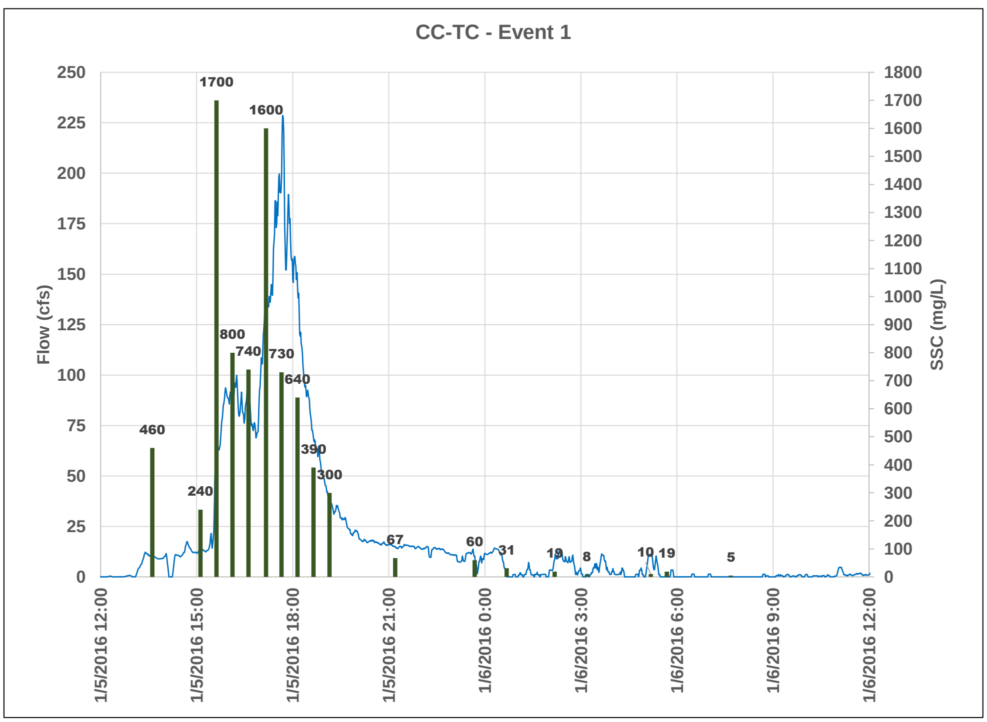


Figure 3-1.
Hydrograph and Results—Wet Weather Event 1 at CC-TC

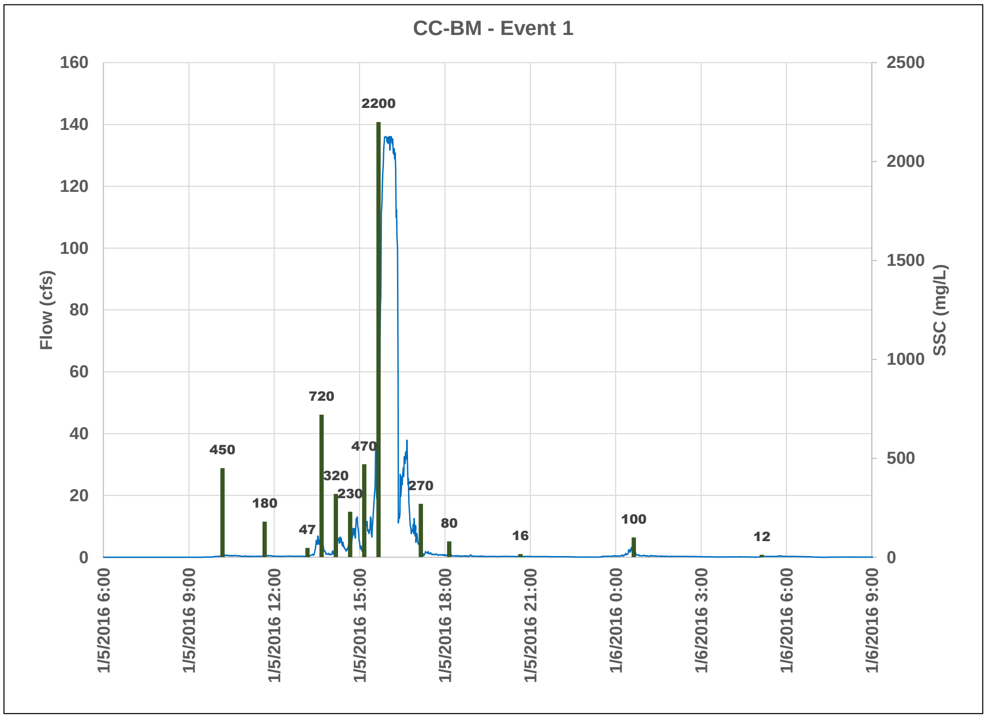


Figure 3-2.
Hydrograph and Results—Wet Weather Event 1 at CC-BM

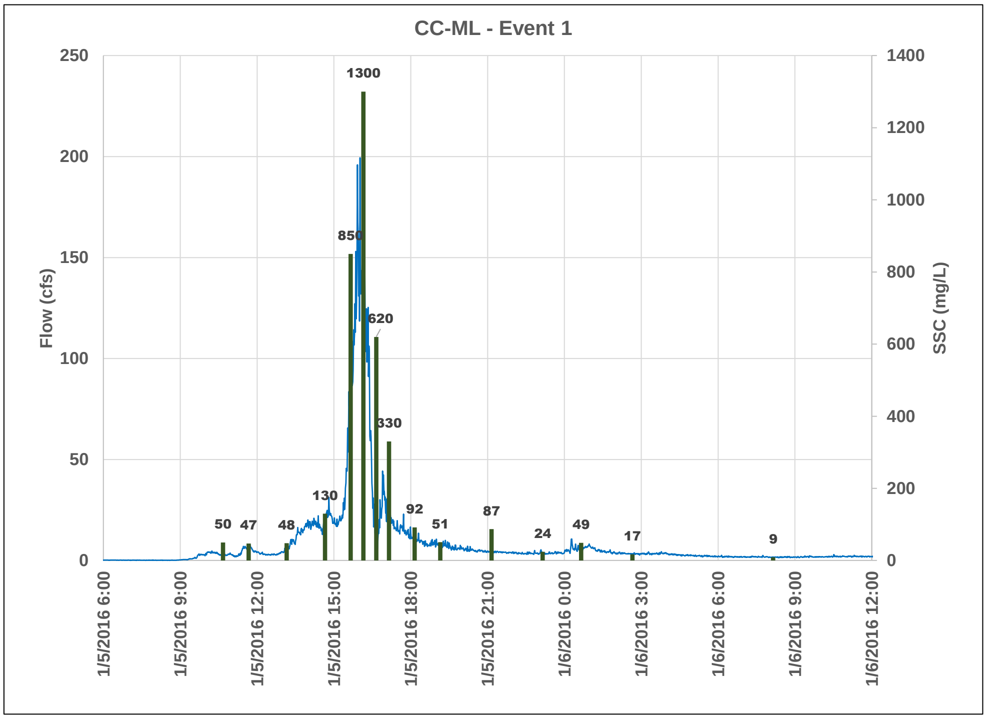
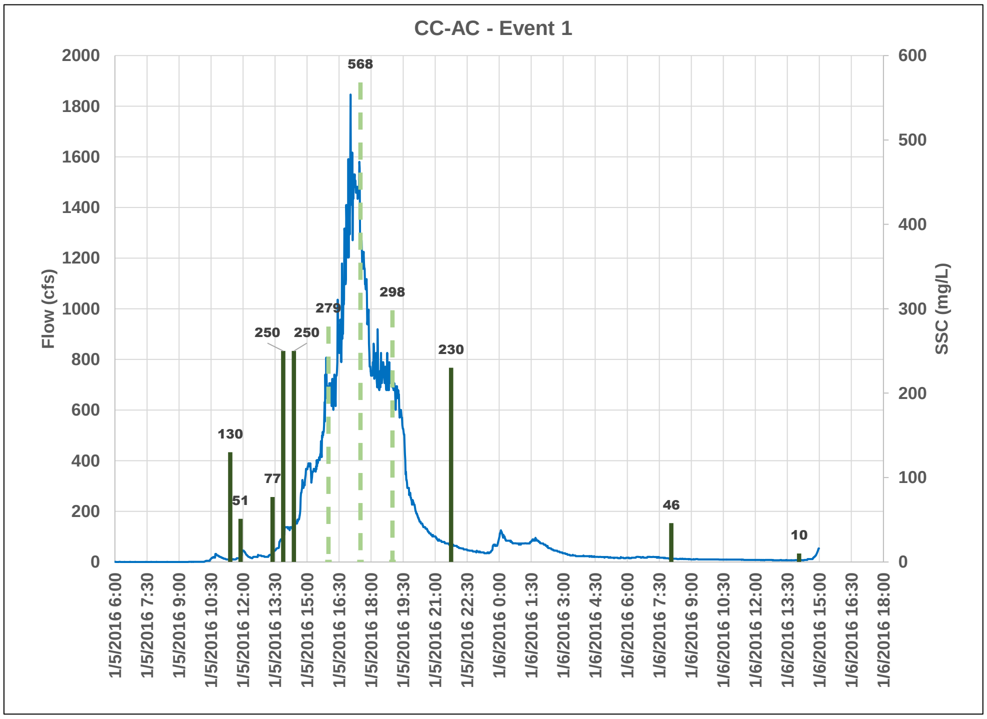


Figure 3-3.
Hydrograph and Results—Wet Weather Event 1 at CC-ML



Note: Dashed lines indicate estimated SSC results for missed samples

Figure 3-4.
Hydrograph and Results—Wet Weather Event 1 at CC-AC

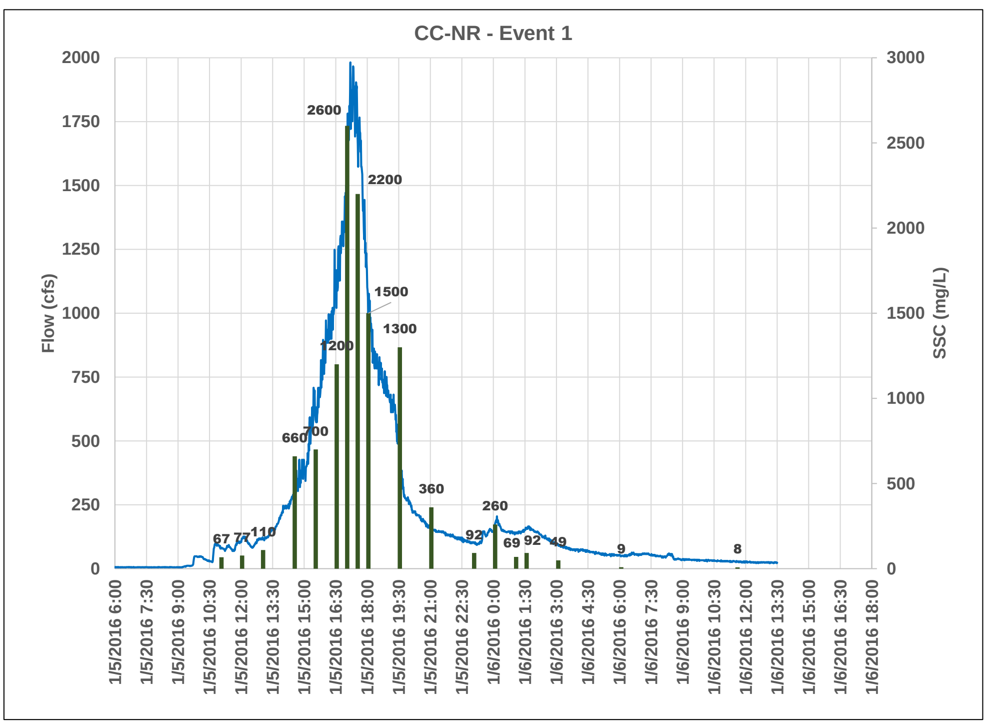
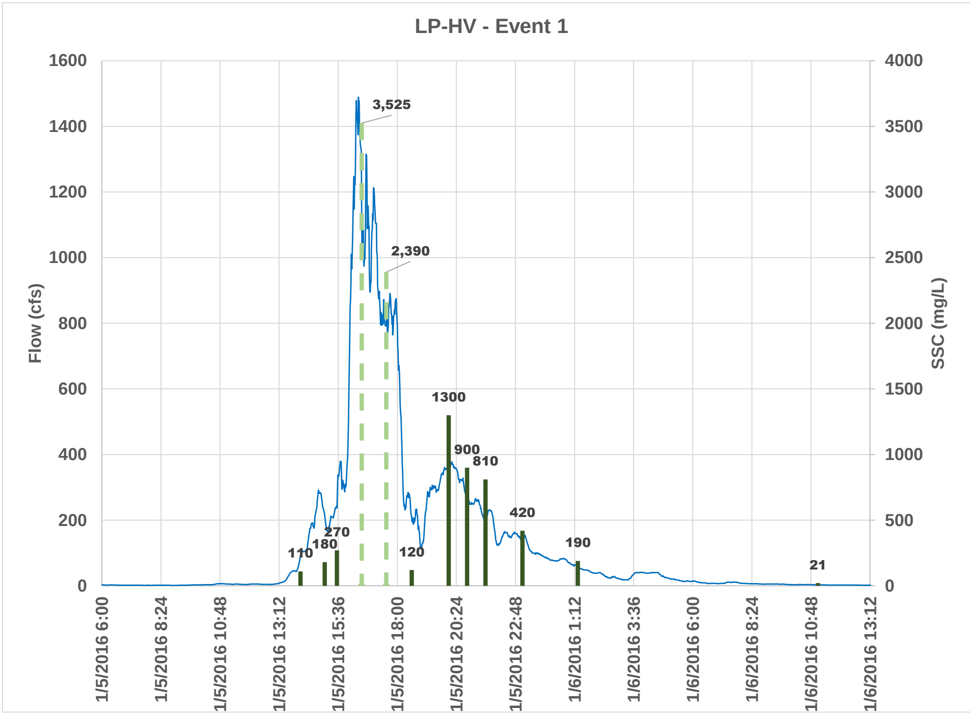


Figure 3-5.
Hydrograph and Results—Wet Weather Event 1 at CC-NR



Note: Dashed lines indicate estimated SSC results for missed samples

Figure 3-6.
Hydrograph and Results—Wet Weather Event 1 at LP-HV

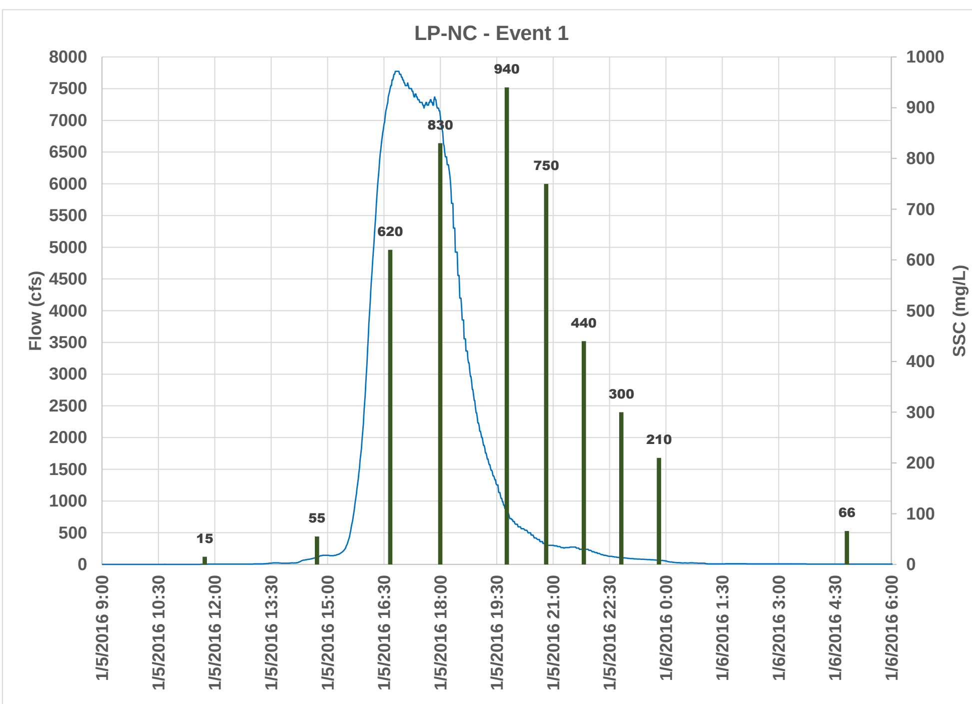


Figure 3-7.
Hydrograph and Results—Wet Weather Event 1 at LP-NC

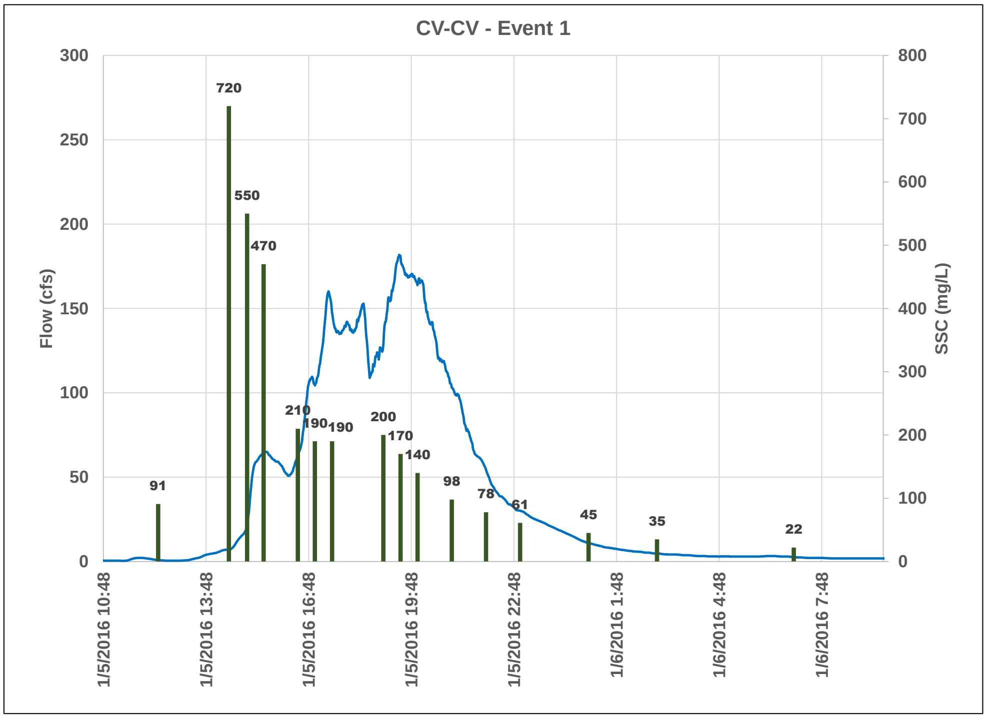


Figure 3-8.
Hydrograph and Results—Wet Weather Event 1 at CV-CV

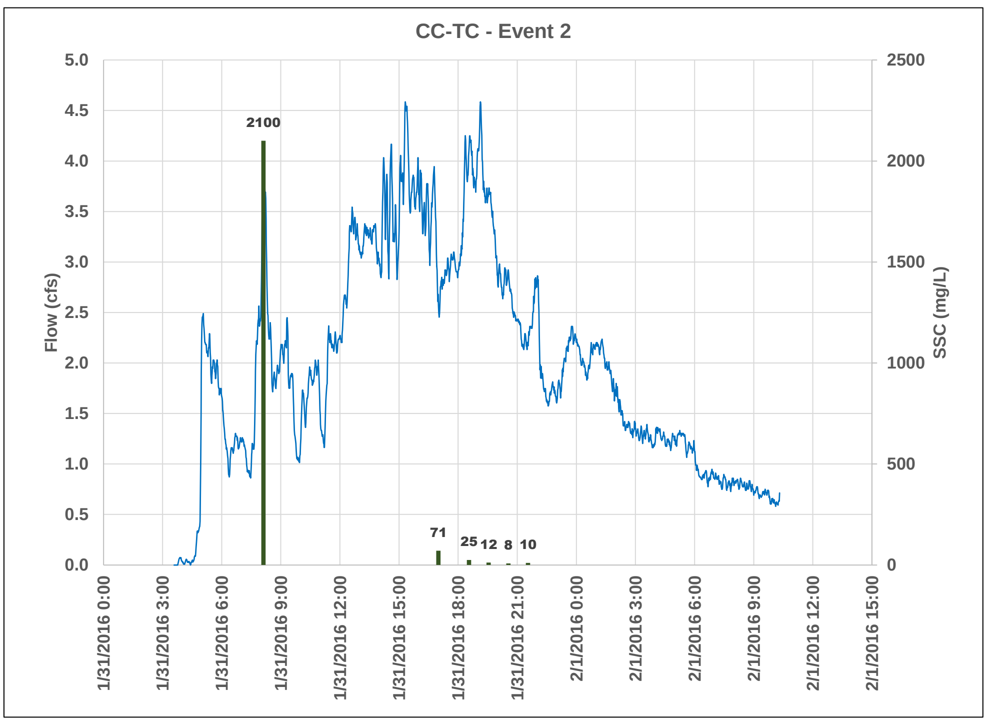


Figure 3-9.
Hydrograph and Results—Wet Weather Event 2 at CC-TC

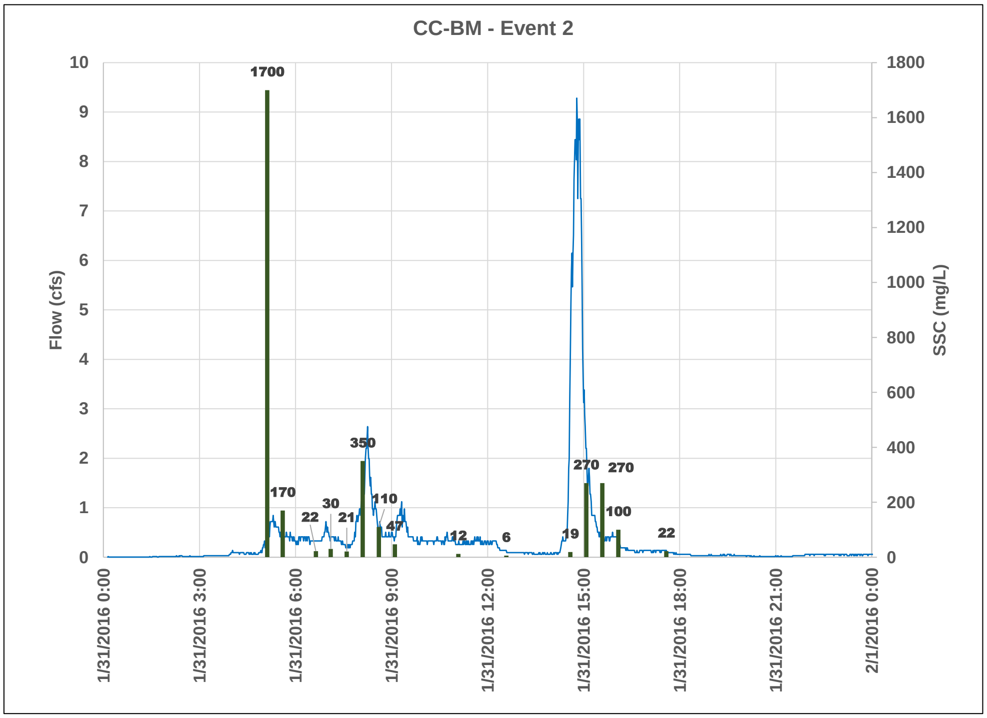


Figure 3-10.
Hydrograph and Results—Wet Weather Event 2 at CC-BM

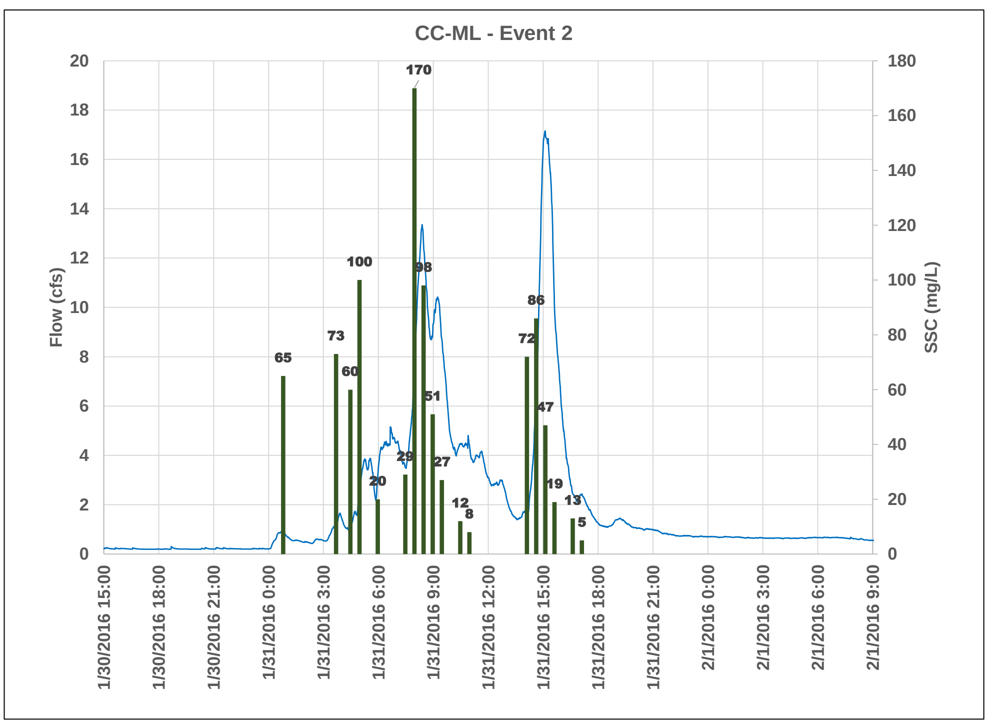


Figure 3-11.
Hydrograph and Results—Wet Weather Event 2 at CC-ML

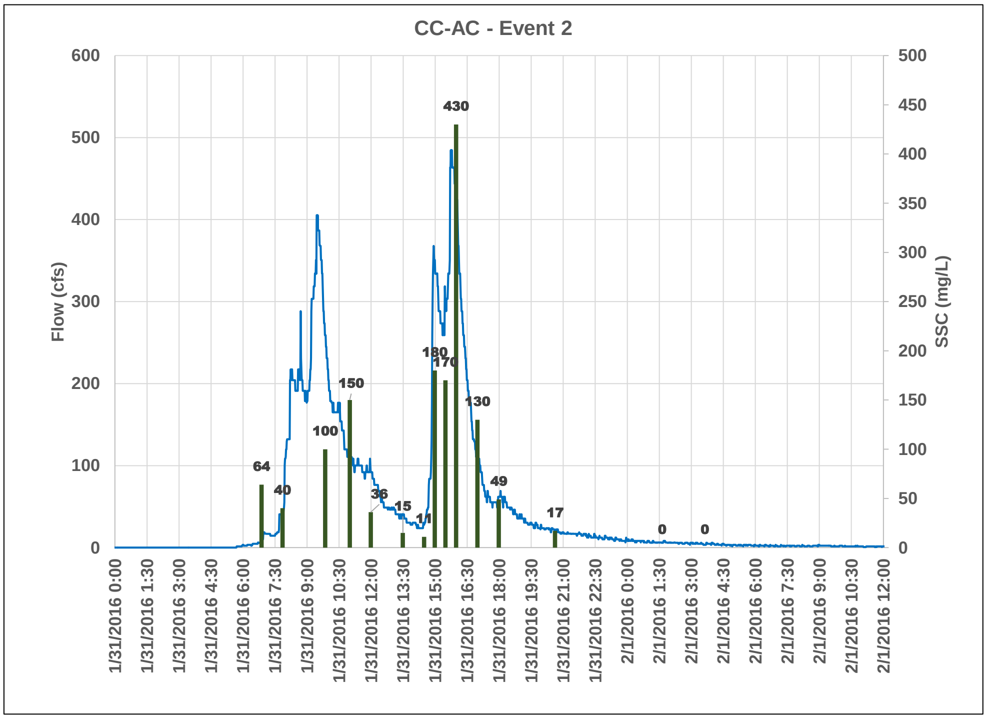


Figure 3-12.
Hydrograph and Results—Wet Weather Event 2 at CC-AC

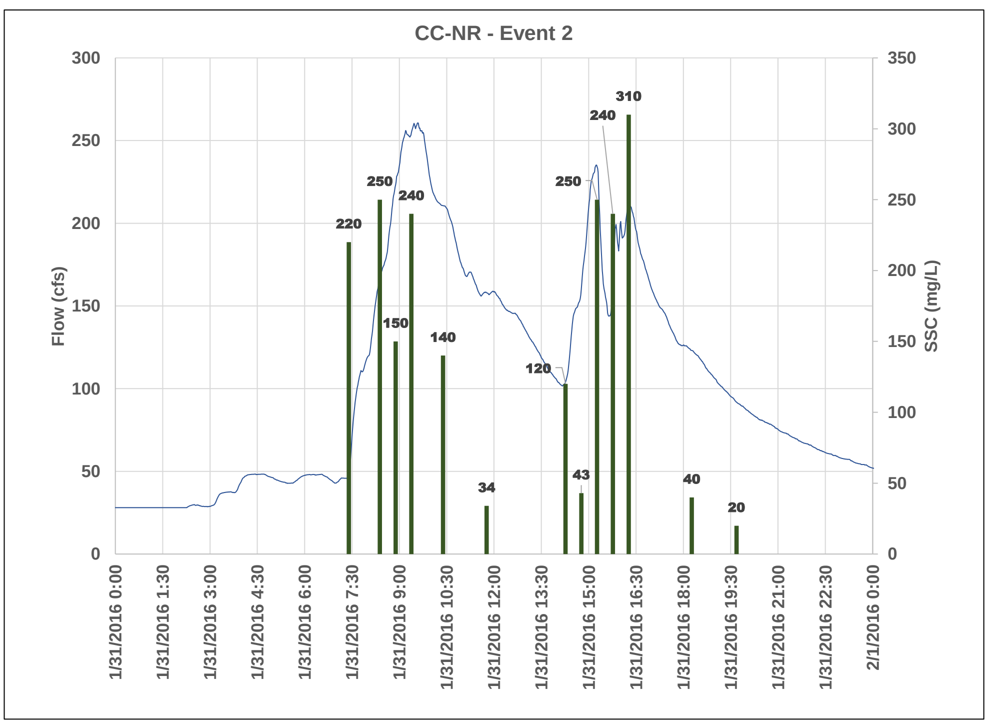


Figure 3-13.
Hydrograph and Results—Wet Weather Event 2 at CC-NR

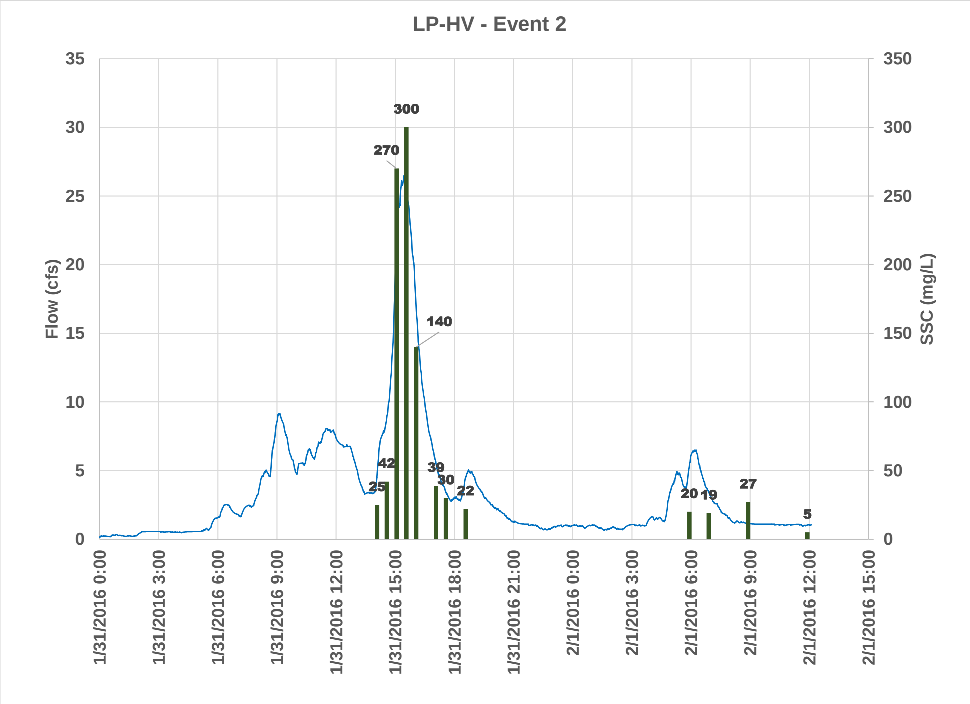


Figure 3-14.
Hydrograph and Results—Wet Weather Event 2 at LP-HV

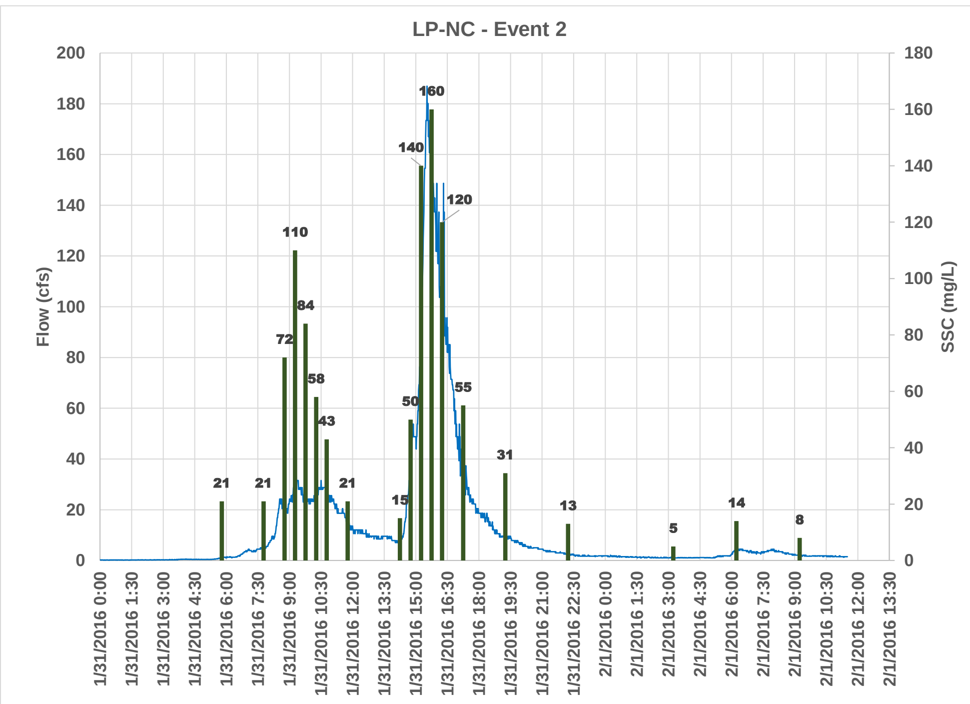


Figure 3-15.
Hydrograph and Results—Wet Weather Event 2 at LP-NC

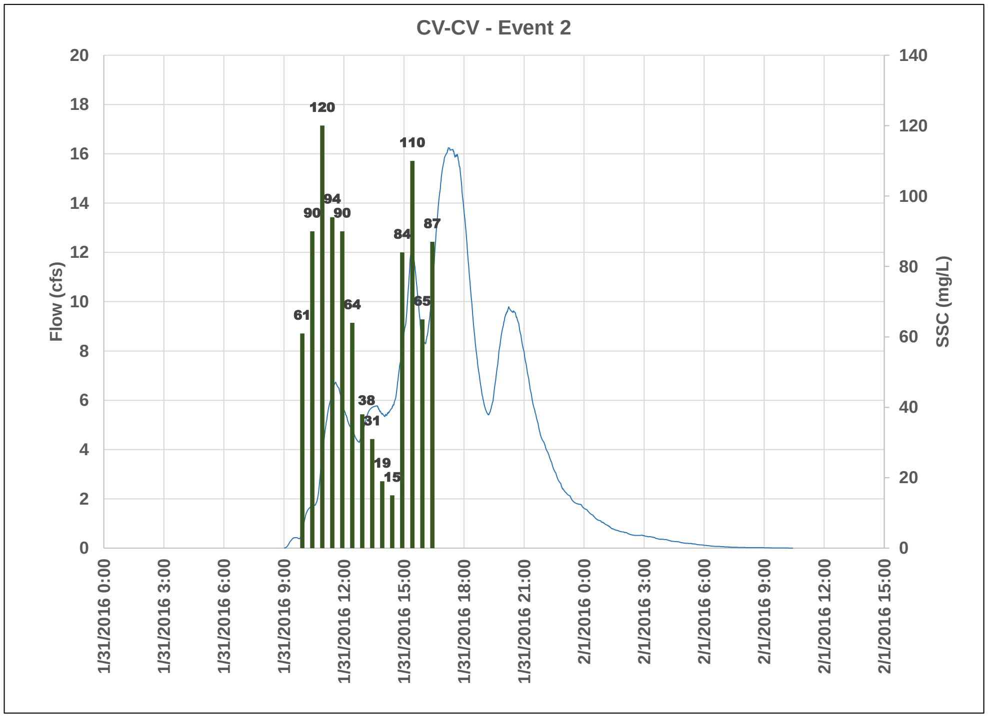


Figure 3-16.
Hydrograph and Results—Wet Weather Event 2 at CV-CV

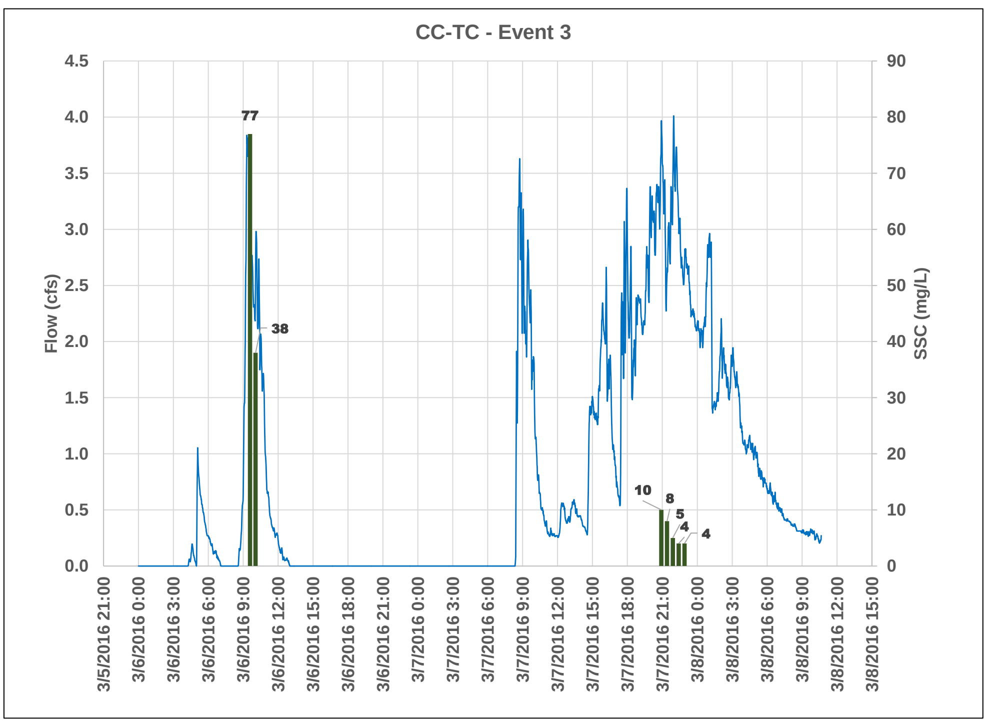


Figure 3-17.
Hydrograph and Results—Wet Weather Event 3 at CC-TC

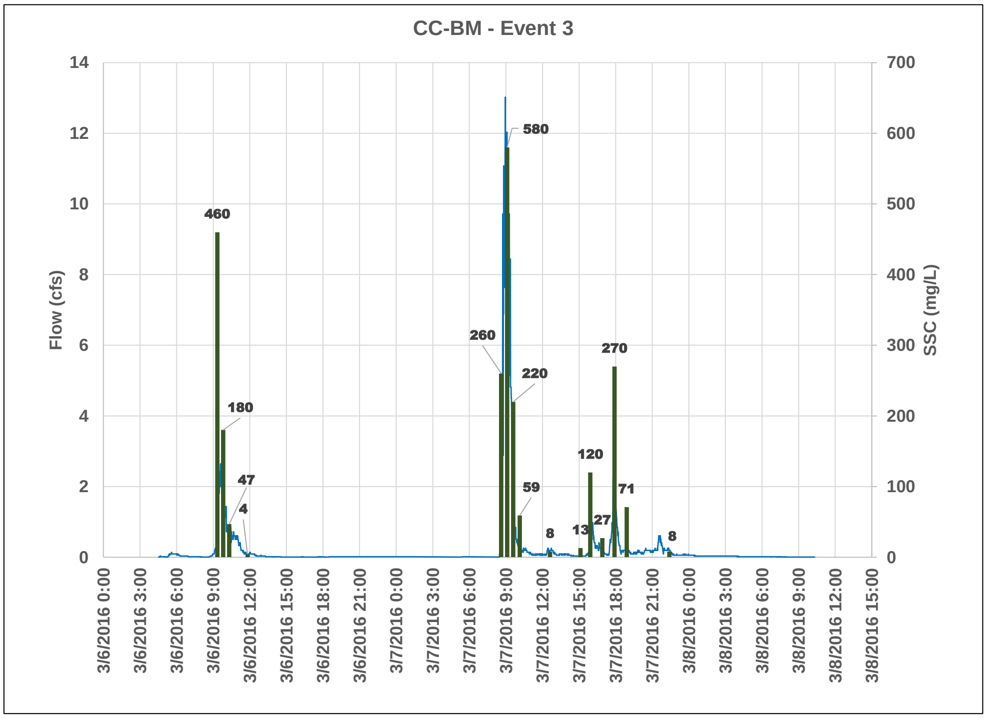


Figure 3-18.
Hydrograph and Results—Wet Weather Event 3 at CC-BM

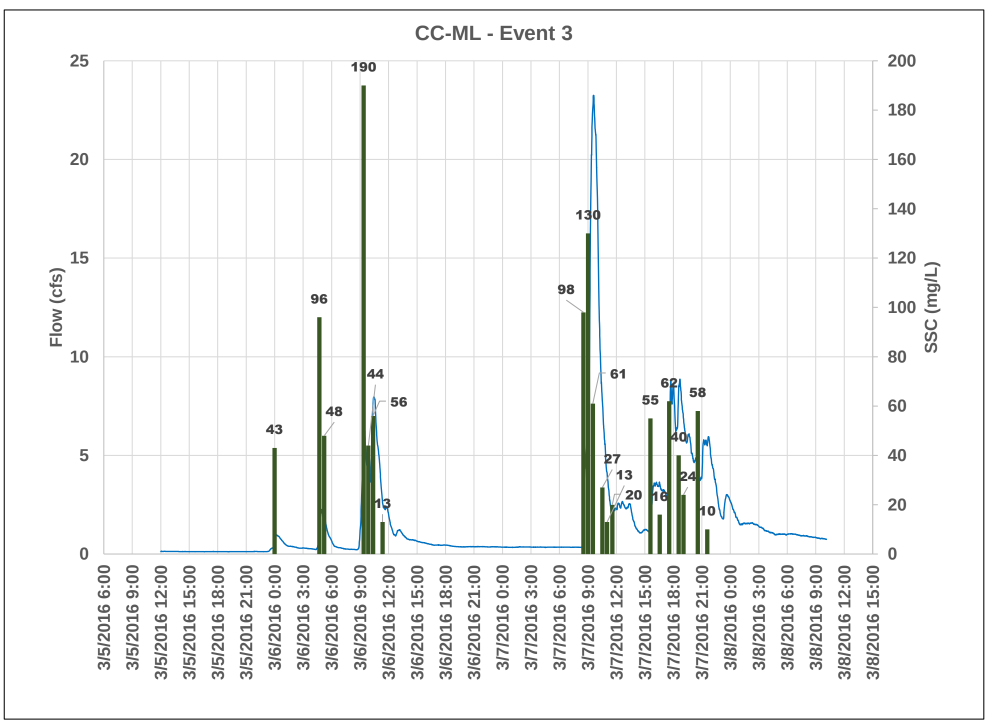


Figure 3-19.
Hydrograph and Results—Wet Weather Event 3 at CC-ML

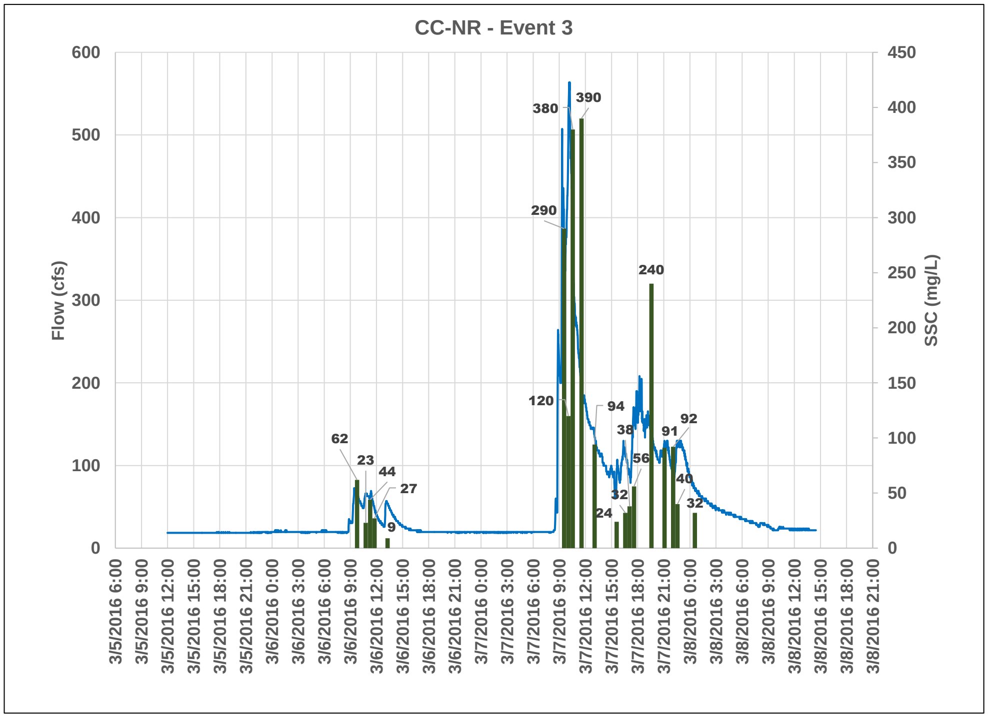


Figure 3-20.
Hydrograph and Results—Wet Weather Event 3 at CC-NR

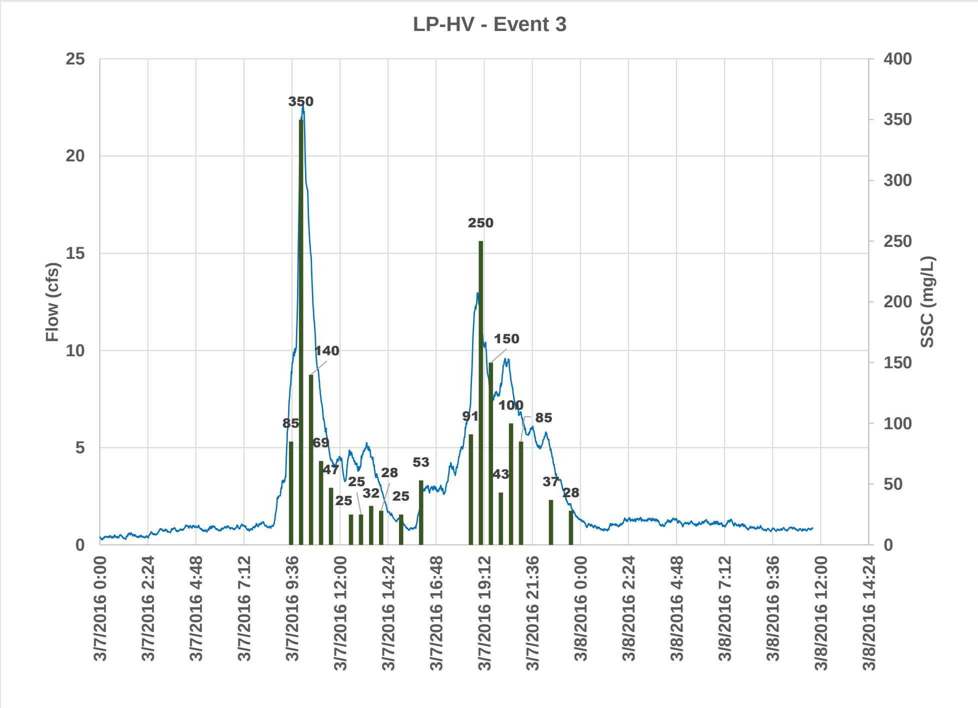


Figure 3-21.
Hydrograph and Results—Wet Weather Event 3 at LP-HV

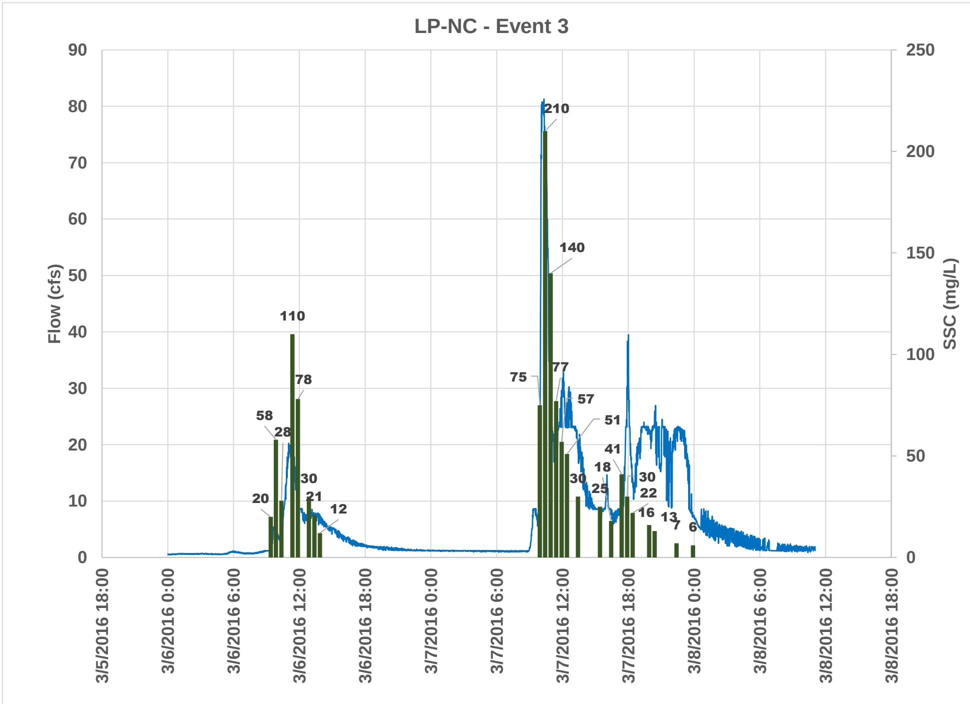


Figure 3-22.
Hydrograph and Results—Wet Weather Event 3 at LP-NC

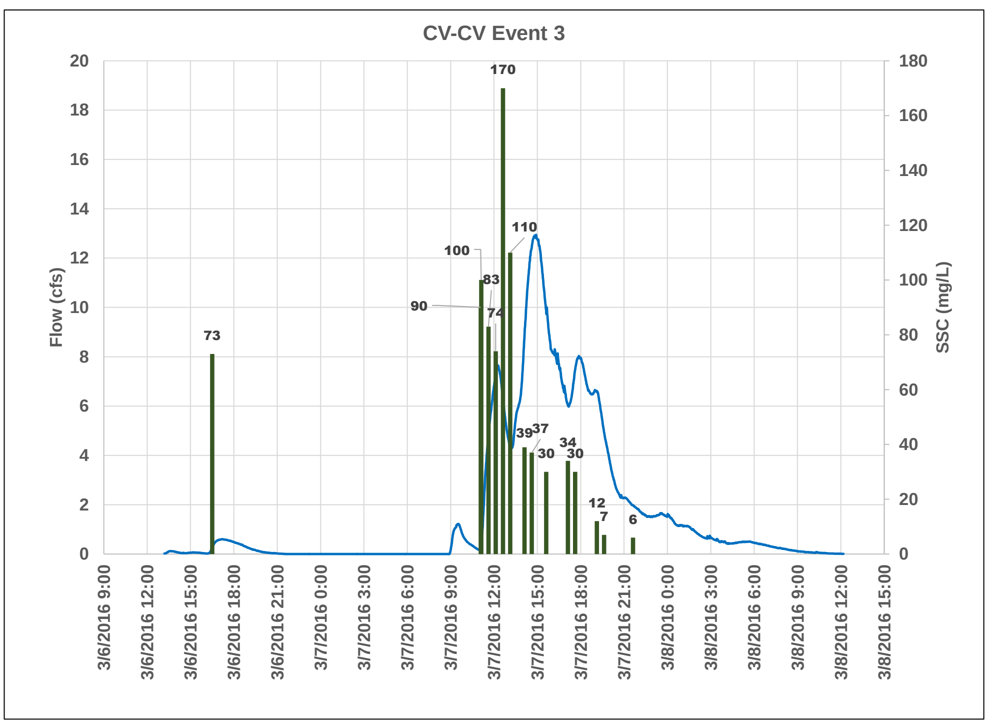


Figure 3-23.
Hydrograph and Results—Wet Weather Event 3 at CV-CV

3.1.3 Bedload Sample Collection

Collection of bedload samples was attempted during each monitored event at five of the eight monitoring locations. CC-ML, LP-HV, and CV-CV did not have suitable locations at which to install samplers. Bedload sampling was attempted using both the trap samplers (installed in the streambed), which have been used in previous wet seasons, and manual bedload samplers (where safe access allowed). No samples were successfully collected during the first event. Most samplers were lost or damaged because of the high flows. One sample from CC-TC was collected during the second event and one sample was collected from CC-NR during the third event. However, in each case, samplers were either displaced or partially buried/overfilled upon retrieval, preventing assessment of the amount of material collected and the associated time frame.

Manual bedload sample collection attempts occurred during low flows, when it was safe to enter the stream, and yielded results from CC-AC and CV-CV during the second wet event only. Samples collected and measured from these two sites resulted in load estimates of 0.21 ton per day and 0.015 ton per day, respectively (not significant relative to washload estimated with SSC results). These samples were collected at one point during one storm and may not be representative of a consistent bed movement condition throughout the storm or day, nor of bedload during other non-sampled. This sample collection was an improvement over that of previous monitoring efforts, but further bedload results are required to accurately quantify this factor.

Appendix C provides the bedload particle size analysis for the bedload samples. Appendix C also provides the results from the volumetric bedload particle size analysis performed in the pre-wet-season sample at each monitoring location.

3.1.4 Post-Storm Pebble Count and Photo Documentation

Post-storm pebble counts were conducted on six occasions during the 2015–2016 wet season. Results from the pebble counts show a general increase in the presence of fine material at CC-TC and CC-BM. Results for CC-AC, CC-NR, and LP-NC varied throughout the year, with no apparent trend. No pebble counts were conducted at CC-ML, LP-HV, and CV-CV, as there were no suitable locations at which to conduct sampling.

For a complete summary of the pebble count findings, refer to Appendix D.

Streambed photographs taken throughout the wet season at each monitoring location were compiled into a photograph log, which is in Appendix E.

3.1.5 Event Mean Concentration and Suspended Sediment Load Results

The annual suspended sediment load was estimated by multiplying the average of the three daily load estimates at each monitoring location by the number of wet days from the 2014–2015 (14 days) and the 2015–2016 (21 days) monitoring years.

Load estimation options are often limited to this type of approach (referred to herein as the “average estimation method”) based on the amount of data. This approach can potentially skew overall estimates in either direction. For example, as in the case for the 2015–2016 wet season, the high load estimate resulting from the unusually large January event drives up the average load. This elevated averaged gets applied to all wet days, regardless of storm size or intensity, potentially resulting in an overestimation. In an effort to better represent load estimations for non-monitored storms at the TMDL Monitoring Program sites, alternative approaches were explored in FY15 by assessing the relationships among rainfall intensity, event mean concentration (EMC), and sediment load to determine whether EMC and/or sediment load values can be reasonably estimated based on rainfall intensity.

This type of approach allows for load estimations based on a measured parameter (e.g., rainfall) for a non-monitored storm, rather than simply applying an average of monitored events. When incorporating data collected during the 2015–2016 wet season, the strength of these relationships decreased and they were deemed unreliable for use in estimating loads. This change is most likely due to flow-duration effects and the non-linear nature of high versus low flows on SSC transport. This also resulted in the inability to use this approach for the Watershed Special Study sites, given the limited data points. Therefore, the load estimations in this report are calculated using only the average estimation method described above. Although the results may be skewed high, these values are comparable to those calculated in the same manner for the TMDL Monitoring Program and they allow for relative comparisons and assessments of fluctuating loads within the subwatersheds.

Table 3-4 provides the EMCs and daily and annual sediment load estimates for Phase I and Phase II.

**Table 3-4.
Event Mean Concentration and Load Results**

Site	SSC Flow-Weighted EMC (mg/L)			Estimated Daily Load (tons/day)			Estimated Annual Load (tons/year) [a]
	Event 1	Event 2	Event 3	Event 1	Event 2	Event 3	
Previous Monitoring – Phase I - 2014–2015							
Trap Channel (CC-TC)	75	29	100	0.4	0.18	0.26	4
Black Mountain (CC-BM)	859	221	90	6.3	1.09	0.25	36
Maya Linda (CC-ML)	230	68	134	3.5	0.8	0.74	24
Subtotal of Upstream Sites[b]	—	—	—	**10.2**	**2.07**	**1.25**	**63**
Arizona Crossing (CC-AC)	764	197	56	141	64	2.9	970
Nancy Ridge (CC-NR)	233	99	58	7.3	4.3	0.63	57
Previous Monitoring - 2014–2015 Compliance Site Monitoring Results							
Carroll Canyon Creek	381	235	76	44.4	33.5	2.6	376
Carmel Valley Creek	5.5	10	10.6	0.2	0.9	0.04	5
Los Peñasquitos Creek	11	6.7	2	10.4	4.7	0.09	71
Total	—	—	—	**55**	**39.1**	**2.73**	452
Current Year Monitoring – Phase II – 2015–2016							
Carroll Canyon Subwatershed							
Trap Channel (CC-TC)	720	677	15.4	50	4.82	0.03	384
Black Mountain (CC-BM)	79	111	322	1.11	0.18	0.25	11
Maya Linda (CC-ML)	598	50.8	50.4	16.71	0.54	0.28	123
Subtotal of Carroll Upstream Sites[b]	—	—	—	**67.82**	**5.54**	**0.56**	**517**
Arizona Crossing (CC-AC)	234	150	59.9	110	31.9	5.38	1031
Nancy Ridge (CC-NR)	1216	152	162	809	62.5	34.7	6343
Los Peñasquitos Subwatershed							
Poway (LP-HV)	365	118	124	162	1.16	1.88	1155
Sabre Springs (LP-NC)	826	90.9	56.7	2249	3.5	1.45	15,778
Carmel Valley Subwatershed							
Carmel Valley Upper (CV-CV)	180	75.1	45.6	20	1.29	0.27	151
Compliance Site Monitoring Results							
Carroll Canyon Creek	2,030	197	307	1,283	15.2	25.8	9,268
Carmel Valley Creek	79.4	30.4	47	23.9	1.73	1.67	191
Los Peñasquitos Creek	373	17.1	4.94	2,004	6.11	0.75	14,076
Total	—	—	—	**3,311**	**23**	**28.2**	23,535

a. Based on the 14 wet days during 2014–2015, and 21 wet days during 2015–2016, as determined during this wet season (Section 3.1.1)
b. The three sites upstream of the confluence to Carroll Canyon Creek were summed to provide a subtotal of the upstream contribution.
mg/L = milligrams per liter

During Phase I, the highest suspended sediment loads were calculated at the Arizona Crossing location (CC-AC), which is at the downstream end of a stream reach that is dominated by highly erodible features. However, during Phase II, the highest sediment loads were calculated at the

North City location (LC-NC) in the upper Los Peñasquitos Creek subwatershed, and were attributable to unusually high flows rather than unusually high EMCs.

There are some challenges when comparing the two phases or years, given the differences in storm characteristics. Phase I occurred during drought conditions and storms were generally characterized by light to moderate consistent rain. Phase II occurred during an El Niño year and, although rainfall totals were slightly below annual averages, storms were generally intense and brief, in particular during storms that occurred over three days in early January 2016, when over half of the total wet season rainfall occurred. Considering these differences in seasons and the data collected through both phases, comparability between years is limited. However, the data collected do provide some preliminary findings.

Stream reaches that may warrant further investigation include the reach of Carroll Canyon Creek running through the gravel mine operations and the immediate reach downstream, the upper portion of Los Peñasquitos Creek, and the upper portions of Carmel Valley Creek. The following provides greater detail regarding each of these stream reaches.

Carroll Canyon Creek. The reach of Carroll Canyon Creek running through the gravel mine operations and the immediate reach downstream appear to be source and sink areas, respectively, with the sink storing material that can be mobilized during large, intense storms, which are the types of storms that the data seem to indicate occurred this year. During Phase I monitoring, the CC-AC site estimated loads were 970 tons per year, while the next downstream site (CC-NR) had an estimated load of 57 tons per year. This result led to a hypothesis last year that the reach between these two locations can serve as a sink, with the sink storing material that can be mobilized during large, intense storms. Monitoring during Phase II indicated that this hypothesis may be true, because much of that material was mobilized and transported downstream based on calculated loads of 1,031 tons per year at CC-AC and 6,343 tons per year at CC-NR (downstream of CC-AC). Input from Flanders Canyon Creek, which is downstream of CC-AC, was not measured this season but may have also contributed unusually high loads.

During sampling, field crews experienced some equipment issues that do not affect the overall assessment of the data. During the first event, there were sample collection failures during a portion of the storm (see dashed lines in Figure 3-4), which may have biased the flow-weighted EMC low, because missed samples were during higher flows. SSC estimates were made for the period of missed samples, based on flow rates and SSC comparisons during that event. When these estimations were incorporated into calculations for this site, the EMC and estimated load increased for this event. Using these estimated SSC values, the estimated load was 1,479 tons per year (compared to 1,031 tons per year calculated without the additional SSC estimated values). This higher estimated load for CC-AC is still less than that for CC-NR.

For the third event, total flow had to be estimated on the basis of previously collected data at CC-AC because of flow monitoring equipment failure (as discussed in Section 3.1.2). Therefore, a flow-weighted EMC could not be calculated for this event at this site. Sample collection was not affected by this failure. The CC-AC load for this storm was estimated using mean SSC and total estimated flow.

Despite the equipment issues encountered at the CC-AC site, preliminary data appear to indicate that this source-sink dynamic does exist in the stream between the upper limit of the gravel mine and CC-NR, and may warrant further investigation for potential management measures to control loads to the Lagoon from Carroll Canyon Creek. Although there were some equipment issues encountered during monitoring, results are representative of the overall conditions within the subwatershed.

Los Peñasquitos Creek. Another area of interest is the upper subwatershed reaches near the LP-HV and LP-NC sites and downstream through the Los Peñasquitos Creek subwatershed. Load estimates are of magnitude similar to those measured at the base of the creek. Table 3-4 provides estimated loads based on submitted samples. Similar to equipment issues during the first event at CC-AC, damaged equipment caused some samples at LP-HV to be missed during peak flows. SSC estimates were made for this period based on samples collected during the monitoring event and associated flows (see dashed lines in Figure 3-6). When these estimates are included in EMC and load calculations, the estimated first event daily load and annual loads at LP-HV are approximately 70 percent of the estimates at LP-NC.

This result may indicate another source reach followed by a large sink, as the load estimates are slightly higher at LP-NC compared to those at the base of the creek. The portion of Los Peñasquitos Creek downstream of the LP-NC location is generally characterized by less developed lands immediately surrounding the creek when compared to portions through Poway. The more natural portion of the creek may be able manage higher flows with less scouring and erosive effects of hydromodification. However, there is only one year of data for this subwatershed; therefore, these results and assessments are preliminary.

Carmel Valley Creek. Similar to Los Peñasquitos Creek, load estimates from the upper portion of Carmel Valley Creek were similar (slightly less) than the estimated load at the base of the creek. However, overall load estimates from Carmel Valley Creek are significantly less than those at Los Peñasquitos and Carroll Canyon Creeks. The proportionally high loads from the upper subwatershed may be attributable to less restricted flows coming from the upper reaches, prior to converging and flowing through the lower reaches, which are generally characterized as lower gradient with heavy vegetation. Also, similar to findings at Los Peñasquitos Creek, this result is based on a limited data set from one year of monitoring. Furthermore, the relatively small loads from this subwatershed make it a low priority for management measures.

Overall WMA Findings Summary. Although these findings are based on limited data, they do provide an initial framework for assessing management measures and focus areas. Of the three subwatersheds, Carroll Canyon Creek is the primary subwatershed on which to focus resources and management measures. In typical years, Carroll Canyon Creek delivers the highest percentage of sediment load to the Lagoon (80 to 90 percent), and despite not contributing the highest percentage this year, its estimated SSC EMCs were the highest of the three subwatersheds. Management measures that address controlling sources of sediment where possible can drive down SSC concentrations, and ultimately loads.

Land use and creek condition through the portion of Carroll Canyon Creek that contributes the highest EMCs and proportion of sediment loads are important factors to consider when assessing methods to control sources. Figure 3-16 presents the land uses surrounding the section of Carroll

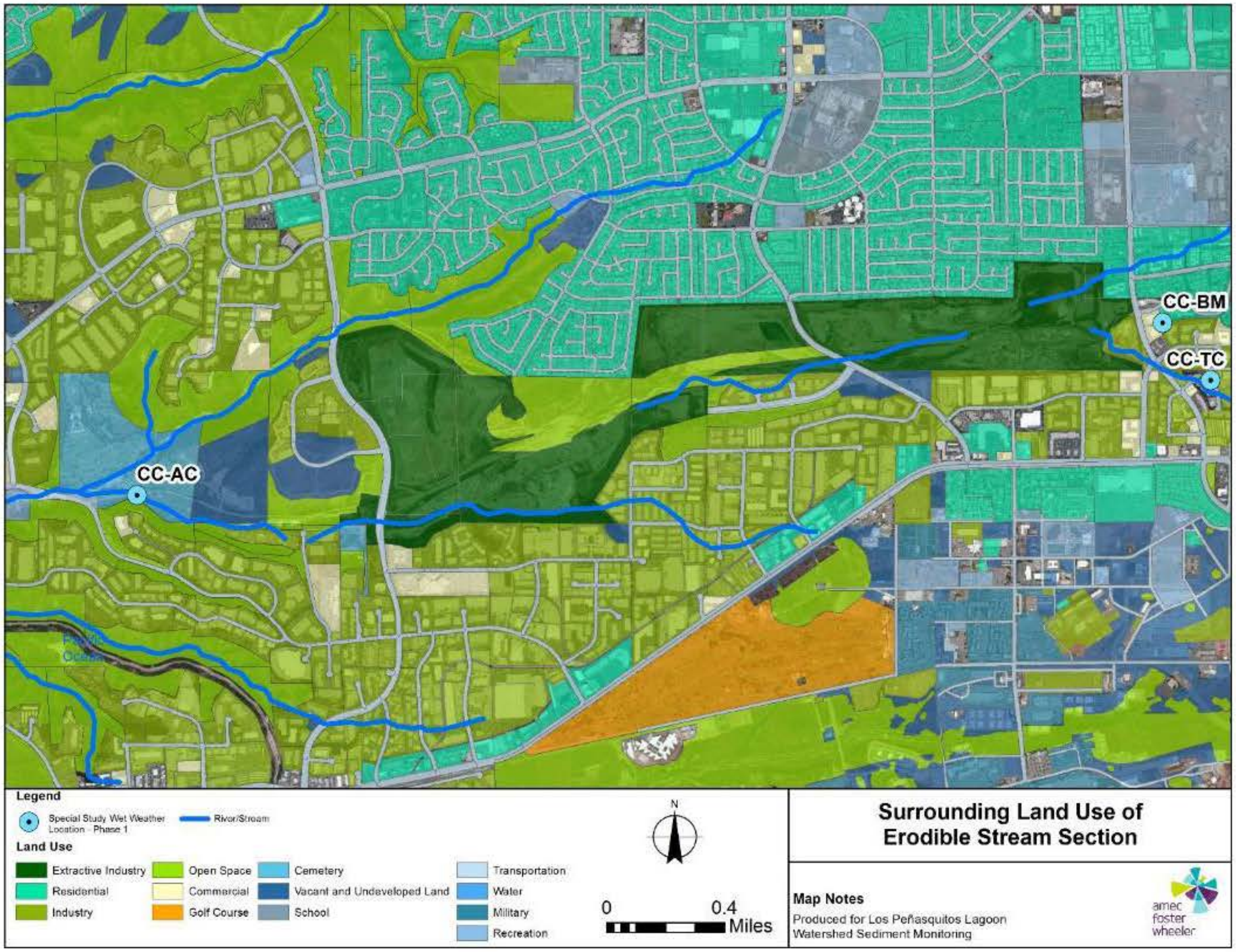


Figure 3-16.
Central Carroll Canyon Creek Land Uses

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Canyon Creek between the monitoring locations described above. These reaches are characterized by lack of vegetation and erodible and unstable banks. The land uses surrounding the section of creek between the three upper subwatershed monitoring locations and CC-AC include heavily developed residential land uses to the north, active industrial land uses to the south and east, and a mining operation along the northern banks of the creek itself.

Flow presents a much more challenging factor to control or reduce. During the unusually high flows encountered during this wet season, loads were elevated throughout the WMA and this was the driving force for the increase in the relative contribution from Los Peñasquitos Creek and the magnitude of the annual load estimate. Managing such high flow through these systems may not be the most cost-effective strategy and doing so to a significant degree may not be feasible. Flows observed this season were large and strong enough to destroy the upper portion of the concrete lined channel in Carroll Canyon Creek and flood the area between CC-AC and CC-NR and the commercial area near the base of Carroll Canyon Creek. BMPs typically are not designed to be effective for storms and/or flows of this size. However, implementing measures to reduce existing impacts of hydromodification may help drive down flow rates, which will likely help reduce erosion and sediment transport (SSC concentrations).

3.1.6 Analysis of SSC and Flow

A preliminary analysis compared SSC measured during two wet seasons (2014–2016) and the corresponding flow rates for those samples. Results of this analysis are provided in Figures 3-16 through 3-23.

CC-NR and CC-AC had the strongest SSC versus flow relationships, with coefficient of determination (R^2) values of 0.78 and 0.74, respectively. These sites were also shown to have ample sediment supply upstream, as found in a geomorphic assessment conducted during the 2014 monitoring program (AMEC, 2014). The reaches upstream of these monitoring locations were characterized by highly erodible banks, with limited armoring within the channel. Hidden Valley also had a relatively strong SSC versus flow relationship (R^2=0.62) over the study period.

The other five sites showed poor relationships between SSC and flow. CC-BM (R^2=0.39) and CC-ML (R^2=-0.13) are similar in that samples are taken as flow enters a storm drain. These two sites, along with CC-TC (R^2=0.22), have small drainage areas with high proportions of impervious surfaces that contribute to their "flashy" behavior and unreliable sediment supply. The LP-NC (R^2=0.38) sample collection point is near the bank after the creek passes over a small pool, which may cause suspended material to settle out of the water column before it can be measured. The collection point faces a similar obstacle at CV-CV (R^2=-0.28), as it is located in a section of the creek directly downstream of a large pool and is situated among small boulders that can become small rapids during high-flow conditions.

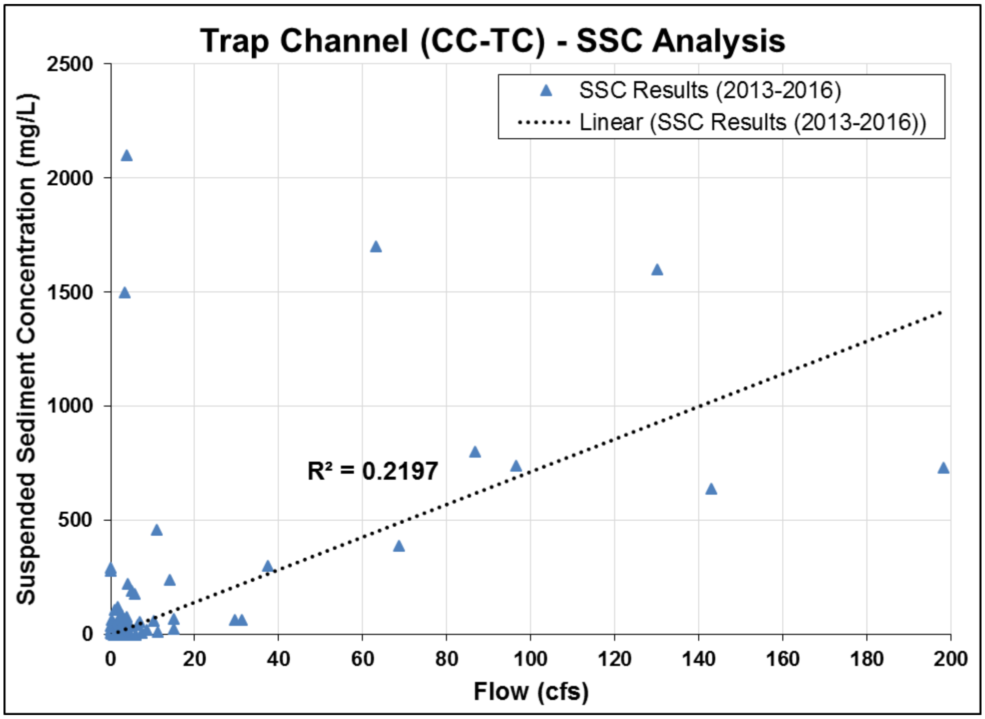

Figure 3-16.
Flow Rate vs. SSC—CC-TC

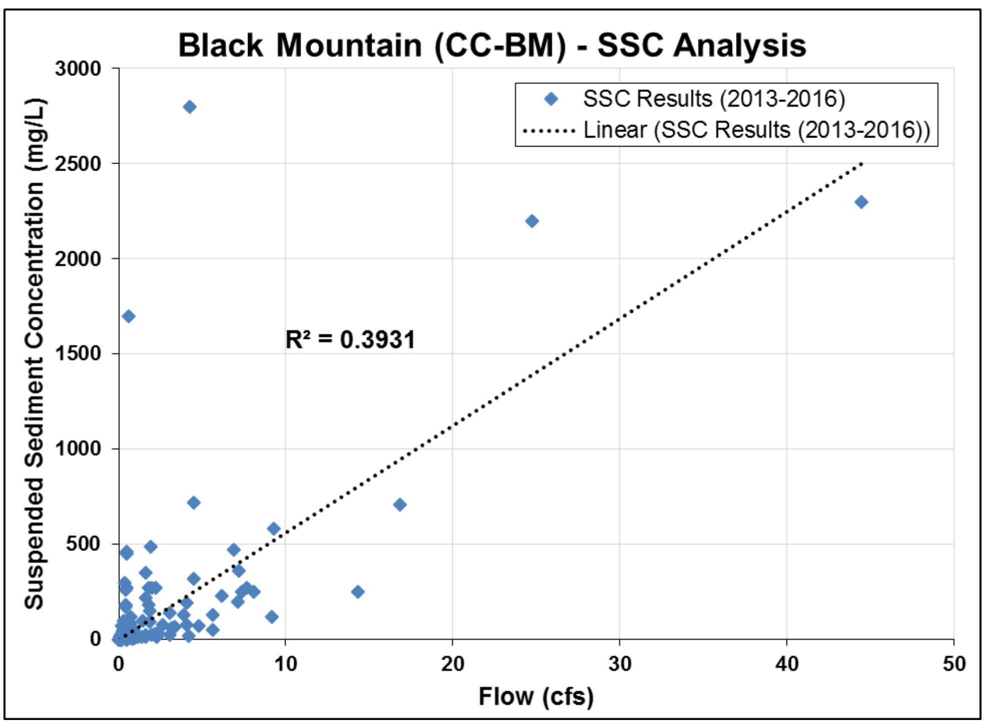

Figure 3-17.
Flow Rate vs. SSC—CC-BM

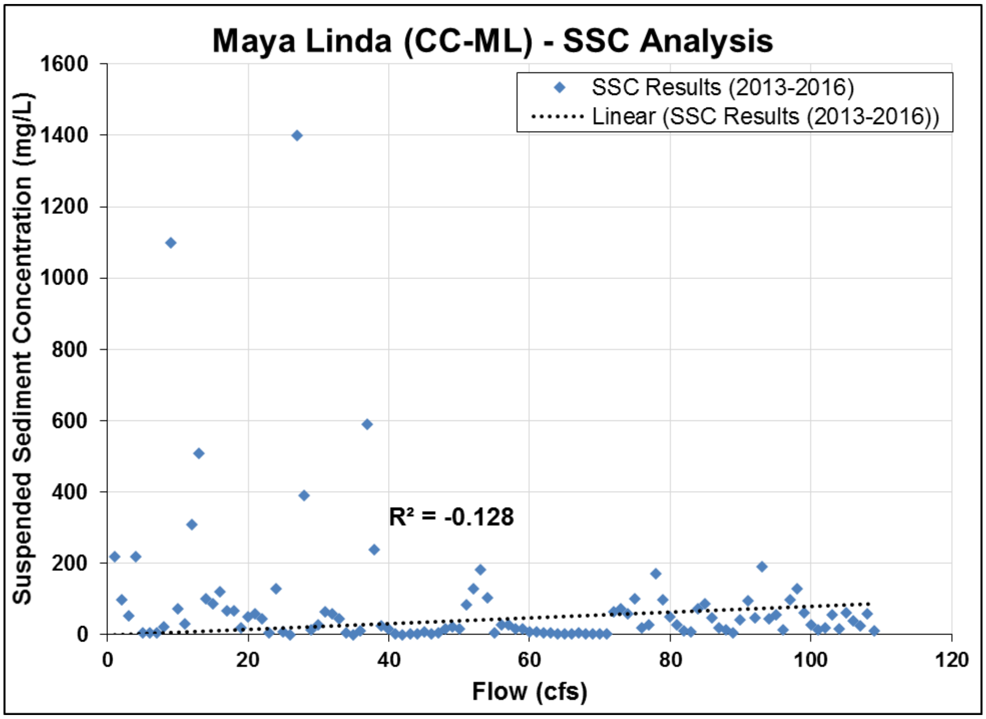

Figure 3-18.
Flow Rate vs. SSC—CC-ML

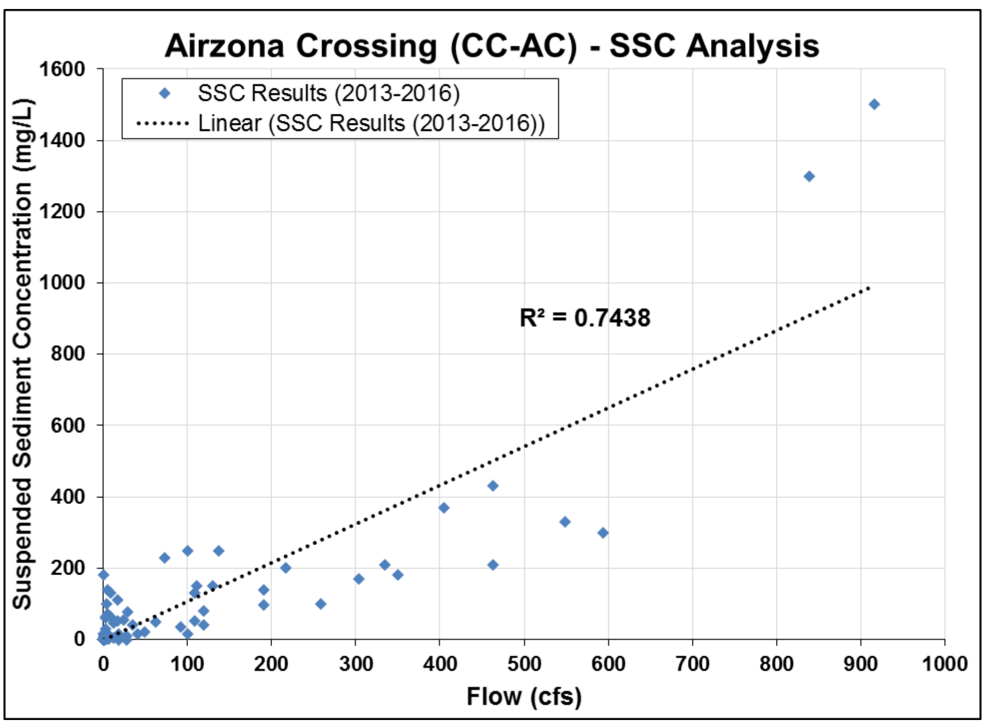

Figure 3-19.
Flow Rate vs. SSC—CC-AC

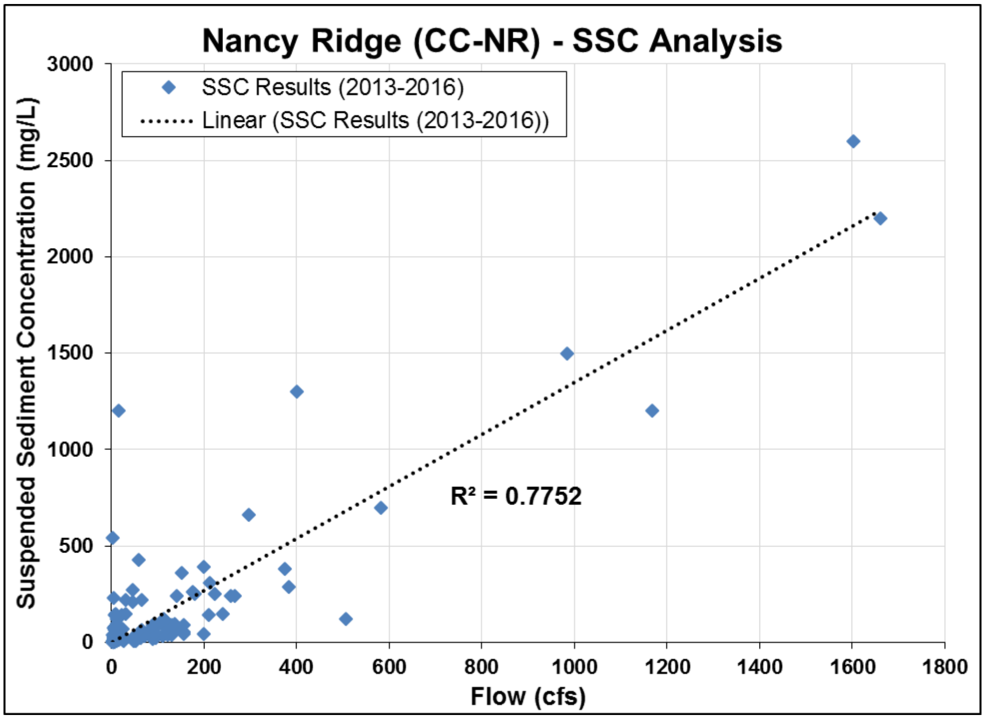

Figure 3-20.
Flow Rate vs. SSC—CC-NR

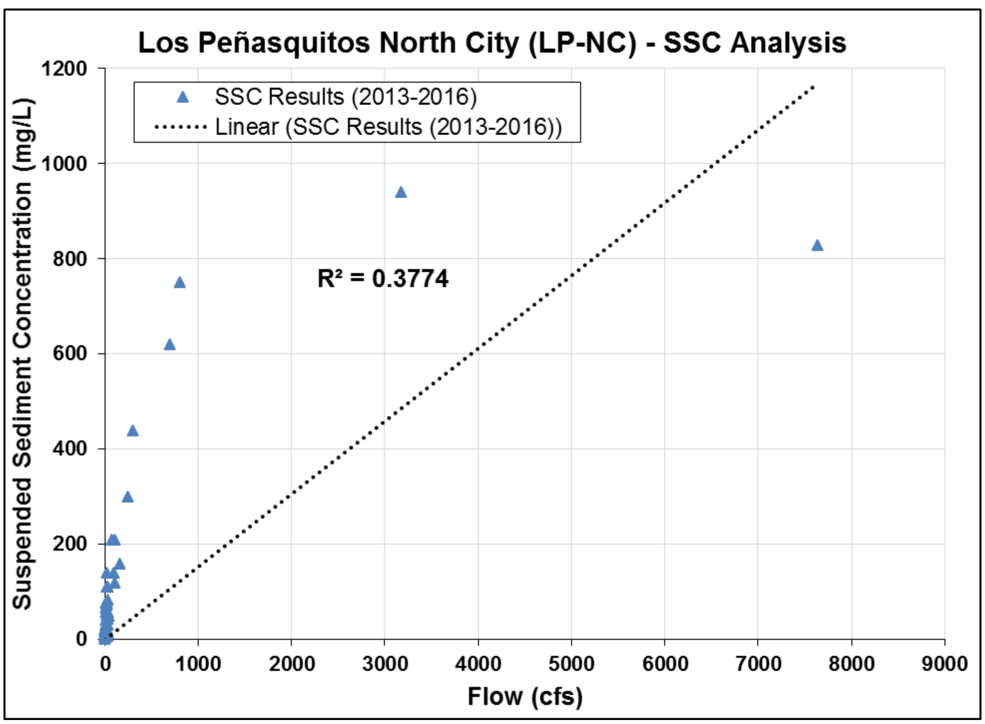

Figure 3-21.
Flow Rate vs. SSC—LP-NC

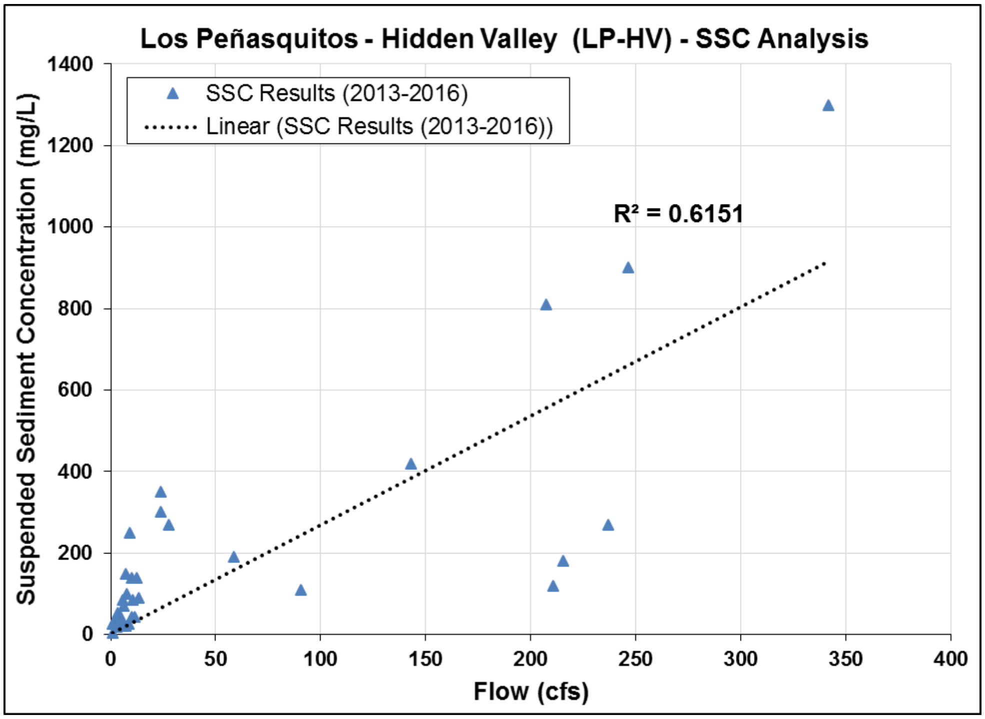

Figure 3-22.
Flow Rate vs. SSC—LP-HV

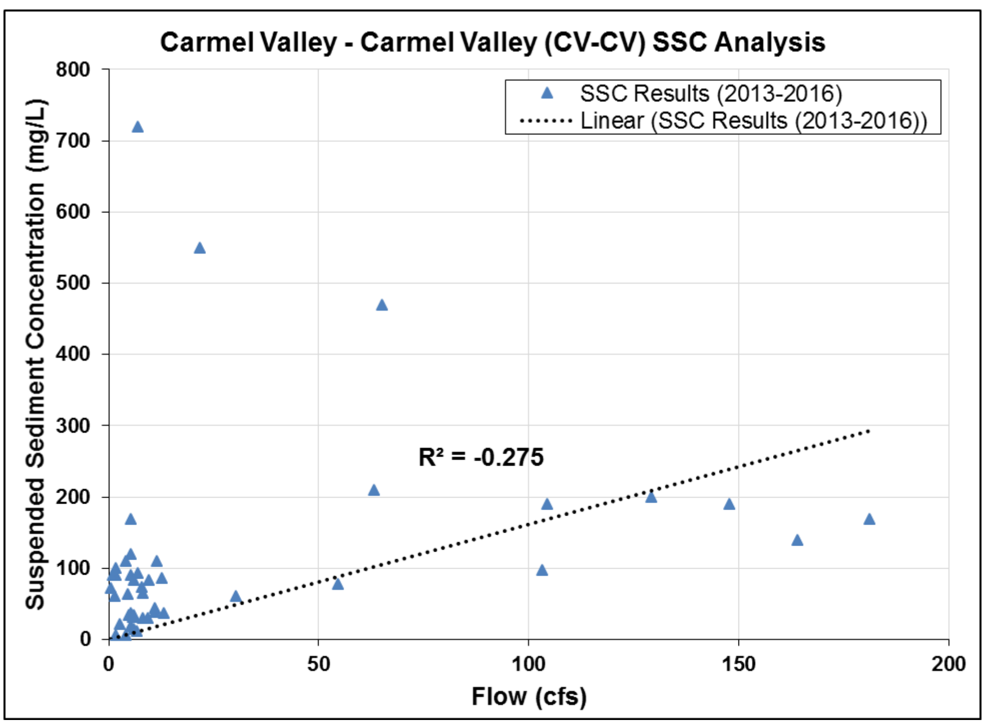

Figure 3-23.
Flow Rate vs. SSC—CV-CV

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3.2 AERIAL DEPOSITION SAMPLING RESULTS

Aerial deposition monitoring results from both FY15 and FY16 indicated that airborne particulate matter equal to or less than 10 microns in diameter (PM_{10}) are not a significant source of sediment within the WMA. Review of the data from the six dry weather deposition sampling events in the Carroll Canyon Creek subwatershed and three events in the other two subwatersheds show generally low concentrations, either at or near the reporting limits. There were marginal increases in concentrations around anthropogenic activities, particularly in the Carroll Canyon Creek subwatershed relative to other monitored locations; however, these slight increases were not consistent or significant. Monitoring results from the two types of monitoring equipment (FRM and optical sensors) indicated that results were similar, in that results from both types of equipment were low or negligible. However, within the low ranges of concentrations, results did not correlate well and showed a mean relative percent difference of 108 percent. Although the RPD is high, this is due to very low concentrations measured that are within 10 times the laboratory reporting limit and standard flow volume. RPD calculations for low concentrations such as those measured during this program mischaracterize what are actually very small differences in concentration. Appendix F provides detailed results and technical memorandum for aerial deposition monitoring.

Visual observations at the Carroll Canyon Creek downwind monitoring location, near the Black Mountain SSC monitoring location, discovered significant particle matter deposition on the surfaces of vehicles, roads, and buildings and other surrounding structures. The observed deposition may be due to the high volume of truck traffic at the mining operations adjacent to the monitoring location, which may trigger turbulent diffusion and transport sediment from the road and vehicles to the nearby surroundings. Despite these observations, monitoring equipment placed on the roof of a nearby fire department did not show high concentrations of PM_{10}. This result indicates that the observed deposition in the immediate area is not being suspended high into the air column and remains localized to the area just outside the gravel mine driveway.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Data generated during the Watershed Special Study monitoring program provided initial insight into the sediment transport characteristics of three subwatersheds within the Los Peñasquitos WMA. The monitoring program was designed to answer the following questions:

- Wet Season Riverine Monitoring
    - What is the sediment concentration at discrete times throughout a wet weather event hydrograph at points throughout the subwatersheds?
    - What are current sediment load estimates at points throughout the subwatersheds? Is there a greater load from a potential source area?
    - How do the wet weather sediment delivery potentials of each creek compare with each other?
- Dry Weather Aerial Deposition Monitoring
    - What are the aerial contributions of sediment to the subwatersheds within the WMA?
    - Can these entrained particles be associated with specific sources or land uses?
    - What is the contribution of aerial deposition relative to wet weather suspended sediment concentrations observed in the subwatersheds?

4.1 CONCLUSIONS

Based on the Watershed Special Study (both phases), the central portion of Carroll Canyon Creek between the three upper subwatershed monitoring locations and CC-NR appears to be the primary area affecting loads to the Lagoon via Carroll Canyon Creek. During Phase I, relatively high loads were estimated at the CC-AC location, which then seemed to be deposited in the channel, as lower loads were estimated at the CC-NR location. During Phase II, there was a relative shift in load proportion, with CC-NR showing higher loads than CC-AC. This dynamic suggests that during typical seasons the large contribution of sediment load that comes from the reach between the upper monitoring locations and CC-AC is deposited downstream, and can be mobilized during years with larger, more intense storms, as encountered during Phase II. The remobilized material contributed to the elevated SSC EMCs and load estimates for Carroll Canyon Creek. Data from the Los Peñasquitos Creek and Carmel Valley Creek subwatersheds suggest that proportionally high loads are generated in the upper portion of these subwatersheds, and may be deposited and/or pick up relatively low amounts of sediment prior to discharging to the Lagoon.

Although Los Peñasquitos Creek delivered the highest overall load this season, this result was driven by the unusually high flows encountered during Phase II; SSC EMCs were relatively low when compared to those of the other two subwatersheds. Overall contribution from Carmel Valley Creek was approximately 1 percent of the annual load estimate this season, and is consistently a small percentage of the total load, thus making this subwatershed the lowest priority for assessing management measures.

Based on data collected during both phases of the Watershed Special Study, two key monitoring locations within the Carroll Canyon subwatershed, CC-AC and CC-NR, showed relatively strong relationships between flow and SSC results, with R^2 values of 0.74 and 0.78, respectively. The other monitoring locations exhibited weak to no relationship between these two parameters, with R2 values ranging from 0.62 to -0.28. Further assessment of the data collected during this program, along with data collected at the TMDL compliance sites, will allow for a better understanding of these relationships at each site, and ultimately will facilitate better load estimations and key areas for potential management measures. Further assessment that includes factors such as supply limitations, dynamic hydrologic factors, and development of flow-duration and load-durations curves (when sufficient data allow) can assist in assessing shear stress within the creeks, which is a key factor in development of management measures.

Aerial deposition monitoring results from Phase II indicated that the contribution from airborne particles to the suspended sediment loads observed in the WMA is not significant relative to those generated by storm flows. PM_{10} analytical results from three monitoring events were generally low or negligible, as they were at or near the analytical laboratory's reporting limits. There were marginal increases in concentrations around anthropogenic activities, particularly in the Carroll Canyon Creek subwatershed relative to other monitored locations; however, these slight increases were not consistent or significant. Monitoring results from the two types of monitoring equipment (FRM and optical sensors) indicated that results were similarly low or negligible; however, within the low ranges of concentrations, results did not correlate well and showed a mean relative percent difference of 108 percent. The variability observed is primarily due to the low range of concentrations, where RPD calculations can misrepresent very small concentration differences.

4.2 RECOMMENDATIONS

The Watershed Special Study is complete. Monitoring at these locations is not planned to continue. The following are recommendations for potential future assessment efforts:

Perform detailed data analysis of both TMDL compliance site and Watershed Special Study monitoring location data using applicable sediment transport methods by utilizing available hydrologic, hydraulic, and geomorphic data for the study reaches. Calibrate the sediment transport predictions with sediment load collected through previous monitoring efforts. Assessment of data collected during this program over the past three years may be used to develop flow-duration and load-duration curves, assess shear stress within the creeks, and ultimately support sediment transport predictions for more accurate annual load estimations.

Focus assessments of management measures on the central portion of Carroll Canyon Creek. Based on data collected during both phases of this program, this portion of the creek appears to be the primary area within the WMA impacting SSC levels and associated impacts to estimated loads to the Lagoon. Reduction of SSC generated and stored in this area will provide a key reduction in sediment loads to the Lagoon.

Assess existing hydromodification impacts and methods to reduce those impacts. Increased flow rates attributed to land use development and associated hydromodification impacts increase erosion and the sediment transport capability of the creeks. This finding appears to be particularly true within the Carroll Canyon Creek subwatershed, where there is a high level of development and measured flows are "flashy" in response. This also appears to exist in the upper portion of Los Peñasquitos Creek subwatershed, in the Poway area, because flows measured at the LP-NC location showed a rapid response to rainfall and had the highest SSC EMCs within the subwatershed.

Focus potential future monitoring on the central Carroll Canyon Creek reaches. If future monitoring is determined to be needed, the scale of the monitoring program should be reduced to focus on the central Carroll Canyon Creek reaches, similar to Phase I. Data collected during both phases of the Watershed Special Study indicated that this area has the greatest sediment transport dynamics driven by storm flows. Further aerial deposition monitoring for load contribution is not recommended, because the data indicated an insignificant contribution from aerial suspension and deposition. Monitoring may be required for various reasons, including further assessment of concentrations and loads for design purposes or effectiveness assessment of potential future management measures implemented within the subwatershed.

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APPENDIX A
LOS PEÑASQUITOS WATERSHED MANAGEMENT AREA SEDIMENT LOAD SPECIAL STUDY FINAL MONITORING PLAN

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LOS PEÑASQUITOS WATERSHED MANAGEMENT AREA
SEDIMENT LOAD SPECIAL STUDY
FINAL MONITORING PLAN

Submitted to:
City of San Diego
Transportation & Storm Water Department
9370 Chesapeake Drive Suite 100
San Diego, California 92123

Submitted by:
Amec Foster Wheeler Environment & Infrastructure, Inc.
San Diego, California

June 2015

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
303(d) list	Clean Water Act Section 303(d), List of Water Quality Limited Segments
AC	alternating current
Air Toxics	Eurofins Air Toxics Laboratory
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
ASTM	ASTM International (formerly American Society for Testing and Materials)
AVB	area-velocity bubbler
Bacteria TMDL	Resolution No. R9-2010-0001: Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)
Caltrans	California Department of Transportation
CC	Carroll Canyon (used for Site ID)
CFR	Code of Federal Regulations
City	City of San Diego
CLRP	Comprehensive Load Reduction Plan
COC	chain of custody
CV	Carmel Valley (used for Site ID)
CWA	Clean Water Act
DC	direct current
DW	dry weather
FRM	Federal Reference Method
FY	fiscal year
GPS	Global Positioning System
HASP	Health and Safety Plan
HDPE	high-density polyethylene
ID	identification
Lagoon	Los Peñasquitos Lagoon
LB	left bank
LCS	laboratory control sample
LP	Los Peñasquitos (used for Site ID)
MB	method blank
MCAS	Marine Corps Air Station
mg/m3	milligrams per cubic meter
MOU	Memorandum of Understanding
MQO	measurement quality objective
MS4	municipal separate storm sewer system
MS4 Permit	Order Number R9-2013-0001: San Diego Regional Municipal Separate Storm Sewer System (MS4) Permit
NWS	National Weather Service
OAL	(California) Office of Administrative Law

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PCH	Pacific Coast Highway
PM	particulate matter
PM10	Particulate matter with an aerodynamic diameter of 10 microns or less
PM2.5	Particulate matter with an aerodynamic diameter of 2.5 microns or less
QA	quality assurance
QC	quality control
RB	right bank
Regional Board	San Diego Regional Water Quality Control Board
RL	reporting limit
RPD	relative percent difference
Sediment TMDL	Resolution Number R9-2012-0033: A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Total Maximum Daily Load for Sedimentation in Los Peñasquitos Lagoon (Regional Board, 2012)
SOP	standard operating procedure
SSC	suspended sediment concentration
State	State of California
State Board	State Water Resources Control Board
TMDL	Total Maximum Daily Load
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
VAC	volts alternating current
VDC	volts direct current
Weck	Weck Laboratories, Inc.
WLA	waste load allocation
WMA	Watershed Management Area

1.0 INTRODUCTION

This special study will complement and provide supporting information for the implementation of Resolution Number R9-2012-0033, *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Total Maximum Daily Load (TMDL) for Sedimentation in Los Peñasquitos Lagoon* (Sediment TMDL) (Regional Board, 2012). The study will monitor suspended sediment concentrations (SSCs) and the deposition of airborne particulates at multiple points along the major tributaries within the greater Los Peñasquitos Watershed Management Area (WMA). The purpose of this special study is to better understand sediment loading and transport within the Los Peñasquitos WMA. Data collected during this special study are intended to provide information on potential source areas within the subwatersheds and to determine whether aerial deposition is a contributing factor to sediment loads. Results of this monitoring are aimed at assisting Responsible Agencies to determine the most effective use of resources to manage sediment loading throughout the WMA.

1.1 BACKGROUND

The Los Peñasquitos WMA encompasses an approximate 94-square-mile drainage area in west-central San Diego County. Within the WMA are the City of Poway, a portion of the City of Del Mar, unincorporated areas of San Diego County, and the City of San Diego communities of Mira Mesa, Scripps Ranch, Carmel Valley, and Sorrento Valley.

The WMA drains a highly urbanized region that supports a variety of water supply, economic, recreational, and habitat-related beneficial uses. The WMA includes four subwatersheds: Carmel Valley Creek, Los Peñasquitos Creek, Carroll Canyon Creek, and Los Peñasquitos Lagoon (the area immediately surrounding the lagoon). For the purposes of this monitoring plan, the three major streams (Carmel Valley Creek, Los Peñasquitos Creek, and Carroll Canyon Creek [also known as Soledad Canyon Creek]) will be referred to collectively as the subwatersheds that are included for monitoring purposes, as these are the primary conveyances that ultimately discharge into the Los Peñasquitos Lagoon (Lagoon). The subwatershed of Los Peñasquitos Lagoon is not included in the monitoring under this special study.

The Lagoon has incurred a number of anthropogenic disturbances that have resulted in excessive sedimentation and the gradual degradation and loss of the estuarine habitat. Accordingly, the Lagoon was placed on the 2006 Clean Water Act (CWA) Section 303(d) List of Water Quality Limited Segments (303(d) list) for sedimentation and siltation on June 28, 2007. Under the 303(d) listing, beneficial uses that are most impaired by sedimentation are estuarine habitat and preservation of biological habitats of special significance. Sedimentation in the Lagoon also restricts tidal flows between the Lagoon and the ocean, and degrades critical saltmarsh habitats.

On June 13, 2012, the San Diego Regional Water Quality Control Board (Regional Board) adopted the Sediment TMDL, which is designed to restore the Lagoon to its mid-1970s condition. The Sediment TMDL has been approved by the State Water Resources Control Board (State Board) and was approved by the California Office of Administrative Law (OAL) on July 14, 2014, and the United States Environmental Protection Agency (USEPA) on October 30, 2014. This Monitoring Plan will be adopted to evaluate progress toward meeting TMDL targets and sediment reduction goals.

The Sediment TMDL will be incorporated into the San Diego Regional Municipal Separate Storm Sewer System (MS4) Permit (MS4 Permit) (Order Number R9-2013-0001) (Regional Board, 2013) and will be included in the Water Quality Improvement Plan for the Los Peñasquitos WMA. The requirements of the Sediment TMDL and the MS4 Permit will be addressed in the Los Peñasquitos WMA Water Quality Improvement Plan. This special study assessing sediment transport within the subwatersheds of the Los Peñasquitos WMA fulfills requirements set forth in the Water Quality Improvement Plan. This study is to be conducted in two phases during the current MS4 Permit cycle, as described in Section 1.2. The first phase was initiated solely by the City of San Diego to serve as a pilot study to assess the feasibility of implementation. The second phase is implemented by the Responsible Agencies throughout the entire WMA, per Water Quality Improvement Plan requirements.

The Responsible Agencies that are party to the development of the Water Quality Improvement Plan for this WMA are:

- City of Del Mar
- City of Poway
- City of San Diego
- County of San Diego
- California Department of Transportation (Caltrans)

Caltrans has partial responsibility for the implementation of the Sediment TMDL along with the Comprehensive Load Reduction Plan (CLRP) for the TMDL for indicator bacteria, *Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001 (Regional Board, 2010), referred to as the Bacteria TMDL. Caltrans is therefore included as a Responsible Agency, but is not listed in the MS4 Permit as a Copermittee. Caltrans is under a separate storm water permit from the State of California (State) to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters (Order No. 2012-0011-DWQ and Amendment Order No. WQ 2014-0077-DWQ) (State Board, 2014 and 2013). Caltrans is voluntarily participating in the development of several Water Quality Improvement Plans across the San Diego region.

1.2 SPECIAL STUDY PLANNING AND OBJECTIVES

This special study will assess sediment transport at multiple points throughout the WMA’s subwatersheds (Carmel Valley Creek, Los Peñasquitos Creek, and Carroll Canyon Creek) in both the riverine water column (during storms) and aerial deposition (during ambient dry conditions). Data collected during this program will provide current sediment loading information for the monitored segments of the creeks. Outcomes from this special study are intended to assist in evaluating and refining the sources of sediment within the study area, which will ultimately assist in addressing potential management measures related to the Sediment TMDL waste load allocation (WLA). This special study is designed to answer the following study questions:

- Wet Season Riverine Monitoring
  - What is the sediment concentration at discrete times throughout a wet weather event hydrograph at points throughout the subwatersheds?

  - What are current sediment load estimates (washload and bedload) at points throughout the subwatersheds? Is there a greater load from a potential source area?
  - How do the sediment delivery potentials of the various creek reaches compare with each other during wet weather events?
- Dry Weather Aerial Deposition Monitoring
  - What are the aerial contributions of sediment to the subwatersheds within the WMA?
  - Can these entrained particles be associated with specific sources or land uses?
  - What is the contribution of aerial deposition relative to wet weather suspended sediment concentrations observed in the sub-watersheds?

This special study is to be executed in two phases as follows:

- Phase 1
  - Initiated by the City of San Diego to assess the feasibility of the study design and provide additional data on Carroll Canyon Creek discharges, as the creek has been identified as the primary contributor of sediment loads to the Lagoon
  - Conducted during Fiscal Year (FY) 2015 (FY15), July 2014 through June 2015. This phase could potentially continue in future fiscal years if Phase 2 is not initiated
  - Includes wet season riverine and dry weather aerial deposition monitoring in the Carroll Canyon Creek subwatershed only
- Phase 2
  - Implemented by the WMA Responsible Agencies throughout the WMA, per the Water Quality Improvement Plan
  - Conducted during one fiscal year, July through June, before the current MS4 Permit Report of Waste Discharge submittal in 2018
  - Includes wet season riverine and dry weather aerial deposition monitoring in the three subwatersheds: Carroll Canyon, Los Peñasquitos, and Carmel Valley Creeks

1.3 SUBWATERSHED STUDY AREAS

There are three monitored subwatersheds within the Los Peñasquitos WMA: Carmel Valley Creek, Los Peñasquitos Creek, and Carroll Canyon Creek. Figure 1-1 shows subwatersheds, boundaries of the creeks' drainage areas, 303(d)-listed segments, and jurisdictional boundaries. Caltrans' jurisdiction occurs in the three subwatershed and consists of the corridors associated with their highways (e.g., Interstate 5, Highway 1/Pacific Coast Highway [PCH]) and are not delineated separately in WMA maps.

Carmel Valley Creek, the northernmost creek, drains the approximate 15.71-square-mile (10,057-acre) sub-basin of Carmel Valley. Carmel Valley Creek flows westward from its headwaters (on Black Mountain) to its drainage point, at the northeastern corner of the Lagoon. The Carmel Valley Creek subwatershed is entirely within City of San Diego boundaries.

Los Peñasquitos Creek is the largest subwatershed in the WMA, draining approximately 59 square miles (37,760 acres) through the middle of the WMA. This creek conjoins with Carroll

Canyon Creek prior to entering the Lagoon. The Los Peñasquitos Creek subwatershed includes portions of the Cities of Poway, Del Mar, and San Diego, and unincorporated areas of San Diego County.

Carroll Canyon Creek, also known as Soledad Canyon Creek, is the southernmost of the three major drainages in the WMA. The creek runs through Carroll Canyon and ultimately drains into the Lagoon at the southwestern end, near its confluence with Los Peñasquitos Creek. Carroll Canyon Creek drains an area of approximately 17.19 square miles (11,004 acres). The Carroll Canyon Creek subwatershed is entirely within City of San Diego boundaries.

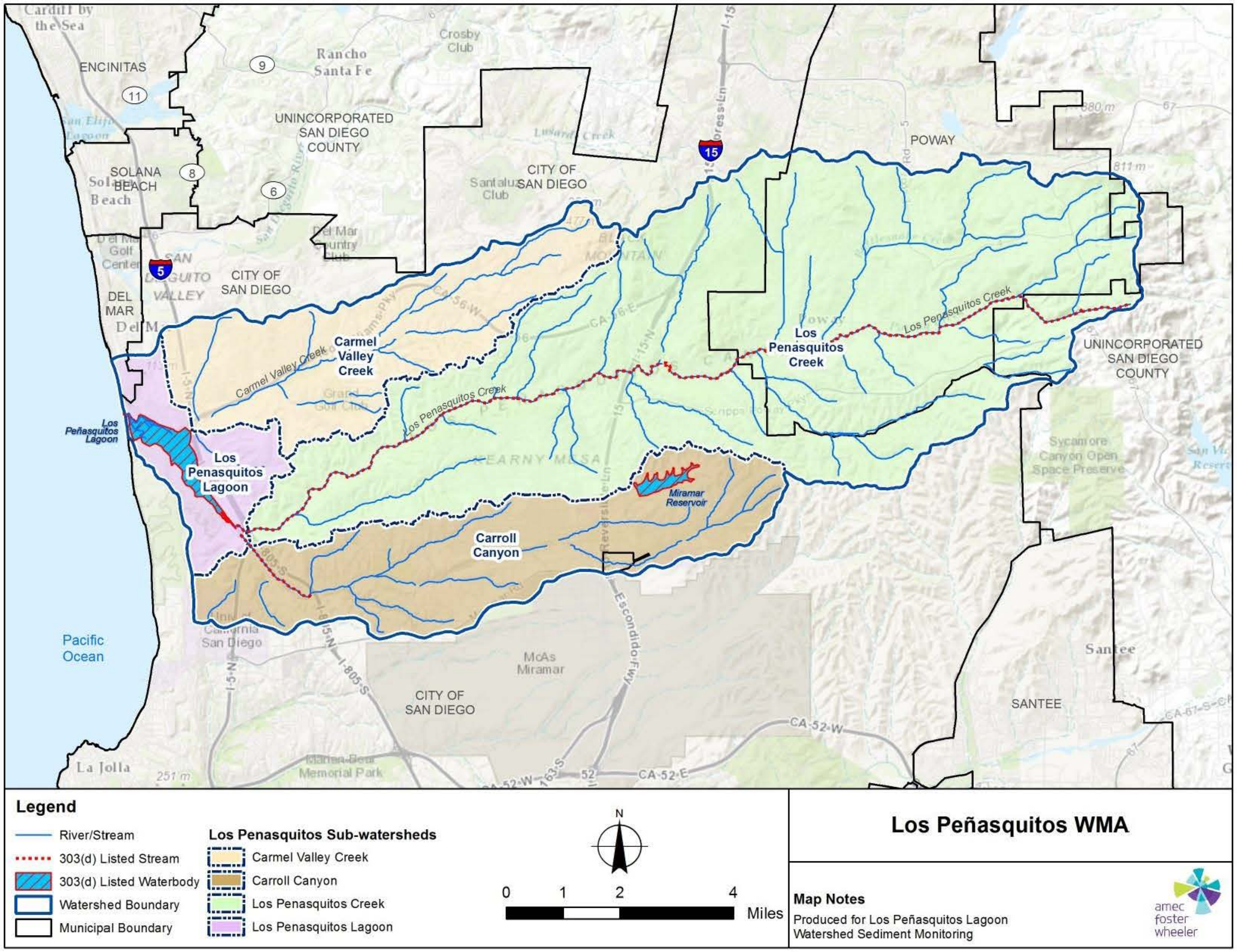

Figure 1-1.
Los Peñasquitos Water Management Area

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1.4 PROJECT ORGANIZATION

The City of San Diego is the municipal government agency that oversees the project. The other municipalities within the WMA will contribute to the program through a Memorandum of Understanding (MOU). The City of San Diego has assigned two staff members to provide project oversight:

- Andre Sonksen is responsible for storm water compliance-related projects at the City of San Diego and will provide project oversight.

- Karina Danek will provide Water Quality Improvement Plan and MS4 Permit-related support, as needed.

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) will coordinate sampling design, sample collection, laboratory analysis, data management, data analysis, and reporting. Amec has assigned project responsibilties to several staff members:

- Jeremy Burns will serve as the Amec Foster Wheeler Project Manager, and will be responsible for project coordination and development, scheduling, budget management, and oversight of all project plans, activities, and reports.
- Kiernan Brtalik, the Amec Foster Wheeler Project Coordinator and Field Sampling Manager, will be responsible for implementing the monitoring activities, coordinating laboratory work, and developing the project report.
- Dr. Theodore VonBitner will be the Amec Foster Wheeler Quality Assurance Officer, with responsibility for the project quality assurance (QA) and quality control (QC) procedures used during sampling, laboratory analysis, data management, and data analysis.
- Jesse Davis, as the Amec Foster Wheeler Health and Safety Officer, will be responsible for implementing the project health and safety plan and related practices.
- Dr. Habib Matin will provide Amec Foster Wheeler senior principal-level oversight and review during development of this monitoring plan, implementation of sampling, data analysis, and reporting.
- Liz Collins is the manager of Amec Foster Wheeler's material testing laboratory, which will conduct particle-size distribution analyses for bedload samples; she will ensure that samples analyzed by Amec Foster Wheeler are analyzed in accordance with the methods and QA requirements outlined in this monitoring plan.

Weck Laboratories, Inc. (Weck), located in City of Industry, California, will be responsible for wet weather SSC analysis:

- Hai Van Nguyen is the Weck Project Manager and will ensure that samples are analyzed in accordance with the methods and QA requirements outlined in this monitoring plan. The Weck laboratory QA/QC manual is in Appendix A.

Eurofins Air Toxics Laboratories, Inc. (Air Toxics), located in Folsom, California, will be responsible for analyzing the aerial deposition samples:

- Kyle Vagadori is the Air Toxics Project Manager and will ensure that aerial deposit samples are analyzed in accordance with the methods and QA requirements outlined in this monitoring plan. The Air Toxics laboratory QA/QC manual is provided in Appendix A.

The project organization is provided in Figure 1-2.

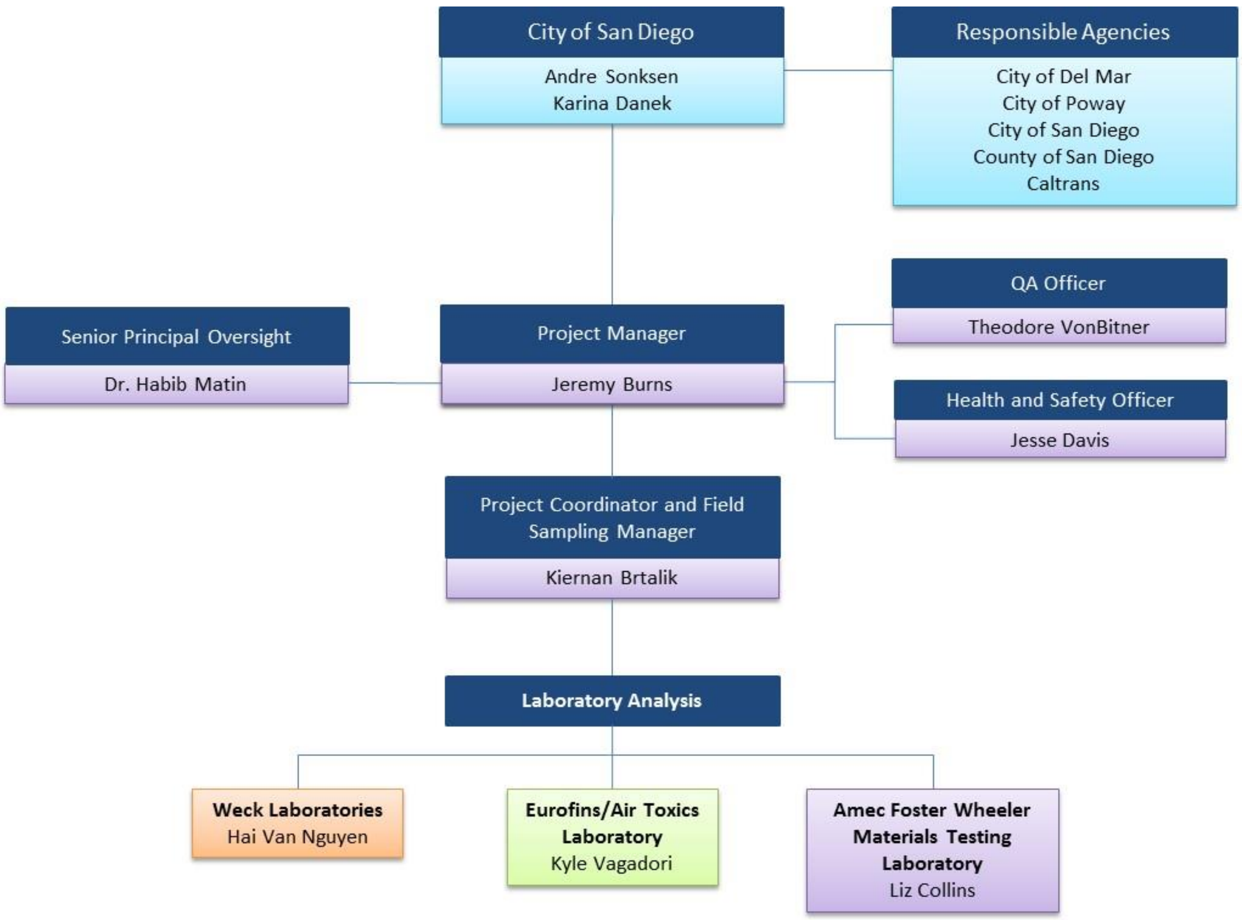

Figure 1-2.
Amec Foster Wheeler Team Organization

1.5 MONITORING PLAN ORGANIZATION

This monitoring plan encompasses wet weather riverine and dry weather aerial depositions monitoring. Given the different media, monitoring locations, and analyses, the structure of the monitoring and analytical procedures in this document is organized on the basis of monitoring type. The Introduction, QA/QC, and Data Analysis and Reporting sections (Sections 1, 5, and 6) are inclusive of both monitoring aspects and describe the overall, collective goals of this special study. For the sake of clarity, the monitoring details (e.g., locations, approach, analyses, etc.) for each monitoring type have been separated in this document.

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2.0 WET SEASON RIVERINE MONITORING

Wet weather and related sediment sampling will occur at several locations in Carmel Valley Creek, Los Peñasquitos Creek, and Carroll Canyon Creek within the study boundary. This section describes the monitoring locations, sampling procedures, and analytical requirements associated with the wet season riverine sampling.

2.1 WET SEASON SAMPLING LOCATIONS

Approximate wet weather sampling locations were pre-selected along Carroll Canyon Creek, Los Peñasquitos Creek, and Carmel Valley Creek. Locations were targeted on the basis of site accessibility, spacing along each creek, characteristics of creek segments, and/or jurisdictional boundaries.

Site names, identifications (IDs) and the approximate geographic coordinates within each subwatershed are listed in Table 2-1. The locations are also shown in Figure 2-1.

Included in Figure 2-1 are three TMDL compliance monitoring locations that are sampled as part of the Los Peñasquitos WMA compliance monitoring program. The three TMDL compliance sites are at the base of each primary tributary creek and are named after their respective subwatersheds: Carmel Valley Creek, Los Peñasquitos Creek, and Carroll Canyon Creek. These locations are shown in the map for context, but are not included in Table 2-1, because they are not part of this special study. Site locations for Phase 1 of this special study are currently being monitored. Site locations for Phase 2 are approximate and may change on the basis of site reconnaissance and suitability for monitoring, as determined during siting efforts in these subwatersheds during Phase 1.

Table 2-1.
Los Peñasquitos WMA Speical Study
Wet Season Monitoring Locations

Site Name	Subwatershed	Site ID	Site Description	Latitude[1]	Longitude[1]	Monitoring Phase
Nancy Ridge	Carroll Canyon Creek	CC-NR	Approx. 100 feet east of the Carroll Canyon Road and Nancy Ridge Drive intersection	32.89168	-117.19194	1 and 2
Arizona Crossing	Carroll Canyon Creek	CC-AC	Approx. 900 feet east of the Fenton Road and Carroll Canyon Road intersection	32.89249	-117.18221	1 and 2
Maya Linda	Carroll Canyon Creek	CC-ML	Large underground storm drain in the Mira Monte Apartments parking lot – northeastern corner of Building “A”	32.90605	-117.11719	1 and 2
Black Mountain	Carroll Canyon Creek	CC-BM	Creek behind office building, approximately 500 feet southeast of the Black Mountain Road and Maya Linda Road intersection	32.90055	-117.12223	1 and 2
Trap Channel	Carroll Canyon Creek	CC-TC	Lined drainage channel approximately 65 feet east of the Via Pasar and Candida Street intersection	32.89770	-117.11947	1 and 2
North City[1]	Los Peñasquitos Creek	LP-NC	Creek near the Sabre Springs Road and Springbrook Drive intersection near Poway	32.94275	-117.08428	2 only
Hidden Valley[1]	Los Peñasquitos Creek	LP-HV	Creek near the Gate Drive and Fairgate Drive intersection in Poway	32.95502	-117.03386	2 only
Carmel Valley[1]	Carmel Valley Creek	CV-CV	Creek location where it passes under Carmel Valley Road	32.94843	-117.19762	2 only

1. Site locations are subject to change. The number of Phase 2 locations (Los Peñasquitos Creek and Carmel Creek) may be increased or decreased on the basis of site reconnaissance and suitability for monitoring.

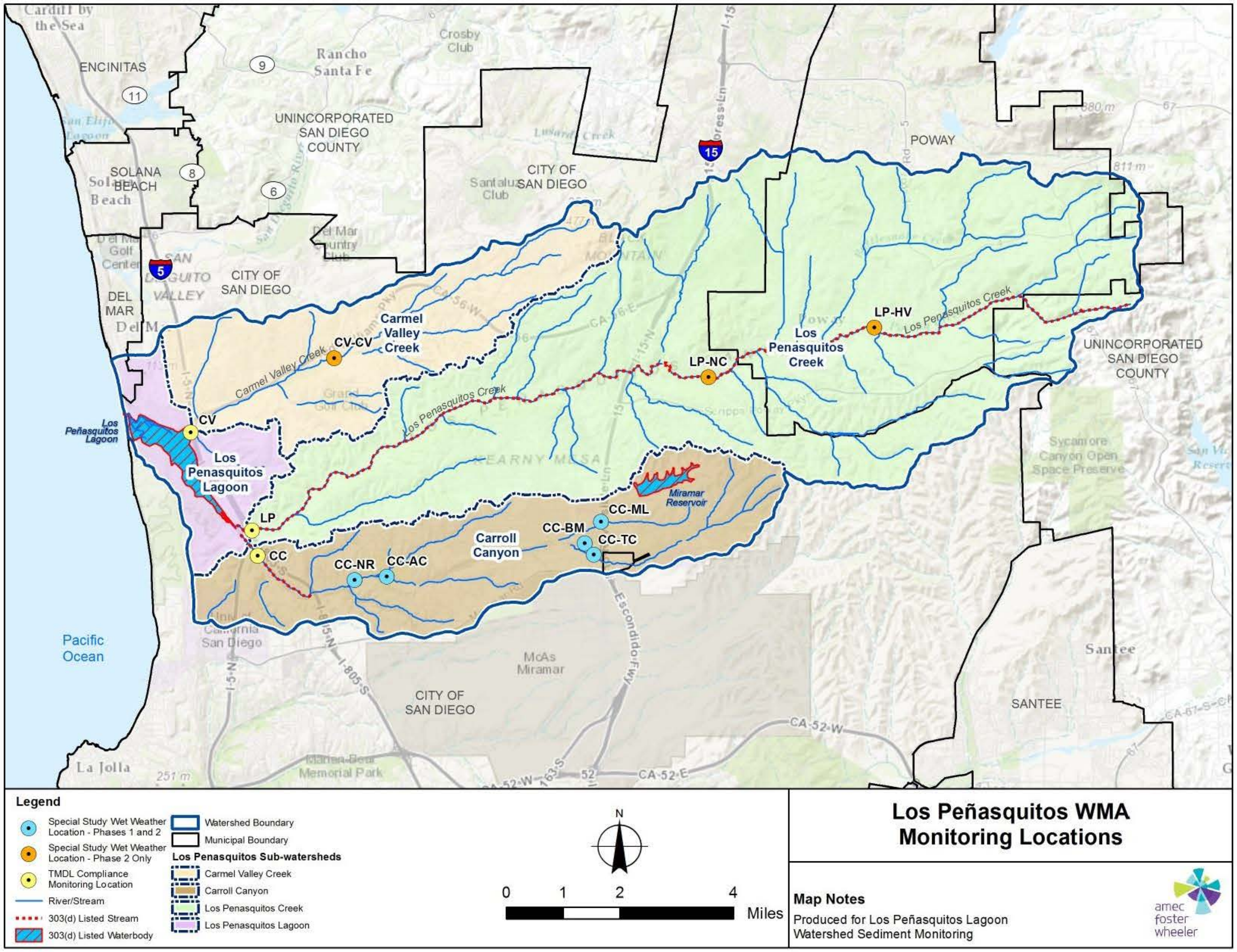

Figure 2-1.
Los Peñasquitos WMA Wet Season Monitoring Locations

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2.2 SAMPLING METHODOLOGY

2.2.1 Pre-Wet Season Sampling

Sections 2.2.1.1 through 2.2.1.4 describe sampling activities for this special study to be performed prior to the wet season.

2.2.1.1 Volumetric Stream Bed Sampling

Volumetric stream bed sampling will be conducted at each monitoring location (except Maya Linda, since it is located in a concrete conveyance) on one occasion prior to the wet weather season. Up to three stream bed material samples will be collected at a representative portion along a cross-sectional transect at each monitoring location. Samples will be collected in an area approximately 12 inches by 12 inches, and by digging down approximately 12 inches, yielding a sample size of approximately 1 cubic foot. If an armor layer of large cobble exists that has a grain size that is distinctly larger than the grain size of the underlying material, the layers will be sampled separately. Samples will be placed in 5-gallon buckets and will be labeled by Site ID. Samples will be transported to Amec Foster Wheeler's materials testing laboratory and analyzed for particle-size distribution (PSD). Data from this sampling provide information on existing grain size and potential susceptibility to erosion. The PSD data provide valuable information on the streambed armoring processes and changes in PSD due to geomorphic changes at the study reach. This PSD monitoring will document the changes in particle size distributions at the beginning of each season in comparison to the size distribution form the previous year.

2.2.1.2 Cross-Sectional Channel Surveys

During the volumetric sampling, field crews will conduct cross-sectional channel surveys at each monitoring location. Surveys will be used to refine flow measurements.

2.2.1.3 Pebble Count Before Wet Season

A pebble count will be conducted at each monitoring location prior to the wet season, except the Maya Linda location. This data point will be used as the baseline for the season and as a comparison point for the subsequent pebble counts that will be conducted after monitored storms and after non-monitored major storms throughout the wet season. It is anticipated that a total of eight pebble counts will occur throughout the project. The method used will be the sampling frame and template method developed by Bunte and Abt (2001a and 2001b), which uses a minimum of 100 particles and half-phi template (gravelometer) to measure particle sizes. A tape measure will be used to space three sampling transects across riffle sections at each location. The pebble count represents the size of material in the area and can be used to assess the representativeness of the volumetric samples. Site locations will be physically marked and recorded using Global Positioning System (GPS) for subsequent pebble counts throughout the wet season. Pebble counts can be used to assess stream power and its ability to move particles downstream. They also provide PSD data after storm events. This information will be used to evaluate the changes in PSD (i.e., D35, D50, and D90) after each storm event compared to the size distribution at the beginning of the wet season. This data will provide information on whether the streambed is coarsening as a result of the storm events.

2.2.1.4 Photodocumentation

The stream bed will be documented with photographs taken during dry weather volumetric sample collection and initial pebble counts. Photos will be taken of the stream bed using a 1-square-foot frame placed in three designated locations within each stream. These same points will be photographed during subsequent pebble counts, based on pebble count site markings. These photographs will provide a time series of stream bed material changes throughout the wet season.

2.2.2 Wet Weather Monitoring

Wet weather monitoring will occur during three qualifying rainfall events (storms forecast to produce greater than 0.20 inch of rainfall) during each wet season. Monitoring will consist of pollutograph and bedload sampling, post-storm pebble counts, photodocumentation, and long-term flow monitoring.

2.2.2.1 Pollutograph Sampling

During each monitored event, water samples will be collected for SSC analysis. A target of 10 pollutograph samples will be collected at each monitoring location (as listed in Table 2-1) during each of the three monitored events. Sampling will be conducted either manually or with automated samplers at each monitoring location. Samples will be collected at equal time intervals or at times adjusted to capture multiple peaks throughout the storm duration. Data from these samples will provide insight on sediment concentrations throughout a storm and will be used to calculate load estimations.

2.2.2.2 Bedload Sampling

Samplers will be installed per United States Department of Agriculture guidelines (Bunte et al., 2007). Attempts will be made to collect bedload samples during monitored events at each monitoring location, with the exception of the Maya Linda site. The Maya Linda site is in a large, underground storm drain that is not considered a feasible location for bedload sampling.

Previous sample collection by Amec Foster Wheeler in other City project locations (Flanders Canyon Creek [2011–2012] and Carroll Canyon Creek [2011–2013]) has been successful on limited occasions; however, based on best professional judgment for these previous monitoring efforts, bedload sample collection may be unsuccessful for a given storm event. For the aforementioned studies, the cause of sample failure is unknown. It is hypothesized that flows may redirect around bedload samplers because of stream hydrology or sample exclusion due to large cobbles.

For these challenged bedload sampling locations, efforts will be made to move the in-stream samplers around in the channel if flows appear to be bypassing the samplers. Bedload samples will be collected using a bedload trap sampler installed at two points across the channel at each site. If a sampler fills with material during the storm and it is safe to access it, attempts will be made to change the mesh bag. These samples will provide data on material that is moving along the stream bed during storms and is not suspended in the water column. If collection is successful, bedload samples will be analyzed for particle size distribution. Bedload data will be used in conjunction with SSC sample data to calculate load estimations. Bedload data will be used in conjunction with SSC sample data to estimate sediment loads. Particle size data for bedload samples will provide insight into stream power and its potential to cause erosion. Bedload data will also provide information on bed shear stress during storm events on the incipient motion of particles for each storm and the effect of bed armoring on particle motion and its transport capacity

2.2.2.3 Post-Storm Pebble Count

A pebble count will be conducted at each monitoring location after each monitored storm and after major storms throughout the wet season, as budget permits. See Section 2.2.1.3 for procedure details.

2.2.2.4 Photodocumentation

The stream bed will be documented with photographs taken during post-storm pebble counts. Photographs will be taken at the same locations that were photographed during the prior to the wet season. These photographs will provide a time series of stream bed material changes throughout the wet season. See Section 2.2.1.4 for procedure details.

2.2.2.5 Long-term Flow Monitoring

In addition to storm event monitoring, flow will be measured continuously at each of the monitoring locations. Flow data will be logged at 1-minute intervals during storm events and at 15-minute intervals during non-storm events. Data will be downloaded, twice per month, to confirm that data are being recorded and that the equipment is functioning properly. Flow data collected at these monitoring locations will be used to calculate load estimations and provide an understanding of the flow regimes at each location, which can affect the sediment transport capabilities at each monitoring location. The continuous flow data can be used in evaluating sediment transport load during storm events. The flow data will be used in evaluating stream transport capacity using particle size distribution and bedload sampling results.

2.3 WET WEATHER MONITORING PREPARATION AND LOGISTICS

2.3.1 Weather Tracking

Weather will be tracked for monitoring purposes throughout the wet season. Throughout the wet season, several sources of weather information will be monitored continuously; however, the National Weather Service (NWS) webpage will be the primary source used to determine whether and when to mobilize monitoring crews.

2.3.2 Storm Selection Criteria

The following criteria will be used to determine whether to mobilize, on the basis of forecast data from the NWS, for an impending storm event:

- Storm forecasts must meet criteria at least 48 hours prior to the onset of rainfall;
- A storm must be forecast to produce at least 0.20 inch of rainfall;
- The probability of precipitation must be greater than 60 percent; and
- A storm event must be preceded by at least 72 hours of dry conditions (less than 0.10 inch of precipitation).

The Field Sampling Manager and/or Project Manager may modify the criteria on a storm-by-storm basis, in consultation with the City of San Diego.

2.3.3 Staffing and Mobilization

Staffing Plan

Monitoring both the flow characteristics and water quality of storm water requires considerable planning before any rain actually falls. Obtaining representative samples and complete storm data is possible only with trained and alert field teams. The uncertainty of weather forecasts coupled with abrupt changes in the weather can greatly alter the expected workload. It is critical to plan and prepare in advance as many aspects of the field work as possible. A staffing plan that designates personnel and specifies the equipment required for each facet of monitoring will be completed as soon as a potential event has been forecast.

Each monitoring team will consist of two field individuals. The staffing plan will specify the following:

- Personnel assigned to each position
- Shift times (e.g., startup and relief) and assigned monitoring location
- Equipment mobilization requirements
- Communication channels

No field teams will be mobilized for a storm event that would require field sampling or laboratory analysis on federal holidays.

Staffing Positions and Personnel

Storm monitoring tasks require a variety of skills. Amec Foster Wheeler personnel will be assigned to the following positions:

- Project Manager
- Field Sampling Manager
- Field Technicians

Project Manager

During storm events, the Project Manager will monitor the status of the storm conditions and communicate with the Field Sampling Manager. The Project Manager must be able to obtain and interpret the most recent weather forecasts to estimate the appropriate timing and duration of the storm. This information will be used to determine the time span between pollutograph sample collections and to make informed decisions regarding the storm status. It is also the responsibility of the Project Manager to notify all personnel of shift start- and end-time changes.

The assigned Project Manager has excellent decision-making and dispatching skills as well as an understanding of the project requirements. If the Project Manager is not available during the storm event, an individual with similar skills will be assigned; however, the Project Manager will be available to answer questions.

Field Sampling Manager

This position requires an understanding of project requirements, sampling procedures, and equipment operations. The Field Sampling Manager must be able to troubleshoot most of the common problems that could be experienced by any of the field teams. The Field Sampling Manager will lead sampling activities, monitor the ability of field teams to safely and effectively complete their shifts, and communicate frequently with the Project Manager to prioritize tasks, request relief teams as needed, and provide onsite weather observations.

The Field Sampling Manager is a technically skilled field supervisor and is the most experienced member of the field team.

Field Technicians

Field technicians are field personnel trained in storm water sample collection and health and safety procedures. They will assist the Field Sampling Manager in storm water sample collection.

Equipment Mobilization

Equipment needed for storm water sampling includes automated sampling equipment, sample containers, safety equipment, personal rain gear, and storm kits. The necessary equipment will be loaded into the appropriate vehicles early in the storm preparation sequence. During the monitoring season, field crews will use safety equipment, personal rain gear, and other monitoring location maintenance equipment.

Table 2-2 lists the contents of a field technician's field kit.

Table 2-2.
Field Equipment for Storm Monitoring and Mobilization

Storm Kit Equipment List	Mobilization List
Flashlights or headlamps	Paper towels
High-quality alkaline batteries for lamps	Cellular phone
Maps of all required areas	Personal rain gear
Pencils and indelible markers	Digital or disposable camera
Desiccant (packages and jar)	Safety gear (see Appendix B, Health and Safety Plan)
Diagonal clipper	Spare sample labels
Electrical tape	Sample control paperwork
Cable ties (assorted sizes)	Spare sets of 1-liter bottle suites for carousel
Utility knife	Automated sampling equipment not existing onsite (including appropriate spare batteries)
Ziploc® plastic bags (assorted sizes)	Spoons, trowels, and shovels
Nitrile gloves	Bedload trap equipment and spare bedload trap nets
Full set of keys (if necessary)	
Field notebook	

Communication Channels

Communication channels must be established for personnel to contact each other before and during the event. The project field notebook will include lists of home, work, and cellular telephone numbers of the Amec Foster Wheeler field team and the work telephone numbers of the primary laboratory contacts and City personnel. Cellular telephone communication links to field teams are essential for efficient storm water monitoring because the Project Manager and Field Sampling Manager will need to track the location and workload of each field team and to prioritize tasks.

Training of Field Personnel

Field personnel will be properly trained in the use of the monitoring equipment and in all appropriate health and safety protocols (see Appendix B). Specifically, the following elements will be included in the training of all field personnel:

- Review of health and safety plan
- Classroom training
- Field training (as necessary)

Each field team member will review the Health and Safety Plan (HASP) and consult with the Field Sampling Manager for any questions before mobilization. Classroom and field training will be provided prior to the first monitored storm event to inform field personnel of the project-specific objectives.

2.3.4 Station Preparation

Field Equipment Installation

Each field installation team will consist of two technicians who are knowledgable on the use of storm water samplers. The technicians will also be familiar with equipment siting requirements. The team will deliver and install the enclosure, monitoring equipment, intake tubing, and flow monitoring sensors prior to the onset of the storm season. Any equipment that is not installed or stored onsite will be mobilized during pre-storm activities.

Determination of Sampling Time Intervals

Water quality monitoring using pollutograph sampling requires an understanding of forecast storm length to determine the proper time intervals between the targeted 10 samples. If automated samplers are used to collect pollutograph samples, the proper time interval must be entered into the automated samplers before the storm starts. Although 10 samples are targeted to be collected throughout the storm, achievement of that target is based on actual storm duration; if the storm ends much earlier than forecast, 10 samples may not be collected.

This project requires individual samples per analysis on the basis of analytical methods. One-liter containers will be used to collect water samples for SSC; one container will be filled at each sample collection interval.

Preparation of Automated Equipment

A maintenance and calibration program will be performed at each automated water sampler before each wet weather event during the monitoring season. Maintenance will include checking the performance of all the equipment, checking power supplies, inspecting and clearing intake structures, checking the status of the instrumentation desiccant, and performing any necessary equipment repairs to keep the monitoring equipment operational.

Field teams will inspect the monitoring equipment at all flow monitoring locations to make sure that it is functional and will verify that the equipment is functional on field forms.

If automated samplers are used for water sample collection, field teams will make sure that the automated sampler has been reset and that it has been programmed to collect samples on the basis of the specified time intervals. The automated sampler will be programmed to collect 10 samples.

Sample Handling

Once samples are collected, the sample bottles will be iced, with sufficient ice maintained around the bottle to ensure that the sample temperature is 6 degrees Celsius or less.

General Inspection of Monitoring Location

The general suitablity for installation of monitoring equipment will be surveyed at each location and assessed to determine whether there is debris or trash that could clog or foul equipment. The equipment will be physically observed for potential problems, such as a damaged cable or a kinked hose. When access allows, intake strainers and flow sensors will be visually checked and cleared of debris, if necessary.

2.3.5 Documentation

Each time a monitoring location is visited (whether during a storm or not), the visit will be recorded in the field log. The field data sheets in Appendix C are a guide to ensure that all the required data are obtained. Occasional checks of equipment parameters, such as date, time, and current water level (when safe access allows), will be conducted to verify that the data being recorded are accurate and that any deviations can be addressed in a timely fashion.

The following information will be entered during monitoring location visits:

- Site identification (alphanumeric)
- Date and time
- Monitoring program
- Field team
- Conveyance type
- Weather conditions
- Runoff characteristics
- Equipment condition
- Sample count
- Miscellaneous comments

Additional data will be recorded on the field data sheet at the end of a monitoring event. The following data will be collected at all stations where applicable:

- Total Flow Volume—Total volume of water that passed the station during the storm.
- Pollutograph Sample Count and Collection Times and Flow Rates—Total number of pollutograph samples collected throughout the storm, the time at which each was collected, and the flow rate at the time of sample collection.
- Total Rainfall—Total accumulated rainfall (in inches) since the start of the storm, measured each time the rain bucket tips.

Flow and rainfall data will be logged by the storm water flow meter and will be downloaded after the storm. However, if any downloaded data are lost, the data recorded on the field data sheet will serve as a secondary data reference.

2.3.6 Field Equipment Installation, Calibration, and Maintenance

Field teams will install the equipment, making sure that all equipment is securely mounted, using stainless-steel hardware. Sampling tubing and wiring will be routed through conduits that will be placed between the monitoring locations and the sampling enclosures. Above-ground instruments will be protected within the monitoring location equipment enclosure. Conduit runs will be buried in short, shallow trenches or secured to other basin features using stainless-steel hardware. Exposed conduit, intakes, and sensors will be securely fastened, using stainless-steel brackets, screws, and anchors.

Bedload trap samplers will be installed prior to a monitored event.

Monitoring equipment will be calibrated upon installation and during maintenance and pre-storm visits. During wet weather events, the field crew will document the equipment status, which will include:

- Checking the performance of all equipment
- Checking power supplies
- Inspecting and clearing intake structures
- Calibrating equipment, as necessary

Field crews will attempt to address maintenance needs that arise while onsite. If issues remain, field crews will note the nature of the problem and return to perform the required maintenance.

2.3.7 Flow Monitoring and Water Quality Monitoring Equipment Specifications

Data-Logging Flow Meter

The Sigma 950 area-velocity-bubbler (AVB) data-logging flow meters measure, calculate, and log flow data, based on a set of continuous measurements and programmed information.

Based on channel type and available historical flow data, water flow at each monitoring location will be measured, using either a head versus flow table or an AVB probe, which measures water stage and velocity. The flow meter allows programming of the geometry of the conveyance and, based on input from the AVB probe, the flow meter calculates instantaneous flow rates. The flow meters also have inputs for a rain gauge and sampler communication.

Flow meters will have data logging capability that allows the flow meter to be connected to an automated sampler. The flow meter provides a method for controlling (pacing or triggering) the sampler and storing the corrresponding sampling data.

The flow meters will measure and log flow levels and rainfall at 1-minute intervals. During rain events, the flow meters convert instantaneous flow into total runoff volume. Storm and hydrological data are electronically stored in the flow meter, with each monitoring event stored separately. The information recorded includes:

- Level, velocity (if applicable), flow, and rainfall data at the programmed logging interval
- Flow rate at the time of each sample
- Time of peak flow rate
- Cumulative rainfall
- Discharge volume totals

Automated Sampler

One of two automated samplers will be used for this project: an American Sigma 900 MAX or a SD900 sampling system. Each system consists of an intake strainer, Teflon-lined intake tubing, flexible silicon pump tubing, a peristaltic pump, a distributor arm, and sample bottles. If manual sample collection is determined to be more practical or successful, the automated samplers will not be used. The decision regarding the method of sample collection will be made on a case-by-case basis by the Field Sampling Manager.

The intake strainers will be securely fastened in a manner that allows sample collection in the estimated middle depth of water column. The intake tubing will be securely fastened to the intake strainer and will be housed in protective conduit to the point where the tubing enters the monitoring equipment enclosure. The intake tubing will be attached to the flexible silicon pump tubing at the sampler. The flexible silicon pump tubing will run through the sampler peristaltic pump into a distributor arm to fill the sample bottles.

Rain Gauges

A tipping bucket rain gauge is configured with a small "bucket" that holds a known amount of rainfall. When the bucket is full, it tips the water out, momentarily closes a switch, and then resets itself and starts the process again. The data logger counts each switch closure and so accumulates rainfall totals. The rain gauges used in this monitoring program are manufactured by American Sigma and will tip after every 0.01 inch of rain.

Rain gauges are installed at the Black Mountain and Trap Channel locations. The other monitoring locations do not allow for rainfall measurement because of site conditions or logistics. The two locations are representative of the upper watershed, while the lower watershed is represented by data collected at the TMDL Compliance Monitoring locations.

Power

The automated sampling equipment (if used) will be powered by 12-volts direct current (VDC) power sources, either 12-VDC deep-cycle marine batteries or 12-VDC gel cell batteries. At each monitoring location, one battery will power each piece of equipment separately; this reduces the chance of batteries running low on power and also gives redundancy in the power system at the monitoring locations. If a battery fails, the other battery can power all of the equipment until a backup battery can be installed by the field crew.

Equipment Security Housing

All monitoring equipment will be housed for the entire monitoriong season in fiberglass or metal equipment enclosures at the monitoring locations, where access allows.

2.4 ANALYTICAL PROCEDURES

Analytical procedures and laboratory information for wet season monitoring are provided in Sections 2.3.1 through 2.3.6. Table 2-3 provides the analytical methods, units, and reporting limits (RLs). Table 2-4 provides the analytical holding times, container types, and preservation requirements.

Alternative laboratory analytical methods may be used as long as appropiate detection limits and quality assurance requirements can be met.

Table 2-3.
Analytical Requirements for Water and Sediment Samples

Analysis	Method	Matrix	Units	Reporting Limit
Particle Size Distribution	ASTM C 136/117	Sediment	Millimeters	NA
Suspended Sediment Concentration	ASTM D 3977	Water	Milligrams per liter	2.0

ASTM = ASTM International; NA = not applicable;

Table 2-4.
Analytical Holding Times, Container Types, and Preservation Requirements

Analysis	Method	Matrix	Holding Time	Container Type	Preservation
Particle Size Distribution	ASTM C 136/117	Sediment	—	Mesh bag or bucket	—
Suspended Sediment Concentration	ASTM D 3977	Water	7 days	1-liter HDPE	≤6 degrees Celsius (°C)

ASTM = ASTM International; HDPE = high-density polyethylene

2.4.1 Volumetric Sample Analysis

Stream bed material samples will be collected at each monitoring location prior to the start of the wet season and analyzed for particle size distribution. If there is a distinct layer of large cobble (i.e., armor layer) above smaller-grain-size material at any sample point, the two layers will be sampled separately. Tables 2-3 and 2-4 provide anayltical and handling requirements.

2.4.2 Wet Weather Sample Analysis

This study aims to sample three wet weather events during each monitoring year. Schedule permitting, wet weather sampling will be conducted during the same three events trageted for the Sediment TMDL Compliance Monitoring program. This will provide paired data and a better overall view of the subwatershed function and the contribution to the Lagoon from the other subwatersheds.

Water samples collected will be analyzed for SSC; bedload sediment samples will be analyzed for particle-size distribution (except for at the Maya Linda monitoring location, because it is an underground storm drain). Table 2-3 provides the analytical methods, units, and RLs. Table 2-4 provides the analytical holding times, container types, and preservation requirements. SSC was selected for water sample analysis over total suspended solids (TSS) because SSC analysis uses the entire sample volume rather than an aliquot, as used in TSS analysis. Based on this anlaytical difference, SSC is considered more representative than TSS of actual sample concentrations, particularly when a sample is composed of larger, heavier particle sizes.

2.4.3 Pebble Count

The pebble count procedure is to measure the size of a random selection of pebbles along a selected stream path to represent the size of material in the area. This does not require collection and/or analysis of samples.

2.4.4 Photodocumentation

The stream bed will be photodocumented initially during the volumetric sample collection before the wet season, as well as after each major storm event, when pebble counts are conducted. This does not require collection and/or analysis of samples.

2.4.5 Laboratory Selection

For volumetric and bedload samples, analyses of particle-size distribution will be conducted by Amec Foster Wheeler's materials testing laboratory at:

- **Amec Foster Wheeler Environment & Infrastructure, Inc.**
  9177 Sky Park Court, San Diego, CA 92123
  (858) 278-3600 (office); (858) 278-5300 (fax)

For water samples, SSC analysis will be performed by:

- **Weck Laboratories, Inc**.
  14859 East Clark Avenue, City of Industry, CA 91745
  (626) 336-2139 (office); (626) 336-2634 (fax)

If necessary, alternative analytical laboratories may be used as long as the required detection limits and project QA/QC objectives can be achieved.

2.4.6 Sample Labeling

Sample bottles and containers will be pre-labeled, to the extent possible, before each monitoring event. Pre-labeling simplifies field activities and leaves only the date, time, and sampling crew's names to be filled out in the field. Each sample container provided will be labeled with the following information:

- Sample identification (ID)
- Project name
- Event number
- Sample collection date (month, day, year)
- Time of collection (in 24-hour [military] time)

- Bottle _N_ of_N__ (for multi-bottle samples)
- Sampler's initials
- Analysis

Field samples will be labeled as described below. These samples will be labeled, recorded on the chain-of-custody (COC) form, and then transported to the appropriate analytical laboratory.

Each sample collected will be assigned a unique alphanumeric code (sample ID) for tracking. The sample ID will be standardized for all samples and will contain information related to the monitoring location, event, and type of sample. The required sample ID components, applicable to all samples, are:

- Site ID:
  - According to Table 2-1
- Event Number:
  - DW = Dry weather
  - 1 = First wet weather event
  - 2 = Second wet weather event
  - 3 = Third wet weather event
- Sample Type:
  - PG1–PG10 = Pollutograph number (for water samples)
  - RB or LB = Right bank or left bank (for bedload samples)

2.4.7 Laboratory Data Package Deliverables

Laboratories will be required to provide analytical results within a three-week turnaround time per event. The deliverable package will include one hard (paper) copy and electronic data files of the results. The hard copy will include standard narratives identifying any analytical problems, QA/QC exceedances, and corrective actions. Individual data sets may be submitted to Amec Foster Wheeler as either Microsoft Excel workbook files or Microsoft Access database files.

3.0 DRY WEATHER AERIAL DEPOSITION MONITORING

3.1 AERIAL DEPOSITION SAMPLING LOCATIONS

Anthropogenic activities throughout the WMA have exposed sediments to wind and water erosion and suspension forces. Storm water flow is the primary transport mechanism of these pollutants, by eroding soils during significant rainfall and transporting sediment particles into streams. Erosion and suspension of particulate matter (PM) by wind or physical suspension may also contribute to sediment loading in the Lagoon.

Preliminary locations for aerial deposition monitoring have been identified and were based on the goal of attaining data that represent upwind and downwind concentrations of sediment from anthropogenic activities, measurement of background concentrations, predominant seasonal wind direction, accessibility of each sampling site, and/or security. Marine Corps Air Station (MCAS) Miramar measurements indicate that typical wind directions in the vicinity of Carroll Canyon are from the west-northwest to east-southeast.

The five current locations that are sampled under Phase 1 are indicated on Figure 3-1. The five current locations include a control site in Del Mar[1] (minimal anthropogenic exposure) and four locations throughout Carroll Canyon. Phase 2 will include these five sites along with two locations in the Los Peñasquitos Creek subwatershed and one location in the Carmel Valley subwatershed. The approximate locations of the three additional sites for Phase 2 are shown in Figure 3-1. Site names, identifications (IDs), brief descriptions, and the geographic coordinates of each aerial deposition monitoring location are listed in Table 3-1. Phase 2 specific site locations are subject to change, based on field reconnaissance efforts and site suitability for sampling determined during Phase 1. Monitoring methodologies will include the USEPA Federal Reference Method (FRM) and optical sensor monitoring. These methods are decribed further in Section 3.2.

[1] The Del Mar control site falls outside of the Los Peñasquitos WMA; however, this location was deemed representative of aerial conditions along the coastline of the Los Peñasquitos WMA, as it is approximately one mile north of the WMA boundary and is minimally impacted by anthropogenic activity.

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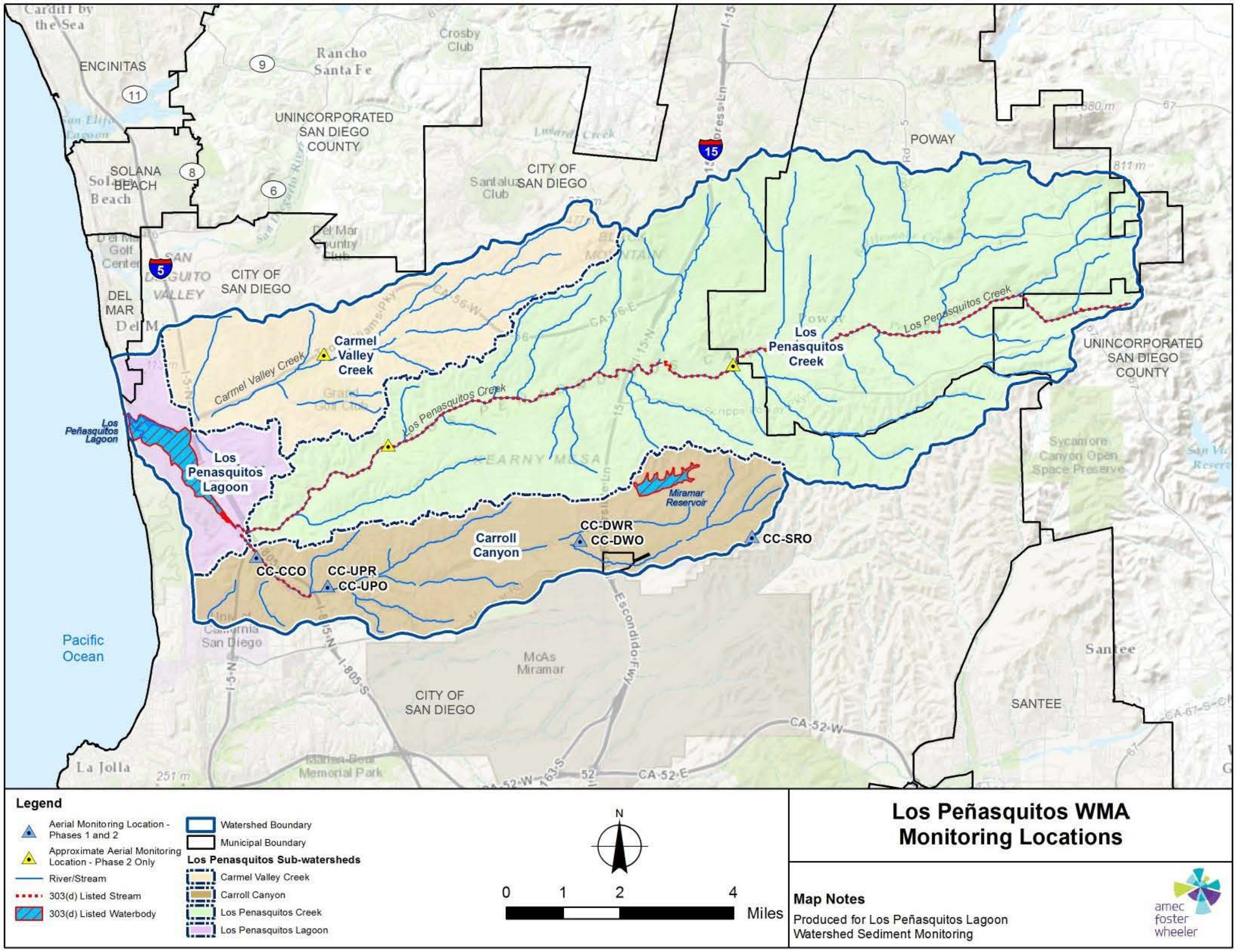

Figure 3-1.
Los Peñasquitos WMA
Aerial Deposition Sampling Locations

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Table 3-1.
Los Peñasquitos WMA
Aerial Deposition Sampling Locations

Site Name	Sub-Watershed	Site ID	Monitoring Method	Site Description	Latitude	Longitude	Monitoring Phase
Del Mar	Lagoon / Control Site	CC-DMR / CC-DMO	FRM and Optical	Elevated location near the corner of 11th Street and Camino Del Mar	32.95497	-117.26404	1 and 2
Carroll Canyon Upwind	Carroll Canyon Creek	CC-UPR / CC-UPO	FRM and Optical	Elevated location near the corner where Scranton Road turns into Carroll Canyon Road	32.89019	-117.20006	1 and 2
Carroll Canyon Downwind	Carroll Canyon Creek	CC-DWR / CC-DWO	FRM and Optical	Elevated location near the Black Mountain Road and Carroll Canyon Road intersection	32.90134	-117.12352	1 and 2
Carroll Canyon Optical	Carroll Canyon Creek	CC-CCO	Optical Only	Elevated location close to the Carroll Canyon TMDL compliance monitoring location	32.89794	-117.22160	1 and 2
Scripps Ranch Optical	Carroll Canyon Creek	CC-SRO	Optical Only	Elevated location in Scripps Ranch	32.90191	-117.07146	1 and 2
TBD	Los Peñasquitos Creek	TBD	Optical Only	TBD	TBD	TBD	2 only
TBD	Los Peñasquitos Creek	TBD	Optical Only	TBD	TBD	TBD	2 only
TBD	Carmel Valley Creek	TBD	Optical Only	TBD	TBD	TBD	2 only

TBD = to be determined. Aerial deposition sampling locations in the Phase 2 subwatersheds will be based on the results and recommendations of Phase 1 monitoring.

Phase 1: Carroll Canyon Creek Aerial Deposition Monitoring

A total of five monitoring locations will be monitored during Phase 1, as listed in Table 3-1. One of the locations is a control site in Del Mar. This location serves as a control site because it is minimally exposed to anthropogenic activities in the small area near the coastline. The remaining four are located throughout the WMA.

Three of the five monitoring locations are coupled stations that include both FRM and optical monitoring. Optical monitoring is cost-effective means of monitoring PM_{10}; however, it is not a method that qualifies as a FRM. The coupled locations allow confirmation and/or calibration of the optical station data with the FRM station data. The cost-effectiveness of the optical stations allows for more monitoring points throughout the entire project area (Phases 1 and 2). This approach is discussed further in Section 3.2.2.

Phase 2: Los Peñasquitos Creek and Carmel Valley Creek Aerial Deposition Monitoring Planned Locations

In addition to the five locations monitored during Phase 1, Phase 2 will include two planned locations within the Los Peñasquitos Creek subwatershed and one in the Carmel Valley Creek subwatershed. Phase 1 includes the Del Mar control site, which will be applicable to the three subwatersheds. The three additional Phase 2 monitoring locations will be optical monitoring stations only.

A higher number of locations were included within the Carroll Canyon sub-watershed compared to the others due to the gravel mining operations being a potentially significant source of dust particles.

3.2 SAMPLING METHODOLOGY

Data from the sampling rounds will be used to estimate direct and indirect deposition in the study area and to determine the relative contributions of sediment input to the Lagoon.

Anthropogenic activities such as construction, automobile traffic, and mining activities can contribute to dust emissions. Aerial deposition sampling for particulate matter will occur at aerial sampling locations during three sampling rounds per year: (1) early fall, prior to the wet season; (2) mid-winter; and (3) late spring, near the end of the wet season. Sampling rounds will not be conducted during rain events or within 72 hours after the end of a rain event. During each sampling round, three 24-hour sample collection periods will occur at each monitoring location: two during weekdays and one during the weekend. This will allow for appropriate representation of varying anthropogenic activity between weekdays and weekends.

Aerial deposition sampling generally falls into two measurement categories: monitoring for PM with an aerodynamic diameter of 10 microns or less (PM_{10}) and monitoring for PM with a diameter of 2.5 microns or less ($PM_{2.5}$). PM_{10} is the particle size most generally associated with construction and land-movement activities, and therefore is the proposed measurement standard for this project.

Two different types of sampling equipment will be used for this study: the FRM and optical sensor sampling. These methods are described further in Sections 3.2.1 and 3.2.2.

3.2.1 USEPA Federal Reference Methodology Sampling

The USEPA specifies sampler design, performance characteristics, and operational requirements applicable to the PM_{10} FRM in Appendix J of 40 Code of Federal Regulations (CFR) Part 50. PM_{10} FRM samplers are intended to acquire deposits over 24-hour periods on Teflon-membrane filters from air drawn at a controlled flow rate through the PM_{10} inlet. The inlet and size separation components, filter types, filter cassettes, and internal configurations of the filter holder assemblies are specified by design, with drawings and manufacturing tolerances published in Appendix O of 40 CFR Part 50. Other sampler components and procedures (such as flow rate control, operator interface controls, exterior housing, and data acquisition) are specified by performance characteristics, with specific test methods to assess that performance.

FRM samplers will be installed with filters specific to PM_{10} to determine the mass concentration. Filters will be analyzed for PM_{10} mass. PM_{10} mass is collected using a high-volume sampler and quartz fiber filters, and then weighed to the nearest microgram by the laboratory using special ultra-sensitive balances under exacting conditions. The laboratory will be required to perform pre-analysis and post-analysis of the filters used to capture the particulate samples.

Inlets for the samplers will be located at least 2 meters above ground level and will be free of interference from nearby buildings, structures, or vegetation. Air is drawn into a sampler and deposited on a filter by the sampler. The sampler records the flow rate and sampling interval for calculating concentrations by volume. The FRM sampling equipment to be used is the BGI PQ100 PM Portable Air Sampler (USEPA Designation No. RFPS-1298-124). This sampler is a low-volume sampler, which can run on direct current (DC) power or on alternating current (AC) power.

3.2.2 Optical Sensor Sampling

Real-time, light-scattering optical PM sensors generally have lower power requirements and offer installation and mounting flexibility that allow a wider range of applications than FRM stations do. The optical sensor equipment to be used is the TSI DustTrak II Aerosol Monitor (model 8530).

Optical sensors are a more cost-effective approach to collecting PM_{10} emissions data. Although these sensors are not an accepted FRM device, using the three co-located stations as calibration points between the FRM and optical sensor data will allow for applying any necessary calibrations or offsets to the independent optical sensors. This procedure provides a higher degree of confidence in the optical sensor data.

3.3 AERIAL DEPOSITION MONITORING PREPARATION AND LOGISTICS

3.3.1 Staffing and Mobilization

Staffing Plan

Installation, maintenance, and operation of the aerial deposition samplers require knowledge of the sampler operation and the ability to troubleshoot issues in the field. Field personnel will be scheduled to run the samplers for each sampling round during a period when no rainfall is forecast.

Each installation and sampling team will consist of two field individuals. The staffing plan will specify the following:

- Personnel assigned to each position
- Shift times (e.g., start-up and relief) and assigned monitoring locations
- Equipment mobilization requirements
- Communication channels

No field sampling or laboratory analysis will be performed on the following holiday black out dates:

- Thanksgiving (November 27–28, 2014)
- Christmas Eve and Day (December 24–25, 2014)

- New Year's Eve Day (December 31, 2014) and New Year’s Day (January 1, 2015)

Staffing Positions and Personnel

Aerial deposition sampling tasks require a variety of skills. Amec Foster Wheeler personnel will be assigned to the following positions:

- Project Manager
- Field Sampling Manager
- Field Technicians

Project Manager: The Project Manager will provide guidance and oversight during each aerial deposition sampling round. If the Project Manager is not available, an individual with similar skills will be assigned; however, the Project Manager will still be available to answer questions.

Field Sampling Manager: The Field Sampling Manager is a technically skilled field supervisor and is the most experienced member of the field team. This position requires an understanding of project requirements, sampling procedures, and equipment operations. The Field Sampling Manager must be able to troubleshoot most of the common problems that could be experienced by any of the field teams. This manager will lead sampling activities.

Field Technicians: Field technicians are field personnel trained in aerial deposition sample collection, equipment operation, and health and safety procedures.

Equipment Mobilization

Equipment needed for activation and operation of the aerial deposition samplers includes filters, power supplies, tools, sample handling and shipping supplies, laptop computers for downloading data, and safety equipment.

Table 3-2 lists the content of a field technician’s field kit for installation and operation of the aerial deposition monitors.

Table 3-2.
Field Equipment for Aerial Deposition Monitoring

Aerial Deposition Monitoring Kit Equipment List	
Maps of all required areas Pencils and indelible markers Field logbook New (unexposed) filter packs Electrical tape Chain-of-custody forms High-visibility safety vest FRM and optical samplers Power supplies and/or cables	Tools (clamps, crimps, polyvinyl chloride pipes (PVC), wires, tubes, nails, screws, hammer, screwdrivers, pliers) Cable ties (assorted sizes) Utility knife Filter pack shipping envelopes Ziploc® plastic bags (assorted sizes) Nitrile gloves Full set of keys (if necessary)

FRM = USEPA Federal Reference Method

Communication Channels

Communication channels must be established so that field personnel can contact each other before and during the sampling event. The project field notebook will include lists of home, work, and cellular telephone numbers of the Amec Foster Wheeler field team and the work telephone numbers of the primary laboratory contacts and City personnel.

Training of Field Personnel

Field personnel will be properly trained in the use of the sampling equipment and in all appropriate health and safety protocols (see Appendix B). Specifically, the following elements will be included in the training of all field personnel:

- Review of health and safety plan
- Classroom training
- Field training (as necessary)

Each field team member will review the project's HASP and consult with the Field Sampling Manager about any issues that arise before mobilization. Classroom and field training will be provided prior to the first aerial deposition sampling round to inform field personnel of the project-specific objectives.

3.3.2 Station Preparation

Field Equipment Installation

Each field installation team will consist of two technicians who are trained in using the aerial deposition samplers and knowledgable about utility installation requirements. The technicians will also be familiar with equipment siting requirements. The team will deliver and install the shelter, towers, support materials, and all monitoring equipment procured and tested in accordance with the equipment procedures manuals. The team will coordinate utility installation, if needed, such as AC power capabilities, site security, shipping of major equipment and support materials, and compliance with local codes.

Determination of Sampling Time Intervals

The aerial deposition samplers will be programmed to collect measurements and/or samples at 5-minute intervals for 24 hours for each sampling period; 24 hours is a standard time frame for aerial deposition sampling.

Preparation of Automated Equipment

Equipment for aerial deposition sampling will be rented from an equipment vendor, and is expected to be calibrated and in good working order upon its arrival. Equipment received will be checked to verify that it is in good working order prior to mobilizing. Maintenance on the sampling equipment will be conducted by the equipment vendor.

FRM and optical sensor sampling equipment will be installed onsite for approximately one week or long enough to allow sampling in the three targeted sampling periods.

Field teams will confirm that the aerial deposition monitor data have been downloaded and that each sampler has been reset and programmed to collect samples, based on specified time intervals.

Sample Filters

Once the PM samples are collected, the filters will be removed from the samplers, and handled and shipped according to the requirements of the manufacturer and the laboratory.

General Inspection of Monitoring Locations

The general functionality of the area surrounding the air sampling locations will be observed and assessed to determine whether there is debris or trash that could clog or foul equipment. The equipment will be physically observed for potential problems, such as damaged components.

3.3.3 Documentation

Each time an aerial deposition monitoring location is visited, the visit will be recorded in the field log. The field data sheets in Appendix C are a guide to ensure that all the required data are obtained. Occasional checks of equipment parameters, such as date and time, will be conducted to verify that the data being recorded are accurate and that any deviations can be addressed in a timely fashion.

The following general information will be entered during aerial deposition monitoring location visits:

- Site identification (alphanumeric)
- Date and time
- Monitoring program
- Field team
- Conveyance type
- Weather conditions
- Visual observations
- Equipment condition
- Sample count
- Miscellaneous comments

Additional data will be recorded on the field data sheet at the end of a sampling round. The following data will be collected at all monitoring locations, where applicable:

- Total Flow Volume—Total volume of air (in gallons) that passed the monitoring location during the sampling round.
- Measurement and Sample Count and Collection Times—Total number of samples collected throughout the sampling and the time at which each sample was collected.

3.3.4 Air Intake and Air Quality Monitoring Equipment

Federal Reference Method Samplers

USEPA-approved FRM samplers will be used to measure, calculate, and log PM_{10} data, on the basis of a set of continuous measurements and programmed information. The approved FRM low-volume sampler to be used is the BGI Incorporated PQ100 PM Portable Air Sampler (USEPA Designation No. RFPS-1298-124).

Optical Sensor

Light-scattering optical sensors will be used both in conjunction with the FRM samplers and independently. TSI Incorporated Dust Trak II monitors (model 8530) will be used in this study.

Power

The aerial deposition sampling equipment will be powered by 12- VDC power sources or 110-volts alternating current (VAC), if available. At each 12-VDC monitoring station, one battery will power each piece of equipment separately.

Equipment Security Housing

All monitoring equipment will be housed in enviromental enclosures at the monitoring locations. The samplers and enclosures will be installed for each sampling round.

3.4 ANALYTICAL PROCEDURES

Analytical procedures and laboratory information are provided in Sections 3.4.1 through 3.4.4. Table 3-3 provides the analytical methods, units, and RLs. Table 3-4 provides the analytical holding times, container types, and preservation requirements.

Alternative laboratory analytical methods may be used as long as appropiate detection limits and quality assurance requirements can be met.

Table 3-3.
Analytical Requirements for Air, Water, and Sediment Samples

Analysis	Method	Matrix	Units	Reporting Limit
PM_{10} Mass	40 CFR Part 50 Appendix J	Air (filter)	Milligrams [a]	1.0

PM_{10} = particulate matter of 10 microns or less
a. PM_{10} analytical results are also expressed in milligrams per cubic meter (mg/m^3)

Table 3-4.
Analytical Holding Times, Container Types, and Preservation Requirements

Analysis	Method	Matrix	Holding Time	Container Type	Preservation
PM_{10} Mass	40 CFR Part 50 Appendix J	Air (filter)	—	Laboratory provided, pre-weighed bag	—

PM_{10} = particulate matter of 10 microns or less

3.4.1 Aerial Deposition Particulate Matter Analysis

Federal Reference Method Analysis

PM_{10} samples will be collected during three sampling rounds per year and analyzed for total PM_{10} mass. Tables 3-3 and 3-4 provide anayltical and handling requirements.

Optical Sensor Analysis

The optical sensor is designed to measure and record the total mass at specified intervals. Optical sensor data will be analyzed in accordance with the manufacturer's specification of the meter used for PM_{10} monitoring.

3.4.2 Laboratory Selection

For aerial deposition samples, PM_{10} analysis will be performed by:

- **Eurofins|Air Toxics, Inc.**
  180 Blue Ravine Road, Ste. B Folsom, CA 95630
  (916) 985-1000 (office)

If necessary, alternative analytical laboratories may be used as long as the required detection limits and project QA/QC objectives can be achieved.

3.4.3 Sample Labeling

Sample filters will be pre-labeled, to the extent possible, before each monitoring event. Pre-labeling simplifies field activities and leaves only the date, time, and sampling crew's names to be filled out in the field. Each sample container provided will be labeled with the following information:

- Sample identification (ID)
- Project name
- Event number
- Sample collection date (month, day, year)
- Time of collection (in 24-hour [military] time)
- Sampler's initials
- Analysis

Field samples will be labeled as described below. These samples will be labeled, recorded on the COC form, and then transported to the appropriate analytical laboratory.

Each sample collected will be assigned a unique alphanumeric code (sample ID) for tracking. The sample ID will be standardized for all samples and will contain information related to the monitoring location, event, and type of sample. The required sample ID components, applicable to all samples, are:

- Site ID:
  - According to Table 2-2
- Event Number:
  For the aerial deposition samples:
  - 1 = First sampling round
  - 2 = Second sampling round
  - 3 = Third sampling round
- Sample Type:
  - PG1–PG10 = Pollutograph number (for water samples)
  - RB or LB = Right bank or left bank (for bedload samples)

3.4.4 Laboratory Data Package Deliverables

Laboratories will be required to provide analytical results within a three-week turnaround time per event. The deliverable package will include one hard (paper) copy and electronic data files of the results. The hard copy will include standard narratives identifying any analytical problems, QA/QC exceedances, and corrective actions. Individual data sets may be submitted to Amec Foster Wheeler as either Microsoft Excel workbook files or Microsoft Access database files.

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4.0 QUALITY ASSURANCE AND QUALITY CONTROL

This section addresses QA/QC activities associated with laboratory analyses.

4.1 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

The laboratories will have written standard operating procedures (SOPs) that specify (for each analytical method) instrument operation and maintenance, determination of method detection limits, QC acceptance criteria, blank requirements, and stepwise procedures. At a minimum, SOPs will be written for the following procedures:

- Sample receipt, control, and disposal
- Sample preparation
- Health and safety practices
- Corrective action(s)

The SOPs and all revisions will be available to the analysts in the laboratories. The laboratories will maintain written records of all activities that might affect the quality of the results.

4.1.1 Laboratory QC Samples

The following laboratory QC checks will be required for this project.

Calibration: All instruments will be calibrated and the calibration acceptance criteria will be met before samples are analyzed. For SSC and PM_{10} analyses, the balance used will be calibrated on the day of sample analysis in the range of samples.

Method Blanks: The method blank ensures that the equipment and reagents used in preparing the samples are free of contaminants that could interfere with the analysis. For SSC analysis, one method blank will be analyzed per batch.

4.1.2 Corrective Action

Corrective action is taken when an analysis is deemed suspect for some reason, such as high blank concentrations. The corrective action varies from analysis to analysis, but typically involves:

- Checking the procedure
- Reviewing the documents and calculations to identify any possible error
- Correcting the error
- Re-analyzing the sample, if it is available, to see whether results can be improved
- Completely reprocessing and re-analyzing additional sample material, if it is available

The laboratories have procedures in place to follow when failures occur, will identify the individual(s) responsible for corrective action, and will appropriately document the incident.

4.2 MEASUREMENT QUALITY OBJECTIVES

The measurement quality objectives (MQOs) for SSC and PM_{10} analyses are quantitative and qualitative statements that define project objectives and specify the acceptable ranges of laboratory performance.

Analytical MQOs willl be assessed through application of accuracy and completeness parameters, as discussed in this section. For SSC analyses, no laboratory duplicates are conducted because the entire sample is used for analysis, so precision is not measured. For PM_{10} analyses, accuracy, precision, and completeness are measured by the laboratory. Due to high variability in SSC concentrations, field duplicates are not collected, as they would be collected by the automated sampler in succession and potential for variability is very high. Field duplicates are not collected for PM_{10} analysis, as the samplers are not configured to hold two filiters and, thus, would require setting up a complete second sampling device. MQOs are summarized in Table 4-1.

Accuracy: Accuracy is defined as the nearness of a result, or the mean of a set of results, to the true or accepted value. Because there are no analyte spikes or laboratory control samples (LCSs) available for SSC or PM_{10} analyses, analytical accuracy of SSC and PM_{10} analyses is measured only by analysis of method blanks. For SSC and PM_{10} analyses, one method blank will be analyzed per batch or 20 samples, whichever is more frequent.

Precision: Precision describes how well repeated measurements agree. The evaluation of precision described here relates to repeated measurements and samples analyzed by the laboratory (laboratory replicates). For PM_{10} analysis, one method blank will be analyzed per batch or 20 samples, whichever is more frequent. Laboratory replicates are not conducted for SSC analysis.

Completeness: Completeness is a measure of the percentage of project-specific data that are valid. Valid data are obtained when samples are collected and analyzed in accordance with QC procedures outlined in this monitoring plan, and when none of the QC criteria that affect data usability are exceeded. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. The requirement of completeness is 90 percent for samples and is determined using the following equation:

$$Completeness = \frac{Actual\ number\ of\ samples\ collected}{Project\ required\ total\ samples\ to\ be\ collected} * 100.$$

Table 4-1.
Water Sample Measurement Quality Objectives

Constituent	Accuracy (Laboratory Method Blank)	Precision (Laboratory Duplicate)	Completeness
SSC	MB: <RL	NA[1]	90%
PM_{10}	Post-weight of filter is within 0.0028 grams of pre-weight filter	Unexposed filters: Weights of the clean filters should be within ±0.0028 grams of the original value Exposed filters: ≤ 25% RPD and weights must be within ±0.005 grams	90%

Notes:
MB = Method blank, NA = Not Applicable, RL = Reporting limit, g = grams, RPD = relative percent difference
1. NA due to complete sample being used for primary analysis (i.e., the one-liter sample cannot be split per method).

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5.0 DATA ANALYSIS AND REPORTING

The data collected during the each monitoring season will be compiled and analyzed with the findings presented in the Draft Los Peñasquitos WMA Special Study Report. The draft report will summarize the sample collection methods and events and will present the findings of the wet season and aerial deposition monitoring. It will provide spatial loading information throughout the monitored portions of the creeks used to compare with the loading data calculated from the TMDL Compliance Monitoring program.

Any deviations from protocols listed in the monitoring plan and the implications of those deviations on the interpretation of the data will be included in the report. A data quality assessment and analytical, field, and hydrological data will be provided as appendices on compact discs. Dr. Habib Matin will provide principal-level support for data interpretation and report review during development of the draft monitoring report.

The draft report will be completed prior to the end of each fiscal year and incorporated into the Water Quality Improvement Plan Annual Report as appropriate. Upon completion of the entire special study, a comprehensive draft report will be developed that summarizes the findings from each phase of the study. The final report will incorporate comments from the City and other Responsible Agencies and will be incorporated into the Report of Waste Discharge.

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6.0 REFERENCES

40 Code of Federal Regulations (CFR) Part 50, National Ambient Air Quality Standards for Particulate Matter.

Bunte, K.; K. Swingle; S. Abt. 2007. Guidelines for using bedload traps in coarse-bedded mountain streams: Construction, installation, operation, and sample processing. Gen. Tech. Rep. RMRS-GTR-191. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 91 pp.

Bunte, K. and S.R. Abt. 2001a. Sampling frame for improving pebble count accuracy in coarse gravel-bed streams. Journal of the American Water Resources Association 37: 1001-1014.

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Regional Board. 2013. Order Number R9-2013-0001: San Diego Regional Municipal Separate Storm Sewer System (MS4) Permit.

Regional Board. 2012. *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Total Maximum Daily Load for Sedimentation in Los Peñasquitos Lagoon,* Resolution Number R9-2012-0033.

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State Water Resources Control Board (State Board). 2014. Amendment Order No. 2014-0077-DWQ, National Pollutant Discharge Elimination System (NPDES) Statewide Storm Water Permit Waste Discharge Requirements (WDRs) for Caltrans.

State Board. 2013. Order No. 2012-0011-DWQ (NPDES No. CAS000003), National Pollutant Discharge Elimination System (NPDES) Statewide Storm Water Permit Waste Discharge Requirements (WDRs) for Caltrans.

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APPENDIX A
LABORATORY QA/QC MANUALS

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APPENDIX B
HEALTH AND SAFETY PLAN (HASP)

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APPENDIX C
FIELD FORMS

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APPENDIX B
SUSPENDED SEDIMENT CONCENTRATION DATA SUMMARY AND LABORATORY REPORTS

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Table B-1.
Wet Weather Event 1 SSC Concentrations

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Arizona Crossing	1	1/5/16	11:24	130
	2		11:53	51
	3		13:23	77
	4		13:53	250
	5		14:23	250
	6		21:45	230
	7	1/6/16	08:04	46
	8		14:03	10
Black Mountain	1	1/5/16	10:11	450
	2		11:40	180
	3		13:10	47
	4		13:40	720
	5		14:10	320
	6		14:40	230
	7		15:10	470
	8		15:40	2200
	9		17:09	270
	10		18:09	80
	11		20:39	16
	12	1/6/16	00:38	100
	13		05:08	12
Maya Linda	1	1/5/16	10:40	50
	2		11:40	47
	3		13:09	48
	4		14:39	130
	5		15:39	850
	6		16:09	1300
	7		16:39	620
	8		17:09	330
	9		18:09	92
	10		19:09	51
	11		21:09	87
	12		23:09	24
	13	1/6/16	00:39	49
	14		02:39	17
	15		08:09	9.0

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Nancy Ridge	1	1/5/16	11:04	67
	2		12:03	77
	3		13:03	110
	4		14:33	660
	5		15:33	700
	6		16:33	1200
	7		17:03	2600
	8		17:33	2200
	9		18:03	1500
	10		19:33	1300
	11		21:03	360
	12		23:05	92
	13	1/6/16	00:05	260
	14		01:05	69
	15		01:35	92
	16		03:05	49
	17		06:05	9.0
	18		11:37	8
Trap Channel	1	1/5/16	13:37	460
	2		15:07	240
	3		15:37	1700
	4		16:07	800
	5		16:37	740
	6		17:10	1600
	7		17:39	730
	8		18:09	640
	9		18:39	390
	10		19:09	300
	11		21:12	67
	12		23:41	60
	13	1/6/16	00:41	31
	14		02:11	19
	15		03:11	8.0
	16		05:11	10
	17		05:41	19
	18		07:41	5.0
Carmel Valley Upstream	1	1/5/16	12:24	91
	2		14:28	720
	3		15:00	550

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Carmel Valley Upstream (continued)	4	1/5/16	15:29	470
	5		16:29	210
	6		16:59	190
	7		17:29	190
	8		18:59	200
	9		19:29	170
	10		19:59	140
	11		20:59	98
	12		21:59	78
	13		22:59	61
	14	1/6/16	00:59	45
	15		02:59	35
	16		6:59	22
North City	1	1/5/16	11:44	15
	2		14:43	55
	3		16:40	620
	4		18:00	830
	5		19:46	940
	6		20:49	750
	7		21:49	440
	8		22:49	300
	9		23:49	210
	10	1/6/16	04:49	66
Hidden Valley	1	1/5/16	14:04	110
	1		15:03	180
	1		15:33	270
	1		18:35	120
	1		20:05	1300
	1		20:50	900
	1		21:35	810
	1		23:05	420
	1	1/6/16	01:20	190
	1		11:05	21

Table B-2.
Wet Weather Event 2 SSC Concentrations

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Arizona Crossing	1	1/31/16	06:52	64
	2		07:51	40
	3		09:51	100
	4		11:00	150
	5		11:59	36
	6		13:29	15
	7		14:29	11
	8		14:59	180
	9		15:29	170
	10		15:59	430
	11		16:59	130
	12		17:59	49
	13		20:37	17
	14	2/1/16	01:38	ND
	15		03:38	ND
Black Mountain	1	1/31/16	05:07	1700
	2		05:36	170
	3		06:38	22
	4		07:06	30
	5		07:36	21
	6		08:06	350
	7		08:36	110
	8		09:06	47
	9		11:05	12
	10		12:35	6.0
	11		14:05	ND
	12		14:35	19
	13		15:05	270
	14		15:35	270
	15		16:05	100
	16		17:35	22
Maya Linda	1	1/31/16	00:48	65
	2		03:41	73
	3		04:28	60
	4		04:58	100
	5		05:58	20
	6		07:28	29
	7		07:58	170
	8		08:28	98
	9		08:58	51
	10		09:28	27

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Maya Linda (continued)	11	1/31/16	10:28	12
	12		10:58	8.0
	13		14:07	72
	14		14:37	86
	15		15:07	47
	16		15:37	19
	17		16:37	13
	18		17:07	5.0
Nancy Ridge	1	1/31/16	07:24	220
	2		08:23	250
	3		08:53	150
	4		09:23	240
	5		10:23	140
	6		11:46	34
	7		14:16	120
	8		14:46	43
	9		15:16	250
	10		15:46	240
	11		16:16	310
	12		18:16	40
	13		19:41	20
Trap Channel	1	1/31/16	08:07	2100
	2		17:00	71
	3		18:33	25
	4		19:33	12
	5		20:33	8.0
	6		21:33	10
Carmel Valley Upstream	1	1/31/16	09:55	61
	2		10:25	90
	3		10:55	120
	4		11:25	94
	5		11:55	90
	6		12:25	64
	7		12:55	38
	8		13:25	31
	9		13:55	19
	10		14:25	15
	11		14:55	84
	12		15:25	110
	13		15:55	65
	14		16:25	87
North City	1	1/31/16	05:47	21
	2		07:46	21

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
North City (continued)	3	1/31/16	08:46	72
	4		09:16	110
	5		09:46	84
	6		10:16	58
	7		10:46	43
	8		11:46	21
	9		14:15	15
	10		14:45	50
	11		15:15	140
	12		15:45	160
	13		16:15	120
	14		17:15	55
	15		19:15	31
	16		22:14	13
	17	2/1/16	03:14	5.0
	18		06:14	14
	19		09:14	8.0
	20		11:14	ND
Hidden Valley	1	1/31/16	14:05	25
	2		14:34	42
	3		15:04	270
	4		15:34	300
	5		16:04	140
	6		17:04	39
	7		17:34	30
	8		18:34	22
	9	2/1/16	05:55	20
	10		06:54	19
	11		08:54	27
	12		11:54	5.0

Table B-3.
Wet Weather Event 3 SSC Concentrations

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Arizona Crossing	1	3/6/16	09:57	130
	2		10:26	82
	3		10:56	31
	4		11:26	15
	5		11:56	10
	6		12:26	16
	7		12:56	76
	8		13:56	10
	9	3/7/16	10:36	54
	10		14:57	9.0
	11		15:23	30
	12		15:52	45
	13		16:22	17
	14		17:22	100
	15		18:22	200
	16		18:52	230
	17		19:52	81
	18		20:52	58
	19		21:22	30
	20		21:52	25
	21		23:52	9.0
Black Mountain	1	3/6/16	09:20	460
	2		09:49	180
	3		10:19	47
	4		11:49	4.0
	5	3/7/16	08:37	260
	6		09:06	580
	6a		9:36	220
	7		10:08	59
	8		12:37	8.0
	9		15:07	13
	10		15:55	120
	11		16:54	27
	12		17:54	270
	13		18:54	71
	14		22:24	8.0
Maya Linda	1	3/5/16	23:59	43
	2	3/6/16	04:42	96
	3		05:13	48
	4		09:22	190
	5		09:52	44

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Maya Linda (continued)	6	3/6/16	10:22	56
	7		11:22	13
	8	3/7/16	08:32	98
	9		09:01	130
	10		09:31	61
	11		10:31	27
	12		11:01	13
	13		11:34	20
	14		15:35	55
	15		16:34	16
	16		17:34	62
	17		18:34	40
	18		19:04	24
	19		20:34	58
	20		21:34	10
Nancy Ridge	1	3/6/16	09:46	62
	2		10:46	23
	3		11:16	44
	4		11:46	27
	5		13:16	9.0
	6	3/7/16	09:33	290
	7		10:03	120
	8		10:33	380
	9		11:33	390
	9a		13:03	94
	10		15:36	24
	11		16:35	32
	12		17:05	38
	13		17:35	56
	14		19:35	240
	15		21:05	91
	16		22:05	92
	17		22:35	40
	18	3/8/16	00:35	32
Trap Channel	1	3/6/16	09:35	77
	2		10:04	38
	3	3/7/16	20:55	10
	4		21:24	8.0
	5		21:54	5.0
	6		22:24	4.0
	7		22:54	4.0
Carmel Valley Upstream	1	3/6/16	16:30	73
	2		11:05	90

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Carmel Valley Upstream (continued)	2a	3/7/16	11:07	100
	3	3/7/16	11:37	83
	4		12:07	74
	5		12:37	170
	6		13:07	110
	7		14:07	39
	8		14:37	37
	9		15:37	30
	10		17:07	34
	11		17:37	30
	12		19:07	12
	13		19:37	7.0
	14		21:37	6.0
North City	1	3/6/16	09:23	20
	2		09:52	58
	3		10:22	28
	4		11:22	110
	5		11:52	78
	6		12:52	30
	7		13:22	21
	8		13:52	12
	9	3/7/16	09:56	75
	10		10:25	210
	11		10:55	140
	12		11:25	77
	13		11:55	57
	14		12:25	51
	15		13:25	30
	16		15:25	25
	17		16:26	18
	18		17:24	41
	19		17:54	30
	20		18:24	22
	21		19:54	16
	22		20:24	13
	23		22:24	7.0
	24		23:54	6
Hidden Valley	1	3/7/16	09:33	85
	2		10:03	350
	3		10:33	140
	4		11:03	69
	5		11:33	47
	6		12:33	25

Site	Sample Number	Sample Date	Collection Time	SSC (mg/L)
Hidden Valley (continued)	7	3/7/16	13:03	25
	8		13:33	32
	9		14:03	28
	10		15:03	25
	11		16:03	53
	12		18:32	91
	13		19:02	250
	14		19:32	150
	15		20:02	43
	16		20:32	100
	17		21:02	85
	18		22:32	37
	19		23:32	28

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	02/17/16 14:22
		Received Date:	01/08/16 12:15
		Turn Around:	Normal
Attention:	Jeremy Burns	**Client Project:**	Los Penasquitos Sediment Transport Mon. 2014-15
Phone:	(858) 514-6464		
Fax:	(858) 278-5300		
Work Order(s):	6A08047		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Jeremy Burns :

Enclosed are the results of analyses for samples received 01/08/16 12:15 with the Chain of Custody document. The samples were received in good condition, at 5.1 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CC-AC-SSC-WW1-01	KB	6A08047-01	Water	01/05/16 11:24
CC-AC-SSC-WW1-02	KB	6A08047-02	Water	01/05/16 11:53
CC-AC-SSC-WW1-03	KB	6A08047-03	Water	01/05/16 13:23
CC-AC-SSC-WW1-04	KB	6A08047-04	Water	01/05/16 13:53
CC-AC-SSC-WW1-05	KB	6A08047-05	Water	01/05/16 14:23
CC-AC-SSC-WW1-06	KB	6A08047-06	Water	01/05/16 21:45
CC-AC-SSC-WW1-07	KB	6A08047-07	Water	01/06/16 08:04
CC-AC-SSC-WW1-08	KB	6A08047-08	Water	01/06/16 14:03
CC-BM-SSC-WW1-01	KB	6A08047-09	Water	01/05/16 10:11
CC-BM-SSC-WW1-02	KB	6A08047-10	Water	01/05/16 11:40
CC-BM-SSC-WW1-03	KB	6A08047-11	Water	01/05/16 13:10
CC-BM-SSC-WW1-04	KB	6A08047-12	Water	01/05/16 13:40
CC-BM-SSC-WW1-05	KB	6A08047-13	Water	01/05/16 14:10
CC-BM-SSC-WW1-06	KB	6A08047-14	Water	01/05/16 14:40
CC-BM-SSC-WW1-07	KB	6A08047-15	Water	01/05/16 15:10
CC-BM-SSC-WW1-08	KB	6A08047-16	Water	01/05/16 15:40
CC-BM-SSC-WW1-09	KB	6A08047-17	Water	01/05/16 17:09
CC-BM-SSC-WW1-10	KB	6A08047-18	Water	01/05/16 18:09
CC-BM-SSC-WW1-11	KB	6A08047-19	Water	01/05/16 20:39
CC-BM-SSC-WW1-12	KB	6A08047-20	Water	01/06/16 00:38
CC-BM-SSC-WW1-13	KB	6A08047-21	Water	01/06/16 05:08
CC-ML-SSC-WW1-01	KB	6A08047-22	Water	01/05/16 10:40
CC-ML-SSC-WW1-02	KB	6A08047-23	Water	01/05/16 11:40
CC-ML-SSC-WW1-03	KB	6A08047-24	Water	01/05/16 13:09
CC-ML-SSC-WW1-04	KB	6A08047-25	Water	01/05/16 14:39
CC-ML-SSC-WW1-05	KB	6A08047-26	Water	01/05/16 15:39
CC-ML-SSC-WW1-06	KB	6A08047-27	Water	01/05/16 16:09
CC-ML-SSC-WW1-07	KB	6A08047-28	Water	01/05/16 16:39
CC-ML-SSC-WW1-08	KB	6A08047-29	Water	01/05/16 17:09
CC-ML-SSC-WW1-09	KB	6A08047-30	Water	01/05/16 18:09
CC-ML-SSC-WW1-10	KB	6A08047-31	Water	01/05/16 19:09
CC-ML-SSC-WW1-11	KB	6A08047-32	Water	01/05/16 21:09
CC-ML-SSC-WW1-12	KB	6A08047-33	Water	01/05/16 23:09
CC-ML-SSC-WW1-13	KB	6A08047-34	Water	01/06/16 00:39
CC-ML-SSC-WW1-14	KB	6A08047-35	Water	01/06/16 02:39
CC-ML-SSC-WW1-15	KB	6A08047-36	Water	01/06/16 08:09
CC-NR-SSC-WW1-01	KB	6A08047-37	Water	01/05/16 11:04
CC-NR-SSC-WW1-02	KB	6A08047-38	Water	01/05/16 12:03
CC-NR-SSC-WW1-03	KB	6A08047-39	Water	01/05/16 13:03
CC-NR-SSC-WW1-04	KB	6A08047-40	Water	01/05/16 14:33
CC-NR-SSC-WW1-05	KB	6A08047-41	Water	01/05/16 15:33
CC-NR-SSC-WW1-06	KB	6A08047-42	Water	01/05/16 16:33
CC-NR-SSC-WW1-07	KB	6A08047-43	Water	01/05/16 17:03

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ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CC-NR-SSC-WW1-08	KB	6A08047-44	Water	01/05/16 17:33
CC-NR-SSC-WW1-09	KB	6A08047-45	Water	01/05/16 18:03
CC-NR-SSC-WW1-10	KB	6A08047-46	Water	01/05/16 19:33
CC-NR-SSC-WW1-11	KB	6A08047-47	Water	01/05/16 21:03
CC-NR-SSC-WW1-12	KB	6A08047-48	Water	01/05/16 23:05
CC-NR-SSC-WW1-13	KB	6A08047-49	Water	01/06/16 00:05
CC-NR-SSC-WW1-14	KB	6A08047-50	Water	01/06/16 01:05
CC-NR-SSC-WW1-15	KB	6A08047-51	Water	01/06/16 01:35
CC-NR-SSC-WW1-16	KB	6A08047-52	Water	01/06/16 03:05
CC-NR-SSC-WW1-17	KB	6A08047-53	Water	01/06/16 06:05
CC-TC-SSC-WW1-01	KB	6A08047-54	Water	01/05/16 13:37
CC-TC-SSC-WW1-02	KB	6A08047-55	Water	01/05/16 15:07
CC-TC-SSC-WW1-03	KB	6A08047-56	Water	01/05/16 15:37
CC-TC-SSC-WW1-04	KB	6A08047-57	Water	01/05/16 16:07
CC-TC-SSC-WW1-05	KB	6A08047-58	Water	01/05/16 16:37
CC-TC-SSC-WW1-06	KB	6A08047-59	Water	01/05/16 17:10
CC-TC-SSC-WW1-07	KB	6A08047-60	Water	01/05/16 17:39
CC-TC-SSC-WW1-08	KB	6A08047-61	Water	01/05/16 18:09
CC-TC-SSC-WW1-09	KB	6A08047-62	Water	01/05/16 18:39
CC-TC-SSC-WW1-10	KB	6A08047-63	Water	01/05/16 19:09
CC-TC-SSC-WW1-11	KB	6A08047-64	Water	01/05/16 21:12
CC-TC-SSC-WW1-12	KB	6A08047-65	Water	01/05/16 23:41
CC-TC-SSC-WW1-13	KB	6A08047-66	Water	01/06/16 00:41
CC-TC-SSC-WW1-14	KB	6A08047-67	Water	01/06/16 02:11
CC-TC-SSC-WW1-15	KB	6A08047-68	Water	01/06/16 03:11
CV-UP-SSC-WW1-01	KB	6A08047-69	Water	01/05/16 12:24
CV-UP-SSC-WW1-02	KB	6A08047-70	Water	01/05/16 14:28
CV-UP-SSC-WW1-03	KB	6A08047-71	Water	01/05/16 15:00
CV-UP-SSC-WW1-04	KB	6A08047-72	Water	01/05/16 15:29
CV-UP-SSC-WW1-05	KB	6A08047-73	Water	01/05/16 16:29
CV-UP-SSC-WW1-06	KB	6A08047-74	Water	01/05/16 16:59
CV-UP-SSC-WW1-07	KB	6A08047-75	Water	01/05/16 17:29
CV-UP-SSC-WW1-08	KB	6A08047-76	Water	01/05/16 18:59
CV-UP-SSC-WW1-09	KB	6A08047-77	Water	01/05/16 19:29
CV-UP-SSC-WW1-10	KB	6A08047-78	Water	01/05/16 19:59
CV-UP-SSC-WW1-11	KB	6A08047-79	Water	01/05/16 20:59
CV-UP-SSC-WW1-12	KB	6A08047-80	Water	01/05/16 21:59
CV-UP-SSC-WW1-13	KB	6A08047-81	Water	01/05/16 22:59
CV-UP-SSC-WW1-14	KB	6A08047-82	Water	01/06/16 00:59
CV-UP-SSC-WW1-15	KB	6A08047-83	Water	01/06/16 02:59
LP-NC-SSC-WW1-01	KB	6A08047-84	Water	01/05/16 11:44
LP-NC-SSC-WW1-02	KB	6A08047-85	Water	01/05/16 14:43
LP-NC-SSC-WW1-03	KB	6A08047-86	Water	01/05/16 16:40

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ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
LP-NC-SSC-WW1-04	KB	6A08047-87	Water	01/05/16 18:00
LP-NC-SSC-WW1-05	KB	6A08047-88	Water	01/05/16 19:46
LP-NC-SSC-WW1-06	KB	6A08047-89	Water	01/05/16 20:49
LP-NC-SSC-WW1-07	KB	6A08047-90	Water	01/05/16 21:49
LP-NC-SSC-WW1-08	KB	6A08047-91	Water	01/05/16 22:49
LP-NC-SSC-WW1-09	KB	6A08047-92	Water	01/05/16 23:49
LP-NC-SSC-WW1-10	KB	6A08047-93	Water	01/06/16 04:49
LP-POW-SSC-WW1-01	KB	6A08047-94	Water	01/05/16 14:04
LP-POW-SSC-WW1-02	KB	6A08047-95	Water	01/05/16 15:03
LP-POW-SSC-WW1-03	KB	6A08047-96	Water	01/05/16 15:33
LP-POW-SSC-WW1-04	KB	6A08047-97	Water	01/05/16 18:35
LP-POW-SSC-WW1-05	KB	6A08047-98	Water	01/05/16 20:05
LP-POW-SSC-WW1-06	KB	6A08047-99	Water	01/05/16 20:50
LP-POW-SSC-WW1-07	KB	6A08047-AA	Water	01/05/16 21:35
LP-POW-SSC-WW1-08	KB	6A08047-AB	Water	01/05/16 23:05
LP-POW-SSC-WW1-09	KB	6A08047-AC	Water	01/06/16 01:20
LP-POW-SSC-WW1-10	KB	6A08047-AD	Water	01/06/16 11:05
CC-NR-SSC-WW1-18	KB	6A08047-AE	Water	01/06/16 11:37
CC-TC-SSC-WW1-16	KB	6A08047-AF	Water	01/06/16 05:11
CC-TC-SSC-WW1-17	KB	6A08047-AG	Water	01/06/16 05:41
CV-UP-SSC-WW1-16	KB	6A08047-AH	Water	01/06/16 06:59
CV-TC-SSC-WW1-18	KB	6A08047-AI	Water	01/06/16 07:41

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

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6A08047-01 **CC-AC-SSC-WW1-01**

Sampled: 01/05/16 11:24 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**130**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Reported: 02/17/16 14:22

6A08047-02 **CC-AC-SSC-WW1-02**

Sampled: 01/05/16 11:53 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**51**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-03 **CC-AC-SSC-WW1-03**

Sampled: 01/05/16 13:23 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**77**	3.1	5.0	mg/l	1	01/09/16 15:09	

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6A08047-04 **CC-AC-SSC-WW1-04**

Sampled: 01/05/16 13:53 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**250**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
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6A08047-05 **CC-AC-SSC-WW1-05**

Sampled: 01/05/16 14:23 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**250**	3.1	5.0	mg/l	1	01/09/16 15:09	

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6A08047-06 **CC-AC-SSC-WW1-06**

Sampled: 01/05/16 21:45 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0440 Prepared: 01/09/16 13:17 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**230**	3.1	5.0	mg/l	1	01/09/16 15:09	

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Date Received: 01/08/16 12:15
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6A08047-07 **CC-AC-SSC-WW1-07**

Sampled: 01/06/16 08:04 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**46**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
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6A08047-08 **CC-AC-SSC-WW1-08**

Sampled: 01/06/16 14:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	01/11/16 14:30	

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6A08047-09 **CC-BM-SSC-WW1-01**

Sampled: 01/05/16 10:11 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**450**	3.1	5.0	mg/l	1	01/11/16 14:30	

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6A08047-10 **CC-BM-SSC-WW1-02**

Sampled: 01/05/16 11:40 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**180**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-11 **CC-BM-SSC-WW1-03**

Sampled: 01/05/16 13:10 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**47**	3.1	5.0	mg/l	1	01/11/16 14:30	

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6A08047-12 **CC-BM-SSC-WW1-04**

Sampled: 01/05/16 13:40 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**720**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Reported: 02/17/16 14:22

6A08047-13 **CC-BM-SSC-WW1-05**

Sampled: 01/05/16 14:10 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**320**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
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6A08047-14 **CC-BM-SSC-WW1-06**

Sampled: 01/05/16 14:40 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**230**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Reported: 02/17/16 14:22

6A08047-15 **CC-BM-SSC-WW1-07**

Sampled: 01/05/16 15:10 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**470**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-16 **CC-BM-SSC-WW1-08**

Sampled: 01/05/16 15:40 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**2200**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-17 **CC-BM-SSC-WW1-09**

Sampled: 01/05/16 17:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**270**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-18 **CC-BM-SSC-WW1-10**

Sampled: 01/05/16 18:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**80**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-19 **CC-BM-SSC-WW1-11**

Sampled: 01/05/16 20:39 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**16**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Reported: 02/17/16 14:22

6A08047-20 **CC-BM-SSC-WW1-12**

Sampled: 01/06/16 00:38 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**100**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-21 **CC-BM-SSC-WW1-13**

Sampled: 01/06/16 05:08 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-22 **CC-ML-SSC-WW1-01**

Sampled: 01/05/16 10:40 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**50**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-23 **CC-ML-SSC-WW1-02**

Sampled: 01/05/16 11:40 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**47**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-24 **CC-ML-SSC-WW1-03**

Sampled: 01/05/16 13:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**48**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-25 **CC-ML-SSC-WW1-04**

Sampled: 01/05/16 14:39 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**130**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-26 **CC-ML-SSC-WW1-05**

Sampled: 01/05/16 15:39 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0465 Prepared: 01/11/16 09:51 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**850**	3.1	5.0	mg/l	1	01/11/16 14:30	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-27 **CC-ML-SSC-WW1-06**

Sampled: 01/05/16 16:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1300**	3.1	5.0	mg/l	1	01/11/16 18:51	

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6A08047-28 **CC-ML-SSC-WW1-07**

Sampled: 01/05/16 16:39 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**620**	3.1	5.0	mg/l	1	01/11/16 18:51	

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6A08047-29 **CC-ML-SSC-WW1-08**

Sampled: 01/05/16 17:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**330**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-30 **CC-ML-SSC-WW1-09**

Sampled: 01/05/16 18:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**92**	3.1	5.0	mg/l	1	01/11/16 18:51	

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6A08047-31 **CC-ML-SSC-WW1-10**

Sampled: 01/05/16 19:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**51**	3.1	5.0	mg/l	1	01/11/16 18:51	

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6A08047-32 **CC-ML-SSC-WW1-11**

Sampled: 01/05/16 21:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**87**	3.1	5.0	mg/l	1	01/11/16 18:51	

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6A08047-33 **CC-ML-SSC-WW1-12**

Sampled: 01/05/16 23:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**24**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Reported: 02/17/16 14:22

6A08047-34 **CC-ML-SSC-WW1-13**

Sampled: 01/06/16 00:39 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**49**	3.1	5.0	mg/l	1	01/11/16 18:51	

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6A08047-35 **CC-ML-SSC-WW1-14**

Sampled: 01/06/16 02:39 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**17**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-36 **CC-ML-SSC-WW1-15**

Sampled: 01/06/16 08:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-37 **CC-NR-SSC-WW1-01**

Sampled: 01/05/16 11:04 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**67**	3.1	5.0	mg/l	1	01/11/16 18:51	

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6A08047-38 **CC-NR-SSC-WW1-02**

Sampled: 01/05/16 12:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**77**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Reported: 02/17/16 14:22

6A08047-39 **CC-NR-SSC-WW1-03**

Sampled: 01/05/16 13:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**110**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-40 **CC-NR-SSC-WW1-04**

Sampled: 01/05/16 14:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**660**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-41 **CC-NR-SSC-WW1-05**

Sampled: 01/05/16 15:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**700**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Received: 01/08/16 12:15
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6A08047-42 **CC-NR-SSC-WW1-06**

Sampled: 01/05/16 16:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1200**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-43 **CC-NR-SSC-WW1-07**

Sampled: 01/05/16 17:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**2600**	3.1	5.0	mg/l	1	01/11/16 18:51	

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6A08047-44 **CC-NR-SSC-WW1-08**

Sampled: 01/05/16 17:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**2200**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Received: 01/08/16 12:15
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6A08047-45 **CC-NR-SSC-WW1-09**

Sampled: 01/05/16 18:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1500**	3.1	5.0	mg/l	1	01/11/16 18:51	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-46 **CC-NR-SSC-WW1-10**

Sampled: 01/05/16 19:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0495 Prepared: 01/11/16 13:43 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1300**	3.1	5.0	mg/l	1	01/11/16 18:51	

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6A08047-47 **CC-NR-SSC-WW1-11**

Sampled: 01/05/16 21:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**360**	3.1	5.0	mg/l	1	01/11/16 17:35	

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6A08047-48 **CC-NR-SSC-WW1-12**

Sampled: 01/05/16 23:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**92**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-49 **CC-NR-SSC-WW1-13**

Sampled: 01/06/16 00:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**260**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-50 **CC-NR-SSC-WW1-14**

Sampled: 01/06/16 01:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**69**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-51 **CC-NR-SSC-WW1-15**

Sampled: 01/06/16 01:35 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**92**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-52 **CC-NR-SSC-WW1-16**

Sampled: 01/06/16 03:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**49**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Reported: 02/17/16 14:22

6A08047-53 **CC-NR-SSC-WW1-17**

Sampled: 01/06/16 06:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-54 **CC-TC-SSC-WW1-01**

Sampled: 01/05/16 13:37 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**460**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-55 **CC-TC-SSC-WW1-02**

Sampled: 01/05/16 15:07 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**240**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Reported: 02/17/16 14:22

6A08047-56 **CC-TC-SSC-WW1-03**

Sampled: 01/05/16 15:37 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1700**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-57 **CC-TC-SSC-WW1-04**

Sampled: 01/05/16 16:07 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**800**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-58 **CC-TC-SSC-WW1-05**

Sampled: 01/05/16 16:37 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**740**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-59 **CC-TC-SSC-WW1-06**

Sampled: 01/05/16 17:10 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1600**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-60 **CC-TC-SSC-WW1-07**

Sampled: 01/05/16 17:39 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**730**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-61 **CC-TC-SSC-WW1-08**

Sampled: 01/05/16 18:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**640**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-62 **CC-TC-SSC-WW1-09**

Sampled: 01/05/16 18:39 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**390**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-63 **CC-TC-SSC-WW1-10**

Sampled: 01/05/16 19:09 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**300**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-64 **CC-TC-SSC-WW1-11**

Sampled: 01/05/16 21:12 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**67**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-65 **CC-TC-SSC-WW1-12**

Sampled: 01/05/16 23:41 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**60**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-66 **CC-TC-SSC-WW1-13**

Sampled: 01/06/16 00:41 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0502 Prepared: 01/11/16 15:04 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**31**	3.1	5.0	mg/l	1	01/11/16 17:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-67 **CC-TC-SSC-WW1-14**

Sampled: 01/06/16 02:11 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**19**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-68 **CC-TC-SSC-WW1-15**

Sampled: 01/06/16 03:11 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-69 **CV-UP-SSC-WW1-01**

Sampled: 01/05/16 12:24 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**91**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-70 **CV-UP-SSC-WW1-02**

Sampled: 01/05/16 14:28 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**720**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-71 **CV-UP-SSC-WW1-03**

Sampled: 01/05/16 15:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**550**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-72 **CV-UP-SSC-WW1-04**

Sampled: 01/05/16 15:29 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**470**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Reported: 02/17/16 14:22

6A08047-73 **CV-UP-SSC-WW1-05**

Sampled: 01/05/16 16:29 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**210**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-74 **CV-UP-SSC-WW1-06**

Sampled: 01/05/16 16:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**190**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-75 **CV-UP-SSC-WW1-07**

Sampled: 01/05/16 17:29 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**190**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-76 **CV-UP-SSC-WW1-08**

Sampled: 01/05/16 18:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**200**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-77 **CV-UP-SSC-WW1-09**

Sampled: 01/05/16 19:29 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**170**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-78 **CV-UP-SSC-WW1-10**

Sampled: 01/05/16 19:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**140**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-79 **CV-UP-SSC-WW1-11**

Sampled: 01/05/16 20:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**98**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-80 **CV-UP-SSC-WW1-12**

Sampled: 01/05/16 21:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**78**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-81 **CV-UP-SSC-WW1-13**

Sampled: 01/05/16 22:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**61**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-82 **CV-UP-SSC-WW1-14**

Sampled: 01/06/16 00:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**45**	3.1	5.0	mg/l	1	01/12/16 11:50	

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6A08047-83 **CV-UP-SSC-WW1-15**

Sampled: 01/06/16 02:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**35**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-84 **LP-NC-SSC-WW1-01**

Sampled: 01/05/16 11:44 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**15**	3.1	5.0	mg/l	1	01/12/16 10:02	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-85 **LP-NC-SSC-WW1-02**

Sampled: 01/05/16 14:43 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**55**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-86 **LP-NC-SSC-WW1-03**

Sampled: 01/05/16 16:40 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0534 Prepared: 01/12/16 09:07 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**620**	3.1	5.0	mg/l	1	01/12/16 11:50	

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Date Received: 01/08/16 12:15
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6A08047-87 **LP-NC-SSC-WW1-04**

Sampled: 01/05/16 18:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**830**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-88 **LP-NC-SSC-WW1-05**

Sampled: 01/05/16 19:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**940**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
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6A08047-89 **LP-NC-SSC-WW1-06**

Sampled: 01/05/16 20:49 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**750**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-90 **LP-NC-SSC-WW1-07**

Sampled: 01/05/16 21:49 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**440**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-91 **LP-NC-SSC-WW1-08**

Sampled: 01/05/16 22:49 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**300**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-92 **LP-NC-SSC-WW1-09**

Sampled: 01/05/16 23:49 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**210**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Reported: 02/17/16 14:22

6A08047-93 **LP-NC-SSC-WW1-10**

Sampled: 01/06/16 04:49 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**66**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
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6A08047-94 **LP-POW-SSC-WW1-01**

Sampled: 01/05/16 14:04 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**110**	3.1	5.0	mg/l	1	01/12/16 12:04	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-95 **LP-POW-SSC-WW1-02**

Sampled: 01/05/16 15:03 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**180**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-96 **LP-POW-SSC-WW1-03**

Sampled: 01/05/16 15:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**270**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-97 **LP-POW-SSC-WW1-04**

Sampled: 01/05/16 18:35 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**120**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-98 **LP-POW-SSC-WW1-05**

Sampled: 01/05/16 20:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1300**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-99 **LP-POW-SSC-WW1-06**

Sampled: 01/05/16 20:50 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**900**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-AA **LP-POW-SSC-WW1-07**

Sampled: 01/05/16 21:35 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**810**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-AB **LP-POW-SSC-WW1-08**

Sampled: 01/05/16 23:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**420**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-AC **LP-POW-SSC-WW1-09**

Sampled: 01/06/16 01:20 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**190**	3.1	5.0	mg/l	1	01/12/16 13:35	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-AD **LP-POW-SSC-WW1-10**

Sampled: 01/06/16 11:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**21**	3.1	5.0	mg/l	1	01/12/16 13:35	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-AE **CC-NR-SSC-WW1-18**

Sampled: 01/06/16 11:37 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	01/12/16 13:35	

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San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-AF **CC-TC-SSC-WW1-16**

Sampled: 01/06/16 05:11 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	01/12/16 13:35	

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San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-AG **CC-TC-SSC-WW1-17**

Sampled: 01/06/16 05:41 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0551 Prepared: 01/12/16 11:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**19**	3.1	5.0	mg/l	1	01/12/16 13:35	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-AH **CV-UP-SSC-WW1-16**

Sampled: 01/06/16 06:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0570 Prepared: 01/12/16 13:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**22**	3.1	5.0	mg/l	1	01/12/16 15:00	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

6A08047-AI **CV-TC-SSC-WW1-18**

Sampled: 01/06/16 07:41 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6A0570 Prepared: 01/12/16 13:55 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**5.0**	3.1	5.0	mg/l	1	01/12/16 15:00	

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Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

QUALITY CONTROL SECTION

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San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6A0440 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0440-BLK1)					Analyzed: 01/09/16 15:09						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6A0465 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0465-BLK1)					Analyzed: 01/11/16 14:30						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6A0495 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0495-BLK1)					Analyzed: 01/11/16 18:51						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6A0502 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0502-BLK1)					Analyzed: 01/11/16 17:35						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6A0534 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0534-BLK1)					Analyzed: 01/12/16 11:50						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6A0551 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0551-BLK1)					Analyzed: 01/12/16 13:35						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6A0570 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6A0570-BLK1)					Analyzed: 01/12/16 15:00						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/08/16 12:15
Date Reported: 02/17/16 14:22

Notes and Definitions

ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	02/29/16 12:06
		Received Date:	02/03/16 16:50
		Turn Around:	Normal
Attention:	Jeremy Burns	**Client Project:**	Los Penasquitos Special Study 2015-16
Phone:	(858) 514-6464		
Fax:	(858) 278-5300	**PO Number:**	C013106084/502515C011
Work Order(s):	6B03075		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

Dear Jeremy Burns :

Enclosed are the results of analyses for samples received 02/03/16 16:50 with the Chain of Custody document. The samples were received in good condition, at 4.6 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

hanannguyen

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CC-AC-SSC-WW2-01	KB	6B03075-01	Water	01/31/16 06:52
CC-AC-SSC-WW2-02	KB	6B03075-02	Water	01/31/16 07:51
CC-AC-SSC-WW2-03	KB	6B03075-03	Water	01/31/16 09:51
CC-AC-SSC-WW2-04	KB	6B03075-04	Water	01/31/16 11:00
CC-AC-SSC-WW2-05	KB	6B03075-05	Water	01/31/16 11:59
CC-AC-SSC-WW2-06	KB	6B03075-06	Water	01/31/16 13:29
CC-AC-SSC-WW2-07	KB	6B03075-07	Water	01/31/16 14:29
CC-AC-SSC-WW2-08	KB	6B03075-08	Water	01/31/16 14:59
CC-AC-SSC-WW2-09	KB	6B03075-09	Water	01/31/16 15:29
CC-AC-SSC-WW2-10	KB	6B03075-10	Water	01/31/16 15:59
CC-AC-SSC-WW2-11	KB	6B03075-11	Water	01/31/16 16:59
CC-AC-SSC-WW2-12	KB	6B03075-12	Water	01/31/16 17:59
CC-AC-SSC-WW2-13	KB	6B03075-13	Water	01/31/16 20:37
CC-AC-SSC-WW2-14	KB	6B03075-14	Water	02/01/16 01:38
CC-AC-SSC-WW2-15	KB	6B03075-15	Water	02/01/16 03:38
CC-BM-SSC-WW2-01	KB	6B03075-16	Water	01/31/16 05:07
CC-BM-SSC-WW2-02	KB	6B03075-17	Water	01/31/16 05:36
CC-BM-SSC-WW2-03	KB	6B03075-18	Water	01/31/16 06:38
CC-BM-SSC-WW2-04	KB	6B03075-19	Water	01/31/16 07:06
CC-BM-SSC-WW2-05	KB	6B03075-20	Water	01/31/16 07:36
CC-BM-SSC-WW2-06	KB	6B03075-21	Water	01/31/16 08:06
CC-BM-SSC-WW2-07	KB	6B03075-22	Water	01/31/16 08:36
CC-BM-SSC-WW2-08	KB	6B03075-23	Water	01/31/16 09:06
CC-BM-SSC-WW2-09	KB	6B03075-24	Water	01/31/16 11:05
CC-BM-SSC-WW2-10	KB	6B03075-25	Water	01/31/16 12:35
CC-BM-SSC-WW2-11	KB	6B03075-26	Water	01/31/16 14:05
CC-BM-SSC-WW2-12	KB	6B03075-27	Water	01/31/16 14:35
CC-BM-SSC-WW2-13	KB	6B03075-28	Water	01/31/16 15:05
CC-BM-SSC-WW2-14	KB	6B03075-29	Water	01/31/16 15:35
CC-BM-SSC-WW2-15	KB	6B03075-30	Water	01/31/16 16:05
CC-BM-SSC-WW2-16	KB	6B03075-31	Water	01/31/16 17:35
CC-ML-SSC-WW2-01	KB	6B03075-32	Water	01/31/16 00:48
CC-ML-SSC-WW2-02	KB	6B03075-33	Water	01/31/16 03:41
CC-ML-SSC-WW2-03	KB	6B03075-34	Water	01/31/16 04:28
CC-ML-SSC-WW2-04	KB	6B03075-35	Water	01/31/16 04:58
CC-ML-SSC-WW2-05	KB	6B03075-36	Water	01/31/16 05:58
CC-ML-SSC-WW2-06	KB	6B03075-37	Water	01/31/16 07:28
CC-ML-SSC-WW2-07	KB	6B03075-38	Water	01/31/16 07:58
CC-ML-SSC-WW2-08	KB	6B03075-39	Water	01/31/16 08:28
CC-ML-SSC-WW2-09	KB	6B03075-40	Water	01/31/16 08:58
CC-ML-SSC-WW2-10	KB	6B03075-41	Water	01/31/16 09:28
CC-ML-SSC-WW2-11	KB	6B03075-42	Water	01/31/16 10:28
CC-ML-SSC-WW2-12	KB	6B03075-43	Water	01/31/16 10:58

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CC-ML-SSC-WW2-13	KB	6B03075-44	Water	01/31/16 14:07
CC-ML-SSC-WW2-14	KB	6B03075-45	Water	01/31/16 14:37
CC-ML-SSC-WW2-15	KB	6B03075-46	Water	01/31/16 15:07
CC-ML-SSC-WW2-16	KB	6B03075-47	Water	01/31/16 15:37
CC-ML-SSC-WW2-17	KB	6B03075-48	Water	01/31/16 16:37
CC-ML-SSC-WW2-18	KB	6B03075-49	Water	01/31/16 17:07
CC-NR-SSC-WW2-01	KB	6B03075-50	Water	01/31/16 07:24
CC-NR-SSC-WW2-02	KB	6B03075-51	Water	01/31/16 08:23
CC-NR-SSC-WW2-03	KB	6B03075-52	Water	01/31/16 08:53
CC-NR-SSC-WW2-04	KB	6B03075-53	Water	01/31/16 09:23
CC-NR-SSC-WW2-05	KB	6B03075-54	Water	01/31/16 10:23
CC-NR-SSC-WW2-06	KB	6B03075-55	Water	01/31/16 11:46
CC-NR-SSC-WW2-07	KB	6B03075-56	Water	01/31/16 14:16
CC-NR-SSC-WW2-08	KB	6B03075-57	Water	01/31/16 14:46
CC-NR-SSC-WW2-09	KB	6B03075-58	Water	01/31/16 15:16
CC-NR-SSC-WW2-10	KB	6B03075-59	Water	01/31/16 15:46
CC-NR-SSC-WW2-11	KB	6B03075-60	Water	01/31/16 16:16
CC-NR-SSC-WW2-12	KB	6B03075-61	Water	01/31/16 18:16
CC-NR-SSC-WW2-13	KB	6B03075-62	Water	01/31/16 19:41
CC-TC-SSC-WW2-01	KB	6B03075-63	Water	01/31/16 08:07
CC-TC-SSC-WW2-02	KB	6B03075-64	Water	01/31/16 17:00
CC-TC-SSC-WW2-03	KB	6B03075-65	Water	01/31/16 18:33
CC-TC-SSC-WW2-04	KB	6B03075-66	Water	01/31/16 19:33
CC-TC-SSC-WW2-05	KB	6B03075-67	Water	01/31/16 20:33
CC-TC-SSC-WW2-06	KB	6B03075-68	Water	01/31/16 21:33
CV-UP-SSC-WW2-01	KB	6B03075-69	Water	01/31/16 09:55
CV-UP-SSC-WW2-02	KB	6B03075-70	Water	01/31/16 10:25
CV-UP-SSC-WW2-03	KB	6B03075-71	Water	01/31/16 10:55
CV-UP-SSC-WW2-04	KB	6B03075-72	Water	01/31/16 11:25
CV-UP-SSC-WW2-05	KB	6B03075-73	Water	01/31/16 11:55
CV-UP-SSC-WW2-06	KB	6B03075-74	Water	01/31/16 12:25
CV-UP-SSC-WW2-07	KB	6B03075-75	Water	01/31/16 12:55
CV-UP-SSC-WW2-08	KB	6B03075-76	Water	01/31/16 13:25
CV-UP-SSC-WW2-09	KB	6B03075-77	Water	01/31/16 13:55
CV-UP-SSC-WW2-10	KB	6B03075-78	Water	01/31/16 14:25
CV-UP-SSC-WW2-11	KB	6B03075-79	Water	01/31/16 14:55
CV-UP-SSC-WW2-12	KB	6B03075-80	Water	01/31/16 15:25
CV-UP-SSC-WW2-13	KB	6B03075-81	Water	01/31/16 15:55
CV-UP-SSC-WW2-14	KB	6B03075-82	Water	01/31/16 16:25
LP-NC-SSC-WW2-01	KB	6B03075-83	Water	01/31/16 05:47
LP-NC-SSC-WW2-02	KB	6B03075-84	Water	01/31/16 07:46
LP-NC-SSC-WW2-03	KB	6B03075-85	Water	01/31/16 08:46
LP-NC-SSC-WW2-04	KB	6B03075-86	Water	01/31/16 09:16

Weck Laboratories, Inc 14859 East Clark Avenue, City of Industry, California 91745-1396 (626) 336-2139 FAX (626) 336-2634

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
LP-NC-SSC-WW2-05	KB	6B03075-87	Water	01/31/16 09:46
LP-NC-SSC-WW2-06	KB	6B03075-88	Water	01/31/16 10:16
LP-NC-SSC-WW2-07	KB	6B03075-89	Water	01/31/16 10:46
LP-NC-SSC-WW2-08	KB	6B03075-90	Water	01/31/16 11:46
LP-NC-SSC-WW2-09	KB	6B03075-91	Water	01/31/16 14:15
LP-NC-SSC-WW2-10	KB	6B03075-92	Water	01/31/16 14:45
LP-NC-SSC-WW2-11	KB	6B03075-93	Water	01/31/16 15:15
LP-NC-SSC-WW2-12	KB	6B03075-94	Water	01/31/16 15:45
LP-NC-SSC-WW2-13	KB	6B03075-95	Water	01/31/16 16:15
LP-NC-SSC-WW2-14	KB	6B03075-96	Water	01/31/16 17:15
LP-NC-SSC-WW2-15	KB	6B03075-97	Water	01/31/16 19:15
LP-NC-SSC-WW2-16	KB	6B03075-98	Water	01/31/16 22:14
LP-NC-SSC-WW2-17	KB	6B03075-99	Water	02/01/16 03:14
LP-NC-SSC-WW2-18	KB	6B03075-AA	Water	02/01/16 06:14
LP-NC-SSC-WW2-19	KB	6B03075-AB	Water	02/01/16 09:14
LP-NC-SSC-WW2-20	KB	6B03075-AC	Water	02/01/16 11:14
LP-POW-SSC-WW2-01	KB	6B03075-AD	Water	01/31/16 14:05
LP-POW-SSC-WW2-02	KB	6B03075-AE	Water	01/31/16 14:34
LP-POW-SSC-WW2-03	KB	6B03075-AF	Water	01/31/16 15:04
LP-POW-SSC-WW2-04	KB	6B03075-AG	Water	01/31/16 15:34
LP-POW-SSC-WW2-05	KB	6B03075-AH	Water	01/31/16 16:04
LP-POW-SSC-WW2-06	KB	6B03075-AI	Water	01/31/16 17:04
LP-POW-SSC-WW2-07	KB	6B03075-AJ	Water	01/31/16 17:34
LP-POW-SSC-WW2-08	KB	6B03075-AK	Water	01/31/16 18:34
LP-POW-SSC-WW2-09	KB	6B03075-AL	Water	02/01/16 05:55
LP-POW-SSC-WW2-10	KB	6B03075-AM	Water	02/01/16 06:54
LP-POW-SSC-WW2-11	KB	6B03075-AN	Water	02/01/16 08:54
LP-POW-SSC-WW2-12	KB	6B03075-AO	Water	02/01/16 11:54

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-01 **CC-AC-SSC-WW2-01**

Sampled: 01/31/16 06:52 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**64**	3.1	5.0	mg/l	1	02/04/16 14:20	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-02 **CC-AC-SSC-WW2-02**

Sampled: 01/31/16 07:51 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**40**	3.1	5.0	mg/l	1	02/04/16 14:20	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-03 **CC-AC-SSC-WW2-03**

Sampled: 01/31/16 09:51 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**100**	3.1	5.0	mg/l	1	02/04/16 14:20	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-04 **CC-AC-SSC-WW2-04**

Sampled: 01/31/16 11:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**150**	3.1	5.0	mg/l	1	02/04/16 14:20	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-05 **CC-AC-SSC-WW2-05**

Sampled: 01/31/16 11:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**36**	3.1	5.0	mg/l	1	02/04/16 14:20	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-06 **CC-AC-SSC-WW2-06**

Sampled: 01/31/16 13:29 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**15**	3.1	5.0	mg/l	1	02/04/16 14:20	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-07 **CC-AC-SSC-WW2-07**

Sampled: 01/31/16 14:29 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**11**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-08 **CC-AC-SSC-WW2-08**

Sampled: 01/31/16 14:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0296 Prepared: 02/04/16 09:23 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**180**	3.1	5.0	mg/l	1	02/04/16 14:20	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-09 **CC-AC-SSC-WW2-09**

Sampled: 01/31/16 15:29 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**170**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Reported: 02/29/16 12:06

6B03075-10 **CC-AC-SSC-WW2-10**

Sampled: 01/31/16 15:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**430**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Reported: 02/29/16 12:06

6B03075-11 **CC-AC-SSC-WW2-11**

Sampled: 01/31/16 16:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**130**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-12 **CC-AC-SSC-WW2-12**

Sampled: 01/31/16 17:59 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**49**	3.1	5.0	mg/l	1	02/05/16 16:50	

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6B03075-13 **CC-AC-SSC-WW2-13**

Sampled: 01/31/16 20:37 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**17**	3.1	5.0	mg/l	1	02/05/16 16:50	

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6B03075-14 **CC-AC-SSC-WW2-14**

Sampled: 02/01/16 01:38 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-15 **CC-AC-SSC-WW2-15**

Sampled: 02/01/16 03:38 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	02/05/16 16:50	

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6B03075-16 **CC-BM-SSC-WW2-01**

Sampled: 01/31/16 05:07 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**1700**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-17 **CC-BM-SSC-WW2-02**

Sampled: 01/31/16 05:36 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**170**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Reported: 02/29/16 12:06

6B03075-18 **CC-BM-SSC-WW2-03**

Sampled: 01/31/16 06:38 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**22**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-19 **CC-BM-SSC-WW2-04**

Sampled: 01/31/16 07:06 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-20 **CC-BM-SSC-WW2-05**

Sampled: 01/31/16 07:36 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**21**	3.1	5.0	mg/l	1	02/05/16 16:50	

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6B03075-21 **CC-BM-SSC-WW2-06**

Sampled: 01/31/16 08:06 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**350**	3.1	5.0	mg/l	1	02/05/16 16:50	

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6B03075-22 **CC-BM-SSC-WW2-07**

Sampled: 01/31/16 08:36 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**110**	3.1	5.0	mg/l	1	02/05/16 16:50	

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6B03075-23 **CC-BM-SSC-WW2-08**

Sampled: 01/31/16 09:06 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**47**	3.1	5.0	mg/l	1	02/05/16 16:50	

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6B03075-24 **CC-BM-SSC-WW2-09**

Sampled: 01/31/16 11:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-25 **CC-BM-SSC-WW2-10**

Sampled: 01/31/16 12:35 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**6.0**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-26 **CC-BM-SSC-WW2-11**

Sampled: 01/31/16 14:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Reported: 02/29/16 12:06

6B03075-27 **CC-BM-SSC-WW2-12**

Sampled: 01/31/16 14:35 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**19**	3.1	5.0	mg/l	1	02/05/16 16:50	

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6B03075-28 **CC-BM-SSC-WW2-13**

Sampled: 01/31/16 15:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0297 Prepared: 02/04/16 09:25 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**270**	3.1	5.0	mg/l	1	02/05/16 16:50	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-29 **CC-BM-SSC-WW2-14**

Sampled: 01/31/16 15:35 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**270**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-30 **CC-BM-SSC-WW2-15**

Sampled: 01/31/16 16:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**100**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-31 **CC-BM-SSC-WW2-16**

Sampled: 01/31/16 17:35 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**22**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-32 **CC-ML-SSC-WW2-01**

Sampled: 01/31/16 00:48 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**65**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-33 **CC-ML-SSC-WW2-02**

Sampled: 01/31/16 03:41 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**73**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-34 **CC-ML-SSC-WW2-03**

Sampled: 01/31/16 04:28 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**60**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-35 **CC-ML-SSC-WW2-04**

Sampled: 01/31/16 04:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**100**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-36 **CC-ML-SSC-WW2-05**

Sampled: 01/31/16 05:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**20**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-37 **CC-ML-SSC-WW2-06**

Sampled: 01/31/16 07:28 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**29**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-38 **CC-ML-SSC-WW2-07**

Sampled: 01/31/16 07:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**170**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Reported: 02/29/16 12:06

6B03075-39 **CC-ML-SSC-WW2-08**

Sampled: 01/31/16 08:28 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**98**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-40 **CC-ML-SSC-WW2-09**

Sampled: 01/31/16 08:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**51**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-41 **CC-ML-SSC-WW2-10**

Sampled: 01/31/16 09:28 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**27**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-42 **CC-ML-SSC-WW2-11**

Sampled: 01/31/16 10:28 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-43 **CC-ML-SSC-WW2-12**

Sampled: 01/31/16 10:58 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Reported: 02/29/16 12:06

6B03075-44 **CC-ML-SSC-WW2-13**

Sampled: 01/31/16 14:07 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**72**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-45 **CC-ML-SSC-WW2-14**

Sampled: 01/31/16 14:37 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**86**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-46 **CC-ML-SSC-WW2-15**

Sampled: 01/31/16 15:07 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**47**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-47 **CC-ML-SSC-WW2-16**

Sampled: 01/31/16 15:37 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**19**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-48 **CC-ML-SSC-WW2-17**

Sampled: 01/31/16 16:37 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0312 Prepared: 02/04/16 10:27 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	02/04/16 12:17	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-49 **CC-ML-SSC-WW2-18**

Sampled: 01/31/16 17:07 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**5.0**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-50 **CC-NR-SSC-WW2-01**

Sampled: 01/31/16 07:24 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**220**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-51 **CC-NR-SSC-WW2-02**

Sampled: 01/31/16 08:23 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**250**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-52 **CC-NR-SSC-WW2-03**

Sampled: 01/31/16 08:53 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**150**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-53 **CC-NR-SSC-WW2-04**

Sampled: 01/31/16 09:23 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**240**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-54 **CC-NR-SSC-WW2-05**

Sampled: 01/31/16 10:23 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**140**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-55 **CC-NR-SSC-WW2-06**

Sampled: 01/31/16 11:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**34**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Reported: 02/29/16 12:06

6B03075-56 **CC-NR-SSC-WW2-07**

Sampled: 01/31/16 14:16 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**120**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-57 **CC-NR-SSC-WW2-08**

Sampled: 01/31/16 14:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**43**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-58 **CC-NR-SSC-WW2-09**

Sampled: 01/31/16 15:16 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**250**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-59 **CC-NR-SSC-WW2-10**

Sampled: 01/31/16 15:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**240**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-60 **CC-NR-SSC-WW2-11**

Sampled: 01/31/16 16:16 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**310**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-61 **CC-NR-SSC-WW2-12**

Sampled: 01/31/16 18:16 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**40**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-62 **CC-NR-SSC-WW2-13**

Sampled: 01/31/16 19:41 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**20**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-63 **CC-TC-SSC-WW2-01**

Sampled: 01/31/16 08:07 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**2100**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-64 **CC-TC-SSC-WW2-02**

Sampled: 01/31/16 17:00 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**71**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-65 **CC-TC-SSC-WW2-03**

Sampled: 01/31/16 18:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**25**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-66 **CC-TC-SSC-WW2-04**

Sampled: 01/31/16 19:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-67 **CC-TC-SSC-WW2-05**

Sampled: 01/31/16 20:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-68 **CC-TC-SSC-WW2-06**

Sampled: 01/31/16 21:33 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0397 Prepared: 02/05/16 10:16 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	02/05/16 13:42	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-69 **CV-UP-SSC-WW2-01**

Sampled: 01/31/16 09:55 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**61**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-70 **CV-UP-SSC-WW2-02**

Sampled: 01/31/16 10:25 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**90**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-71 **CV-UP-SSC-WW2-03**

Sampled: 01/31/16 10:55 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**120**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-72 **CV-UP-SSC-WW2-04**

Sampled: 01/31/16 11:25 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**94**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Reported: 02/29/16 12:06

6B03075-73 **CV-UP-SSC-WW2-05**

Sampled: 01/31/16 11:55 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**90**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-74 **CV-UP-SSC-WW2-06**

Sampled: 01/31/16 12:25 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**64**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-75 **CV-UP-SSC-WW2-07**

Sampled: 01/31/16 12:55 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**38**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-76 **CV-UP-SSC-WW2-08**

Sampled: 01/31/16 13:25 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**31**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-77 **CV-UP-SSC-WW2-09**

Sampled: 01/31/16 13:55 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**19**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-78 **CV-UP-SSC-WW2-10**

Sampled: 01/31/16 14:25 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**15**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Reported: 02/29/16 12:06

6B03075-79 **CV-UP-SSC-WW2-11**

Sampled: 01/31/16 14:55 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**84**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-80 **CV-UP-SSC-WW2-12**

Sampled: 01/31/16 15:25 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**110**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-81 **CV-UP-SSC-WW2-13**

Sampled: 01/31/16 15:55 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**65**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-82 **CV-UP-SSC-WW2-14**

Sampled: 01/31/16 16:25 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**87**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-83 **LP-NC-SSC-WW2-01**

Sampled: 01/31/16 05:47 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**21**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-84 **LP-NC-SSC-WW2-02**

Sampled: 01/31/16 07:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**21**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-85 **LP-NC-SSC-WW2-03**

Sampled: 01/31/16 08:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**72**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-86 **LP-NC-SSC-WW2-04**

Sampled: 01/31/16 09:16 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**110**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-87 **LP-NC-SSC-WW2-05**

Sampled: 01/31/16 09:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**84**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-88 **LP-NC-SSC-WW2-06**

Sampled: 01/31/16 10:16 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0433 Prepared: 02/05/16 13:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**58**	3.1	5.0	mg/l	1	02/05/16 17:07	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-89 **LP-NC-SSC-WW2-07**

Sampled: 01/31/16 10:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**43**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-90 **LP-NC-SSC-WW2-08**

Sampled: 01/31/16 11:46 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**21**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-91 **LP-NC-SSC-WW2-09**

Sampled: 01/31/16 14:15 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**15**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-92 **LP-NC-SSC-WW2-10**

Sampled: 01/31/16 14:45 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**50**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-93 **LP-NC-SSC-WW2-11**

Sampled: 01/31/16 15:15 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**140**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-94 **LP-NC-SSC-WW2-12**

Sampled: 01/31/16 15:45 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**160**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-95 **LP-NC-SSC-WW2-13**

Sampled: 01/31/16 16:15 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**120**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-96 **LP-NC-SSC-WW2-14**

Sampled: 01/31/16 17:15 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**55**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-97 **LP-NC-SSC-WW2-15**

Sampled: 01/31/16 19:15 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**31**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-98 **LP-NC-SSC-WW2-16**

Sampled: 01/31/16 22:14 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-99 **LP-NC-SSC-WW2-17**

Sampled: 02/01/16 03:14 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**5.0**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AA **LP-NC-SSC-WW2-18**

Sampled: 02/01/16 06:14 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**14**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AB **LP-NC-SSC-WW2-19**

Sampled: 02/01/16 09:14 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AC **LP-NC-SSC-WW2-20**

Sampled: 02/01/16 11:14 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	ND	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AD **LP-POW-SSC-WW2-01**

Sampled: 01/31/16 14:05 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**25**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AE **LP-POW-SSC-WW2-02**

Sampled: 01/31/16 14:34 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**42**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AF **LP-POW-SSC-WW2-03**

Sampled: 01/31/16 15:04 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**270**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AG **LP-POW-SSC-WW2-04**

Sampled: 01/31/16 15:34 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**300**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AH **LP-POW-SSC-WW2-05**

Sampled: 01/31/16 16:04 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**140**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AI **LP-POW-SSC-WW2-06**

Sampled: 01/31/16 17:04 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0442 Prepared: 02/05/16 15:32 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**39**	3.1	5.0	mg/l	1	02/05/16 17:47	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AJ **LP-POW-SSC-WW2-07**

Sampled: 01/31/16 17:34 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0453 Prepared: 02/05/16 17:08 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	02/05/16 17:40	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AK **LP-POW-SSC-WW2-08**

Sampled: 01/31/16 18:34 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0453 Prepared: 02/05/16 17:08 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**22**	3.1	5.0	mg/l	1	02/05/16 17:40	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AL **LP-POW-SSC-WW2-09**

Sampled: 02/01/16 05:55 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0453 Prepared: 02/05/16 17:08 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**20**	3.1	5.0	mg/l	1	02/05/16 17:40	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AM **LP-POW-SSC-WW2-10**

Sampled: 02/01/16 06:54 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0453 Prepared: 02/05/16 17:08 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**19**	3.1	5.0	mg/l	1	02/05/16 17:40	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AN **LP-POW-SSC-WW2-11**

Sampled: 02/01/16 08:54 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0453 Prepared: 02/05/16 17:08 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**27**	3.1	5.0	mg/l	1	02/05/16 17:40	

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Date Received: 02/03/16 16:50
Date Reported: 02/29/16 12:06

6B03075-AO **LP-POW-SSC-WW2-12**

Sampled: 02/01/16 11:54 **Sampled By:** KB **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6B0453 Prepared: 02/05/16 17:08 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**5.0**	3.1	5.0	mg/l	1	02/05/16 17:40	

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QUALITY CONTROL SECTION

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Date Reported: 02/29/16 12:06

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6B0296 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0296-BLK1)					Analyzed: 02/04/16 14:20						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6B0297 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0297-BLK1)					Analyzed: 02/05/16 16:50						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6B0312 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0312-BLK1)					Analyzed: 02/04/16 12:17						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6B0397 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0397-BLK1)					Analyzed: 02/05/16 13:42						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6B0433 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0433-BLK1)					Analyzed: 02/05/16 17:07						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6B0442 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0442-BLK1)					Analyzed: 02/05/16 17:47						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6B0453 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6B0453-BLK1)					Analyzed: 02/05/16 17:40						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

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Date Reported: 02/29/16 12:06

Notes and Definitions

ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	04/01/16 10:35
		Received Date:	03/10/16 16:30
		Turn Around:	7 workdays
Attention:	Jeremy Burns	**Client Project:**	Los Penasquitos Special Study 2015-2016
Phone:	(858) 514-6464		
Fax:	(858) 278-5300		
Work Order(s):	6C10069		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

Dear Jeremy Burns :

Enclosed are the results of analyses for samples received 03/10/16 16:30 with the Chain of Custody document. The samples were received in good condition, at 7.7 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

hanangiyen

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CC-AC-SSC-WW3-01	Client	6C10069-01	Water	03/06/16 09:57
CC-AC-SSC-WW3-02	Client	6C10069-02	Water	03/06/16 10:26
CC-AC-SSC-WW3-03	Client	6C10069-03	Water	03/06/16 10:56
CC-AC-SSC-WW3-04	Client	6C10069-04	Water	03/06/16 11:26
CC-AC-SSC-WW3-05	Client	6C10069-05	Water	03/06/16 11:56
CC-AC-SSC-WW3-06	Client	6C10069-06	Water	03/06/16 12:26
CC-AC-SSC-WW3-07	Client	6C10069-07	Water	03/06/16 12:56
CC-AC-SSC-WW3-08	Client	6C10069-08	Water	03/06/16 13:56
CC-AC-SSC-WW3-09	Client	6C10069-09	Water	03/07/16 10:36
CC-AC-SSC-WW3-10	Client	6C10069-10	Water	03/07/16 14:57
CC-AC-SSC-WW3-11	Client	6C10069-11	Water	03/07/16 15:23
CC-AC-SSC-WW3-12	Client	6C10069-12	Water	03/07/16 15:52
CC-AC-SSC-WW3-13	Client	6C10069-13	Water	03/07/16 16:22
CC-AC-SSC-WW3-14	Client	6C10069-14	Water	03/07/16 17:22
CC-AC-SSC-WW3-15	Client	6C10069-15	Water	03/07/16 18:22
CC-AC-SSC-WW3-16	Client	6C10069-16	Water	03/07/16 18:52
CC-AC-SSC-WW3-17	Client	6C10069-17	Water	03/07/16 19:52
CC-AC-SSC-WW3-18	Client	6C10069-18	Water	03/07/16 20:52
CC-AC-SSC-WW3-19	Client	6C10069-19	Water	03/07/16 21:22
CC-AC-SSC-WW3-20	Client	6C10069-20	Water	03/07/16 21:52
CC-AC-SSC-WW3-21	Client	6C10069-21	Water	03/07/16 23:52
CC-BM-SSC-WW3-01	Client	6C10069-22	Water	03/06/16 09:20
CC-BM-SSC-WW3-02	Client	6C10069-23	Water	03/06/16 09:49
CC-BM-SSC-WW3-03	Client	6C10069-24	Water	03/06/16 10:19
CC-BM-SSC-WW3-04	Client	6C10069-25	Water	03/06/16 11:49
CC-BM-SSC-WW3-05	Client	6C10069-26	Water	03/07/16 08:37
CC-BM-SSC-WW3-06	Client	6C10069-27	Water	03/07/16 09:06
CC-BM-SSC-WW3-07	Client	6C10069-28	Water	03/07/16 10:08
CC-BM-SSC-WW3-08	Client	6C10069-29	Water	03/07/16 12:37
CC-BM-SSC-WW3-09	Client	6C10069-30	Water	03/07/16 15:07
CC-BM-SSC-WW3-10	Client	6C10069-31	Water	03/07/16 15:55
CC-BM-SSC-WW3-11	Client	6C10069-32	Water	03/07/16 16:54
CC-BM-SSC-WW3-12	Client	6C10069-33	Water	03/07/16 17:54
CC-BM-SSC-WW3-13	Client	6C10069-34	Water	03/07/16 18:54
CC-BM-SSC-WW3-14	Client	6C10069-35	Water	03/07/16 22:24
CC-ML-SSC-WW3-01	Client	6C10069-36	Water	03/05/16 23:59
CC-ML-SSC-WW3-02	Client	6C10069-37	Water	03/06/16 04:42
CC-ML-SSC-WW3-03	Client	6C10069-38	Water	03/06/16 05:13
CC-ML-SSC-WW3-04	Client	6C10069-39	Water	03/06/16 09:22
CC-ML-SSC-WW3-05	Client	6C10069-40	Water	03/06/16 09:52
CC-ML-SSC-WW3-06	Client	6C10069-41	Water	03/06/16 10:22
CC-ML-SSC-WW3-07	Client	6C10069-42	Water	03/06/16 11:22
CC-ML-SSC-WW3-08	Client	6C10069-43	Water	03/07/16 08:32

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CC-ML-SSC-WW3-09	Client	6C10069-44	Water	03/07/16 09:01
CC-ML-SSC-WW3-10	Client	6C10069-45	Water	03/07/16 09:31
CC-ML-SSC-WW3-11	Client	6C10069-46	Water	03/07/16 10:31
CC-ML-SSC-WW3-12	Client	6C10069-47	Water	03/07/16 11:01
CC-ML-SSC-WW3-13	Client	6C10069-48	Water	03/07/16 11:34
CC-ML-SSC-WW3-14	Client	6C10069-49	Water	03/07/16 15:35
CC-ML-SSC-WW3-15	Client	6C10069-50	Water	03/07/16 16:34
CC-ML-SSC-WW3-16	Client	6C10069-51	Water	03/07/16 17:34
CC-ML-SSC-WW3-17	Client	6C10069-52	Water	03/07/16 18:34
CC-ML-SSC-WW3-18	Client	6C10069-53	Water	03/07/16 19:04
CC-ML-SSC-WW3-19	Client	6C10069-54	Water	03/07/16 20:34
CC-ML-SSC-WW3-20	Client	6C10069-55	Water	03/07/16 21:34
CC-NR-SSC-WW3-01	Client	6C10069-56	Water	03/06/16 09:46
CC-NR-SSC-WW3-02	Client	6C10069-57	Water	03/06/16 10:46
CC-NR-SSC-WW3-03	Client	6C10069-58	Water	03/06/16 11:16
CC-NR-SSC-WW3-04	Client	6C10069-59	Water	03/06/16 11:46
CC-NR-SSC-WW3-05	Client	6C10069-60	Water	03/06/16 13:16
CC-NR-SSC-WW3-06	Client	6C10069-61	Water	03/07/16 09:33
CC-NR-SSC-WW3-07	Client	6C10069-62	Water	03/07/16 10:03
CC-NR-SSC-WW3-08	Client	6C10069-63	Water	03/07/16 10:33
CC-NR-SSC-WW3-09	Client	6C10069-64	Water	03/07/16 11:33
CC-NR-SSC-WW3-10	Client	6C10069-65	Water	03/07/16 15:36
CC-NR-SSC-WW3-11	Client	6C10069-66	Water	03/07/16 16:35
CC-NR-SSC-WW3-12	Client	6C10069-67	Water	03/07/16 17:05
CC-NR-SSC-WW3-13	Client	6C10069-68	Water	03/07/16 17:35
CC-NR-SSC-WW3-14	Client	6C10069-69	Water	03/07/16 19:35
CC-NR-SSC-WW3-15	Client	6C10069-70	Water	03/07/16 21:05
CC-NR-SSC-WW3-16	Client	6C10069-71	Water	03/07/16 22:05
CC-NR-SSC-WW3-17	Client	6C10069-72	Water	03/07/16 22:35
CC-NR-SSC-WW3-18	Client	6C10069-73	Water	03/08/16 00:35
CC-TC-SSC-WW3-01	Client	6C10069-74	Water	03/06/16 09:35
CC-TC-SSC-WW3-02	Client	6C10069-75	Water	03/06/16 10:04
CC-TC-SSC-WW3-03	Client	6C10069-76	Water	03/07/16 20:55
CC-TC-SSC-WW3-04	Client	6C10069-77	Water	03/07/16 21:24
CC-TC-SSC-WW3-05	Client	6C10069-78	Water	03/07/16 21:54
CC-TC-SSC-WW3-06	Client	6C10069-79	Water	03/07/16 22:24
CC-TC-SSC-WW3-07	Client	6C10069-80	Water	03/07/16 22:54
CV-UP-SSC-WW3-01	Client	6C10069-81	Water	03/06/16 16:30
CV-UP-SSC-WW3-02	Client	6C10069-82	Water	03/07/16 11:05
CV-UP-SSC-WW3-03	Client	6C10069-83	Water	03/07/16 11:37
CV-UP-SSC-WW3-04	Client	6C10069-84	Water	03/07/16 12:07
CV-UP-SSC-WW3-05	Client	6C10069-85	Water	03/07/16 12:37
CV-UP-SSC-WW3-06	Client	6C10069-86	Water	03/07/16 13:07

Weck Laboratories, Inc 14859 East Clark Avenue, City of Industry, California 91745-1396 (626) 336-2139 FAX (626) 336-2634

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CV-UP-SSC-WW3-07	Client	6C10069-87	Water	03/07/16 14:07
CV-UP-SSC-WW3-08	Client	6C10069-88	Water	03/07/16 14:37
CV-UP-SSC-WW3-09	Client	6C10069-89	Water	03/07/16 15:37
CV-UP-SSC-WW3-10	Client	6C10069-90	Water	03/07/16 17:07
CV-UP-SSC-WW3-11	Client	6C10069-91	Water	03/07/16 17:37
CV-UP-SSC-WW3-12	Client	6C10069-92	Water	03/07/16 19:07
CV-UP-SSC-WW3-13	Client	6C10069-93	Water	03/07/16 19:37
CV-UP-SSC-WW3-14	Client	6C10069-94	Water	03/07/16 21:37
LP-NC-SSC-WW3-01	Client	6C10069-95	Water	03/06/16 09:23
LP-NC-SSC-WW3-02	Client	6C10069-96	Water	03/06/16 09:52
LP-NC-SSC-WW3-03	Client	6C10069-97	Water	03/06/16 10:22
LP-NC-SSC-WW3-04	Client	6C10069-98	Water	03/06/16 11:22
LP-NC-SSC-WW3-05	Client	6C10069-99	Water	03/06/16 11:52
LP-NC-SSC-WW3-06	Client	6C10069-AA	Water	03/06/16 12:52
LP-NC-SSC-WW3-07	Client	6C10069-AB	Water	03/06/16 13:22
LP-NC-SSC-WW3-08	Client	6C10069-AC	Water	03/06/16 13:52
LP-NC-SSC-WW3-09	Client	6C10069-AD	Water	03/07/16 09:56
LP-NC-SSC-WW3-10	Client	6C10069-AE	Water	03/07/16 10:25
LP-NC-SSC-WW3-11	Client	6C10069-AF	Water	03/07/16 10:55
LP-NC-SSC-WW3-12	Client	6C10069-AG	Water	03/07/16 11:25
LP-NC-SSC-WW3-13	Client	6C10069-AH	Water	03/07/16 11:55
LP-NC-SSC-WW3-14	Client	6C10069-AI	Water	03/07/16 12:25
LP-NC-SSC-WW3-15	Client	6C10069-AJ	Water	03/07/16 13:25
LP-NC-SSC-WW3-16	Client	6C10069-AK	Water	03/07/16 15:25
LP-NC-SSC-WW3-17	Client	6C10069-AL	Water	03/07/16 16:26
LP-NC-SSC-WW3-18	Client	6C10069-AM	Water	03/07/16 17:24
LP-NC-SSC-WW3-19	Client	6C10069-AN	Water	03/07/16 17:54
LP-NC-SSC-WW3-20	Client	6C10069-AO	Water	03/07/16 18:24
LP-NC-SSC-WW3-21	Client	6C10069-AP	Water	03/07/16 19:54
LP-NC-SSC-WW3-22	Client	6C10069-AQ	Water	03/07/16 20:24
LP-NC-SSC-WW3-23	Client	6C10069-AR	Water	03/07/16 22:24
LP-POW-SSC-WW3-01	Client	6C10069-AS	Water	03/07/16 09:33
LP-POW-SSC-WW3-02	Client	6C10069-AT	Water	03/07/16 10:03
LP-POW-SSC-WW3-03	Client	6C10069-AU	Water	03/07/16 10:33
LP-POW-SSC-WW3-04	Client	6C10069-AV	Water	03/07/16 11:03
LP-POW-SSC-WW3-05	Client	6C10069-AW	Water	03/07/16 11:33
LP-POW-SSC-WW3-06	Client	6C10069-AX	Water	03/07/16 12:33
LP-POW-SSC-WW3-07	Client	6C10069-AY	Water	03/07/16 13:03
LP-POW-SSC-WW3-08	Client	6C10069-AZ	Water	03/07/16 13:33
LP-POW-SSC-WW3-09	Client	6C10069-BA	Water	03/07/16 14:03
LP-POW-SSC-WW3-10	Client	6C10069-BB	Water	03/07/16 15:03
LP-POW-SSC-WW3-11	Client	6C10069-BC	Water	03/07/16 16:03
LP-POW-SSC-WW3-12	Client	6C10069-BD	Water	03/07/16 18:32

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
LP-POW-SSC-WW3-13	Client	6C10069-BE	Water	03/07/16 19:02
LP-POW-SSC-WW3-14	Client	6C10069-BF	Water	03/07/16 19:32
LP-POW-SSC-WW3-15	Client	6C10069-BG	Water	03/07/16 20:02
LP-POW-SSC-WW3-16	Client	6C10069-BH	Water	03/07/16 20:32
LP-POW-SSC-WW3-17	Client	6C10069-BI	Water	03/07/16 21:02
LP-POW-SSC-WW3-18	Client	6C10069-BJ	Water	03/07/16 22:32
LP-POW-SSC-WW3-19	Client	6C10069-BK	Water	03/07/16 23:32

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-01 **CC-AC-SSC-WW3-01**

Sampled: 03/06/16 09:57 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**130**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-02 **CC-AC-SSC-WW3-02**

Sampled: 03/06/16 10:26 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**82**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-03 **CC-AC-SSC-WW3-03**

Sampled: 03/06/16 10:56 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**31**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-04 **CC-AC-SSC-WW3-04**

Sampled: 03/06/16 11:26 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**15**	3.1	5.0	mg/l	1	03/11/16 10:10	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-05 **CC-AC-SSC-WW3-05**

Sampled: 03/06/16 11:56 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-06 **CC-AC-SSC-WW3-06**

Sampled: 03/06/16 12:26 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**16**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-07 **CC-AC-SSC-WW3-07**

Sampled: 03/06/16 12:56 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**76**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-08 **CC-AC-SSC-WW3-08**

Sampled: 03/06/16 13:56 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-09 **CC-AC-SSC-WW3-09**

Sampled: 03/07/16 10:36 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**54**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-10 **CC-AC-SSC-WW3-10**

Sampled: 03/07/16 14:57 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-11 **CC-AC-SSC-WW3-11**

Sampled: 03/07/16 15:23 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	03/11/16 10:10	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-12 **CC-AC-SSC-WW3-12**

Sampled: 03/07/16 15:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**45**	3.1	5.0	mg/l	1	03/11/16 10:10	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-13 **CC-AC-SSC-WW3-13**

Sampled: 03/07/16 16:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**17**	3.1	5.0	mg/l	1	03/11/16 10:10	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-14 **CC-AC-SSC-WW3-14**

Sampled: 03/07/16 17:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**100**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-15 **CC-AC-SSC-WW3-15**

Sampled: 03/07/16 18:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**200**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-16 **CC-AC-SSC-WW3-16**

Sampled: 03/07/16 18:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**230**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-17 **CC-AC-SSC-WW3-17**

Sampled: 03/07/16 19:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**81**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-18 **CC-AC-SSC-WW3-18**

Sampled: 03/07/16 20:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**58**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-19 **CC-AC-SSC-WW3-19**

Sampled: 03/07/16 21:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-20 **CC-AC-SSC-WW3-20**

Sampled: 03/07/16 21:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**25**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-21 **CC-AC-SSC-WW3-21**

Sampled: 03/07/16 23:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0687 Prepared: 03/11/16 08:33 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	03/11/16 10:10	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-22 **CC-BM-SSC-WW3-01**

Sampled: 03/06/16 09:20 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**460**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-23 **CC-BM-SSC-WW3-02**

Sampled: 03/06/16 09:49 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**180**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-24 **CC-BM-SSC-WW3-03**

Sampled: 03/06/16 10:19 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**47**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-25 **CC-BM-SSC-WW3-04**

Sampled: 03/06/16 11:49 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**4.0**	3.1	5.0	mg/l	1	03/11/16 11:30	J

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-26 **CC-BM-SSC-WW3-05**

Sampled: 03/07/16 08:37 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**260**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-27 **CC-BM-SSC-WW3-06**

Sampled: 03/07/16 09:06 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**580**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-28 **CC-BM-SSC-WW3-07**

Sampled: 03/07/16 10:08 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**59**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-29 **CC-BM-SSC-WW3-08**

Sampled: 03/07/16 12:37 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-30 **CC-BM-SSC-WW3-09**

Sampled: 03/07/16 15:07 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-31 **CC-BM-SSC-WW3-10**

Sampled: 03/07/16 15:55 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**120**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-32 **CC-BM-SSC-WW3-11**

Sampled: 03/07/16 16:54 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**27**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-33 **CC-BM-SSC-WW3-12**

Sampled: 03/07/16 17:54 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**270**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-34 **CC-BM-SSC-WW3-13**

Sampled: 03/07/16 18:54 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**71**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-35 **CC-BM-SSC-WW3-14**

Sampled: 03/07/16 22:24 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-36 **CC-ML-SSC-WW3-01**

Sampled: 03/05/16 23:59 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**43**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-37 **CC-ML-SSC-WW3-02**

Sampled: 03/06/16 04:42 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**96**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-38 **CC-ML-SSC-WW3-03**

Sampled: 03/06/16 05:13 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**48**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-39 **CC-ML-SSC-WW3-04**

Sampled: 03/06/16 09:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**190**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-40 **CC-ML-SSC-WW3-05**

Sampled: 03/06/16 09:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0683 Prepared: 03/10/16 17:44 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**44**	3.1	5.0	mg/l	1	03/11/16 13:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-41 **CC-ML-SSC-WW3-06**

Sampled: 03/06/16 10:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**56**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-42 **CC-ML-SSC-WW3-07**

Sampled: 03/06/16 11:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-43 **CC-ML-SSC-WW3-08**

Sampled: 03/07/16 08:32 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**98**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-44 **CC-ML-SSC-WW3-09**

Sampled: 03/07/16 09:01 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**130**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-45 **CC-ML-SSC-WW3-10**

Sampled: 03/07/16 09:31 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**61**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-46 **CC-ML-SSC-WW3-11**

Sampled: 03/07/16 10:31 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**27**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-47 **CC-ML-SSC-WW3-12**

Sampled: 03/07/16 11:01 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-48 **CC-ML-SSC-WW3-13**

Sampled: 03/07/16 11:34 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0698 Prepared: 03/11/16 10:14 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**20**	3.1	5.0	mg/l	1	03/11/16 11:30	

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Date Reported: 04/01/16 10:35

6C10069-49 **CC-ML-SSC-WW3-14**

Sampled: 03/07/16 15:35 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**55**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-50 **CC-ML-SSC-WW3-15**

Sampled: 03/07/16 16:34 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**16**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-51 **CC-ML-SSC-WW3-16**

Sampled: 03/07/16 17:34 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**62**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-52 **CC-ML-SSC-WW3-17**

Sampled: 03/07/16 18:34 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**40**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-53 **CC-ML-SSC-WW3-18**

Sampled: 03/07/16 19:04 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**24**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-54 **CC-ML-SSC-WW3-19**

Sampled: 03/07/16 20:34 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**58**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-55 **CC-ML-SSC-WW3-20**

Sampled: 03/07/16 21:34 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-56 **CC-NR-SSC-WW3-01**

Sampled: 03/06/16 09:46 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**62**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-57 **CC-NR-SSC-WW3-02**

Sampled: 03/06/16 10:46 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**23**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-58 **CC-NR-SSC-WW3-03**

Sampled: 03/06/16 11:16 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**44**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-59 **CC-NR-SSC-WW3-04**

Sampled: 03/06/16 11:46 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**27**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-60 **CC-NR-SSC-WW3-05**

Sampled: 03/06/16 13:16 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**9.0**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-61 **CC-NR-SSC-WW3-06**

Sampled: 03/07/16 09:33 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**290**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-62 **CC-NR-SSC-WW3-07**

Sampled: 03/07/16 10:03 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**120**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Reported: 04/01/16 10:35

6C10069-63 **CC-NR-SSC-WW3-08**

Sampled: 03/07/16 10:33 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**380**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-64 **CC-NR-SSC-WW3-09**

Sampled: 03/07/16 11:33 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**390**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-65 **CC-NR-SSC-WW3-10**

Sampled: 03/07/16 15:36 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**24**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-66 **CC-NR-SSC-WW3-11**

Sampled: 03/07/16 16:35 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**32**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-67 **CC-NR-SSC-WW3-12**

Sampled: 03/07/16 17:05 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**38**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-68 **CC-NR-SSC-WW3-13**

Sampled: 03/07/16 17:35 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**56**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-69 **CC-NR-SSC-WW3-14**

Sampled: 03/07/16 19:35 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**240**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-70 **CC-NR-SSC-WW3-15**

Sampled: 03/07/16 21:05 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**91**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-71 **CC-NR-SSC-WW3-16**

Sampled: 03/07/16 22:05 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**92**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-72 **CC-NR-SSC-WW3-17**

Sampled: 03/07/16 22:35 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**40**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-73 **CC-NR-SSC-WW3-18**

Sampled: 03/08/16 00:35 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0701 Prepared: 03/11/16 11:38 Analyst: mbc

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**32**	3.1	5.0	mg/l	1	03/11/16 14:33	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-74 **CC-TC-SSC-WW3-01**

Sampled: 03/06/16 09:35 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**77**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-75 **CC-TC-SSC-WW3-02**

Sampled: 03/06/16 10:04 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**38**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-76 **CC-TC-SSC-WW3-03**

Sampled: 03/07/16 20:55 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**10**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-77 **CC-TC-SSC-WW3-04**

Sampled: 03/07/16 21:24 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**8.0**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-78 **CC-TC-SSC-WW3-05**

Sampled: 03/07/16 21:54 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**5.0**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-79 **CC-TC-SSC-WW3-06**

Sampled: 03/07/16 22:24 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**4.0**	3.1	5.0	mg/l	1	03/11/16 18:50	J

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-80 **CC-TC-SSC-WW3-07**

Sampled: 03/07/16 22:54 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**4.0**	3.1	5.0	mg/l	1	03/11/16 18:50	J

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-81 **CV-UP-SSC-WW3-01**

Sampled: 03/06/16 16:30 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**73**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-82 **CV-UP-SSC-WW3-02**

Sampled: 03/07/16 11:05 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**90**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-83 **CV-UP-SSC-WW3-03**

Sampled: 03/07/16 11:37 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**83**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-84 **CV-UP-SSC-WW3-04**

Sampled: 03/07/16 12:07 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**74**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-85 **CV-UP-SSC-WW3-05**

Sampled: 03/07/16 12:37 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**170**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-86 **CV-UP-SSC-WW3-06**

Sampled: 03/07/16 13:07 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**110**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-87 **CV-UP-SSC-WW3-07**

Sampled: 03/07/16 14:07 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**39**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-88 **CV-UP-SSC-WW3-08**

Sampled: 03/07/16 14:37 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**37**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-89 **CV-UP-SSC-WW3-09**

Sampled: 03/07/16 15:37 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Reported: 04/01/16 10:35

6C10069-90 **CV-UP-SSC-WW3-10**

Sampled: 03/07/16 17:07 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**34**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-91 **CV-UP-SSC-WW3-11**

Sampled: 03/07/16 17:37 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-92 **CV-UP-SSC-WW3-12**

Sampled: 03/07/16 19:07 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-93 **CV-UP-SSC-WW3-13**

Sampled: 03/07/16 19:37 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**7.0**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Reported: 04/01/16 10:35

6C10069-94 **CV-UP-SSC-WW3-14**

Sampled: 03/07/16 21:37 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**6.0**	3.1	5.0	mg/l	1	03/11/16 18:50	

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6C10069-95 **LP-NC-SSC-WW3-01**

Sampled: 03/06/16 09:23 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**20**	3.1	5.0	mg/l	1	03/11/16 13:31	

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6C10069-96 **LP-NC-SSC-WW3-02**

Sampled: 03/06/16 09:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**58**	3.1	5.0	mg/l	1	03/11/16 13:31	

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6C10069-97 **LP-NC-SSC-WW3-03**

Sampled: 03/06/16 10:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**28**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Reported: 04/01/16 10:35

6C10069-98 **LP-NC-SSC-WW3-04**

Sampled: 03/06/16 11:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**110**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Reported: 04/01/16 10:35

6C10069-99 **LP-NC-SSC-WW3-05**

Sampled: 03/06/16 11:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**78**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Reported: 04/01/16 10:35

6C10069-AA **LP-NC-SSC-WW3-06**

Sampled: 03/06/16 12:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AB **LP-NC-SSC-WW3-07**

Sampled: 03/06/16 13:22 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0699 Prepared: 03/11/16 11:02 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**21**	3.1	5.0	mg/l	1	03/11/16 13:31	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AC **LP-NC-SSC-WW3-08**

Sampled: 03/06/16 13:52 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**12**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AD **LP-NC-SSC-WW3-09**

Sampled: 03/07/16 09:56 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**75**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
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6C10069-AE **LP-NC-SSC-WW3-10**

Sampled: 03/07/16 10:25 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**210**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AF **LP-NC-SSC-WW3-11**

Sampled: 03/07/16 10:55 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**140**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AG **LP-NC-SSC-WW3-12**

Sampled: 03/07/16 11:25 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**77**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Reported: 04/01/16 10:35

6C10069-AH **LP-NC-SSC-WW3-13**

Sampled: 03/07/16 11:55 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**57**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AI **LP-NC-SSC-WW3-14**

Sampled: 03/07/16 12:25 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**51**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AJ **LP-NC-SSC-WW3-15**

Sampled: 03/07/16 13:25 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	03/11/16 18:51	

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6C10069-AK **LP-NC-SSC-WW3-16**

Sampled: 03/07/16 15:25 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**25**	3.1	5.0	mg/l	1	03/14/16 11:40	

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6C10069-AL **LP-NC-SSC-WW3-17**

Sampled: 03/07/16 16:26 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**18**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
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6C10069-AM **LP-NC-SSC-WW3-18**

Sampled: 03/07/16 17:24 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**41**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AN **LP-NC-SSC-WW3-19**

Sampled: 03/07/16 17:54 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**30**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AO **LP-NC-SSC-WW3-20**

Sampled: 03/07/16 18:24 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**22**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AP **LP-NC-SSC-WW3-21**

Sampled: 03/07/16 19:54 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**16**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AQ **LP-NC-SSC-WW3-22**

Sampled: 03/07/16 20:24 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**13**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AR **LP-NC-SSC-WW3-23**

Sampled: 03/07/16 22:24 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**7.0**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AS **LP-POW-SSC-WW3-01**

Sampled: 03/07/16 09:33 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**85**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AT **LP-POW-SSC-WW3-02**

Sampled: 03/07/16 10:03 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**350**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Reported: 04/01/16 10:35

6C10069-AU **LP-POW-SSC-WW3-03**

Sampled: 03/07/16 10:33 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**140**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AV **LP-POW-SSC-WW3-04**

Sampled: 03/07/16 11:03 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0703 Prepared: 03/11/16 12:19 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**69**	3.1	5.0	mg/l	1	03/11/16 15:30	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AW **LP-POW-SSC-WW3-05**

Sampled: 03/07/16 11:33 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**47**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AX **LP-POW-SSC-WW3-06**

Sampled: 03/07/16 12:33 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**25**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-AY **LP-POW-SSC-WW3-07**

Sampled: 03/07/16 13:03 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**25**	3.1	5.0	mg/l	1	03/11/16 18:51	

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Date Reported: 04/01/16 10:35

6C10069-AZ **LP-POW-SSC-WW3-08**

Sampled: 03/07/16 13:33 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0709 Prepared: 03/11/16 13:37 Analyst: nra

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**32**	3.1	5.0	mg/l	1	03/11/16 18:51	

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6C10069-BA **LP-POW-SSC-WW3-09**

Sampled: 03/07/16 14:03 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**28**	3.1	5.0	mg/l	1	03/14/16 11:40	

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6C10069-BB **LP-POW-SSC-WW3-10**

Sampled: 03/07/16 15:03 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**25**	3.1	5.0	mg/l	1	03/14/16 11:40	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-BC **LP-POW-SSC-WW3-11**

Sampled: 03/07/16 16:03 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0711 Prepared: 03/11/16 13:56 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**53**	3.1	5.0	mg/l	1	03/14/16 11:40	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-BD **LP-POW-SSC-WW3-12**

Sampled: 03/07/16 18:32 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**91**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-BE **LP-POW-SSC-WW3-13**

Sampled: 03/07/16 19:02 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**250**	3.1	5.0	mg/l	1	03/11/16 18:50	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-BF **LP-POW-SSC-WW3-14**

Sampled: 03/07/16 19:32 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**150**	3.1	5.0	mg/l	1	03/11/16 18:50	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-BG **LP-POW-SSC-WW3-15**

Sampled: 03/07/16 20:02 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**43**	3.1	5.0	mg/l	1	03/11/16 18:50	

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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-BH **LP-POW-SSC-WW3-16**

Sampled: 03/07/16 20:32 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**100**	3.1	5.0	mg/l	1	03/11/16 18:50	

AMEC Environment & Infrastructure
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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-BI **LP-POW-SSC-WW3-17**

Sampled: 03/07/16 21:02 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**85**	3.1	5.0	mg/l	1	03/11/16 18:50	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-BJ **LP-POW-SSC-WW3-18**

Sampled: 03/07/16 22:32 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0739 Prepared: 03/11/16 17:21 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**37**	3.1	5.0	mg/l	1	03/11/16 18:50	

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

6C10069-BK **LP-POW-SSC-WW3-19**

Sampled: 03/07/16 23:32 **Sampled By:** Client **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C0788 Prepared: 03/14/16 09:12 Analyst: ajw

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**28**	3.1	5.0	mg/l	1	03/14/16 10:50	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

QUALITY CONTROL SECTION

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6C0683 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0683-BLK1)					Analyzed: 03/11/16 13:51						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0687 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0687-BLK1)					Analyzed: 03/11/16 10:10						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0698 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0698-BLK1)					Analyzed: 03/11/16 11:30						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0699 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0699-BLK1)					Analyzed: 03/11/16 13:31						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0701 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0701-BLK1)					Analyzed: 03/11/16 14:33						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0703 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0703-BLK1)					Analyzed: 03/11/16 15:30						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0709 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0709-BLK1)					Analyzed: 03/11/16 18:51						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0711 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0711-BLK1)					Analyzed: 03/14/16 11:40						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

Batch W6C0739 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0739-BLK1)					Analyzed: 03/11/16 18:50						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

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Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6C0788 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C0788-BLK1)					Analyzed: 03/14/16 10:50						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/10/16 16:30
Date Reported: 04/01/16 10:35

Notes and Definitions

J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then not detected at or above the MDL.
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

CERTIFICATE OF ANALYSIS

Client:	AMEC Environment & Infrastructure 9177 Sky Park Court, Ste A San Diego CA, 92123	**Report Date:**	05/16/16 11:11
		Received Date:	03/15/16 11:40
		Turn Around:	Normal
Attention:	Jeremy Burns	**Client Project:**	Los Penasquitos Special Study 2015-16
Phone:	(858) 514-6464		
Fax:	(858) 278-5300	**PO Number:**	C013106084/502515C011
Work Order(s):	6C15066		

NELAC #4047-002 ORELAP ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Jeremy Burns :

Enclosed are the results of analyses for samples received 03/15/ 16 11:40 with the Chain of Custody document. The samples were received in good condition, at 1.3 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:
This is a Supplement to the Certificate of Analysis previously issued 4/1/16 for the above referenced project to correct sample ID to reflect COC and to split report to separate projects.

Reviewed by:

Hai Van Nguyen
Project Manager

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AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:11

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Lab ID	Matrix	Date Sampled
CC-BM-SSC-WW3-6a	RW	6C15066-01	Water	03/07/16 09:36
CC-NR-SSC-WW3-9a	RW	6C15066-03	Water	03/07/16 13:03
CV-UP-SSC-WW3-2a	RW	6C15066-08	Water	03/07/16 11:07
LP-NC-SSC-WW3-24	RW	6C15066-10	Water	03/07/16 23:54

ANALYSES

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:11

6C15066-01 **CC-BM-SSC-WW3-6a**

Sampled: 03/07/16 09:36 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**220**	3.1	5.0	mg/l	1	03/18/16 12:28	

AMEC Environment & Infrastructure
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Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:11

6C15066-03 **CC-NR-SSC-WW3-9a**

Sampled: 03/07/16 13:03 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**94**	3.1	5.0	mg/l	1	03/18/16 12:28	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:11

6C15066-08 **CV-UP-SSC-WW3-2a**

Sampled: 03/07/16 11:07 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**100**	3.1	5.0	mg/l	1	03/18/16 12:28	

AMEC Environment & Infrastructure
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San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:11

6C15066-10 **LP-NC-SSC-WW3-24**

Sampled: 03/07/16 23:54 **Sampled By:** RW **Matrix:** Water

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D3977-97 Batch: W6C1146 Prepared: 03/18/16 10:00 Analyst: lac

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Suspended Sediment Concentration	**6.0**	3.1	5.0	mg/l	1	03/18/16 12:28	

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:11

QUALITY CONTROL SECTION

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:11

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W6C1146 - ASTM D3977-97

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W6C1146-BLK1)					Analyzed: 03/18/16 12:28						
Suspended Sediment Concentration	ND	3.1	5.0	mg/l							

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 03/15/16 11:40
Date Reported: 05/16/16 11:11

Notes and Definitions

ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then not detected at or above the MDL.
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

APPENDIX C
BEDLOAD AND VOLUMETRIC STREAMBED PARTICLE-SIZE ANALYSIS

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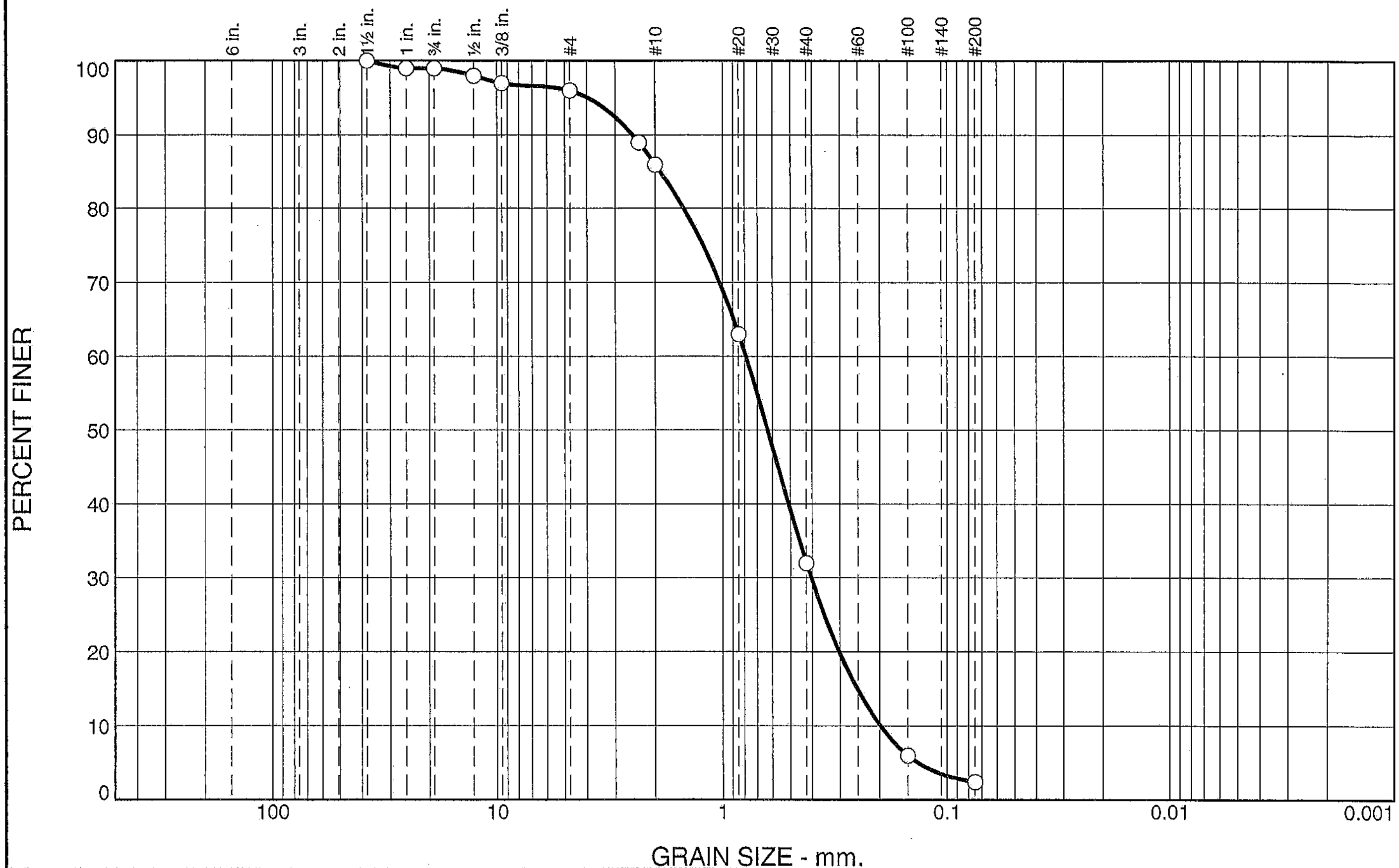
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.0	3.0	10.0	54.0	29.6	2.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	99.0		
0.75"	99.0		
0.5"	98.0		
0.375"	97.0		
#4	96.0		
#8	89.0		
#10	86.0		
#20	63.0		
#40	32.0		
#100	6.0		
#200	2.4		

* (no specification provided)

Material Description

SP (#29654)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.5109 D_{85}= 1.8990 D_{60}= 0.7898
D_{50}= 0.6319 D_{30}= 0.4045 D_{15}= 0.2523
D_{10}= 0.1990 C_u= 3.97 C_c= 1.04

Classification

USCS= SP AASHTO=

Remarks

Sample Number: LP-POW-VBL

Date: 2/9/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29654

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: LP-POW-VBL
Material Description: SP (#29654)
Date: 2/9/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
1.5"	100.0
1"	99.0
0.75"	99.0
0.5"	98.0
0.375"	97.0
#4	96.0
#8	89.0
#10	86.0
#20	63.0
#40	32.0
#100	6.0
#200	2.4

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	1.0	3.0	4.0	10.0	54.0	29.6	93.6			2.4

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1350	0.1990	0.2523	0.3032	0.4045	0.5100	0.6319	0.7898	1.4960	1.8990	2.5109	3.9384

Fineness Modulus	C_u	C_c
2.72	3.97	1.04

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Brtalik, AmecFW	LAB NO.: 29654
LOCATION: Los Penasquitos	SAMPLED BY: Kevin S.	DATE: 12.29.15
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL~~: Time 12:30	AUTHORIZED BY:	DATE:
BORING: LP-POW-VBL	TESTED BY: RV	DATE: 2-9-16
DEPTH:	REVIEWED BY:	DATE:

+8

-8 491.9 w/bpan

CTB-16

SIEVE SIZE 1 1/2	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		100
~~1 1/2"~~ 1"	41.0	.6	99.4		99
~~1"~~ 3/4	41.0	.6	99.4		99
~~3/4"~~ 1/2"	127.8	1.8	98.2		98
~~1/2"~~ 3/8	192.2	2.7	97.3		97
~~3/8"~~ #4	306.9	4.4	95.6		96
~~#4~~ 8	806.2	11.4	88.6		89
#10	16.00	3.3	96.7	85.7	86
#20	144.36	29.3 ✓	70.7 ✓	62.6	✓63
#40	315.10	64.1 ✓	35.9 ✓	31.8	32
#100	460.30	93.6 ✓	6.4 ✓	5.7	6
#200	478.39	97.3 ✓	2.7 ✓	2.4	✓

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______

Weight of soil & tare (dry) 8476.9 w/o vegetation

Weight of Tare E4 1429.2

Weight of H20 ______

Net weight of dry soil ______

% H20 ______

WEIGHT BEFORE WASH: 7047.7 (+8) ✓

491.9 (-8)

EQUIPMENT USED:

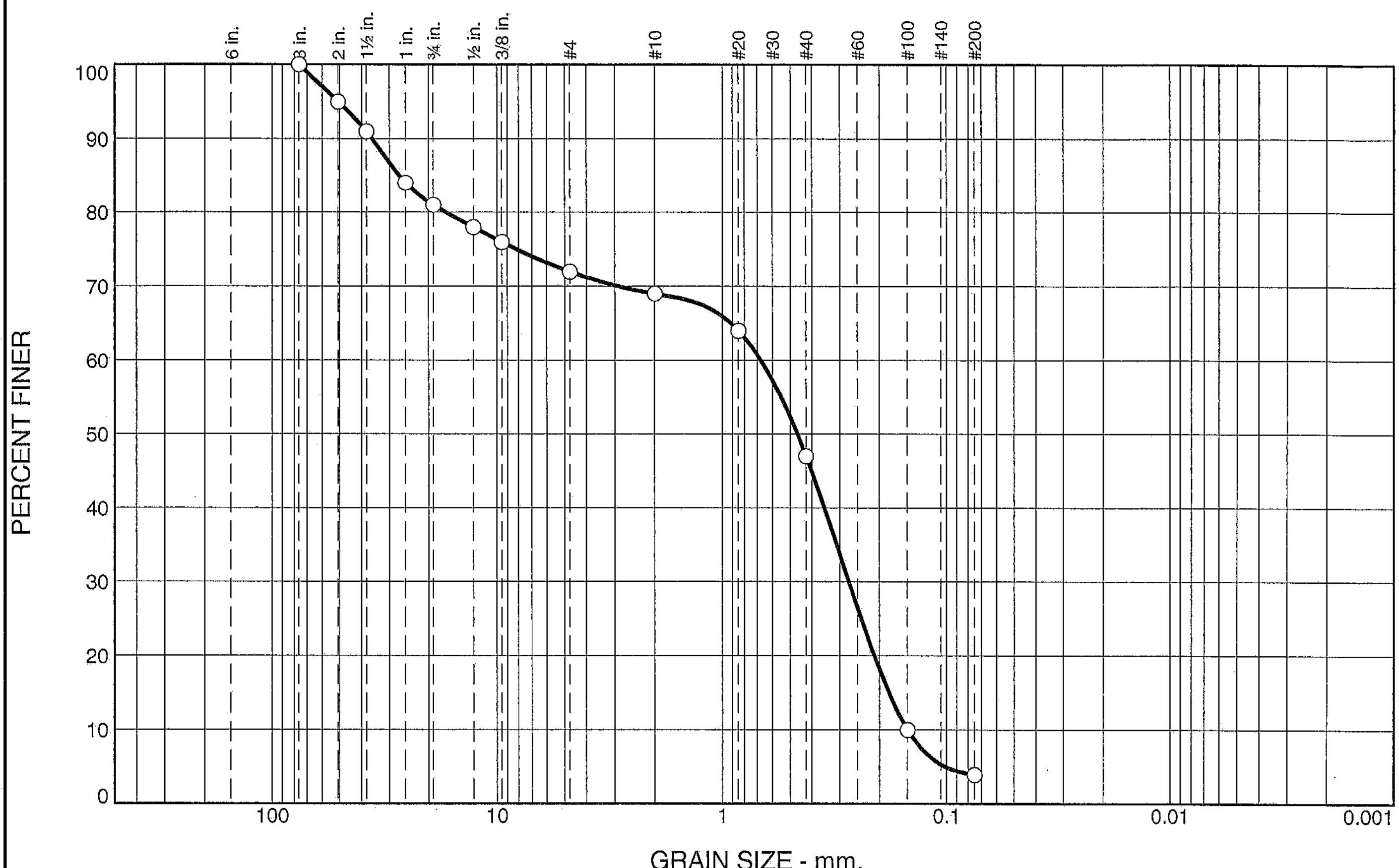
Scale I.D.: CW9204

Sieve Set I.D.: Gilson + 12" Sieves

Oven I.D.: 184078 - 184079

Shaker I.D.: Gilson - Gringer

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.0	9.0	3.0	22.0	43.1	3.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	95.0		
1.5"	91.0		
1"	84.0		
0.75"	81.0		
0.5"	78.0		
0.375"	76.0		
#4	72.0		
#10	69.0		
#20	64.0		
#40	47.0		
#100	10.0		
#200	3.9		

* (no specification provided)

Material Description

SP (#29650)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 35.9213 D_{85}= 27.1293 D_{60}= 0.6768
D_{50}= 0.4648 D_{30}= 0.2740 D_{15}= 0.1814
D_{10}= 0.1500 C_u= 4.51 C_c= 0.74

Classification

USCS= SP AASHTO=

Remarks

Sample Number: CC-BM-WW1-BL-RB

Date: 2/12/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29650

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-BM-WW1-BL-RB
Material Description: SP (#29650)
Date: 2/12/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
3"	100.0
2"	95.0
1.5"	91.0
1"	84.0
0.75"	81.0
0.5"	78.0
0.375"	76.0
#4	72.0
#10	69.0
#20	64.0
#40	47.0
#100	10.0
#200	3.9

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	19.0	9.0	28.0	3.0	22.0	43.1	68.1			3.9

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1014	0.1500	0.1814	0.2109	0.2740	0.3520	0.4648	0.6768	16.7671	27.1293	35.9213	50.8000

Fineness Modulus	C_u	C_c
3.42	4.51	0.74

AMEC

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Bertalix, AmecFW	LAB NO.: 29656
LOCATION: Los Penasquitos	SAMPLED BY: Kevin S.	DATE:
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL~~: Time: 1200	AUTHORIZED BY:	DATE:
BORING: CC-BM-WW1-BL-RB	TESTED BY: RW	DATE: 2-12-16
DEPTH:	REVIEWED BY:	DATE:

3" 100

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		
2"	247.8	4.9	95.1		95
1 1/2"	429.2	8.5	91.5		91
1"	825.3	16.3	83.7		84
3/4"	978.3	19.4	80.6		81.
1/2"	1131.3	22.4	77.6		78
3/8"	1215.9	24.1	75.9		76
#4	1428.8	28.3	71.7		72
#10	19.71	4.1	95.9	68.8	69
#20	50.91	10.5 90.5	89.5	64.2	64
#40	166.23	34.2	65.8	47.2	47
#100	421.06	86.5	13.5	9.6	10
#200	459.59	94.5	5.5	4.0	3.9

CTB-16 = 486.51

SAMPLE MOISTURE CONTENT

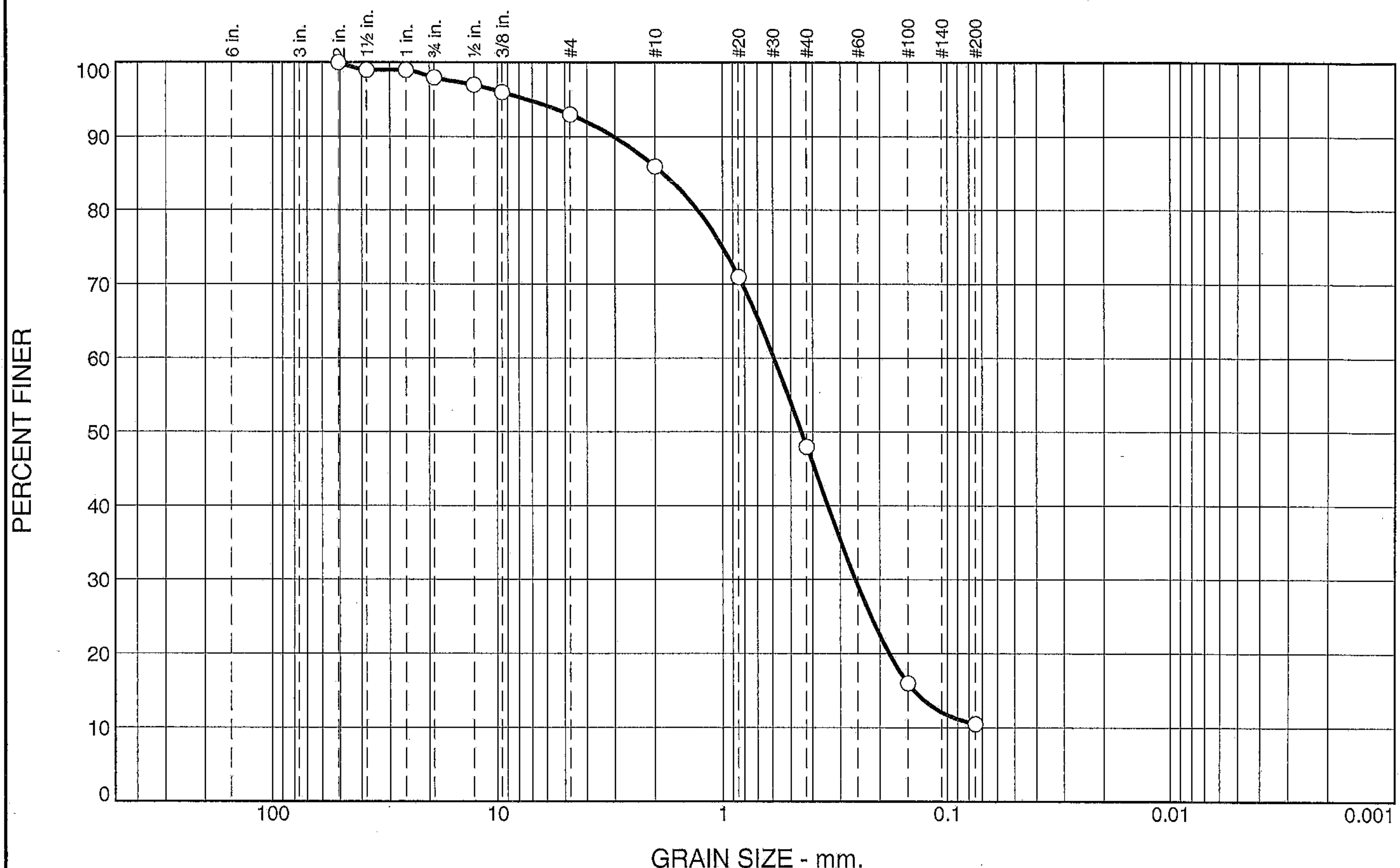
Weight of soil & tare (wet)	
Weight of soil & tare (dry)	7231.7 w/o vegetation.
Weight of Tare	2182.5
Weight of H20 FW	
Net weight of dry soil	5049.2
% H20	

WEIGHT BEFORE WASH: 5049.2 (+#4)

486.51 -#4

EQUIPMENT USED:
Scale I.D.: CW9204
Sieve Set I.D.: Gilson + 12" Sieves
Oven I.D.: 184078-184079
Shaker I.D.: Gilson - Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.0	5.0	7.0	38.0	37.5	10.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	99.0		
1"	99.0		
0.75"	98.0		
0.5"	97.0		
0.375"	96.0		
#4	93.0		
#10	86.0		
#20	71.0		
#40	48.0		
#100	16.0		
#200	10.5		

* (no specification provided)

Material Description

(#29649)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 3.0341 D_{85}= 1.8350 D_{60}= 0.5941
D_{50}= 0.4487 D_{30}= 0.2569 D_{15}= 0.1409
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: CC-BM-WW1-BL-LB

Date: 2/12/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29649

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-BM-WW1-BL-LB
Material Description: (#29649)
Date: 2/12/16
Tested by: R. Valles
Checked by: L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
2"	100.0
1.5"	99.0
1"	99.0
0.75"	98.0
0.5"	97.0
0.375"	96.0
#4	93.0
#10	86.0
#20	71.0
#40	48.0
#100	16.0
#200	10.5

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	2.0	5.0	7.0	7.0	38.0	37.5	82.5			10.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.1409	0.1818	0.2569	0.3420	0.4487	0.5941	1.2931	1.8350	3.0341	7.3481

Fineness Modulus
2.36

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

PROJECT NO: 5025151004,02	NAME: Kiernan Portalik AmecFw	LAB NO.: 29649
LOCATION: Los Penasquitos	SAMPLED BY: Kevin Stolzenbach	DATE: 1-7-16
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL~~: Time 1200	AUTHORIZED BY:	DATE:
BORING: CC-BM-WM-BL-LB	TESTED BY: RV	DATE: 2-12-16
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		2" 100
1 1/2"	62.1	.6	99.4		99
1"	124.3	1.2	98.8		99
3/4"	185.9	1.9	98.1		98
1/2"	300.8	3.0	97.0		97
3/8"	390.1	3.9	96.1		96
#4	698.6	7.0	93.0		93
#10	39.33	8.0	92.0	85.6	86
#20	115.79	23.5	76.5	71.1	71
#40	237.53	48.3	51.7	48.1	48
#100	408.00	83.6	17.0	15.9	16
#200	436.21	88.7	11.3	10.5	✓

CTB-10 = 491.8

27.70

w/ bag & Pan

16560.1

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ________

Weight of soil & tare (dry) ________

Weight of Tare P-1 4479.5

Weight of H20 ________

Net weight of dry soil 10013.6

% H20 ________

WEIGHT BEFORE WASH: 10013.6 (+4)

491.8 (-4)

EQUIPMENT USED:

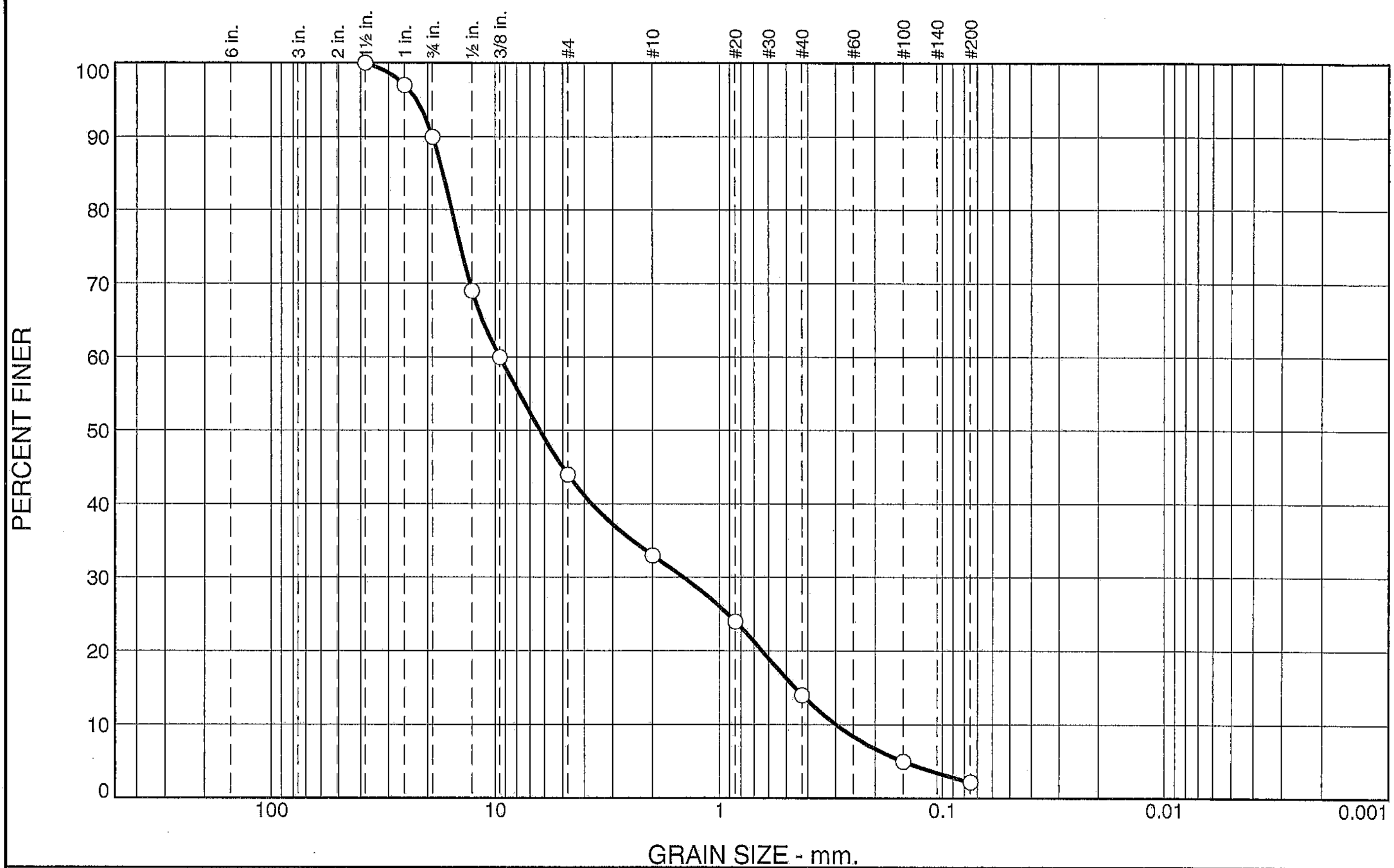
Scale I.D.: CW 9204

Sieve Set I.D.: Gilson -12"

Oven I.D.: 184078 - 184077

Shaker I.D.: Gilson / Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.0	46.0	11.0	19.0	11.8	2.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	97.0		
0.75"	90.0		
0.5"	69.0		
0.375"	60.0		
#4	44.0		
#10	33.0		
#20	24.0		
#40	14.0		
#100	5.0		
#200	2.2		

* (no specification provided)

Material Description

GP (#29648)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 19.0500 D_{85}= 17.1358 D_{60}= 9.5250
D_{50}= 6.3234 D_{30}= 1.4565 D_{15}= 0.4576
D_{10}= 0.2994 C_u= 31.82 C_c= 0.74

Classification

USCS= GP AASHTO=

Remarks

Sample Number: CC-TC-WW1-BL-LB

Date: 2/12/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29648

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-TC-WW1-BL-LB
Material Description: GP (#29648)
Date: 2/12/16
USCS Classification: GP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
1.5"	100.0
1"	97.0
0.75"	90.0
0.5"	69.0
0.375"	60.0
#4	44.0
#10	33.0
#20	24.0
#40	14.0
#100	5.0
#200	2.2

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	10.0	46.0	56.0	11.0	19.0	11.8	41.8			2.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1500	0.2994	0.4576	0.6428	1.4565	3.7216	6.3234	9.5250	15.6460	17.1358	19.0500	22.5144

Fineness Modulus	C_u	C_c
5.10	31.82	0.74

AMEC

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

PROJECT NO: 502515C004,02	NAME: KiernanBortalik AmecFW	LAB NO.: 29648
LOCATION: LosPenasquitos	SAMPLED BY: Kevin Stolzenbach	DATE: 1-7-16
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL:~~ Time: 1200	AUTHORIZED BY:	DATE:
BORING: CC-TC-WW1-BL-LB	TESTED BY: Rw	DATE: 2-12-16
DEPTH:	REVIEWED BY:	DATE:

CTB-12 = ~~486.0~~ 469.3
16.4

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		
1 1/2"	0	0	100		
1"	373.0	2.9	97.1		97
3/4"	1203.2	9.5	90.5		90
1/2"	3882.3	30.7	69.3		69
3/8"	5053.6	39.9	60.1		60
#4	7017.2	55.5	44.5		44
#10	120.75	25.7	74.3	33.1	✓
#20	216.00	46	54.0	24.0	✓
#40	321.54	68.5	31.5	14.0	✓
#100	419.29	89.3	10.7	4.7	5 ✓
#200	446.30	95.1	4.9	2.2	✓

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______

Weight of soil & tare (dry) 16484.1

Weight of Tare CS 3829.8

Weight of H20 ______

Net weight of dry soil ______

% H20 ______

WEIGHT BEFORE WASH: 12654.3 (+4)

469.3 (-4)

EQUIPMENT USED:

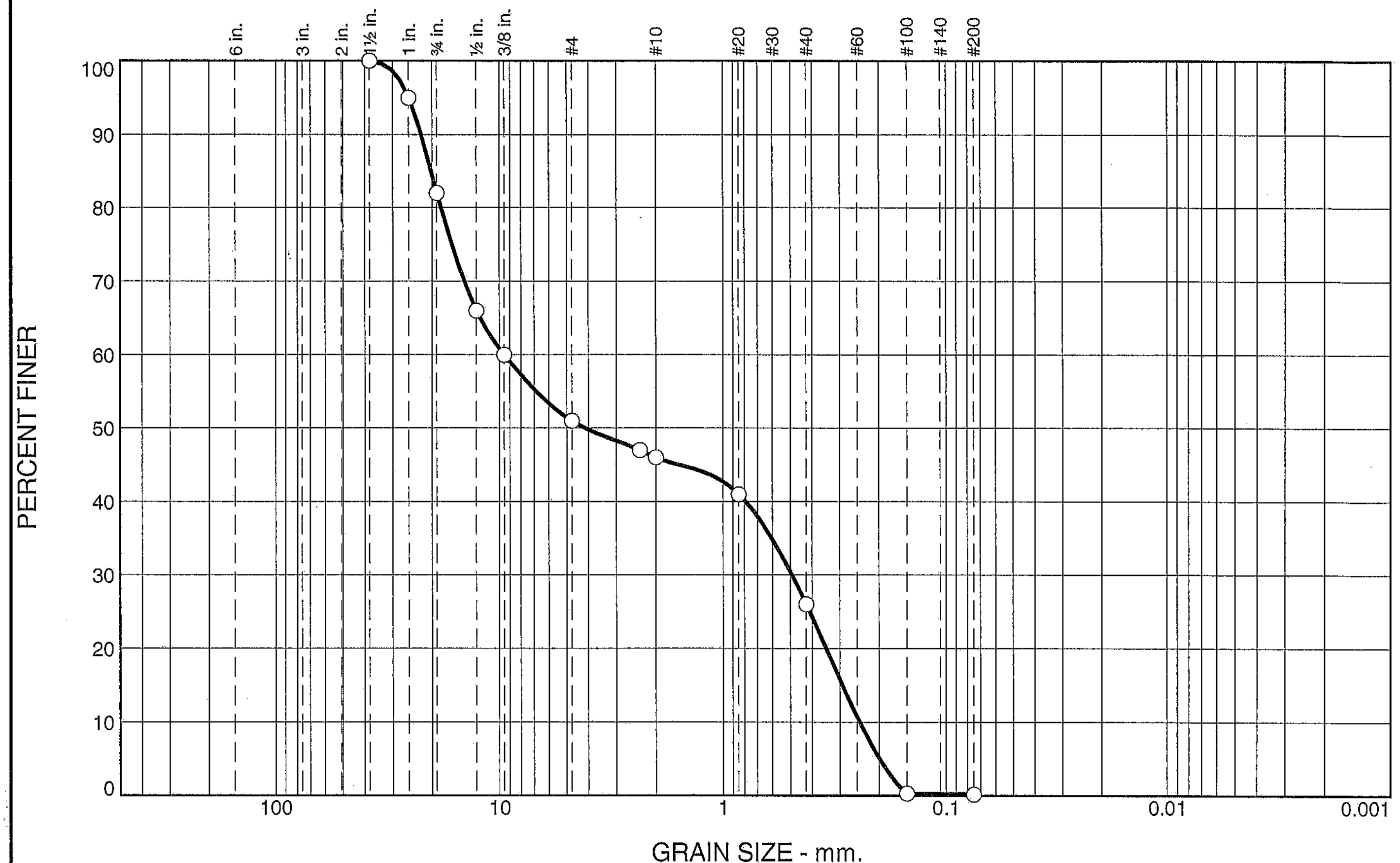
Scale I.D.: CW 9204

Sieve Set I.D.: Gilson - 12"

Oven I.D.: 184078 - 184077

Shaker I.D.: Gilson / Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.0	31.0	5.0	20.0	25.8	0.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	95.0		
0.75"	82.0		
0.5"	66.0		
0.375"	60.0		
#4	51.0		
#8	47.0		
#10	46.0		
#20	41.0		
#40	26.0		
#100	0.3		
#200	0.2		

* (no specification provided)

Material Description

SP (#29651)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 22.4295 D_{85}= 20.2374 D_{60}= 9.5250
D_{50}= 4.1474 D_{30}= 0.4923 D_{15}= 0.2921
D_{10}= 0.2444 C_u= 38.98 C_c= 0.10

Classification

USCS= SP AASHTO=

Remarks

Sample Number: CC-AC-WW2-MBL-1

Date: 2/9/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29651

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-AC-WW2-MBL-1
Material Description: SP (#29651)
Date: 2/9/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
1.5"	100.0
1"	95.0
0.75"	82.0
0.5"	66.0
0.375"	60.0
#4	51.0
#8	47.0
#10	46.0
#20	41.0
#40	26.0
#100	0.3
#200	0.2

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	18.0	31.0	49.0	5.0	20.0	25.8	50.8			0.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1990	0.2444	0.2921	0.3460	0.4923	0.7912	4.1474	9.5250	18.2750	20.2374	22.4295	25.4000

Fineness Modulus	C_u	C_c
4.65	38.98	0.10

AMEC

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Brtalik, AmecFW	LAB NO.: 29651
LOCATION: Los Penasquitos	SAMPLED BY:	DATE:
SOURCE: Sediment TMDL	SUBMITTED BY: Kevin S.	DATE:
~~MATERIAL:~~ Time 1520	AUTHORIZED BY:	DATE:
BORING: CC-AC-WW2-MBL-1	TESTED BY: RU	DATE: 2-9-16
DEPTH:	REVIEWED BY:	DATE:

	SIEVE SIZE 1 1/2	WEIGHT RETAINED, GMS.	% RETAINED 0	% PASS 0		100
	~~1 1/2"~~ 1"	74.9	5.4	94.6		95
	~~1"~~ 3/4	236.7	17.9	82.1		82
	~~3/4"~~ 1/2	446.8	33.8	66.2		66
	~~1/2"~~ 3/8	533.3	40.3	59.7		60
	~~3/8"~~ #4	645.1	48.7	51.3		51
+8 = 1323.50	~~#4~~ #8	699.4	52.8	47.2		47
-8 617.0	#10	9.94	1.6 ✓	98.4	46.4	46
CTB-30	#20	76.70	12.4 ✓	87.6	41.3	41
	#40	283.79	46.0 ✓	54.0	25.5	26
	#100	612.45	99.3 ✓	.7	.3	0.3 ✓
	#200	614.53	99.6 ✓	.4	.2	✓

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______

Weight of soil & tare (dry) 1591.8

Weight of Tare CTB-2 268.3

Weight of H20 ______

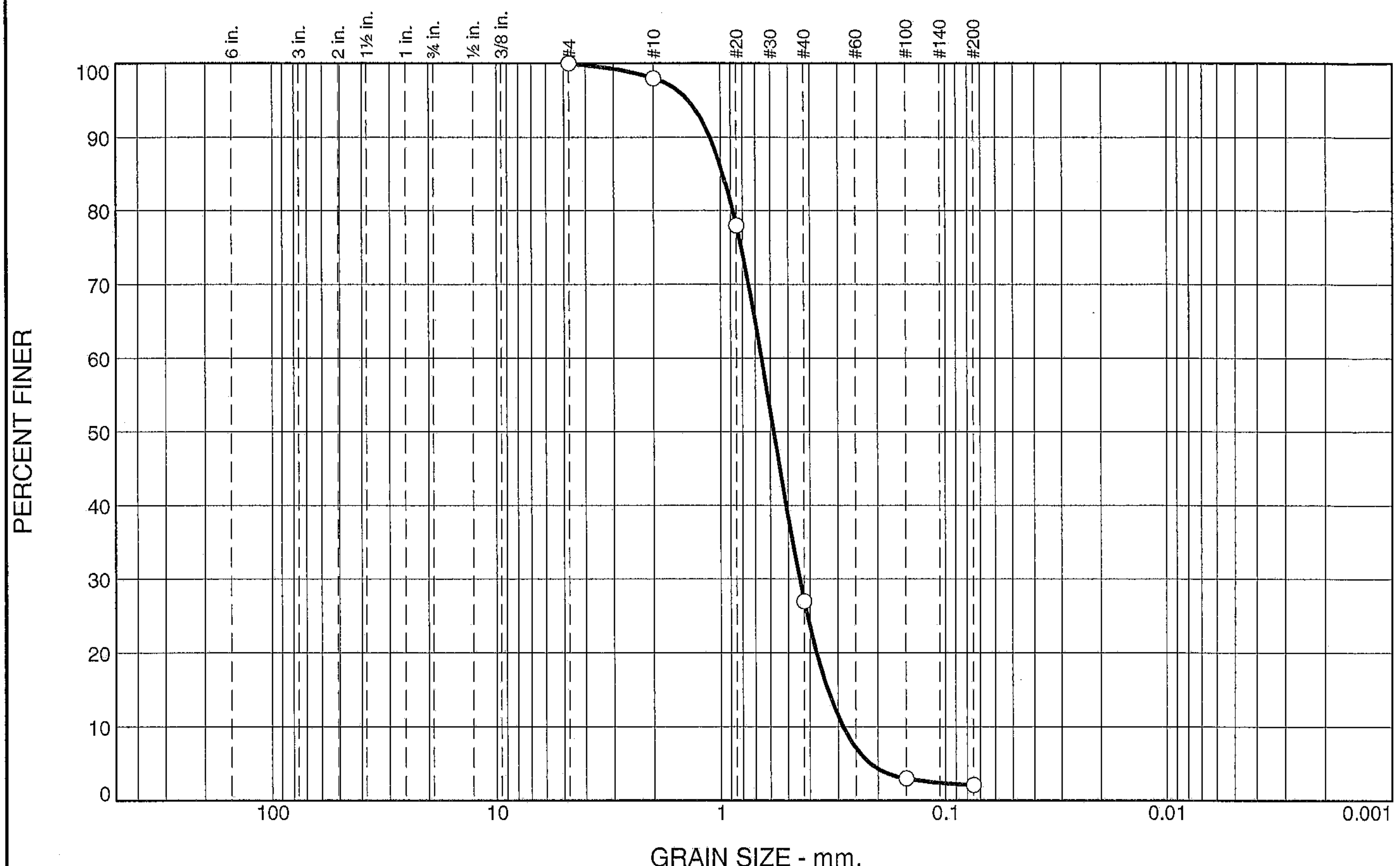
Net weight of dry soil ______

% H20 ______

WEIGHT BEFORE WASH: 1323.5 (+8) ✓
617.0 (-8)

EQUIPMENT USED:
Scale I.D.: CW9204
Sieve Set I.D.: Gilson + 12" Sieves
Oven I.D.: 184078 - 184077
Shaker I.D.: Gilson - Gyrator

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	2.0	71.0	24.9	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.0		
#20	78.0		
#40	27.0		
#100	3.0		
#200	2.1		

* (no specification provided)

Material Description

SP (#29652)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1180 D_{85}= 0.9758 D_{60}= 0.6580
D_{50}= 0.5804 D_{30}= 0.4452 D_{15}= 0.3339
D_{10}= 0.2859 C_u= 2.30 C_c= 1.05

Classification

USCS= SP AASHTO=

Remarks

Sample Number: CV-UP-WW2-MBL-1

Date: 2/9/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29652

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CV-UP-WW2-MBL-1
Material Description: SP (#29652)
Date: 2/9/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
#4	100.0
#10	98.0
#20	78.0
#40	27.0
#100	3.0
#200	2.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	2.0	71.0	24.9	97.9			2.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.2163	0.2859	0.3339	0.3745	0.4452	0.5113	0.5804	0.6580	0.8806	0.9758	1.1180	1.3974

Fineness Modulus	C_u	C_c
2.43	2.30	1.05

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Bertalik, AmecFW	LAB NO.: 29652
LOCATION: Los Penasquitos	SAMPLED BY:	DATE: 1.31.16
SOURCE: Sediment TMDL	SUBMITTED BY: Kevin S.	DATE:
~~MATERIAL~~: Time 1730	AUTHORIZED BY:	DATE:
BORING: CV-UP-WW2-MBL-1	TESTED BY: pw	DATE: 2.9.16
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS	
1 1/2"				
1"				
3/4"				
1/2"				
3/8"	0	0	100	
#4	0	0	100	
#10	1.72	1.9	98.1	
#20	20.35	22.0	78.0	
#40	67.47	72.8	27.2	27
#100	90.31	97.4	2.6	3
#200	90.72	97.9	2.1	

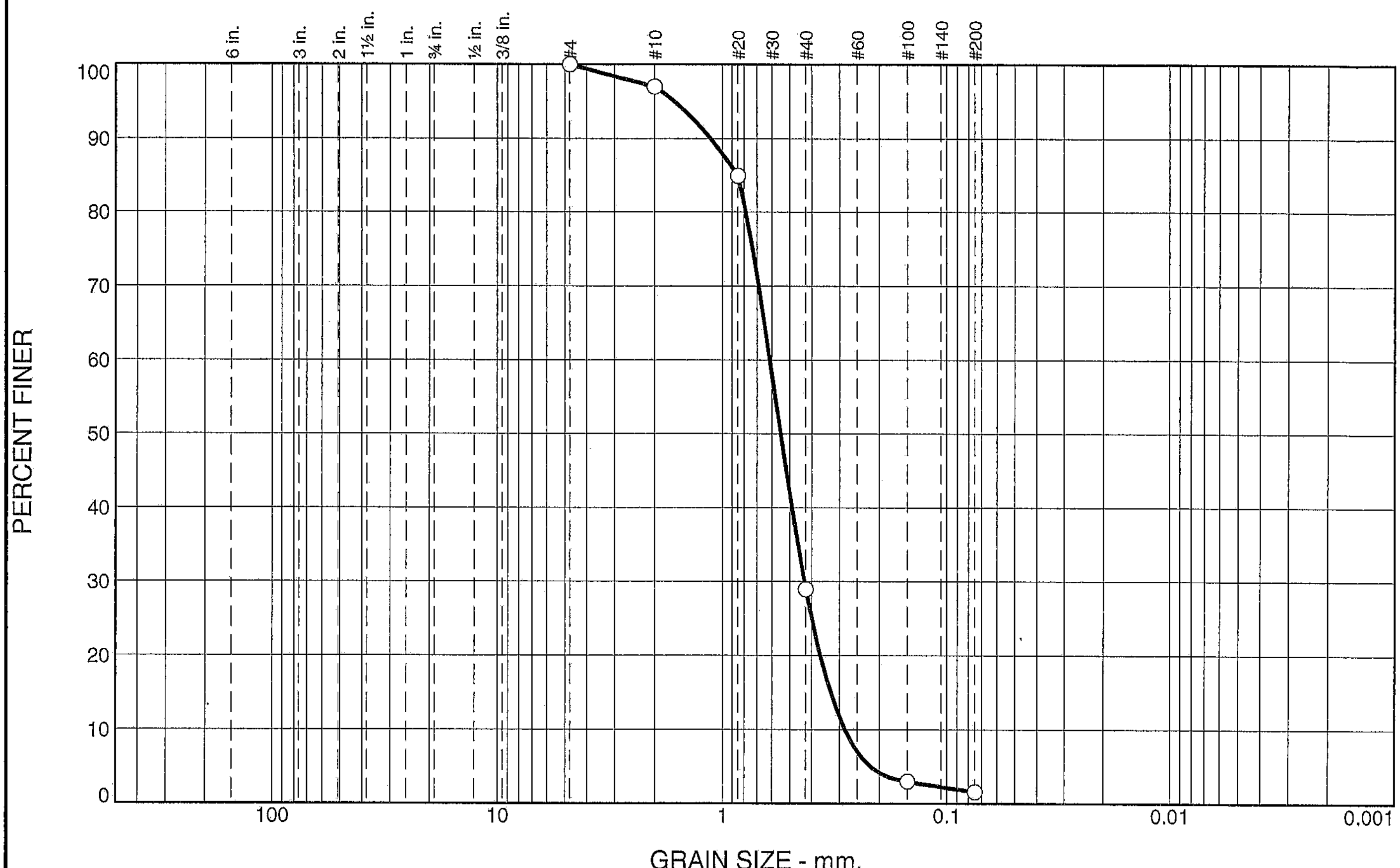
SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______
Weight of soil & tare (dry) 318.0
Weight of Tare 225.35 Fw1
Weight of H20 ______
Net weight of dry soil 92.65
% H20 ______

WEIGHT BEFORE WASH: 92.65

EQUIPMENT USED:
Scale I.D.: CW9204
Sieve Set I.D.: Gilson + 12" Sieves
Oven I.D.: 184078 - 184077
Shaker I.D.: Gilson - Grinder

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.0	68.0	27.4	1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.0		
#20	85.0		
#40	29.0		
#100	3.0		
#200	1.6		

* (no specification provided)

Material Description

SP (#29653)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1307 D_{85}= 0.8500 D_{60}= 0.6143
D_{50}= 0.5493 D_{30}= 0.4310 D_{15}= 0.3292
D_{10}= 0.2845 C_u= 2.16 C_c= 1.06

Classification

USCS= SP AASHTO=

Remarks

Sample Number: CC-TC-WW2-BL-MID

Date: 2/9/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29653

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-TC-WW2-BL-MID
Material Description: SP (#29653)
Date: 2/9/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
#4	100.0
#10	97.0
#20	85.0
#40	29.0
#100	3.0
#200	1.6

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	3.0	68.0	27.4	98.4			1.6

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.2186	0.2845	0.3292	0.3666	0.4310	0.4897	0.5493	0.6143	0.7859	0.8500	1.1307	1.6375

Fineness Modulus	C_u	C_c
2.39	2.16	1.06

AMEC

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

PROJECT NO: 5025.15C004-02	NAME: Kiernan Brtalik, AmecFW	LAB NO.: 29653
LOCATION: Los Penasquitos	SAMPLED BY: Kevin S.	DATE:
SOURCE: Sediment TMDL	SUBMITTED BY: Kevin S.	DATE:
~~MATERIAL~~: Time 1030	AUTHORIZED BY:	DATE:
BORING: CC-TC-WW2-BL-MID	TESTED BY: RV	DATE: 2-9-16
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS	
1 1/2"				
1"				
3/4"				
1/2"				
3/8"	0	0	100	
#4	0	0	100	
#10	21.49	2.6	97.4	97
#20	126.64	15.1	84.9	85
#40	595.99	70.9	29.1	29
#100	817.75	97.4	2.6	3
#200	826.82	98.4	1.6	✓

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______

Weight of soil & tare (dry) 1086.9 w/o vegetation.

Weight of Tare 246.9

Weight of H20 PQ

Net weight of dry soil 840

% H20 ______

WEIGHT BEFORE WASH: 840

EQUIPMENT USED:

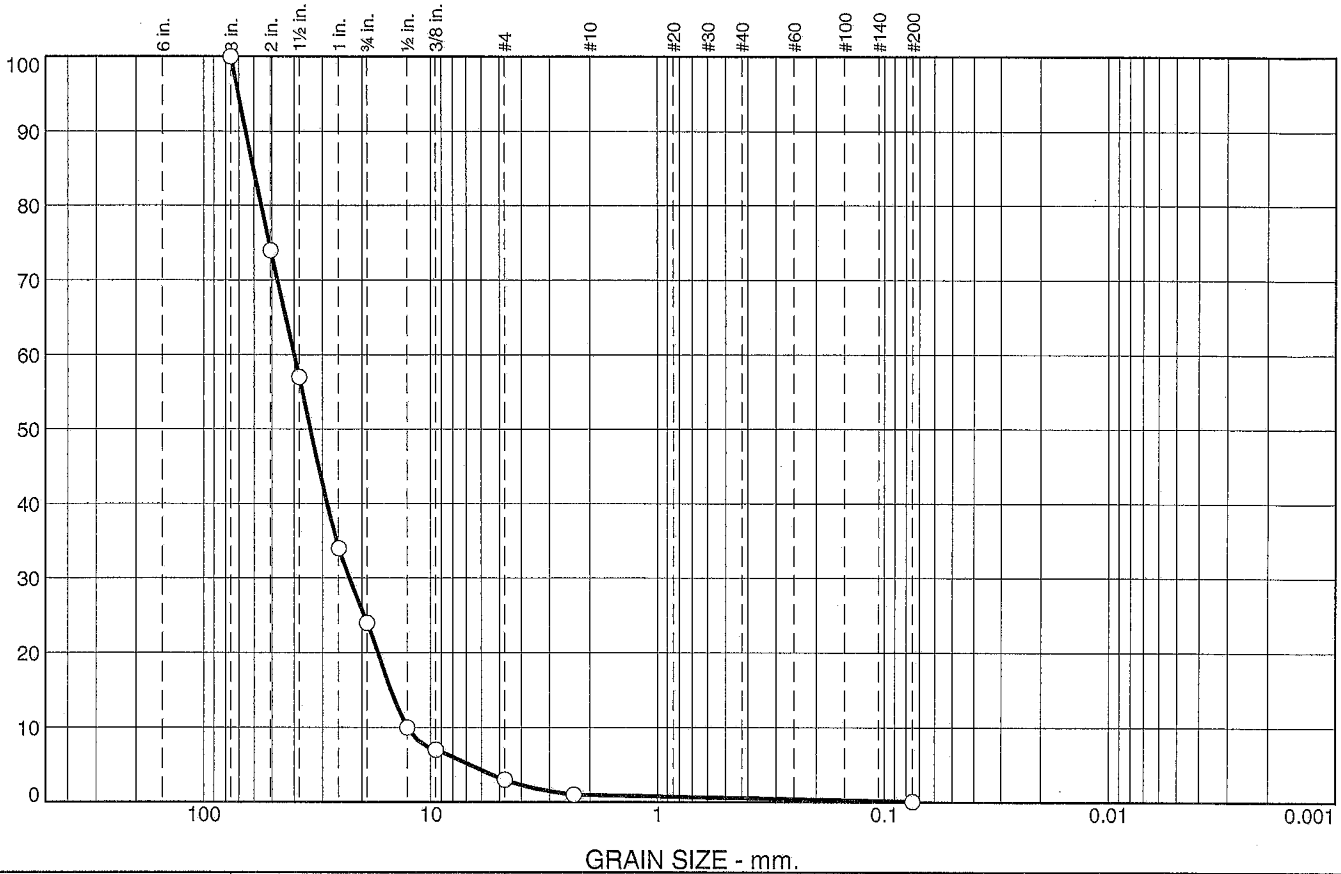
Scale I.D.: CW9204

Sieve Set I.D.: Gilson + 12" Sieves

Oven I.D.: 184078 - 184077

Shaker I.D.: Gilson - Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	76.0	21.0	2.0	0.4	0.5	0.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	74.0		
1.5"	57.0		
1"	34.0		
0.75"	24.0		
0.5"	10.0		
0.375"	7.0		
#4	3.0		
#8	1.0		
#200	0.1		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 65.4479 D_{85}= 60.5835 D_{60}= 40.0559
D_{50}= 33.9999 D_{30}= 22.8671 D_{15}= 14.9984
D_{10}= 12.7000 C_u= 3.15 C_c= 1.03

Classification

USCS= GP AASHTO=

Remarks

Location: CCNR-WW3-BL

Date: 3/17/16

amec

Client:

Project: Los Penasquitos Sediment Transport Monitoring 2014-2015

Project No: 502515C011.02 **Figure** #29700

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

3/18/2016

Project: Los Penasquitos Sediment Transport Monitoring 2014-2015
Project Number: 502515C011.02
Location: CCNR-WW3-BL
Date: 3/17/16
USCS Classification: GP
Tested by: R. Valles
Checked by: L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
3"	100.0
2"	74.0
1.5"	57.0
1"	34.0
0.75"	24.0
0.5"	10.0
0.375"	7.0
#4	3.0
#8	1.0
#200	0.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	76.0	21.0	97.0	2.0	0.4	0.5	2.9			0.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
6.7641	12.7000	14.9984	17.1063	22.8671	28.6926	33.9999	40.0559	55.9967	60.5835	65.4479	70.6358

Fineness Modulus	C_u	C_c
8.06	3.15	1.03

amec

SIEVE ANALYSIS OF AGGREGATE - SAND EQUIVALENT

ASTM D2419 / AASHTO T176 / CTM217
ASTM C117 / AASHTO T11
ASTM C136 / AASHTO T27

Project No. ______ Project Name: Los Penesquito Sediment
Lab No. 29700 Sampled by: ______ Date: ______
Type of Aggregate: ______ Submitted by: ______ Date: ______
Source of Aggregate: ______ Tested by: RU Date: 3-17-16
Sample Location: ______ Reviewed by: ______ Date: ______

SAMPLE WEIGHT DRY GMS.					
Screen	Weight Retained	% Retained	% Pass	Cum. Pass	Specification Limit
4"	0	0	100	100	
3"	0	0	100	100	
2"	1068.5	26.4	73.6		
1-1/2"	1732.5	42.7	57.3		
1"	2676.5	66.6	34.0		
3/4"	3094.9	76.4	23.6		
1/2"	3646.0	90.0	10.0		
3/8"	3772.1	93.1	6.9		
#4	3920.8	96.7	3.3		
#4 Grading Portion ______ gm					
#8	3998.5	98.7	1.3		
#16					
#30					
#50					
#100					
#200					

MOISTURE CONTENT			SAND EQUIVALENT	
Weight of sample & tare (wet)			/ =	
Weight of sample & tare (dry)	4666.0		/ =	
Weight of tare 104	613.0	0	/ =	
Weight of H20	4053	4.0		
Net weight of dry sample		1		
% H20	.09%	3.6	Ave.=	

~~3968.5 total~~
~~4041.2 w/pan~~
4049.4 w/pan

EQUIPMENT USED:
Sieve Set I.D.: Gilson Mechanical Shaker: I.D.: Gilson
Scale I.D. ______ S.E. Shaker I.D.: ______
Oven I.D.: 184077

change This Code
502515C011.02

Amec Foster Wheeler - Materials Lab

9177 Sky Park Court San Diego, CA 92213-4341
Tel 858-514-3000

CHAIN OF CUSTODY RECORD

STANDARD

CLIENT NAME: Kiernan Brtalik, Amec Foster Wheeler

PROJECT: Los Peñasquitos Sediment Special Study

ADDRESS: 9177 Sky Park Court San Diego, CA 92213-4341

PHONE: 858-514-7752
FAX:
EMAIL: Kiernan.Brtalik@amecfw.com

PROJECT MANAGER Jeremy Burns

SAMPLER Kevin Stolzenbach

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☐ 10 - 15 Business Days
- ☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	ANALYSES REQUESTED: Particle Size Distribution									COMMENTS
29648	1/7/16	12:00	SED	CC-TC-WW1-BL-LB	2	X									3x5" piece of tile in sample
29649	↓	↓	↓	CC-BM-WW1-BL-LB	2	X									
29650	↓	↓	↓	CC-BM-WW1-BL-RB	1	X									
29651	1/31/16	1520	↓	CC-AC-WW2-MBL-1	1	X									
29652	↓	1730	↓	CV-UP-WW2-MBL-1	1	X									
29653	2/1/16	1030	↓	CC-TC-WW2-BL-MID	1	X									
29654	12/29/15	1230	SED	LP-POW-VBL	1	X									

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Attacked	Y / N
Preserved at Lab	Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION

Bill to 502515C011.02

COC version 042707

Amec Foster Wheeler - Materials Lab

CHAIN OF CUSTODY RECORD

9177 Sky Park Court San Diego, CA 92213-4341
Tel 858-514-3000

STANDARD

Page______Of________

CLIENT NAME: Jeremy Burns, Amec Foster Wheeler	PROJECT: ~~Los Penasquitos Sediment TMDL~~ Los Peñasquitos Sediment Transport Monitoring 2014-2015
ADDRESS: 9177 Sky Park Court San Diego, CA 92213-4341	PHONE: 858-514-7752 FAX: EMAIL: jeremy.burns@amec.com
PROJECT MANAGER Jeremy Burns	SAMPLER Kevin Stolzenbach & Robert Wheeler

ANALYSES REQUESTED

	ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Particle Size Distribution										COMMENTS
29699	CCC ~~CVC~~-WW3-BL	03/08/16	1414		Carroll Canyon ~~Carmel Valley~~ Bed load		X										#502515CØ11 .02
29700	CCNR-WW3-BL	03/08/16	1540		Nancy Ridge Bedload		X										

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☐ 10 - 15 Business Days
- ☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

RELINQUISHED BY	DATE / TIME	RECEIVED BY
Robert Wheeler R.W.	3/15/16 3:30 pm	Liz Collins
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Attacked	Y / N
Preserved at Lab	Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION

COC version 042707

amec foster wheeler
9177 Sky Park Court, San Diego, CA 92123
Phone: 858-278-3600 Fax: 858-278-5300

Lab No. : ____________

page ____ of ____

REQUEST FOR GEOTECHNICAL TESTING

Project Name: PR Semment
Project No.: 5013ISC011.02
Client: ____________

Sampled By: ____________ Date: ____________
Received By: ____________ Date: ____________
Requested By: ____________ Date Due: ____________

Completed by: ____________
Sampled Logged in OC-Track: ____________
Reviewed by: ____________
Distribution to Acct.: ____________
Distribution : ____________

			SAMPLE REMOLDING		CHEMICAL TESTING*				DIRECT SHEAR		CONSOLIDATION / ASTM D2435						PHYSICAL TESTS																		OTHER		
BORING OR TEST PIT NO.	SAMPLE DEPTH	SAMPLE TYPE - (R)ing or (B)ulk	PERCENT COMPACTION	MOISTURE CONTENT / ASTM D2216	SULFATE CONTENT	PH CONTENT / CTM 643	CHLORIDE CONTENT	SOIL RESRISTIVITY	DIRECT SHEAR - SURCHARGE (psf)/ AASHTO T236	SOAK	SOAK AFTER (psf)	LOAD TO (psf)	REBOUND TO (psf)	RELOAD TO (psf)	REBOUND TO (psf)	TIME RATE (Y/N)	COMPACTION / ASTM D1557	VISUAL SOIL CLASSIFICATION	CBR / ASTM D1883	CBR W/ LIME OR CEMENT	R-VALUE / ASTM D2844	R-VALUE W/ LIME	SAMPLE PREP	EXPANSION INDEX / ASTM D4829	- #200 WASH, % / ASTM D1140	- #200 WASH W/ SIEVE / ASTM D1140 & D422	HYDROMETER ASSUMED SPG/ ASTM D422 & D423	PLASTICITY INDEX / ASTM D4318	MOISTURE & DENSITY, RING / ASTM D2216	FINE GRADATION / ASTM C136	COARSE GRADATION / ASTM C136	UNCONFINED COMPRESSION / ASTM D2938	SPECIFIC GRAVITY / ASTM D854	ORGANIC CONTENT / ASTM C40	REMOLD SAMPLE/ CONSOL / ASTM D2435	REMOLD SAMPLE/ SHEAR / ASTM D3080	SAND EQUIVALENT / ASTM D2419
29699																										X											
29700																										X											
N/A	N/A	N/A		UQNN8E	UP220	UP370	UP372	UP371	UQDE6E		UQCD6E						UQCA1E	130270	UQCX3E	131080	UQRT2E	130880	UQST4E	UQEF6E	UQSV4E	UQSV6E	UQHI8E	UQLL9E	UQSW0E	UQSU8E	UQSU6E	UQUZ6E	UQSW6E	UQUZ6E	UQRT3E	130800	UQFG8E

UP CODE or UNIT PRICE **Note all 4 tests use code #UQSX9E*

L:\Forms and Procedures\5014\lab test requests\Geotechnical Testing Request 01122012_Rev 04.2015.xlsx

amec foster wheeler

9177 Sky Park Court, San Diego, CA 92123
Phone: 858-278-3600 Fax: 858-278-5300

Lab No. : ____________

page ____ of ____

REQUEST FOR GEOTECHNICAL TESTING

Completed by: ____________
Sampled Logged in OC-Track: ____________
Reviewed by: ____________
Distribution to Acct.: ____________
Distribution : ____________

Project Name: PQ SEDIMENT   Sampled By: ____________   Date: ____________
Project No.: 502515C011.02   Received By: ____________   Date: ____________
Client: ____________   Requested By: ____________   Date Due: ____________

BORING OR TEST PIT NO.	SAMPLE DEPTH	SAMPLE TYPE - (R)ing or (B)ulk	SAMPLE REMOLDING: PERCENT COMPACTION	SAMPLE REMOLDING: MOISTURE CONTENT / ASTM D2216	CHEMICAL TESTING*: SULFATE CONTENT	CHEMICAL TESTING*: PH CONTENT / CTM 643	CHEMICAL TESTING*: CHLORIDE CONTENT	CHEMICAL TESTING*: SOIL RESRISTIVITY	DIRECT SHEAR: DIRECT SHEAR - SURCHARGE (psf)/ AASHTO T236	DIRECT SHEAR: SOAK
29648										
29649										
29650										
29651										
29652										
29653										
29654										
N/A	N/A	N/A		UQNN8E	UP220	UP370	UP372	UP371	UQDE6E	

BORING OR TEST PIT NO.	CONSOLIDATION / ASTM D2435: SOAK AFTER (psf)	LOAD TO (psf)	REBOUND TO (psf)	RELOAD TO (psf)	REBOUND TO (psf)	TIME RATE (Y/N)
29648						
29649						
29650						
29651						
29652						
29653						
29654						
N/A	UQCD6E					

BORING OR TEST PIT NO.	PHYSICAL TESTS: COMPACTION / ASTM D1557	VISUAL SOIL CLASSIFICATION	CBR / ASTM D1883	CBR W/ LIME OR CEMENT	R-VALUE / ASTM D2844	R-VALUE W/ LIME	SAMPLE PREP	EXPANSION INDEX / ASTM D4829	- #200 WASH, % / ASTM D1140	- #200 WASH W/ SIEVE / ASTM D1140 & D422	HYDROMETER ASSUMED SPG/ ASTM D422 & D423	PLASTICITY INDEX / ASTM D4318	MOISTURE & DENSITY, RING / ASTM D2216	FINE GRADATION / ASTM C136	COARSE GRADATION / ASTM C136	UNCONFINED COMPRESSION / ASTM D2938	SPECIFIC GRAVITY / ASTM D854	ORGANIC CONTENT / ASTM C40	OTHER: REMOLD SAMPLE/ CONSOL / ASTM D2435	REMOLD SAMPLE/ SHEAR / ASTM D3080	SAND EQUIVALENT / ASTM D2419
29648									X												
29649									X												
29650									X												
29651									X												
29652									X												
29653									X												
29654									X												
N/A	UQCA1E	130270	UQCX3E	131080	UQRT2E	130880	UQST4E	UQEF6E	UQSV4E	UQSV6E	UQHI8E	UQLL9E	UQSW0E	UQSU8E	UQSU6E	UQUZ6E	UQSW6E	UQUZ6E	UQRT3E	130800	UQFG8E

UP CODE or UNIT PRICE ***Note all 4 tests use code #UQSX9E***

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9177 Sky Park Court, San Diego, CA 92123
Phone: 858-278-3600 Fax: 858-278-5300

Lab No. : ______

page ____ of ____

REQUEST FOR GEOTECHNICAL TESTING

Project Name: PQ SEDIMENT
Project No.: 5025.15C004.02
Client: ______

Sampled By: ______ Date: ______
Received By: ______ Date: ______
Requested By: ______ Date Due: ______

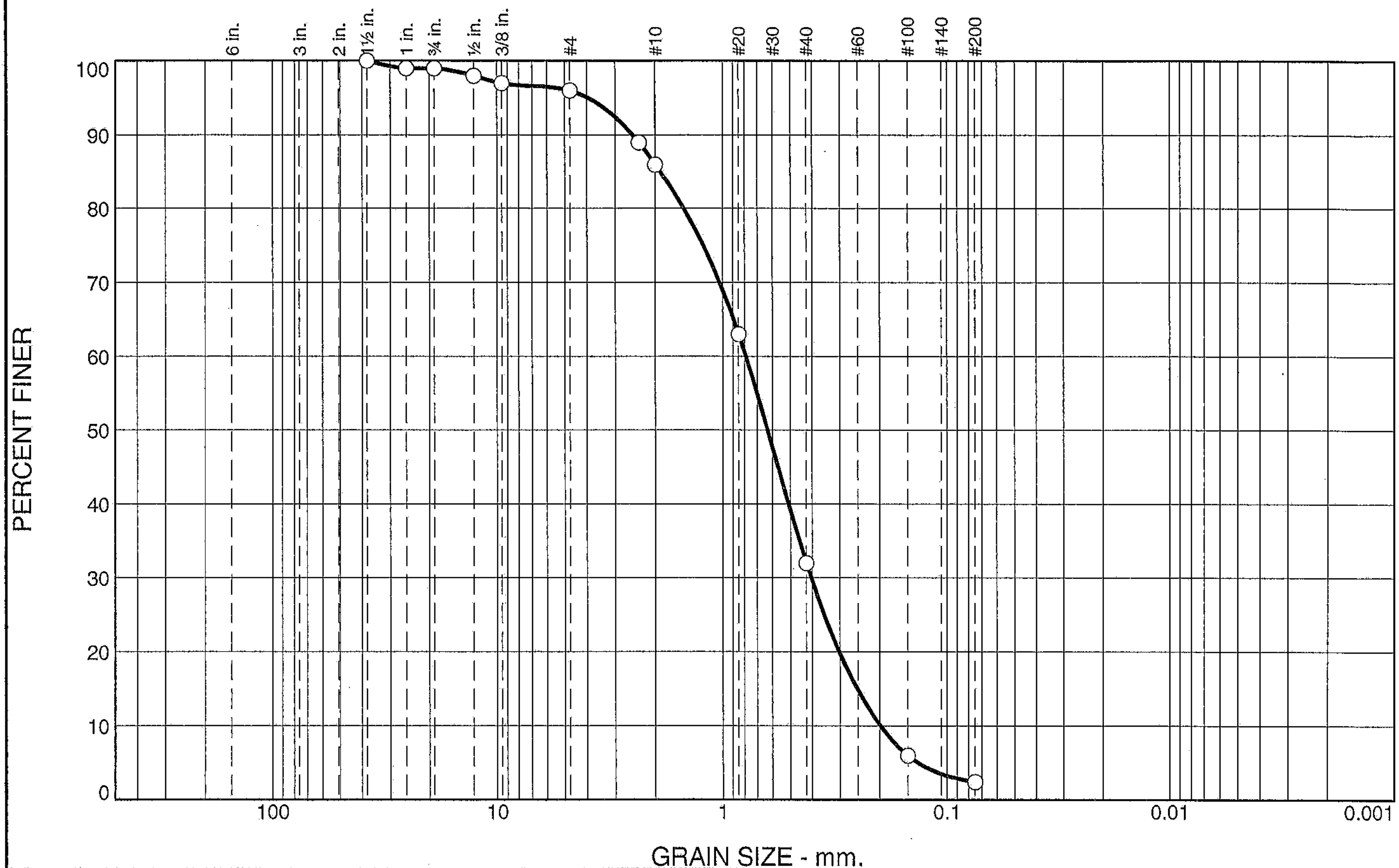
Completed by: ______
Sampled Logged in OC-Track: ______
Reviewed by: ______
Distribution to Acct.: ______
Distribution : ______

Group	Test	UP CODE or UNIT PRICE	Sample 1	Sample 2	Sample 3	Sample 4
	BORING OR TEST PIT NO.	N/A	29 644	29 645	29 646	29 647
	SAMPLE DEPTH	N/A				
	SAMPLE TYPE - (R)ing or (B)ulk	N/A				
SAMPLE REMOLDING	PERCENT COMPACTION					
SAMPLE REMOLDING	MOISTURE CONTENT / ASTM D2216	UQNN8E				
CHEMICAL TESTING*	SULFATE CONTENT	UP220				
CHEMICAL TESTING*	PH CONTENT / CTM 643	UP370				
CHEMICAL TESTING*	CHLORIDE CONTENT	UP372				
CHEMICAL TESTING*	SOIL RESRISTIVITY	UP371				
DIRECT SHEAR	DIRECT SHEAR - SURCHARGE (psf)/ AASHTO T236	UQDE6E				
DIRECT SHEAR	SOAK	UQDE6E				
CONSOLIDATION / ASTM D2435	SOAK AFTER (psf)	UQCD6E				
CONSOLIDATION / ASTM D2435	LOAD TO (psf)	UQCD6E				
CONSOLIDATION / ASTM D2435	REBOUND TO (psf)	UQCD6E				
CONSOLIDATION / ASTM D2435	RELOAD TO (psf)	UQCD6E				
CONSOLIDATION / ASTM D2435	REBOUND TO (psf)	UQCD6E				
CONSOLIDATION / ASTM D2435	TIME RATE (Y/N)	UQCD6E				
PHYSICAL TESTS	COMPACTION / ASTM D1557	UQCA1E				
PHYSICAL TESTS	VISUAL SOIL CLASSIFICATION	130270				
PHYSICAL TESTS	CBR / ASTM D1883	UQCX3E				
PHYSICAL TESTS	CBR W/ LIME OR CEMENT	131080				
PHYSICAL TESTS	R-VALUE / ASTM D2844	UQRT2E				
PHYSICAL TESTS	R-VALUE W/ LIME	130880				
PHYSICAL TESTS	SAMPLE PREP	UQST4E				
PHYSICAL TESTS	EXPANSION INDEX / ASTM D4829	UQEF6E				
PHYSICAL TESTS	- #200 WASH, % / ASTM D1140	UQSV4E	X	X	X	X
PHYSICAL TESTS	- #200 WASH W/ SIEVE / ASTM D1140 & D422	UQSV6E				
PHYSICAL TESTS	HYDROMETER ASSUMED SPG/ ASTM D422 & D423	UQHI8E				
PHYSICAL TESTS	PLASTICITY INDEX / ASTM D4318	UQLL9E				
PHYSICAL TESTS	MOISTURE & DENSITY, RING / ASTM D2216	UQSW0E				
PHYSICAL TESTS	FINE GRADATION / ASTM C136	UQSU8E				
PHYSICAL TESTS	COARSE GRADATION / ASTM C136	UQSU6E				
PHYSICAL TESTS	UNCONFINED COMPRESSION / ASTM D2938	UQUZ6E				
PHYSICAL TESTS	SPECIFIC GRAVITY / ASTM D854	UQSW6E				
PHYSICAL TESTS	ORGANIC CONTENT / ASTM C40	UQUZ6E				
OTHER	REMOLD SAMPLE/ CONSOL / ASTM D2435	UQRT3E				
OTHER	REMOLD SAMPLE/ SHEAR / ASTM D3080	130800				
OTHER	SAND EQUIVALENT / ASTM D2419	UQFG8E				

UP CODE or UNIT PRICE *Note all 4 tests use code #UQSX9E*

L:\Forms and Procedures\5014\lab test requests\Geotechnical Testing Request 01122012_Rev 04.2015.xlsx

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.0	3.0	10.0	54.0	29.6	2.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	99.0		
0.75"	99.0		
0.5"	98.0		
0.375"	97.0		
#4	96.0		
#8	89.0		
#10	86.0		
#20	63.0		
#40	32.0		
#100	6.0		
#200	2.4		

* (no specification provided)

Material Description

SP (#29654)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.5109 D_{85}= 1.8990 D_{60}= 0.7898
D_{50}= 0.6319 D_{30}= 0.4045 D_{15}= 0.2523
D_{10}= 0.1990 C_u= 3.97 C_c= 1.04

Classification

USCS= SP AASHTO=

Remarks

Sample Number: LP-POW-VBL

Date: 2/9/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29654

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: LP-POW-VBL
Material Description: SP (#29654)
Date: 2/9/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
1.5"	100.0
1"	99.0
0.75"	99.0
0.5"	98.0
0.375"	97.0
#4	96.0
#8	89.0
#10	86.0
#20	63.0
#40	32.0
#100	6.0
#200	2.4

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	1.0	3.0	4.0	10.0	54.0	29.6	93.6			2.4

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1350	0.1990	0.2523	0.3032	0.4045	0.5100	0.6319	0.7898	1.4960	1.8990	2.5109	3.9384

Fineness Modulus	C_u	C_c
2.72	3.97	1.04

AMEC

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Brtalik, AmecFW	LAB NO.: 29654
LOCATION: Los Penasquitos	SAMPLED BY:	DATE: 12.29.15
SOURCE: Sediment TMDL	SUBMITTED BY: Kevin S.	DATE:
~~MATERIAL~~: Time 12:30	AUTHORIZED BY:	DATE:
BORING: LP-POW-VBL	TESTED BY: RV	DATE: 2-9-16
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE 1 1/2	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		100
~~1 1/2"~~ 1"	41.0	.6	99.4		99
~~1"~~ 3/4	41.0	.6	99.4		99
~~3/4"~~ 1/2"	127.8	1.8	98.2		98
~~1/2"~~ 3/8	192.2	2.7	97.3		97
~~3/8"~~ #4	306.9	4.4	95.6		96
~~#4~~ 8	806.2	11.4	88.6		89
#10	16.00	3.3	96.7	85.7	86
#20	144.36	29.3 ✓	70.7 ✓	62.6	✓63
#40	315.10	64.1 ✓	35.9 ✓	31.8	32
#100	460.30	93.6 ✓	6.4 ✓	5.7	6
#200	478.39	97.3 ✓	2.7 ✓	2.4	✓

+8

-8 491.9 w/ bpan

CTB-16

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______

Weight of soil & tare (dry) 8476.9 w/o vegetation

Weight of Tare E4 1429.2

Weight of H20 ______

Net weight of dry soil ______

% H20 ______

WEIGHT BEFORE WASH: 7047.7 (+8) ✓
491.9 (-8)

EQUIPMENT USED:

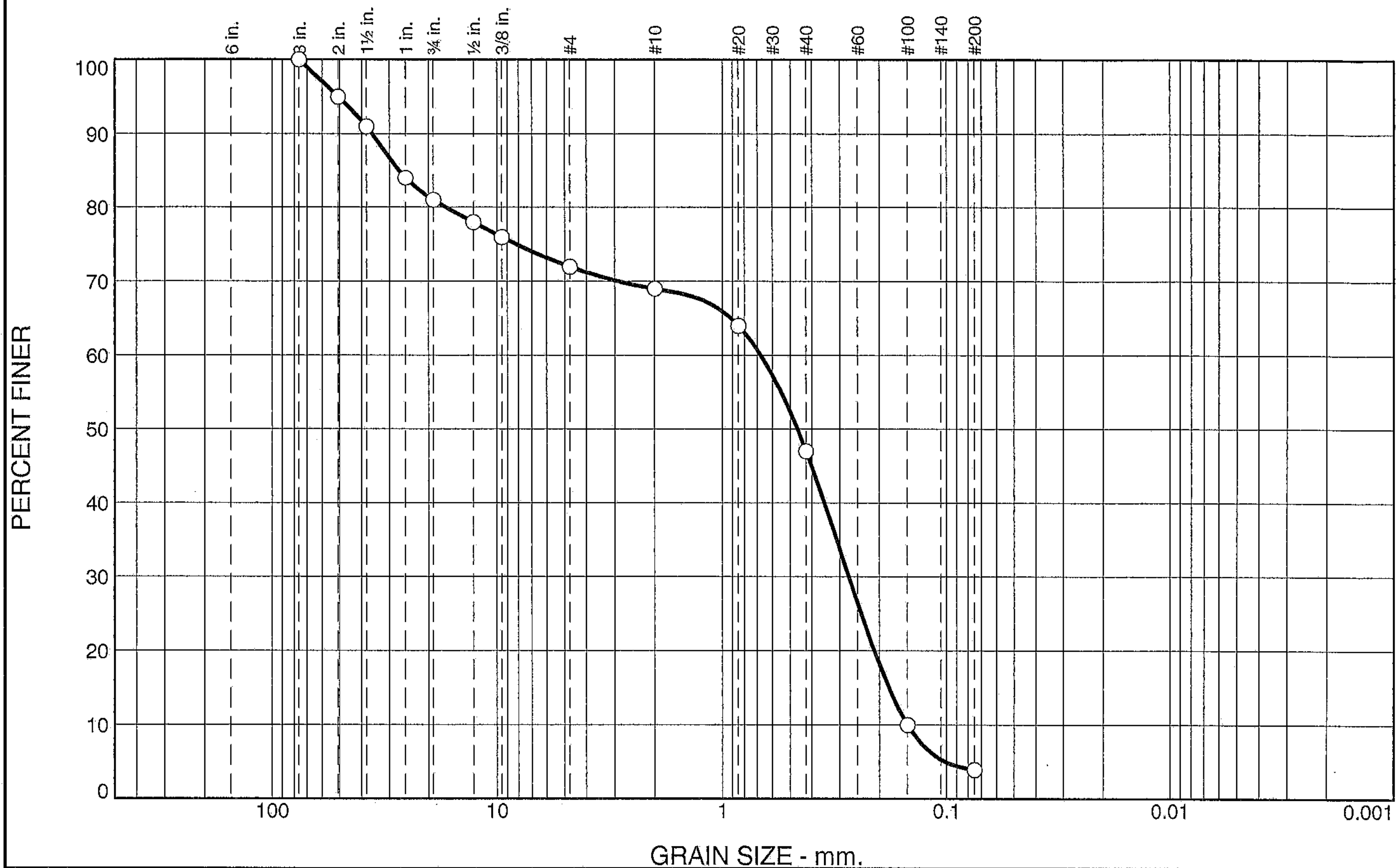
Scale I.D.: CW9204

Sieve Set I.D.: Gilson + 12" Sieves

Oven I.D.: 184078-184079

Shaker I.D.: Gilson - Garage

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.0	9.0	3.0	22.0	43.1	3.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	95.0		
1.5"	91.0		
1"	84.0		
0.75"	81.0		
0.5"	78.0		
0.375"	76.0		
#4	72.0		
#10	69.0		
#20	64.0		
#40	47.0		
#100	10.0		
#200	3.9		

* (no specification provided)

Material Description

SP (#29650)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 35.9213 D_{85}= 27.1293 D_{60}= 0.6768
D_{50}= 0.4648 D_{30}= 0.2740 D_{15}= 0.1814
D_{10}= 0.1500 C_u= 4.51 C_c= 0.74

Classification

USCS= SP AASHTO=

Remarks

Sample Number: CC-BM-WW1-BL-RB

Date: 2/12/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29650

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-BM-WW1-BL-RB
Material Description: SP (#29650)
Date: 2/12/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
3"	100.0
2"	95.0
1.5"	91.0
1"	84.0
0.75"	81.0
0.5"	78.0
0.375"	76.0
#4	72.0
#10	69.0
#20	64.0
#40	47.0
#100	10.0
#200	3.9

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	19.0	9.0	28.0	3.0	22.0	43.1	68.1			3.9

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1014	0.1500	0.1814	0.2109	0.2740	0.3520	0.4648	0.6768	16.7671	27.1293	35.9213	50.8000

Fineness Modulus	C_u	C_c
3.42	4.51	0.74

AMEC

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Bertalix, AmecFW	LAB NO.: 29656
LOCATION: Los Penasquitos	SAMPLED BY: Kevin S.	DATE:
SOURCE: Sediment TMDL	SUBMITTED BY: Kevin S.	DATE:
~~MATERIAL~~: Time: 1200	AUTHORIZED BY:	DATE:
BORING: CC-BM-WWI-BL-RB	TESTED BY: RW	DATE: 2-12-16
DEPTH:	REVIEWED BY:	DATE:

3" 100

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		
2"	247.8	4.9	95.1		95
1 1/2"	429.2	8.5	91.5		91
1"	825.3	16.3	83.7		84
3/4"	978.3	19.4	80.6		81
1/2"	1131.3	22.4	77.6		78
3/8"	1215.9	24.1	75.9		76
#4	1428.8	28.3	71.7		72
#10	19.71	4.1	95.9	68.8	69
#20	50.91	10.5 ~~90.5~~	89.5	64.2	64
#40	166.23	34.2	65.8	47.2	47
#100	421.06	86.5	13.5	9.6	10
#200	459.59	94.5	5.5	4.0	3.9

CTB-16 = 486.51

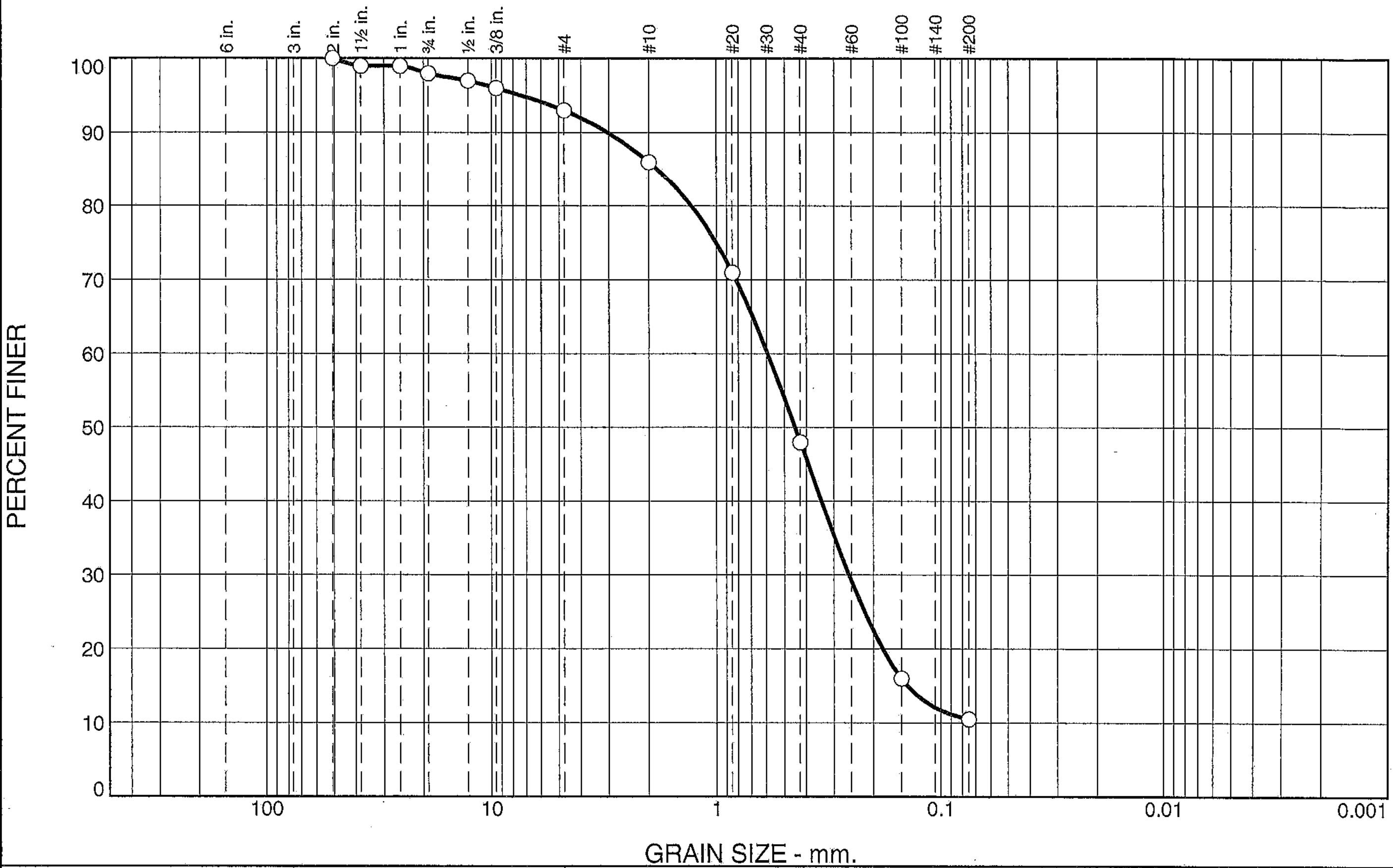
SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______
Weight of soil & tare (dry) 7231.7 w/o vegetation.
Weight of Tare 2182.5
Weight of H20 FL ______
Net weight of dry soil 5049.2
% H20 ______

WEIGHT BEFORE WASH: 5049.2 (+#4)
486.51 -#4

EQUIPMENT USED:
Scale I.D.: CW9204
Sieve Set I.D.: Gilson + 12" sieves
Oven I.D.: 184078-184079
Shaker I.D.: Gilson - Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.0	5.0	7.0	38.0	37.5	10.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1.5"	99.0		
1"	99.0		
0.75"	98.0		
0.5"	97.0		
0.375"	96.0		
#4	93.0		
#10	86.0		
#20	71.0		
#40	48.0		
#100	16.0		
#200	10.5		

* (no specification provided)

Material Description

(#29649)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 3.0341 D_{85}= 1.8350 D_{60}= 0.5941
D_{50}= 0.4487 D_{30}= 0.2569 D_{15}= 0.1409
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: CC-BM-WW1-BL-LB

Date: 2/12/16

amec

Client:
Project: Los Penasquitos Sediment Special Study

Project No: 502515C011.02 **Figure** #29649

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-BM-WW1-BL-LB
Material Description: (#29649)
Date: 2/12/16
Tested by: R. Valles
Checked by: L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
2"	100.0
1.5"	99.0
1"	99.0
0.75"	98.0
0.5"	97.0
0.375"	96.0
#4	93.0
#10	86.0
#20	71.0
#40	48.0
#100	16.0
#200	10.5

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	2.0	5.0	7.0	7.0	38.0	37.5	82.5			10.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.1409	0.1818	0.2569	0.3420	0.4487	0.5941	1.2931	1.8350	3.0341	7.3481

Fineness Modulus
2.36

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025151004,02	NAME: Kiernan Portalik AmecFW	LAB NO.: 29649
LOCATION: Los Penasquitos	SAMPLED BY: Kevin Stolzenbach	DATE: 1-7-16
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL~~: Time 1200	AUTHORIZED BY:	DATE:
BORING: CC-BM-WM-BL-LB	TESTED BY: RU	DATE: 2-12-16
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		2" 100
1 1/2"	62.1	.6	99.4		99
1"	124.3	1.2	98.8		99
3/4"	185.9	1.9	98.1		98
1/2"	300.8	3.0	97.0		97
3/8"	390.1	3.9	96.1		96
#4	698.6	7.0	93.0		93
#10	39.33	8.0	92.0	85.6	86
#20	115.79	23.5	76.5	71.1	71
#40	237.53	48.3	51.7	48.1	48
#100	408.00	83.6	17.0	15.9	16
#200	436.21	88.7	11.3	10.5	✓

CTB-10 = 491.8

27.70

W/ Bag & Pan

16560.1

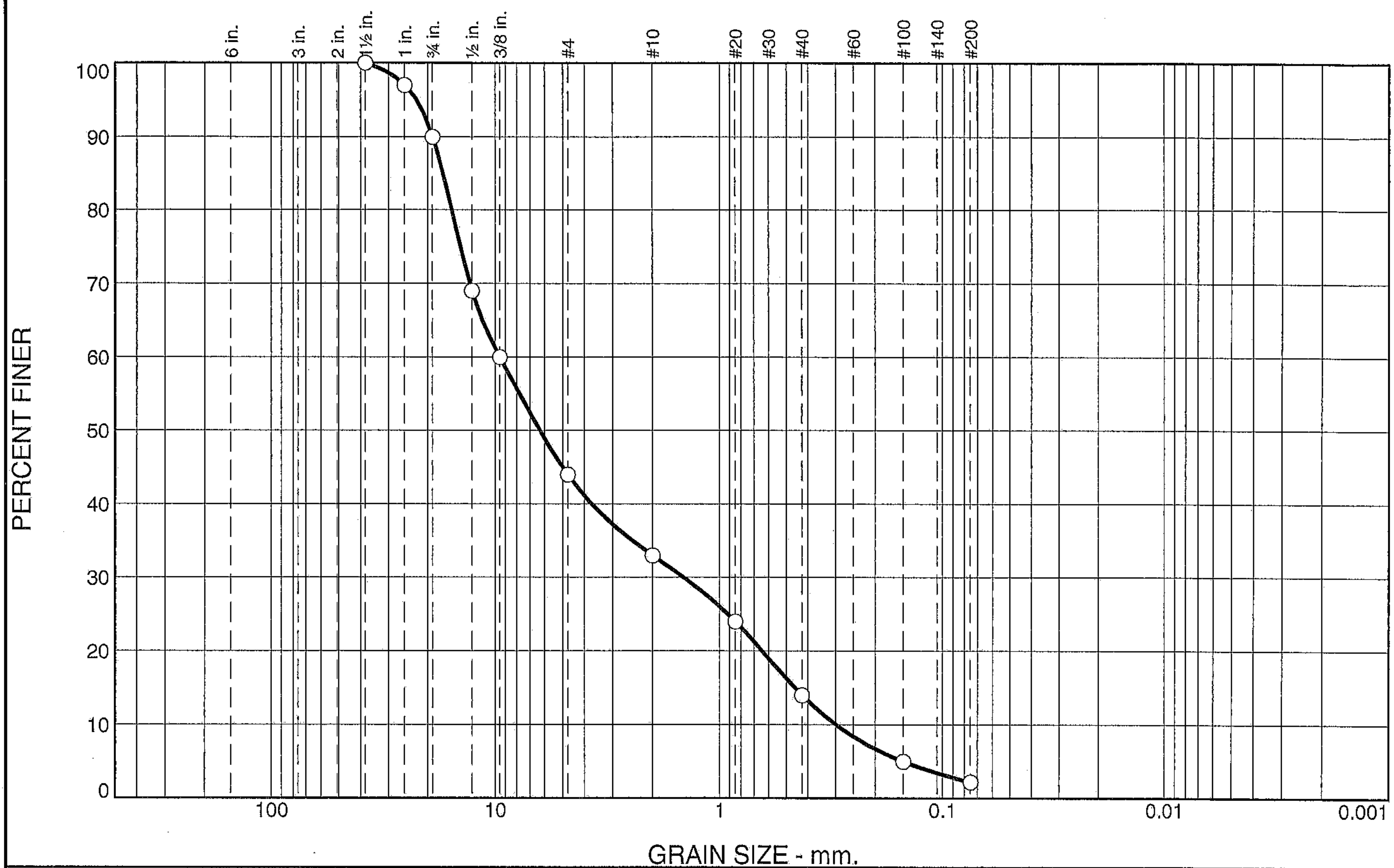
SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) __________
Weight of soil & tare (dry) __________
Weight of Tare P-1 4479.5
Weight of H20 __________
Net weight of dry soil 10013.6
% H20 __________

WEIGHT BEFORE WASH: 10013.6 (+4)
491.8 (-4)

EQUIPMENT USED:
Scale I.D.: CW 9204
Sieve Set I.D.: Gilson - 12"
Oven I.D.: 184078 - 184077
Shaker I.D.: Gilson / Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.0	46.0	11.0	19.0	11.8	2.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	97.0		
0.75"	90.0		
0.5"	69.0		
0.375"	60.0		
#4	44.0		
#10	33.0		
#20	24.0		
#40	14.0		
#100	5.0		
#200	2.2		

* (no specification provided)

Material Description

GP (#29648)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 19.0500 D_{85}= 17.1358 D_{60}= 9.5250
D_{50}= 6.3234 D_{30}= 1.4565 D_{15}= 0.4576
D_{10}= 0.2994 C_u= 31.82 C_c= 0.74

Classification

USCS= GP AASHTO=

Remarks

Sample Number: CC-TC-WW1-BL-LB

Date: 2/12/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29648

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-TC-WW1-BL-LB
Material Description: GP (#29648)
Date: 2/12/16
USCS Classification: GP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
1.5"	100.0
1"	97.0
0.75"	90.0
0.5"	69.0
0.375"	60.0
#4	44.0
#10	33.0
#20	24.0
#40	14.0
#100	5.0
#200	2.2

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	10.0	46.0	56.0	11.0	19.0	11.8	41.8			2.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1500	0.2994	0.4576	0.6428	1.4565	3.7216	6.3234	9.5250	15.6460	17.1358	19.0500	22.5144

Fineness Modulus	C_u	C_c
5.10	31.82	0.74

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

PROJECT NO: 5025151004,02	NAME: Kiernan Bortalik AmecFw	LAB NO.: 29648
LOCATION: Los Penasquitos	SAMPLED BY: Kevin Stolzenbach	DATE: 1-7-16
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL:~~ Time: 1200	AUTHORIZED BY:	DATE:
BORING: CC-TC-WW1-BL-LB	TESTED BY: Rw	DATE: 2-12-16
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		
1 1/2"	0	0	100		
1"	373.0	2.9	97.1		97
3/4"	1203.2	9.5	90.5		90
1/2"	3882.3	30.7	69.3		69
3/8"	5053.6	39.9	60.1		60
#4	7017.2	55.5	44.5		44
#10	120.75	25.7	74.3	33.1	✓
#20	216.00	46	54.0	24.0	✓
#40	321.54	68.5	31.5	14.0	✓
#100	419.29	89.3	10.7	4.7	5 ✓
#200	446.30	95.1	4.9	2.2	✓

CTB-12 = ~~486.0~~ 469.3
16.4

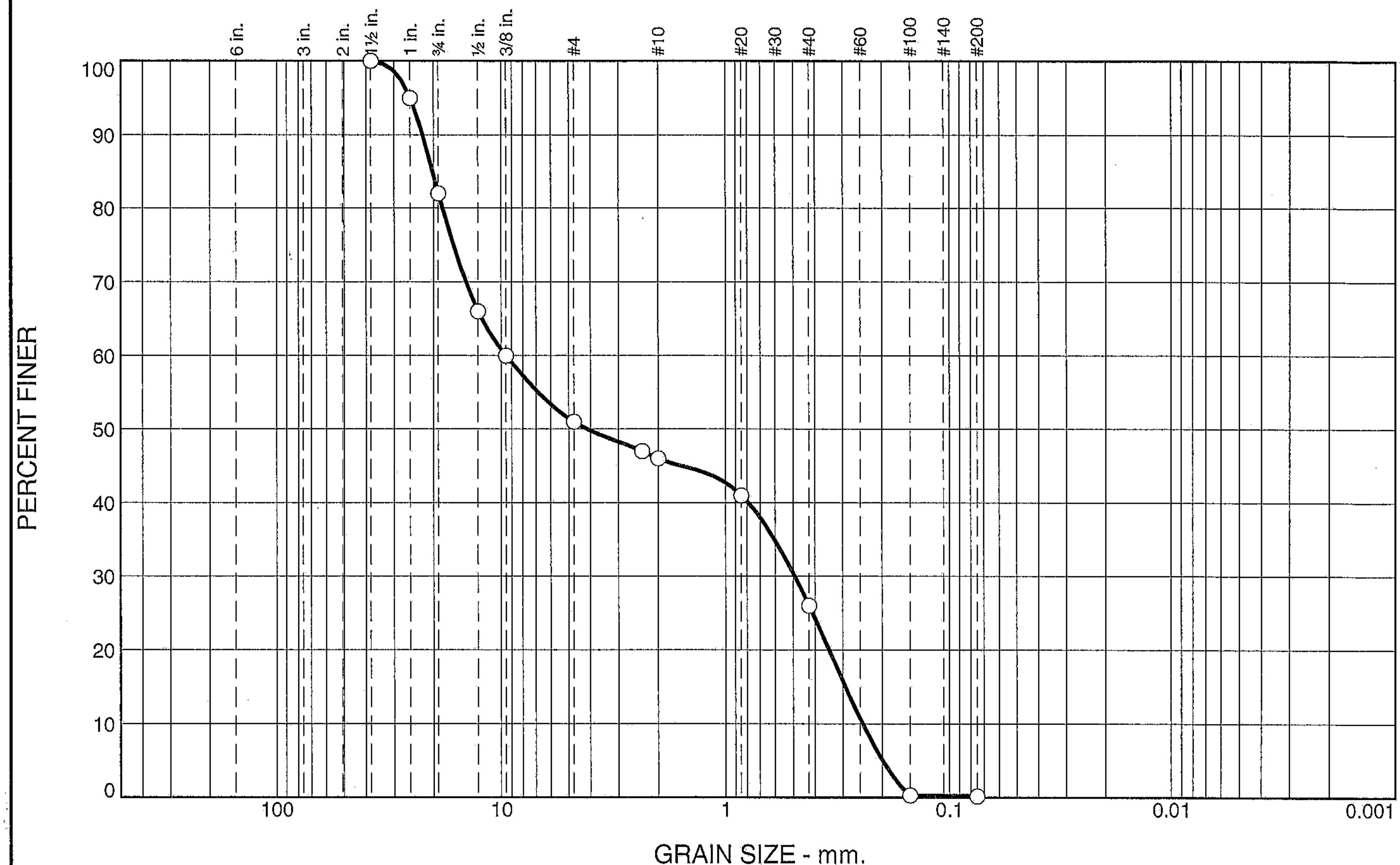
SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ________
Weight of soil & tare (dry) 16484.1
Weight of Tare C5 3829.8
Weight of H20 ________
Net weight of dry soil ________
% H20 ________

WEIGHT BEFORE WASH: 12654.3 (+4)
469.3 (-4)

EQUIPMENT USED:
Scale I.D.: CW 9204
Sieve Set I.D.: Gilson - 12
Oven I.D.: 184078 - 184077
Shaker I.D.: Gilson / Ginger

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.0	31.0	5.0	20.0	25.8	0.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	95.0		
0.75"	82.0		
0.5"	66.0		
0.375"	60.0		
#4	51.0		
#8	47.0		
#10	46.0		
#20	41.0		
#40	26.0		
#100	0.3		
#200	0.2		

* (no specification provided)

Material Description

SP (#29651)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 22.4295 D_{85}= 20.2374 D_{60}= 9.5250
D_{50}= 4.1474 D_{30}= 0.4923 D_{15}= 0.2921
D_{10}= 0.2444 C_u= 38.98 C_c= 0.10

Classification

USCS= SP AASHTO=

Remarks

Sample Number: CC-AC-WW2-MBL-1

Date: 2/9/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29651

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-AC-WW2-MBL-1
Material Description: SP (#29651)
Date: 2/9/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
1.5"	100.0
1"	95.0
0.75"	82.0
0.5"	66.0
0.375"	60.0
#4	51.0
#8	47.0
#10	46.0
#20	41.0
#40	26.0
#100	0.3
#200	0.2

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	18.0	31.0	49.0	5.0	20.0	25.8	50.8			0.2

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1990	0.2444	0.2921	0.3460	0.4923	0.7912	4.1474	9.5250	18.2750	20.2374	22.4295	25.4000

Fineness Modulus	C_u	C_c
4.65	38.98	0.10

amec

SIEVE ANALYSIS OF SOIL
ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Bertalik, AmecFW	LAB NO.: 29651
LOCATION: Los Penasquitos	SAMPLED BY: Kevin S.	DATE:
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL:~~ Time 1520	AUTHORIZED BY:	DATE:
BORING: CC-AC-WW2-MBL-1	TESTED BY: RU	DATE: 2-9-16
DEPTH:	REVIEWED BY:	DATE:

+8 = 1323.50

-8 617.0

CTB·30

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS		
1½	0	0	0		100
~~1 1/2"~~ 1"	74.9	5.4	94.6		95
~~1"~~ 3/4	236.7	17.9	82.1		82
~~3/4"~~ 1/2	446.8	33.8	66.2		66
~~1/2"~~ 3/8	533.3	40.3	59.7		60
~~3/8"~~ #4	645.1	48.7	51.3		51
~~#4~~ #8	699.4	52.8	47.2		47
#10	9.94	1.6	98.4	46.4	46
#20	76.70	12.4	87.6	41.3	41
#40	283.79	46.0	54.0	25.5	26
#100	612.45	99.3	.7	.3	0.3
#200	614.53	99.6	.4	.2	

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ________

Weight of soil & tare (dry) 1591.8

Weight of Tare CTB-2 268.3

Weight of H20 ________

Net weight of dry soil ________

% H20 ________

WEIGHT BEFORE WASH: 1323.5 (+8)

617.0 (-8)

EQUIPMENT USED:

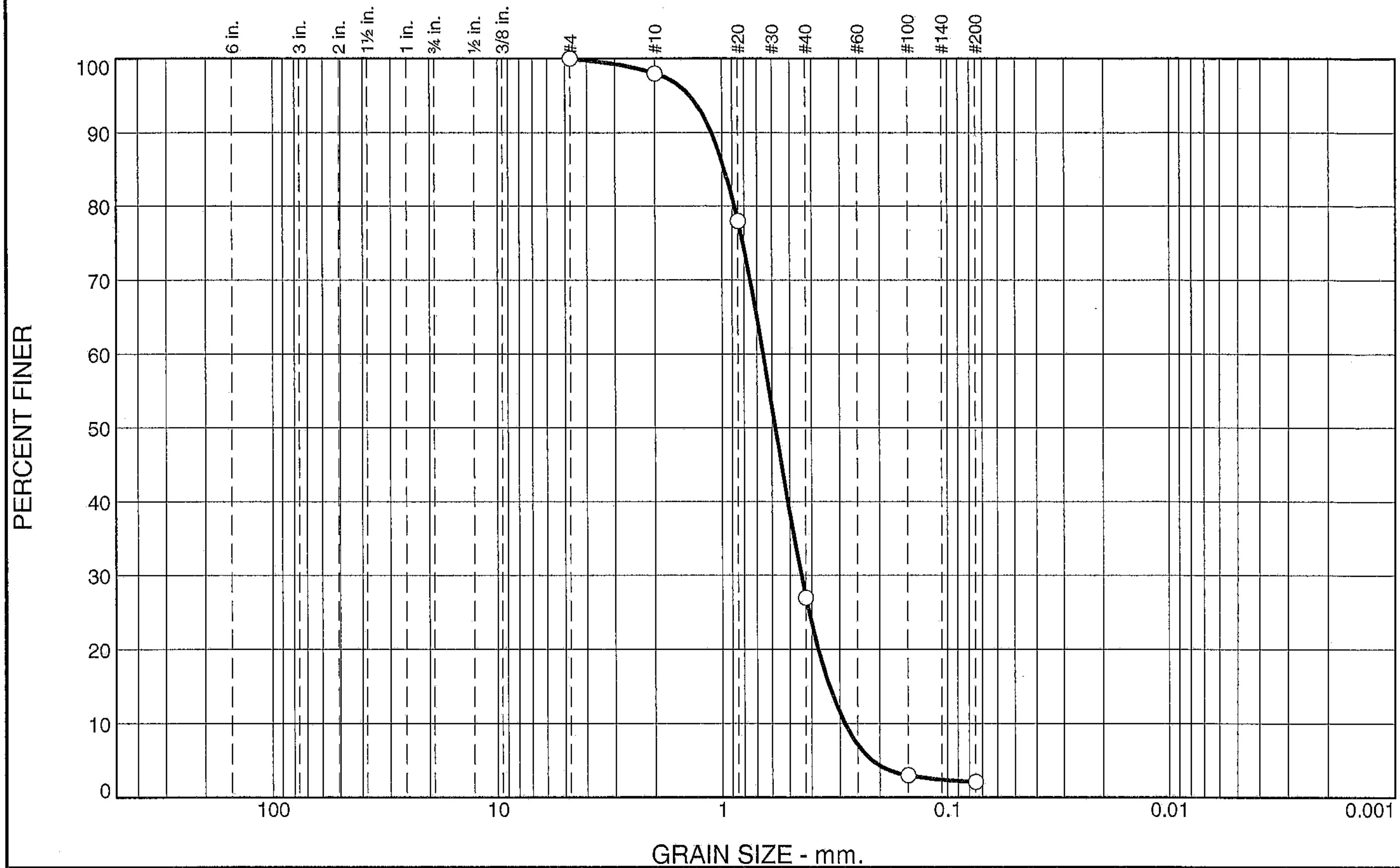
Scale I.D.: CW9204

Sieve Set I.D.: Gilson + 12" Sieves

Oven I.D.: 184078-184077

Shaker I.D.: Gilson - Gyrator

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	2.0	71.0	24.9	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.0		
#20	78.0		
#40	27.0		
#100	3.0		
#200	2.1		

* (no specification provided)

Material Description

SP (#29652)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1180 D_{85}= 0.9758 D_{60}= 0.6580
D_{50}= 0.5804 D_{30}= 0.4452 D_{15}= 0.3339
D_{10}= 0.2859 C_u= 2.30 C_c= 1.05

Classification

USCS= SP AASHTO=

Remarks

Sample Number: CV-UP-WW2-MBL-1

Date: 2/9/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29652

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CV-UP-WW2-MBL-1
Material Description: SP (#29652)
Date: 2/9/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
#4	100.0
#10	98.0
#20	78.0
#40	27.0
#100	3.0
#200	2.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	2.0	71.0	24.9	97.9			2.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.2163	0.2859	0.3339	0.3745	0.4452	0.5113	0.5804	0.6580	0.8806	0.9758	1.1180	1.3974

Fineness Modulus	C_u	C_c
2.43	2.30	1.05

AMEC

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Bretalik, AmecFW	LAB NO.: 29652
LOCATION: Los Penasquitos	SAMPLED BY:	DATE: 1-31-16
SOURCE: Sediment TMDL	SUBMITTED BY: Kevin S.	DATE:
~~MATERIAL~~: Time 1730	AUTHORIZED BY:	DATE:
BORING: CV-UP-WW2-MBL-1	TESTED BY: RW	DATE: 2-9-16
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS
1 1/2"			
1"			
3/4"			
1/2"			
3/8"	0	0	100
#4	0	0	100
#10	1.72	1.9	98.1
#20	20.35	22.0	78.0
#40	67.47	72.8	27.2 27
#100	90.31	97.4	2.6 3
#200	90.72	97.9	2.1

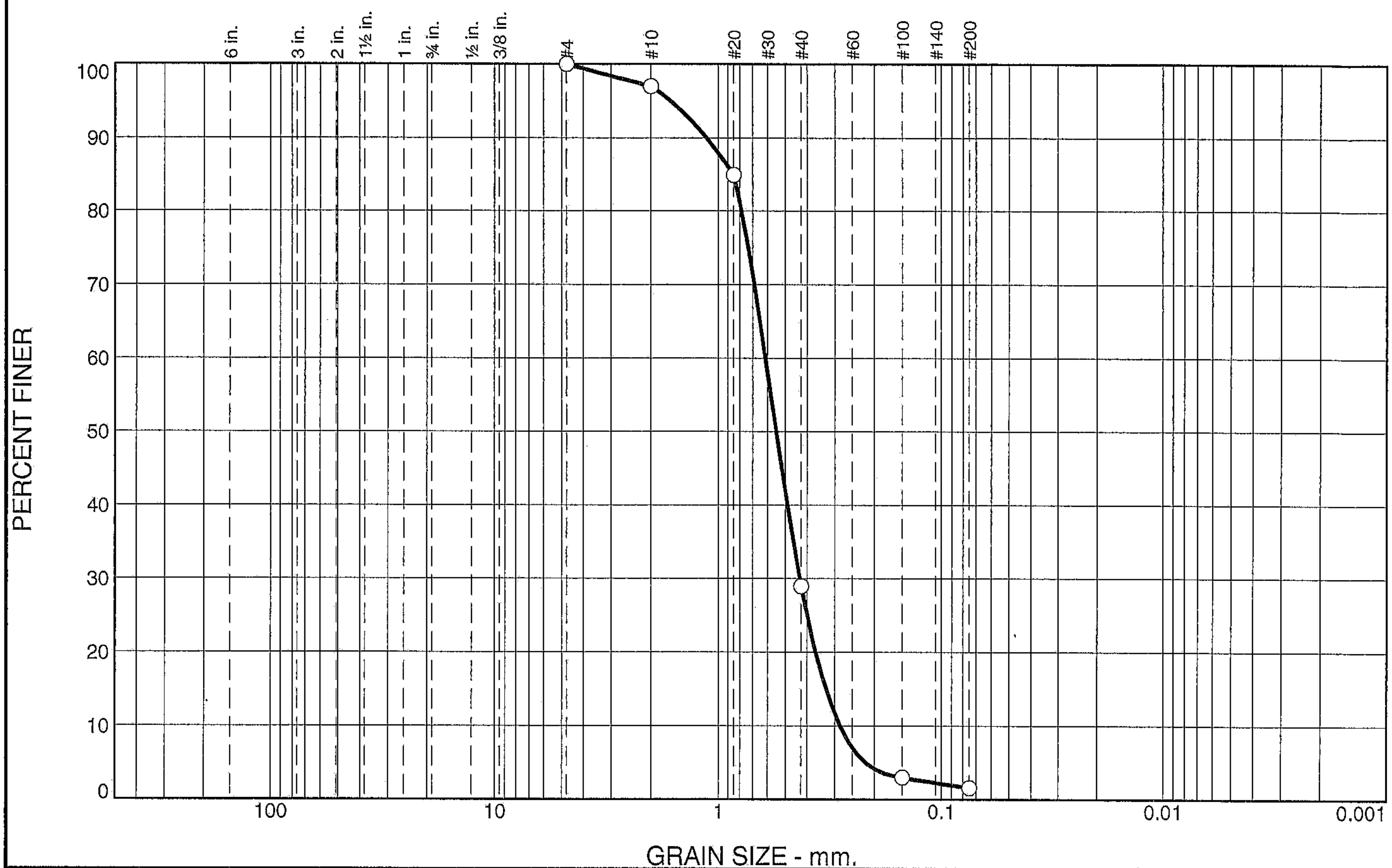
SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet)	
Weight of soil & tare (dry)	318.0
Weight of Tare Foil	225.35
Weight of H20	
Net weight of dry soil	92.65
% H20	

WEIGHT BEFORE WASH: 92.65

EQUIPMENT USED:
Scale I.D.: CW9204
Sieve Set I.D.: Gilson + 12" sieves
Oven I.D.: 184078-184077
Shaker I.D.: Gilson - Gringer

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.0	68.0	27.4	1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.0		
#20	85.0		
#40	29.0		
#100	3.0		
#200	1.6		

* (no specification provided)

Material Description

SP (#29653)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1307 D_{85}= 0.8500 D_{60}= 0.6143
D_{50}= 0.5493 D_{30}= 0.4310 D_{15}= 0.3292
D_{10}= 0.2845 C_u= 2.16 C_c= 1.06

Classification

USCS= SP AASHTO=

Remarks

Sample Number: CC-TC-WW2-BL-MID

Date: 2/9/16

amec

Client:
Project: Los Penasquitos Sediment Special Study
Project No: 502515C011.02 **Figure** #29653

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

2/15/2016

Project: Los Penasquitos Sediment Special Study
Project Number: 502515C011.02
Sample Number: CC-TC-WW2-BL-MID
Material Description: SP (#29653)
Date: 2/9/16
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
#4	100.0
#10	97.0
#20	85.0
#40	29.0
#100	3.0
#200	1.6

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	3.0	68.0	27.4	98.4			1.6

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.2186	0.2845	0.3292	0.3666	0.4310	0.4897	0.5493	0.6143	0.7859	0.8500	1.1307	1.6375

Fineness Modulus	C_u	C_c
2.39	2.16	1.06

amec

SIEVE ANALYSIS OF SOIL

ASTM D1140/ D422

PROJECT NO: 5025.15C004.02	NAME: Kiernan Brtalik, AmecFW	LAB NO.: 29653
LOCATION: Los Penasquitos	SAMPLED BY: Kevin S.	DATE:
SOURCE: Sediment TMDL	SUBMITTED BY:	DATE:
~~MATERIAL~~: Time 1030	AUTHORIZED BY:	DATE:
BORING: CC-TC-WW2-BL-MID	TESTED BY: RV	DATE: 2-9-16
DEPTH:	REVIEWED BY:	DATE:

SIEVE SIZE	WEIGHT RETAINED, GMS.	% RETAINED	% PASS	
1 1/2"				
1"				
3/4"				
1/2"				
3/8"	0	0	100	
#4	0	0	100	
#10	21.49	2.6	97.4	97
#20	126.64	15.1	84.9	85
#40	595.99	70.9	29.1	29
#100	817.75	97.4	2.6	3
#200	826.82	98.4	1.6	✓

SAMPLE MOISTURE CONTENT

Weight of soil & tare (wet) ______

Weight of soil & tare (dry) 1086.9 w/o vegetation.

Weight of Tare 246.9

Weight of H20 PQ ______

Net weight of dry soil 840

% H20 ______

WEIGHT BEFORE WASH: 840

EQUIPMENT USED:

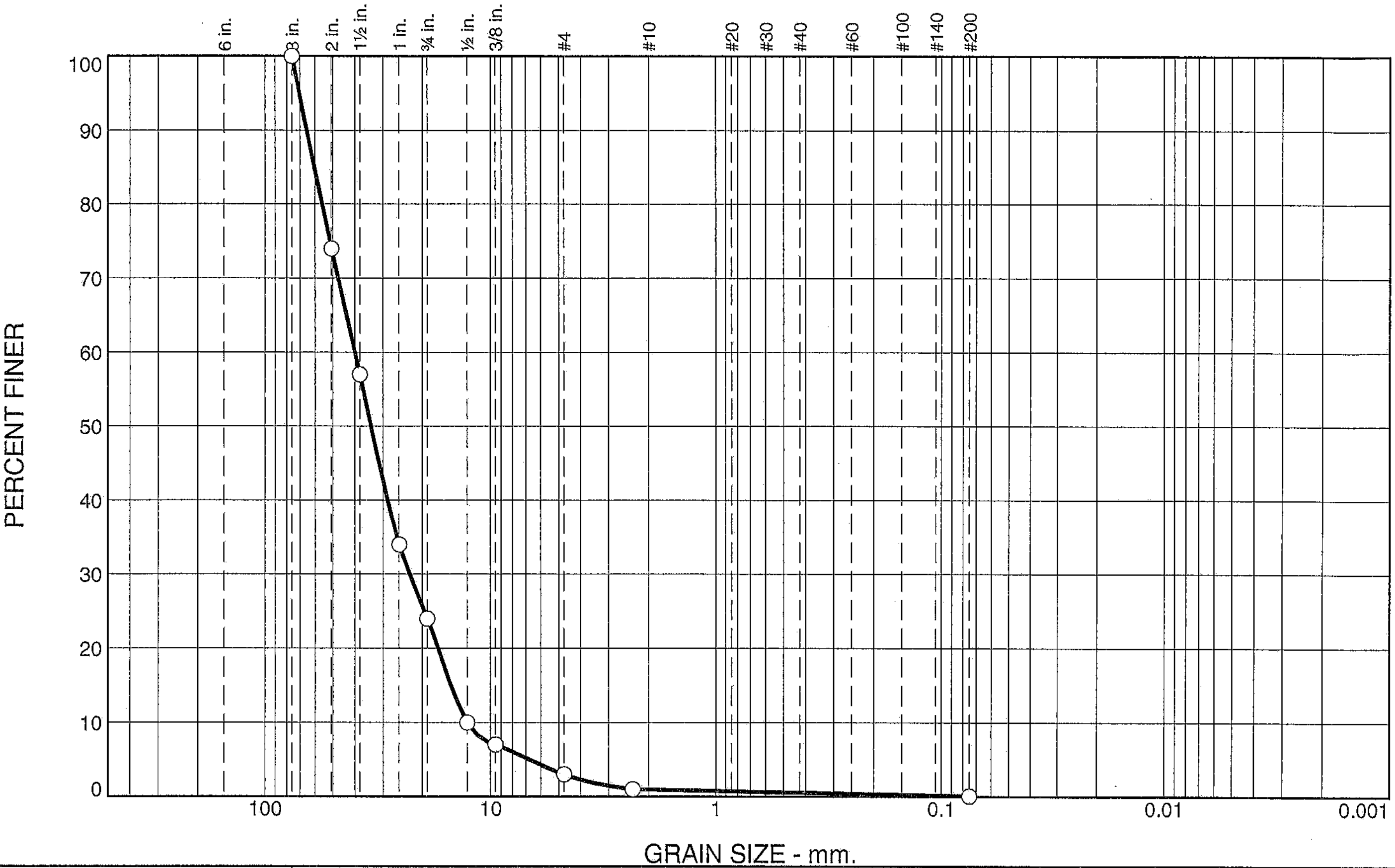
Scale I.D.: CW 9204

Sieve Set I.D.: Gilson + 12" sieves

Oven I.D.: 184078 - 184077

Shaker I.D.: Gilson - Gringer

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	76.0	21.0	2.0	0.4	0.5	0.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	74.0		
1.5"	57.0		
1"	34.0		
0.75"	24.0		
0.5"	10.0		
0.375"	7.0		
#4	3.0		
#8	1.0		
#200	0.1		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 65.4479 D_{85}= 60.5835 D_{60}= 40.0559
D_{50}= 33.9999 D_{30}= 22.8671 D_{15}= 14.9984
D_{10}= 12.7000 C_u= 3.15 C_c= 1.03

Classification

USCS= GP AASHTO=

Remarks

Location: CCNR-WW3-BL

Date: 3/17/16

amec

Client:
Project: Los Penasquitos Sediment Transport Monitoring 2014-2015

Project No: 502515C011.02 **Figure** #29700

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

3/18/2016

Project: Los Penasquitos Sediment Transport Monitoring 2014-2015
Project Number: 502515C011.02
Location: CCNR-WW3-BL
Date: 3/17/16
USCS Classification: GP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
3"	100.0
2"	74.0
1.5"	57.0
1"	34.0
0.75"	24.0
0.5"	10.0
0.375"	7.0
#4	3.0
#8	1.0
#200	0.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	76.0	21.0	97.0	2.0	0.4	0.5	2.9			0.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
6.7641	12.7000	14.9984	17.1063	22.8671	28.6926	33.9999	40.0559	55.9967	60.5835	65.4479	70.6358

Fineness Modulus	C_u	C_c
8.06	3.15	1.03

amec

SIEVE ANALYSIS OF AGGREGATE - SAND EQUIVALENT

ASTM D2419 / AASHTO T176 / CTM217
ASTM C117 / AASHTO T11
ASTM C136 / AASHTO T27

Project No. ______ Project Name: Los Penesquito Sediment
Lab No. 29700 Sampled by: ______ Date: ______
Type of Aggregate: ______ Submitted by: ______ Date: ______
Source of Aggregate: ______ Tested by: RU Date: 3-17-16
Sample Location: ______ Reviewed by: ______ Date: ______

SAMPLE WEIGHT DRY GMS.					
Screen	Weight Retained	% Retained	% Pass	Cum. Pass	Specification Limit
4"	0	0	100	100	
3"	0	0	100	100	
2"	1068.5	26.4	73.6		
1-1/2"	1732.5	42.7	57.3		
1"	2676.5	66.6	34.0		
3/4"	3094.9	76.4	23.6		
1/2"	3646.0	90.0	10.0		
3/8"	3772.1	93.1	6.9		
#4	3920.8	96.7	3.3		
#4 Grading Portion ______ gm					
#8	3998.5	98.7	1.3		
#16					
#30					
#50					
#100					
#200					

MOISTURE CONTENT			SAND EQUIVALENT	
Weight of sample & tare (wet)			/ =	
Weight of sample & tare (dry)	4666.0		/ =	
Weight of tare 104	613.0	0	/ =	
Weight of H₂0	4053	4/0		
Net weight of dry sample		1		
% H20	.09%	3.6	Ave.=	

~~3968.8 %pan~~
~~3929.2 %pan~~
4049.4 %pan

EQUIPMENT USED:
Sieve Set I.D.: Gilson Mechanical Shaker: I.D.: Gilson
Scale I.D. ______ S.E. Shaker I.D.: ______
Oven I.D.: 184077

change This Code

502515C011.02

Amec Foster Wheeler - Materials Lab

9177 Sky Park Court San Diego, CA 92213-4341
Tel 858-514-3000

CHAIN OF CUSTODY RECORD

STANDARD

CLIENT NAME: Kiernan Brtalik, Amec Foster Wheeler

PROJECT: Los Peñasquitos Sediment Special Study

ADDRESS: 9177 Sky Park Court San Diego, CA 92213-4341

PHONE: 858-514-7752
FAX:
EMAIL: Kiernan.Brtalik@amecfw.com

PROJECT MANAGER Jeremy Burns

SAMPLER Kevin Stolzenbach

ANALYSES REQUESTED: Particle Size Distribution

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Particle Size Distribution	COMMENTS
29648	1/7/16	12:00	SED	CC-TC-WW1-BL-LB	2	X	3x5" piece of tile in sample
29649	↓	↓	↓	CC-BM-WW1-BL-LB	2	X	
29650	↓	↓	↓	CC-BM-WW1-BL-RB	1	X	
29651	1/31/16	1520	↓	CC-AC-WW2-MBL-1	1	X	
29652	↓	1730	↓	CV-UP-WW2-MBL-1	1	X	
29653	2/1/16	1030	↓	CC-TC-WW2-BL-MID	1	X	
29654	12/29/15	1230	SED	LP-POW-VBL	1	X	

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☐ 10 - 15 Business Days
- ☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice Y / N
Preserved Y / N
Evidence Seals Present Y / N
Container Attacked Y / N
Preserved at Lab Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION

Bill to 502515C011.02

COC version 042707

Amec Foster Wheeler - Materials Lab

CHAIN OF CUSTODY RECORD

9177 Sky Park Court San Diego, CA 92213-4341
Tel 858-514-3000

STANDARD

Page_____Of_____

CLIENT NAME: Jeremy Burns, Amec Foster Wheeler	PROJECT: ~~Los Penasquitos Sediment TMDL~~ Los Peñasquitos Sediment Transport Monitoring 2014-2015
ADDRESS: 9177 Sky Park Court San Diego, CA 92213-4341	PHONE: 858-514-7752 FAX: EMAIL: jeremy.burns@amec.com
PROJECT MANAGER Jeremy Burns	SAMPLER Kevin Stolzenbach & Robert Wheeler

ANALYSES REQUESTED

	ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	Particle Size Distribution									COMMENTS
29699	CCC ~~CVC~~-WW3-BL	03/08/16	1414		Carroll Canyon ~~Carmel Valley~~ Bed load		X									#502515C011 .02
29700	CCNR-WW3-BL	03/08/16	1540		Nancy Ridge Bed load		X									

SPECIAL HANDLING

- ☐ Same Day Rush 150%
- ☐ 24 Hour Rush 100%
- ☐ 48-72 Hour Rush 75%
- ☐ 4 - 5 Day Rush 30%
- ☐ Rush Extractions 50%
- ☐ 10 - 15 Business Days
- ☐ QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

RELINQUISHED BY	DATE / TIME	RECEIVED BY
Robert Wheeler R.W.	3/15/16 3:30 pm	Liz Collins
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Attacked	Y / N
Preserved at Lab	Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION

COC version 042707

amec foster wheeler
9177 Sky Park Court, San Diego, CA 92123
Phone: 858-278-3600 Fax: 858-278-5300

Lab No. : ______

page ____ of ____

REQUEST FOR GEOTECHNICAL TESTING

Project Name: PQ Sentiment
Project No.: 5013ISC 011.02
Client: ______

Sampled By: ______ Date: ______
Received By: ______ Date: ______
Requested By: ______ Date Due: ______

Completed by: ______
Sampled Logged in OC-Track: ______
Reviewed by: ______
Distribution to Acct.: ______
Distribution : ______

Group	Test	UP Code or Unit Price	Sample 1	Sample 2
	BORING OR TEST PIT NO.	N/A	29699	29700
	SAMPLE DEPTH	N/A		
	SAMPLE TYPE - (R)ing or (B)ulk	N/A		
SAMPLE REMOLDING	PERCENT COMPACTION			
SAMPLE REMOLDING	MOISTURE CONTENT / ASTM D2216	UQNN8E		
CHEMICAL TESTING*	SULFATE CONTENT	UP220		
CHEMICAL TESTING*	PH CONTENT / CTM 643	UP370		
CHEMICAL TESTING*	CHLORIDE CONTENT	UP372		
CHEMICAL TESTING*	SOIL RESRISTIVITY	UP371		
DIRECT SHEAR	DIRECT SHEAR - SURCHARGE (psf)/ AASHTO T236	UQDE6E		
DIRECT SHEAR	SOAK	UQDE6E		
CONSOLIDATION / ASTM D2435	SOAK AFTER (psf)	UQCD6E		
CONSOLIDATION / ASTM D2435	LOAD TO (psf)	UQCD6E		
CONSOLIDATION / ASTM D2435	REBOUND TO (psf)	UQCD6E		
CONSOLIDATION / ASTM D2435	RELOAD TO (psf)	UQCD6E		
CONSOLIDATION / ASTM D2435	REBOUND TO (psf)	UQCD6E		
CONSOLIDATION / ASTM D2435	TIME RATE (Y/N)	UQCD6E		
PHYSICAL TESTS	COMPACTION / ASTM D1557	UQCA1E		
PHYSICAL TESTS	VISUAL SOIL CLASSIFICATION	130270		
PHYSICAL TESTS	CBR / ASTM D1883	UQCX3E		
PHYSICAL TESTS	CBR W/ LIME OR CEMENT	131080		
PHYSICAL TESTS	R-VALUE / ASTM D2844	UQRT2E		
PHYSICAL TESTS	R-VALUE W/ LIME	130880		
PHYSICAL TESTS	SAMPLE PREP	UQST4E		
PHYSICAL TESTS	EXPANSION INDEX / ASTM D4829	UQEF6E		
PHYSICAL TESTS	- #200 WASH, % / ASTM D1140	UQSV4E		
PHYSICAL TESTS	- #200 WASH W/ SIEVE / ASTM D1140 & D422	UQSV6E	X	X
PHYSICAL TESTS	HYDROMETER ASSUMED SPG/ ASTM D422 & D423	UQHI8E		
PHYSICAL TESTS	PLASTICITY INDEX / ASTM D4318	UQLL9E		
PHYSICAL TESTS	MOISTURE & DENSITY, RING / ASTM D2216	UQSW0E		
PHYSICAL TESTS	FINE GRADATION / ASTM C136	UQSU8E		
PHYSICAL TESTS	COARSE GRADATION / ASTM C136	UQSU6E		
PHYSICAL TESTS	UNCONFINED COMPRESSION / ASTM D2938	UQUZ6E		
PHYSICAL TESTS	SPECIFIC GRAVITY / ASTM D854	UQSW6E		
PHYSICAL TESTS	ORGANIC CONTENT / ASTM C40	UQUZ6E		
OTHER	REMOLD SAMPLE/ CONSOL / ASTM D2435	UQRT3E		
OTHER	REMOLD SAMPLE/ SHEAR / ASTM D3080	130800		
OTHER	SAND EQUIVALENT / ASTM D2419	UQFG8E		

UP CODE or UNIT PRICE **Note all 4 tests use code #UQSX9E*

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amec foster wheeler
9177 Sky Park Court, San Diego, CA 92123
Phone: 858-278-3600 Fax: 858-278-5300

Lab No. : ________

page ____ of ____

REQUEST FOR GEOTECHNICAL TESTING

Project Name: PQ SEDIMENT
Project No.: 5025150011.02
Client: ________

Sampled By: ________ Date: ________
Received By: ________ Date: ________
Requested By: ________ Date Due: ________

Completed by: ________
Sampled Logged in OC-Track: ________
Reviewed by: ________
Distribution to Acct.: ________
Distribution : ________

Group	Test	UP CODE or UNIT PRICE									
	BORING OR TEST PIT NO.	N/A	29648	29649	29650	29651	29652	29653	29654		
	SAMPLE DEPTH	N/A									
	SAMPLE TYPE - (R)ing or (B)ulk	N/A									
SAMPLE REMOLDING	PERCENT COMPACTION										
	MOISTURE CONTENT / ASTM D2216	UQNN8E									
CHEMICAL TESTING*	SULFATE CONTENT	UP220									
	PH CONTENT / CTM 643	UP370									
	CHLORIDE CONTENT	UP372									
	SOIL RESRISTIVITY	UP371									
DIRECT SHEAR	DIRECT SHEAR - SURCHARGE (psf)/ AASHTO T236	UQDE6E									
	SOAK										
CONSOLIDATION / ASTM D2435	SOAK AFTER (psf)	UQCD6E									
	LOAD TO (psf)										
	REBOUND TO (psf)										
	RELOAD TO (psf)										
	REBOUND TO (psf)										
	TIME RATE (Y/N)										
PHYSICAL TESTS	COMPACTION / ASTM D1557	UQCA1E									
	VISUAL SOIL CLASSIFICATION	130270									
	CBR / ASTM D1883	UQCX3E									
	CBR W/ LIME OR CEMENT	131080									
	R-VALUE / ASTM D2844	UQRT2E									
	R-VALUE W/ LIME	130880									
	SAMPLE PREP	UQST4E									
	EXPANSION INDEX / ASTM D4829	UQEF6E									
	- #200 WASH, % / ASTM D1140	UQSV4E	X	X	X	X	X	X	X		
	- #200 WASH W/ SIEVE / ASTM D1140 & D422	UQSV6E									
	HYDROMETER ASSUMED SPG/ ASTM D422 & D423	UQHI8E									
	PLASTICITY INDEX / ASTM D4318	UQLL9E									
	MOISTURE & DENSITY, RING / ASTM D2216	UQSW0E									
	FINE GRADATION / ASTM C136	UQSU8E									
	COARSE GRADATION / ASTM C136	UQSU6E									
	UNCONFINED COMPRESSION / ASTM D2938	UQUZ6E									
	SPECIFIC GRAVITY / ASTM D854	UQSW6E									
	ORGANIC CONTENT / ASTM C40	UQUZ6E									
OTHER	REMOLD SAMPLE/ CONSOL / ASTM D2435	UQRT3E									
	REMOLD SAMPLE/ SHEAR / ASTM D3080	130800									
	SAND EQUIVALENT / ASTM D2419	UQFG8E									

UP CODE or UNIT PRICE **Note all 4 tests use code #UQSX9E*

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amec foster wheeler
9177 Sky Park Court, San Diego, CA 92123
Phone: 858-278-3600 Fax: 858-278-5300

Lab No. : ______

page ____ of ____

REQUEST FOR GEOTECHNICAL TESTING

Completed by:	
Sampled Logged in OC-Track:	
Reviewed by:	
Distribution to Acct.:	
Distribution :	

Project Name: PQ SEDIMENT   Sampled By: ______   Date: ______
Project No.: 5025.15C004.02   Received By: ______   Date: ______
Client: ______   Requested By: ______   Date Due: ______

	BORING OR TEST PIT NO.	SAMPLE DEPTH	SAMPLE TYPE - (R)ing or (B)ulk	SAMPLE REMOLDING: PERCENT COMPACTION	SAMPLE REMOLDING: MOISTURE CONTENT / ASTM D2216	CHEMICAL TESTING*: SULFATE CONTENT	CHEMICAL TESTING*: PH CONTENT / CTM 643	CHEMICAL TESTING*: CHLORIDE CONTENT	CHEMICAL TESTING*: SOIL RESRISTIVITY	DIRECT SHEAR: DIRECT SHEAR - SURCHARGE (psf)/ AASHTO T236	DIRECT SHEAR: SOAK
29	644										
29	645										
29	646										
29	647										
	N/A	N/A	N/A		UQNN8E	UP220	UP370	UP372	UP371	UQDE6E	

BORING OR TEST PIT NO.	CONSOLIDATION / ASTM D2435: SOAK AFTER (psf)	LOAD TO (psf)	REBOUND TO (psf)	RELOAD TO (psf)	REBOUND TO (psf)	TIME RATE (Y/N)
644						
645						
646						
647						
N/A	UQCD6E					

BORING OR TEST PIT NO.	PHYSICAL TESTS: COMPACTION / ASTM D1557	VISUAL SOIL CLASSIFICATION	CBR / ASTM D1883	CBR W/ LIME OR CEMENT	R-VALUE / ASTM D2844	R-VALUE W/ LIME	SAMPLE PREP	EXPANSION INDEX / ASTM D4829	- #200 WASH, % / ASTM D1140
644									X
645									X
646									X
647									X
N/A	UQCA1E	130270	UQCX3E	131080	UQRT2E	130880	UQST4E	UQEF6E	UQSV4E

BORING OR TEST PIT NO.	- #200 WASH W/ SIEVE / ASTM D1140 & D422	HYDROMETER ASSUMED SPG/ ASTM D422 & D423	PLASTICITY INDEX / ASTM D4318	MOISTURE & DENSITY, RING / ASTM D2216	FINE GRADATION / ASTM C136	COARSE GRADATION / ASTM C136	UNCONFINED COMPRESSION / ASTM D2938	SPECIFIC GRAVITY / ASTM D854	ORGANIC CONTENT / ASTM C40	OTHER: REMOLD SAMPLE/ CONSOL / ASTM D2435	REMOLD SAMPLE/ SHEAR / ASTM D3080	SAND EQUIVALENT / ASTM D2419
644												
645												
646												
647												
N/A	UQSV6E	UQHI8E	UQLL9E	UQSW0E	UQSU8E	UQSU6E	UQUZ6E	UQSW6E	UQUZ6E	UQRT3E	130800	UQFG8E

UP CODE or UNIT PRICE ***Note all 4 tests use code #UQSX9E***

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APPENDIX D
PEBBLE COUNT PARTICLE-SIZE DISTRIBUTION ANALYSIS

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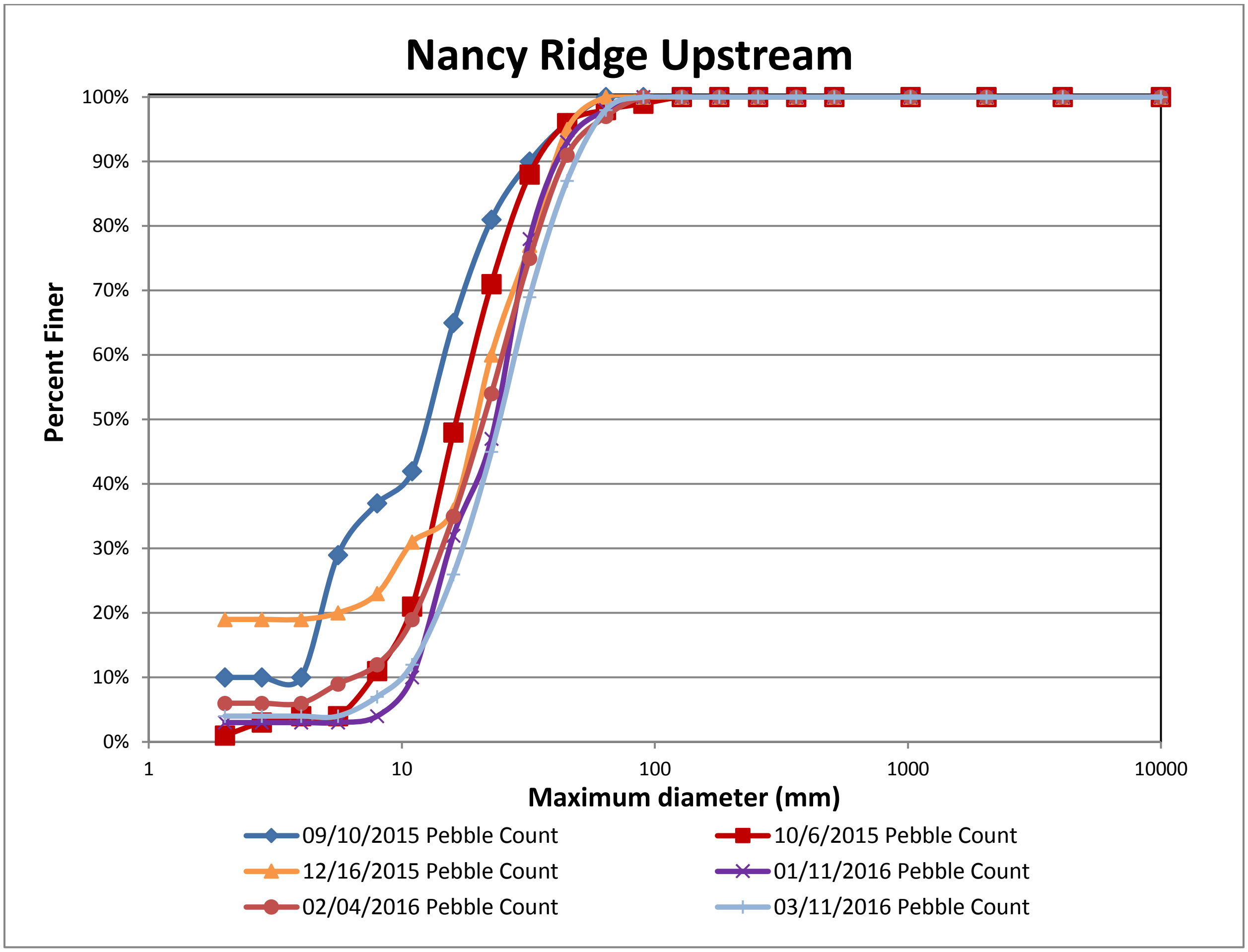
APPENDIX D: POST-STORM PEBBLE COUNT PARTICLE SIZE DISTRIBUTION ANALYSIS

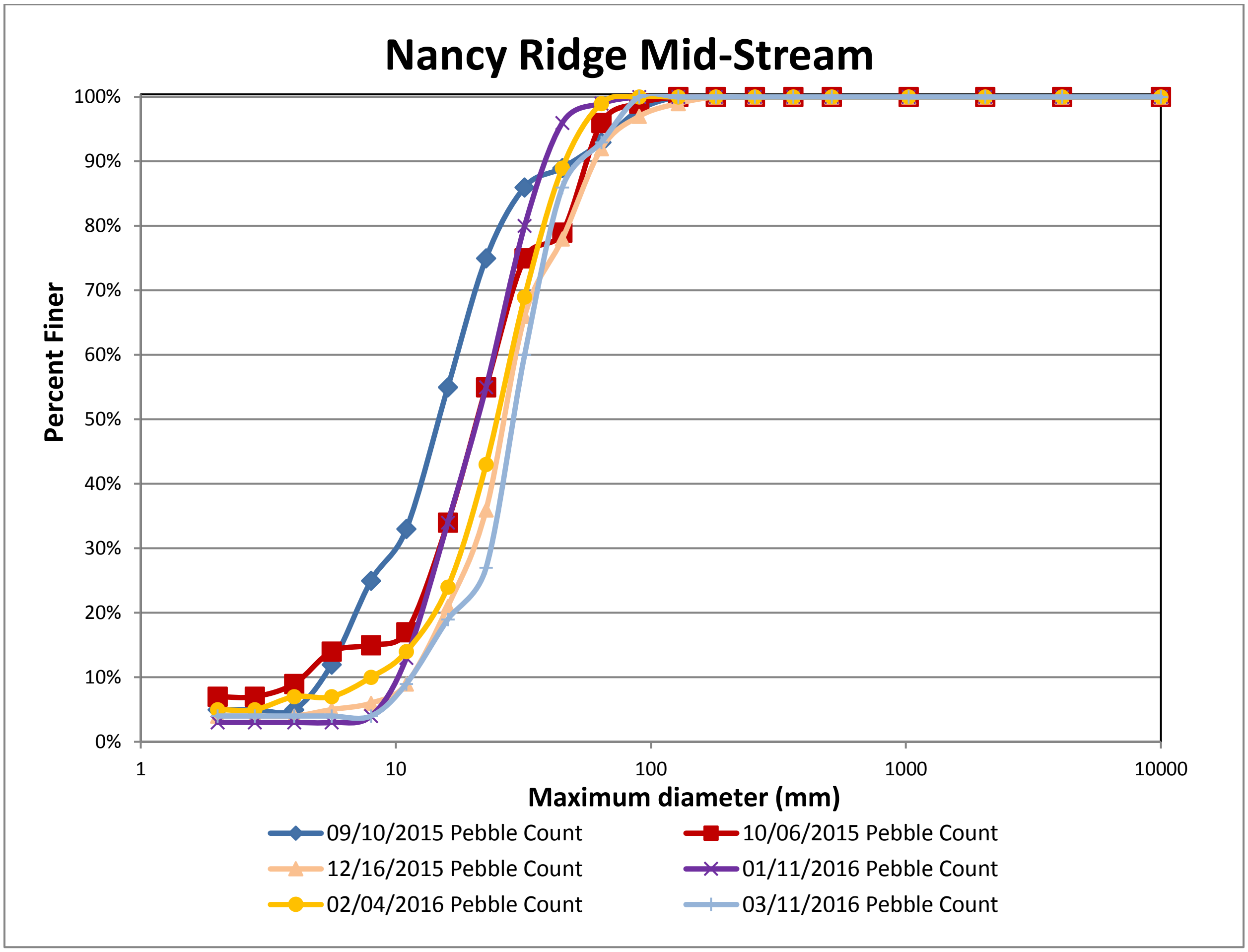
This appendix presents the particle size distribution analysis results conducted for upper watershed sites of Carroll Canyon (Nancy Ridge, Arizona Crossing, Trap Channel and Black Mountain) and Los Peñasquitos North City using the post-storm pebble count data collected throughout the wet weather season. Note that there is no data available on 12/16/15 for Trap Channel, Black Mountain and North City.

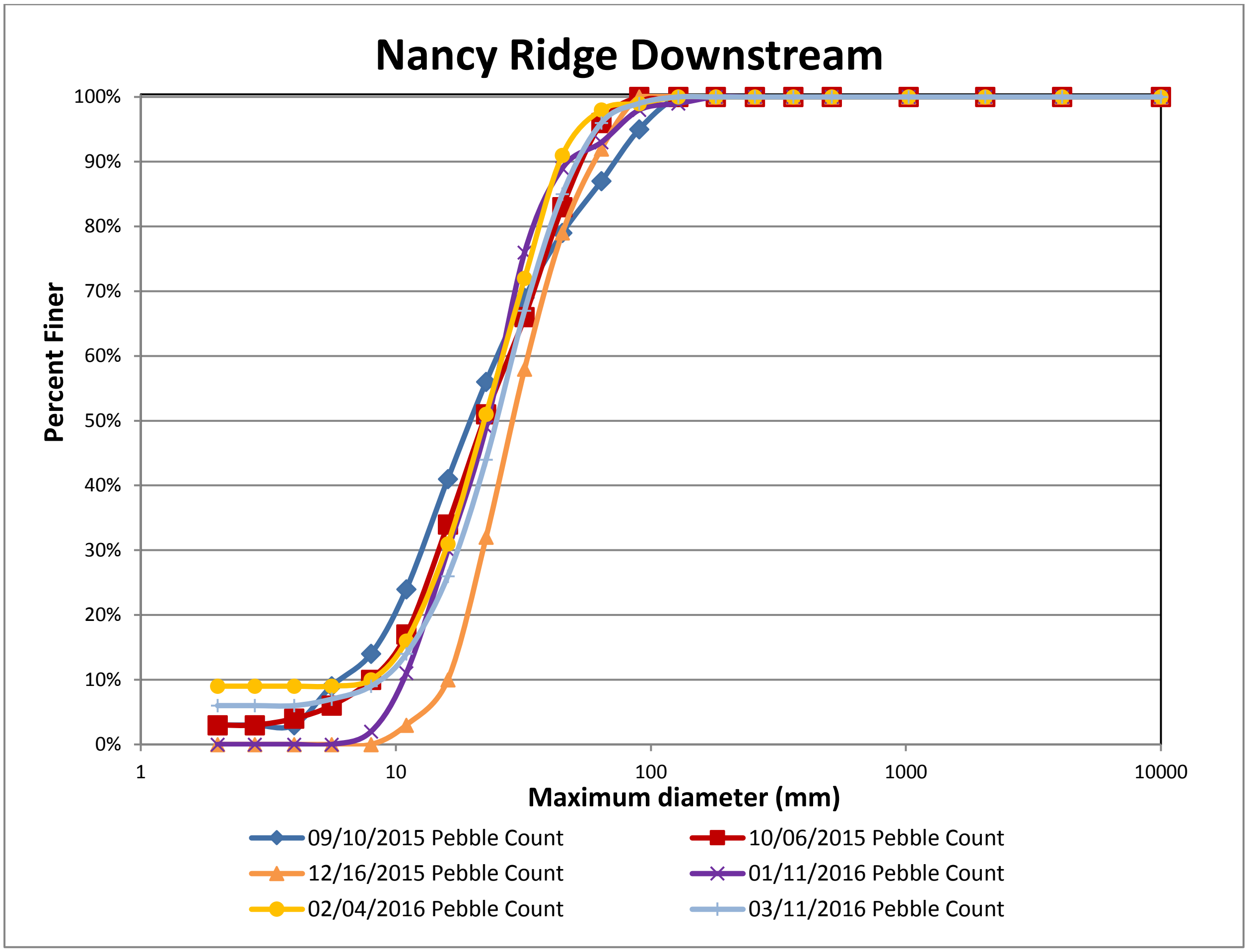
Nancy Ridge, Arizona Crossing and North City are relatively consistent, with Arizona Crossing North City having a slight increase in sand percentage over the course of the season (10-20%). Trap Channel and Black Mountain showed marked increase in sand percentages. At Trap Channel, this was most evident at the upstream and downstream locations which showed a shift of around 60-65%. As mentioned previously, this site was impacted by a construction site which had an outflow located at the mid-stream location where pebble counts were conducted. Black Mountain had a shift of 25-50% measured at each location over the course of the season.

Complete pebble count results and particle-size distribution plots are provided below.

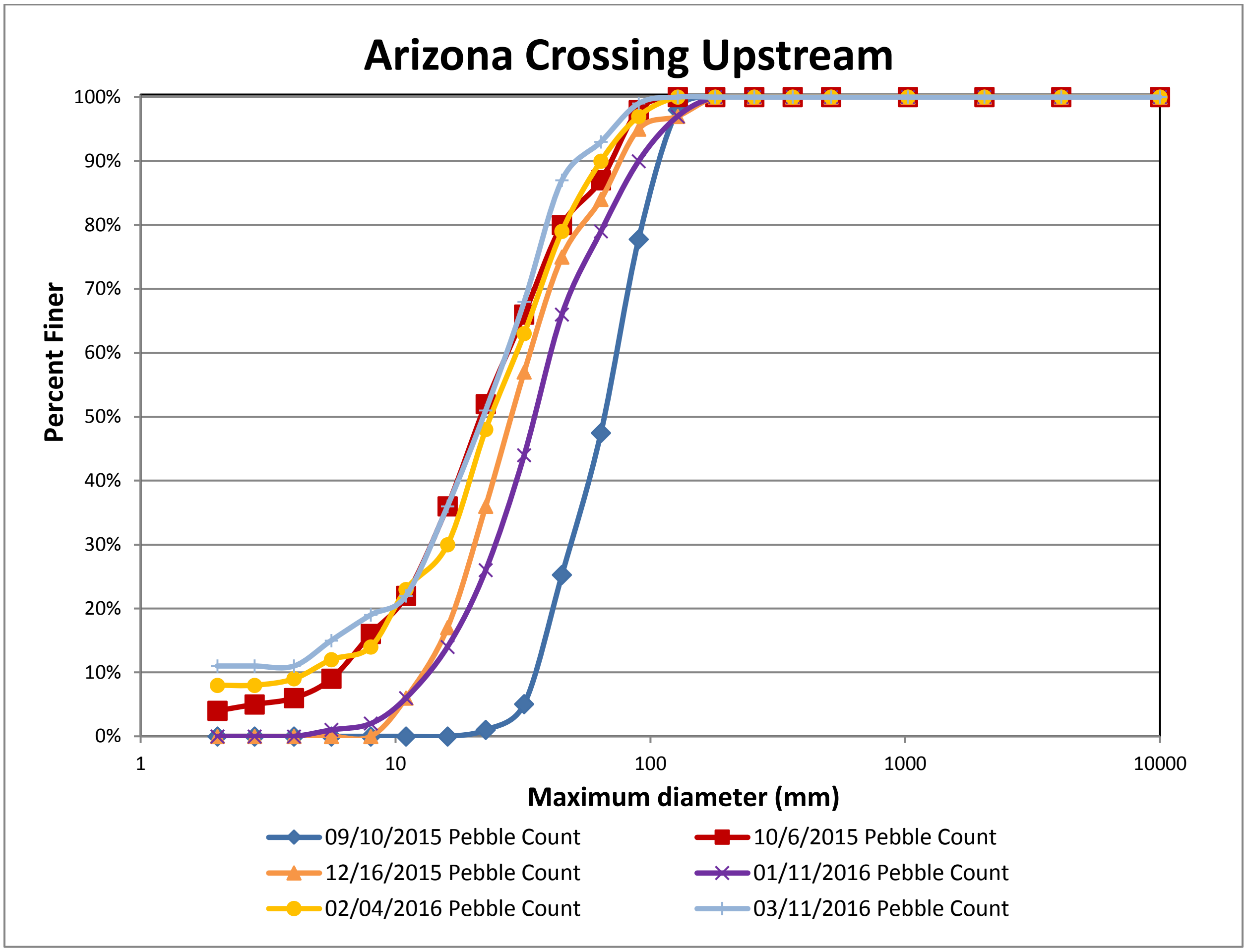
Carrol Canyon – Nancy Ridge:

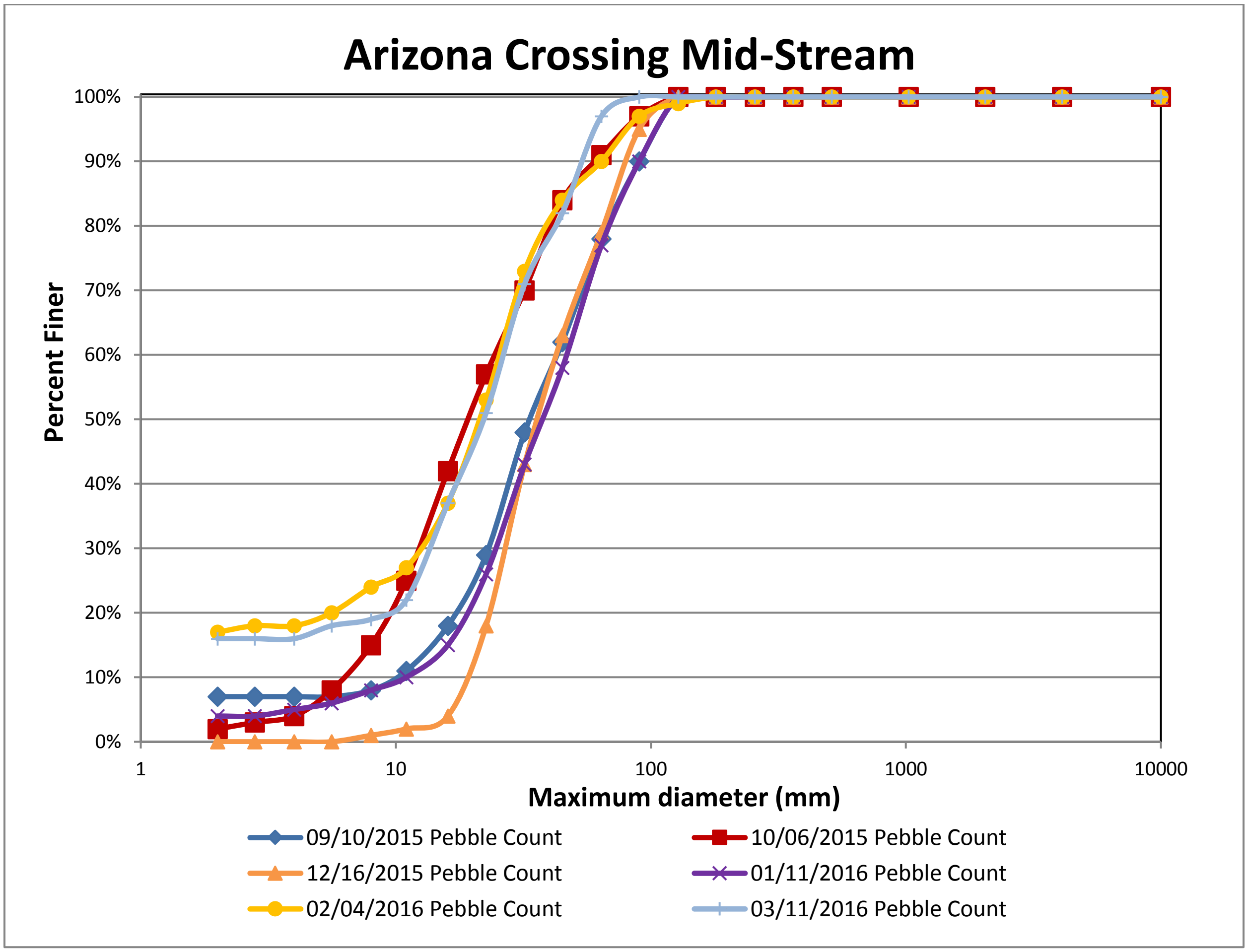


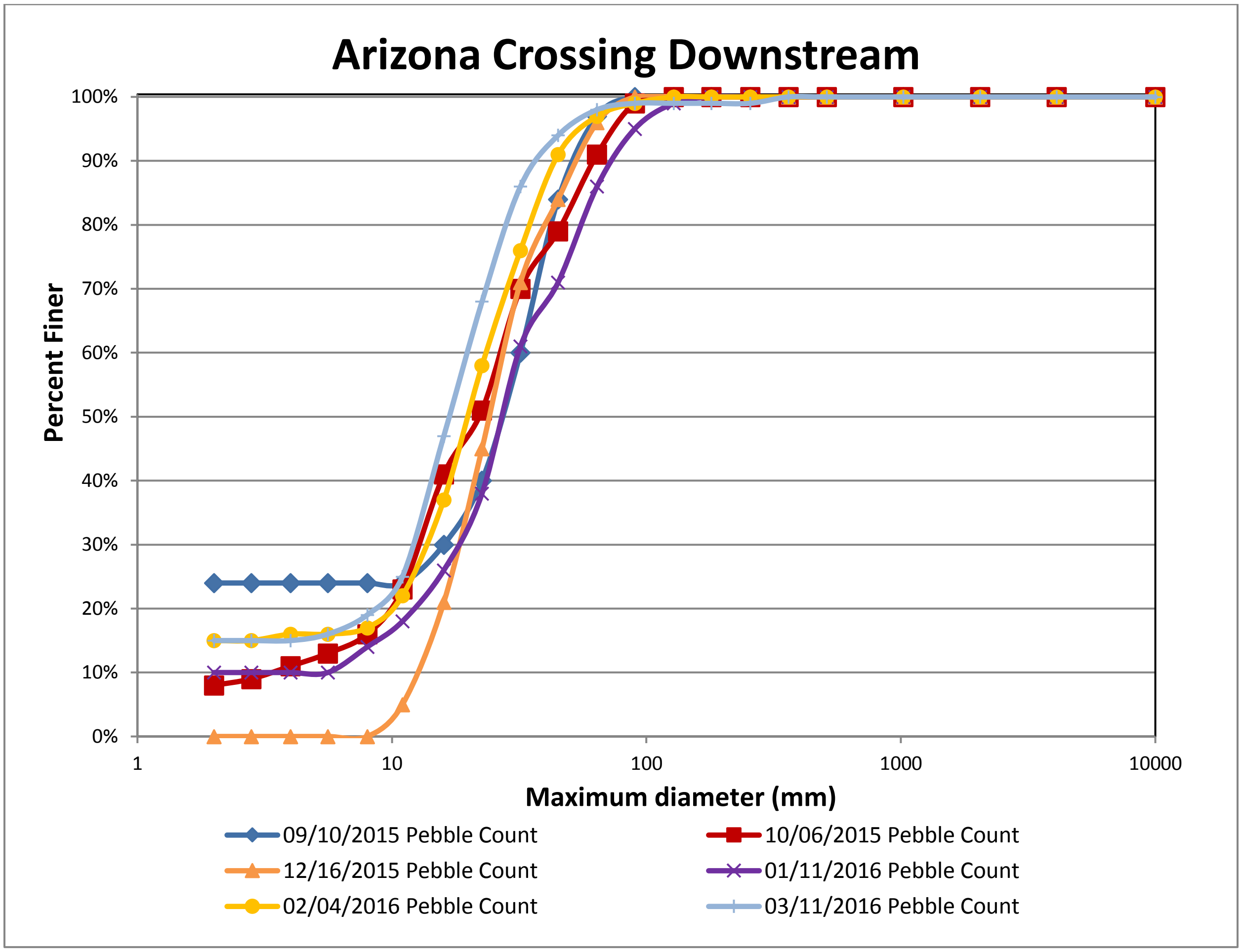

Nancy Ridge Mid-Stream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count


Nancy Ridge Downstream
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent Finer
1
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count

Carroll Canyon – Arizona Crossing:




Arizona Crossing Mid-Stream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count


Arizona Crossing Downstream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
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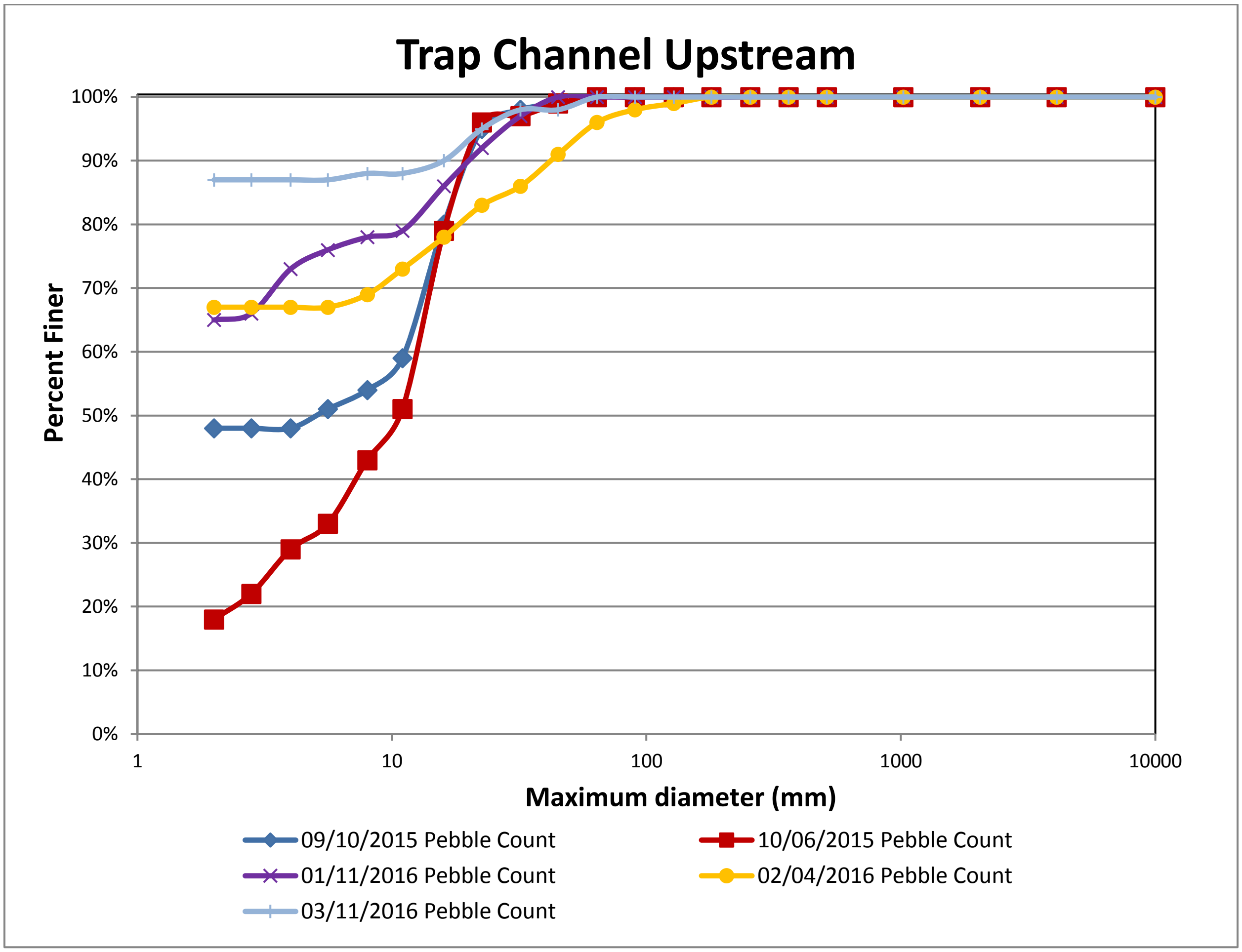
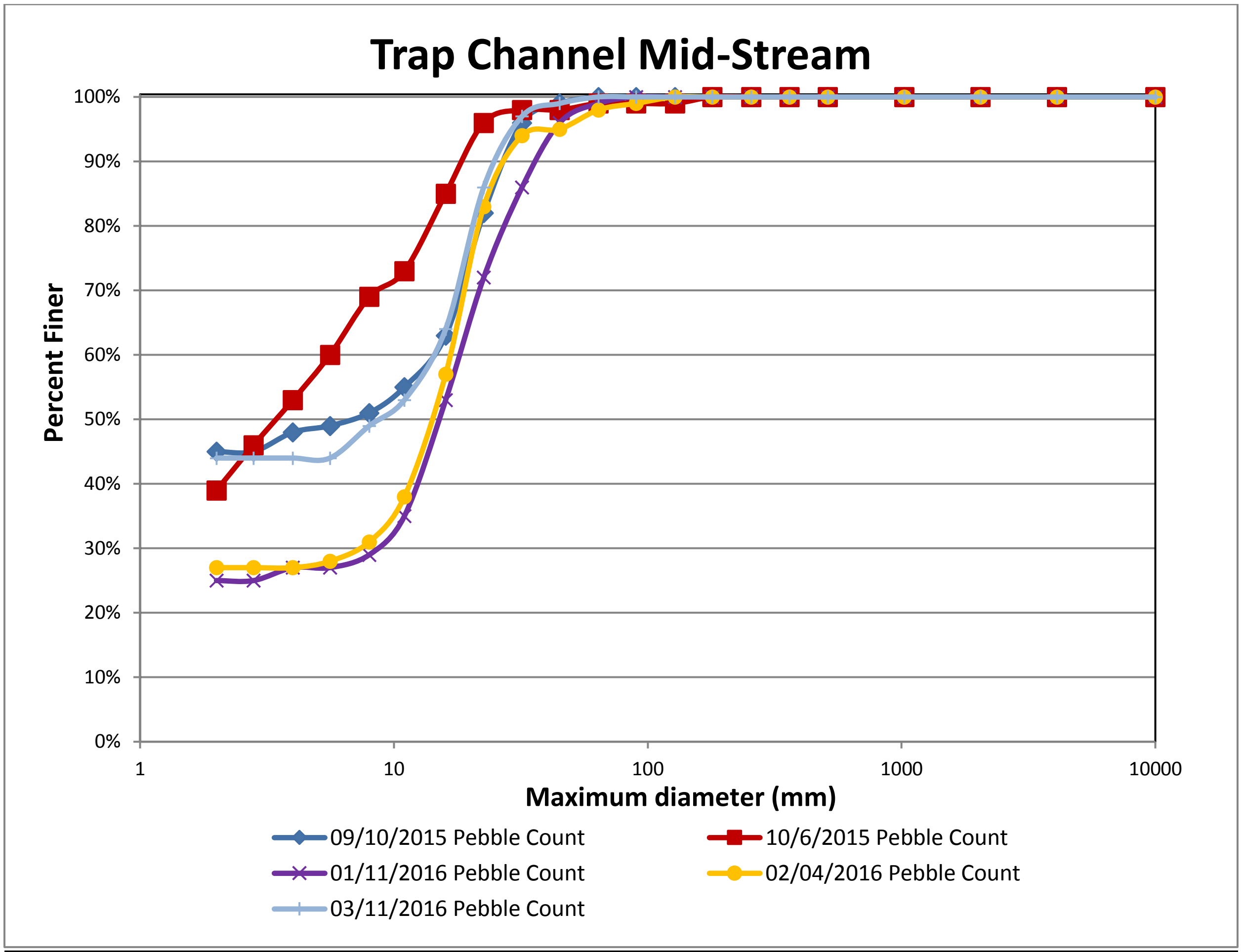
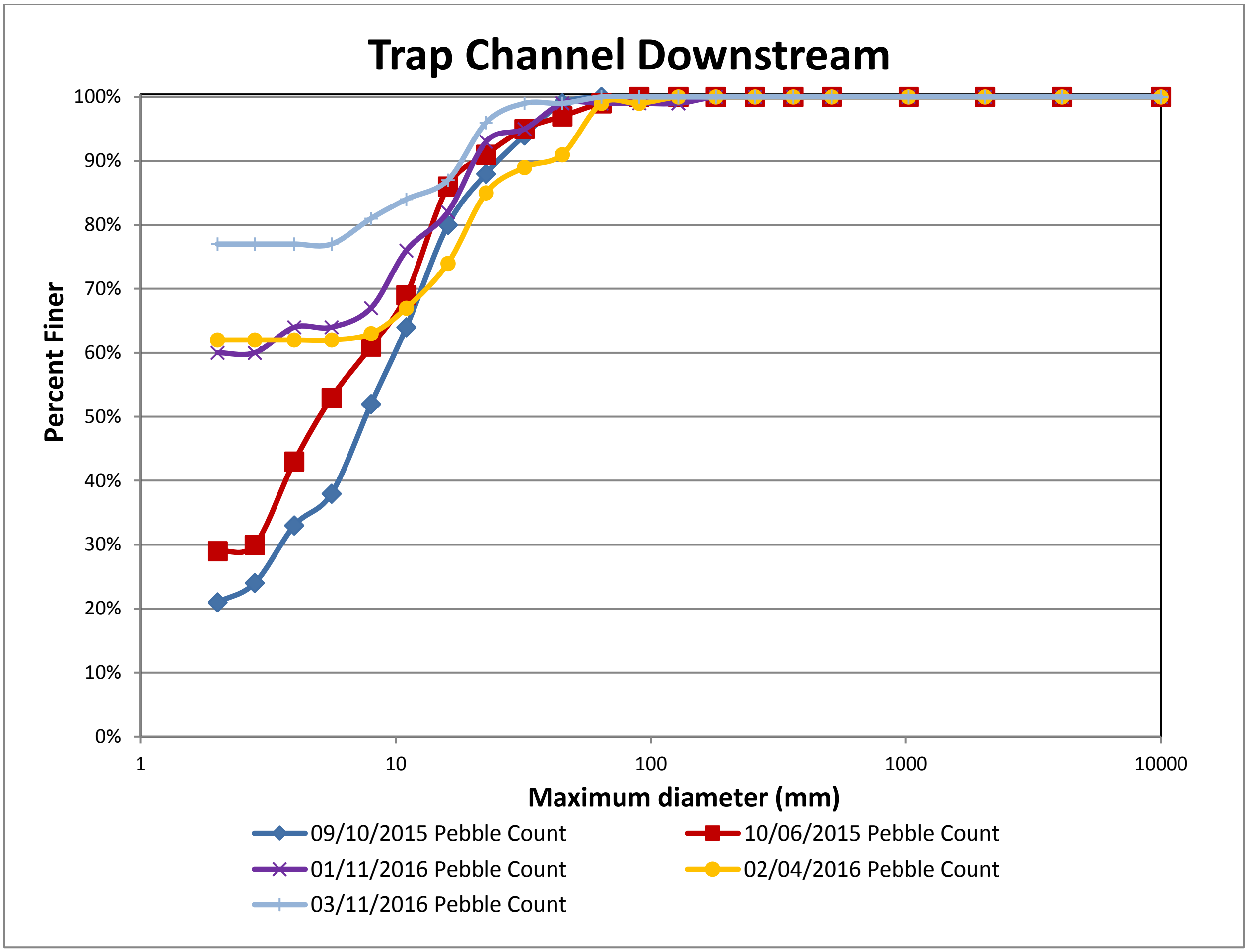
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/06/2015 Pebble Count
12/16/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count

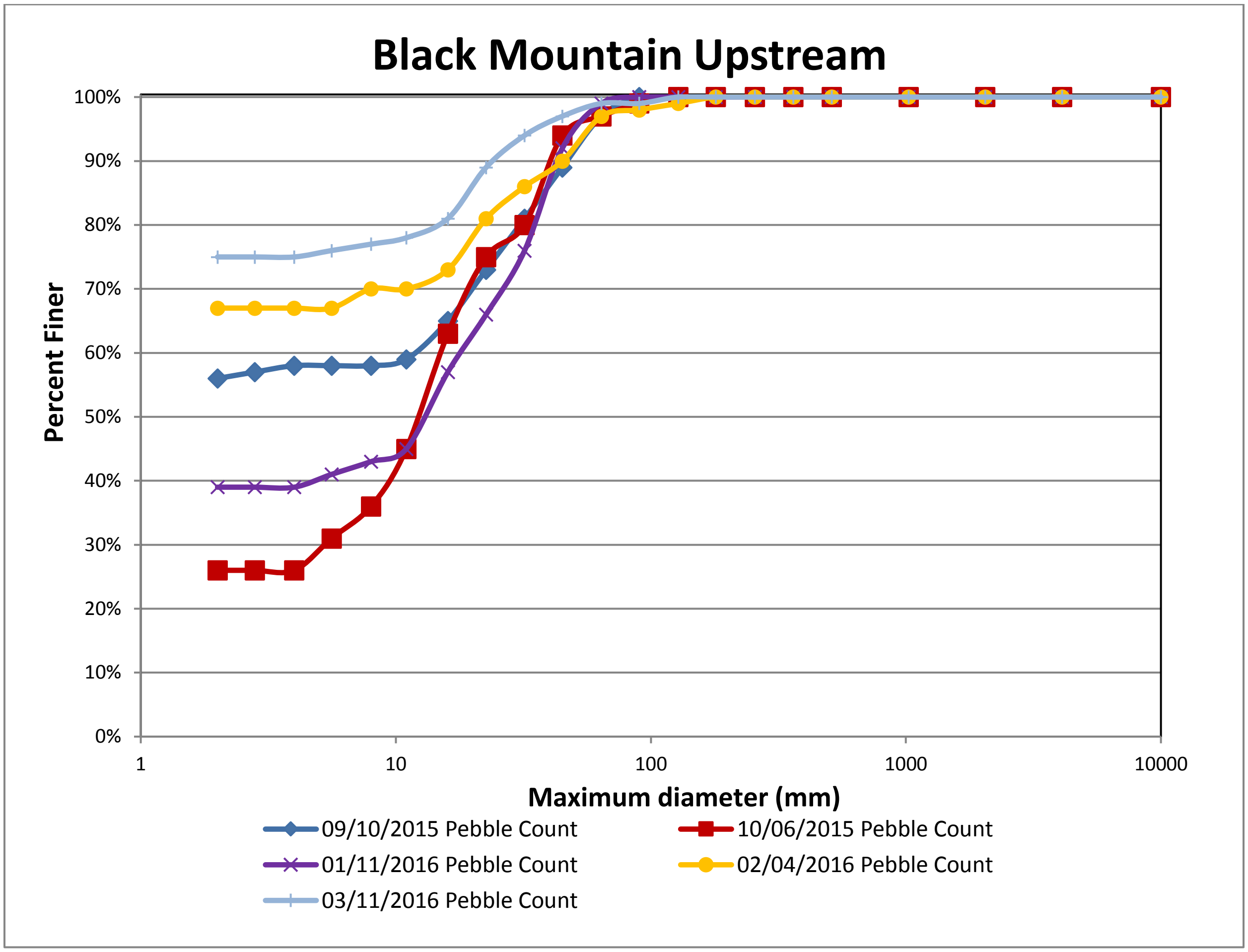
Carrol Canyon – Trap Channel:

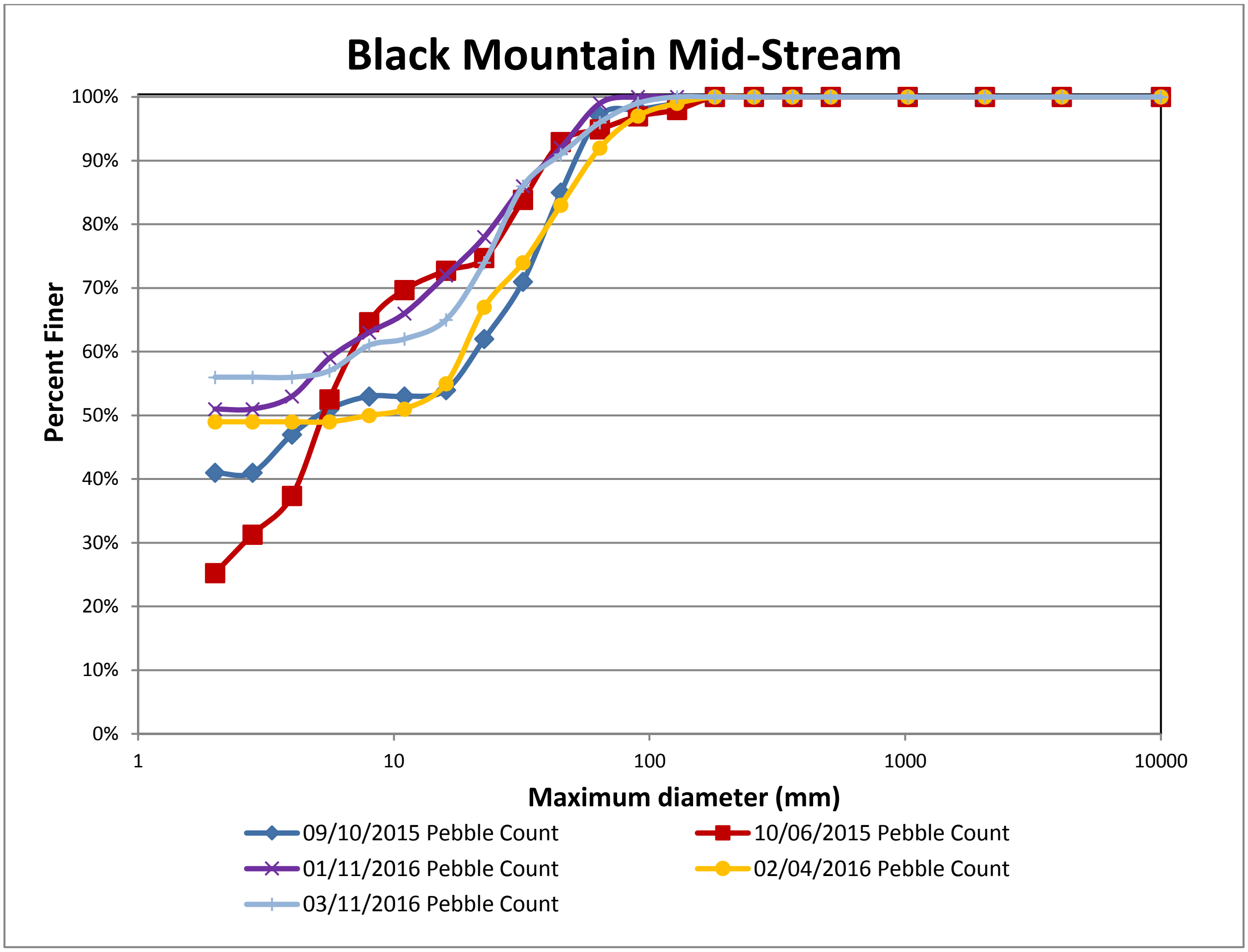


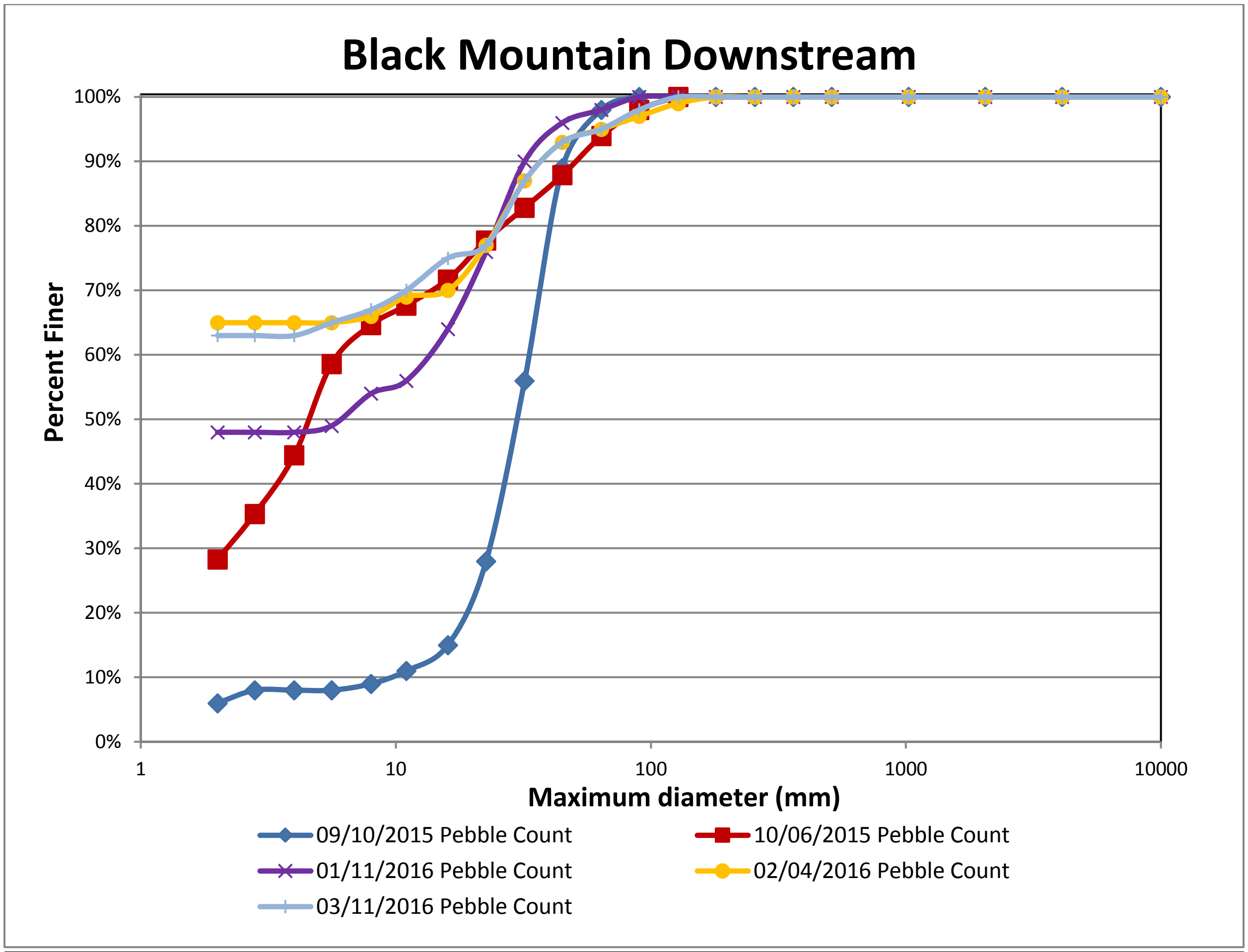

Trap Channel Mid-Stream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/6/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count


Trap Channel Downstream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/06/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count

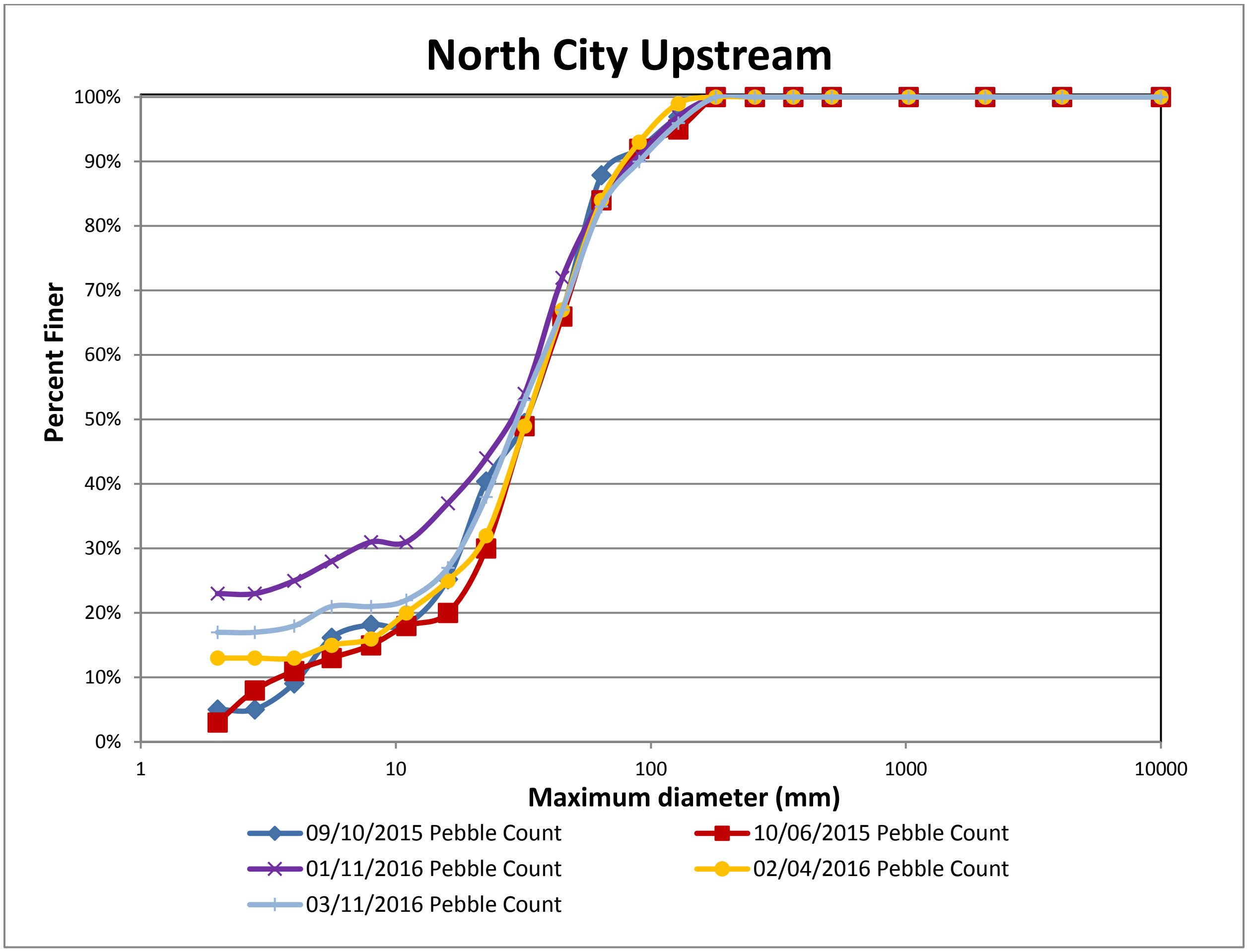
Carrol Canyon – Black Mountain:

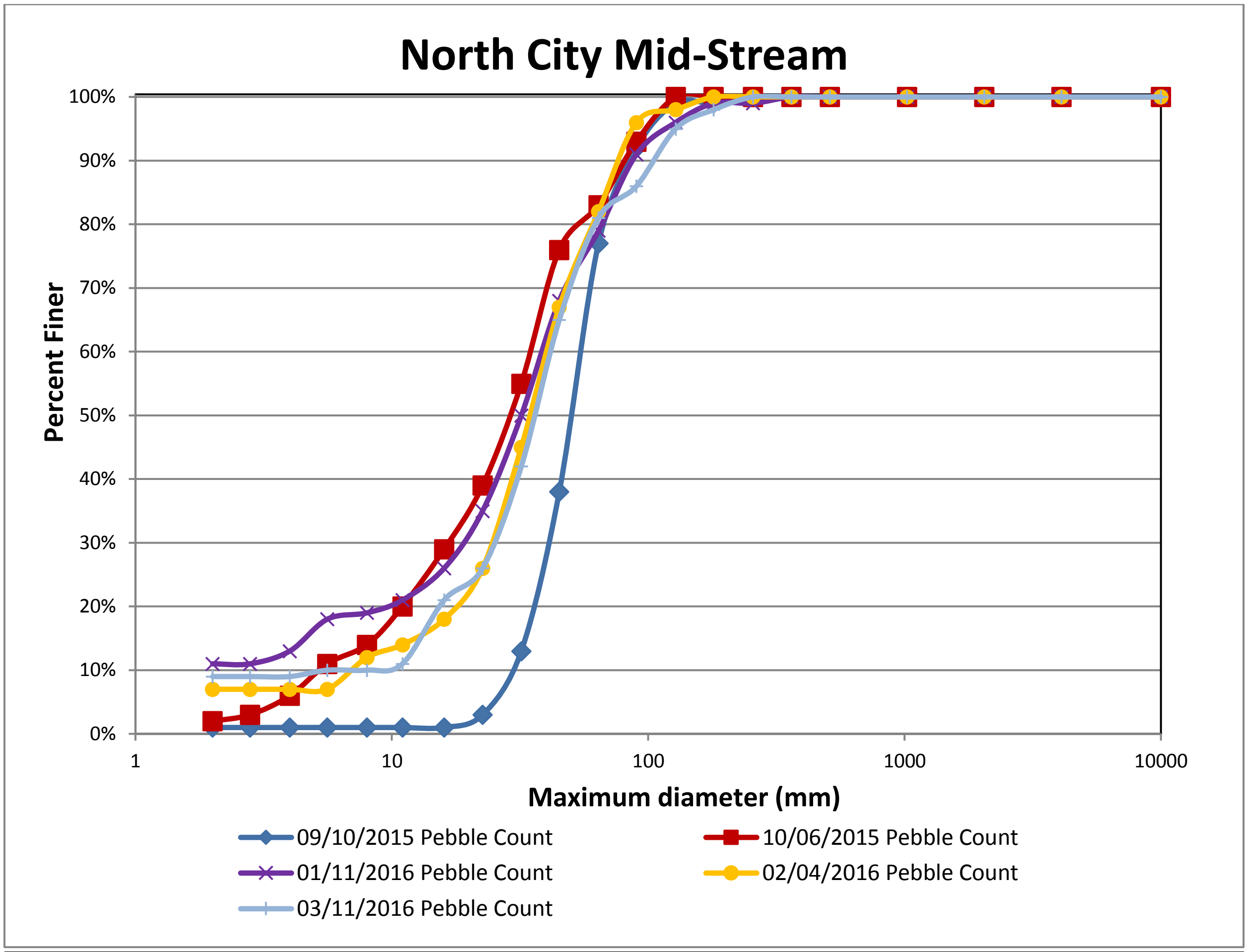


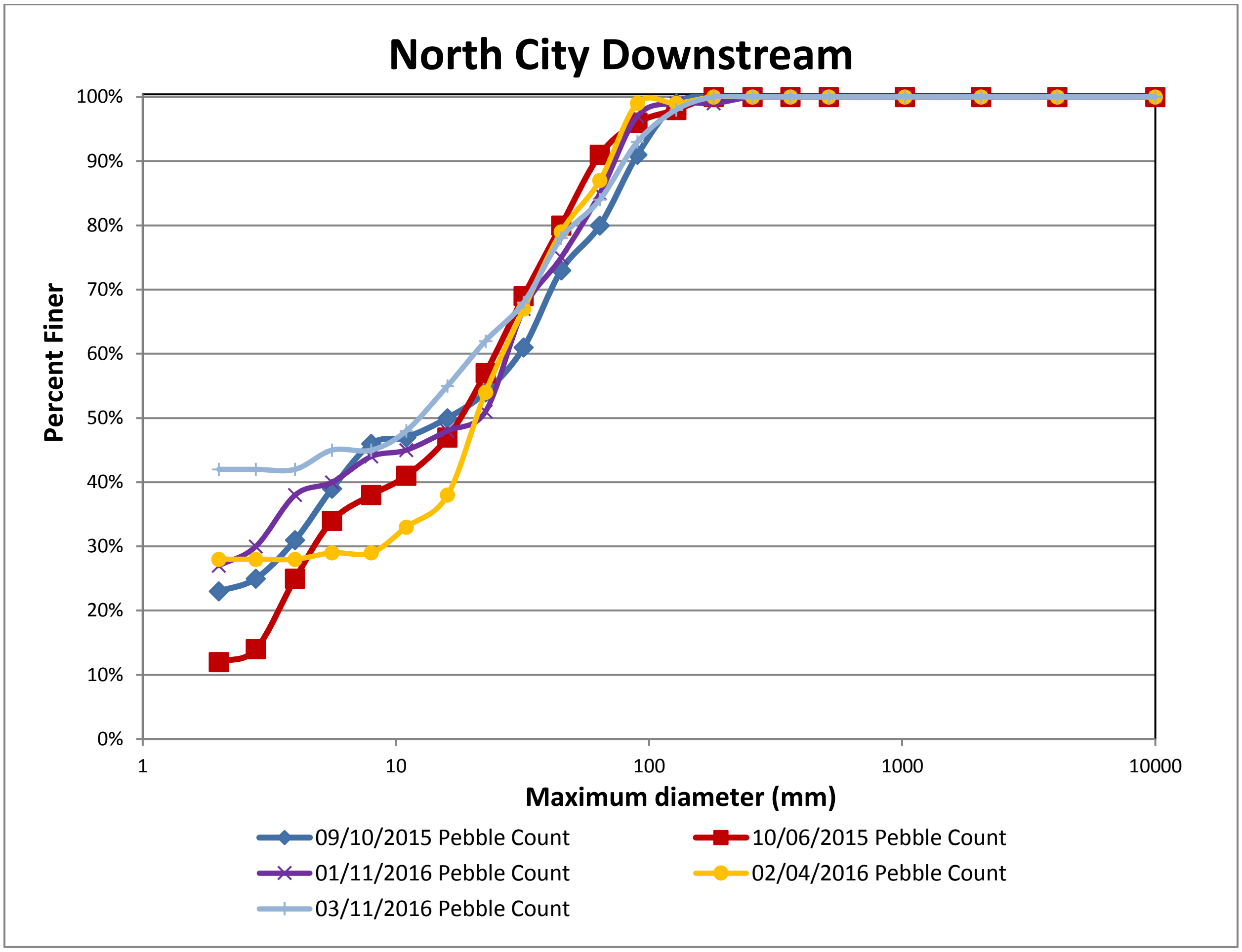

Black Mountain Mid-Stream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/06/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count


Black Mountain Downstream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/06/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count

Los Peñasquitos – North City:




North City Mid-Stream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/06/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count


North City Downstream
Percent Finer
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
10
100
1000
10000
Maximum diameter (mm)
09/10/2015 Pebble Count
10/06/2015 Pebble Count
01/11/2016 Pebble Count
02/04/2016 Pebble Count
03/11/2016 Pebble Count

APPENDIX E
STREAMBED PHOTOGRAPH LOG

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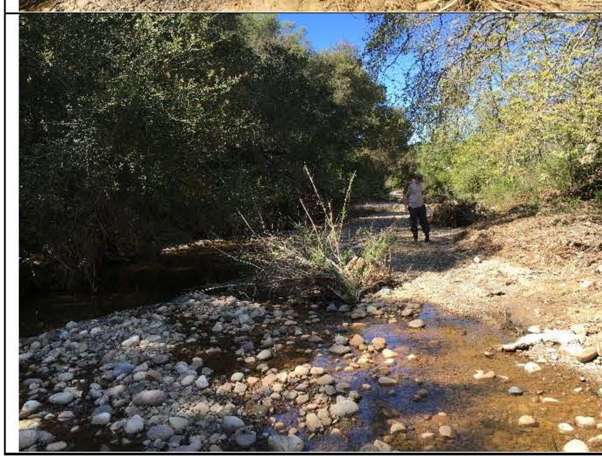
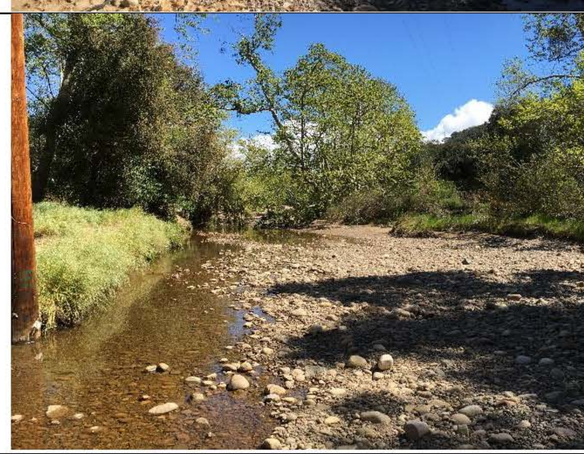
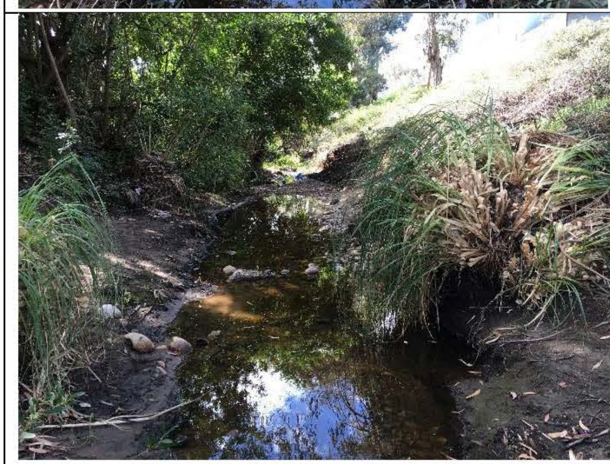
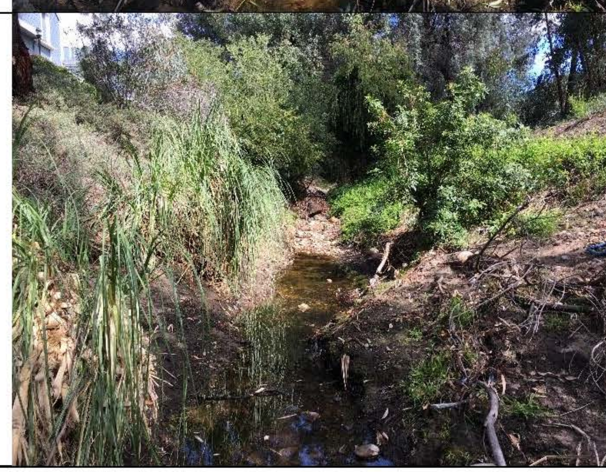
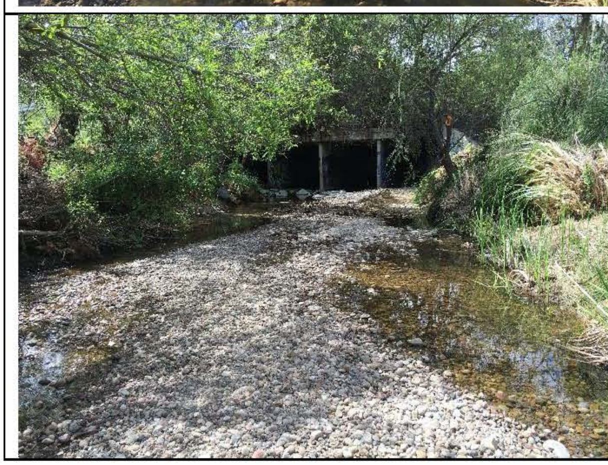
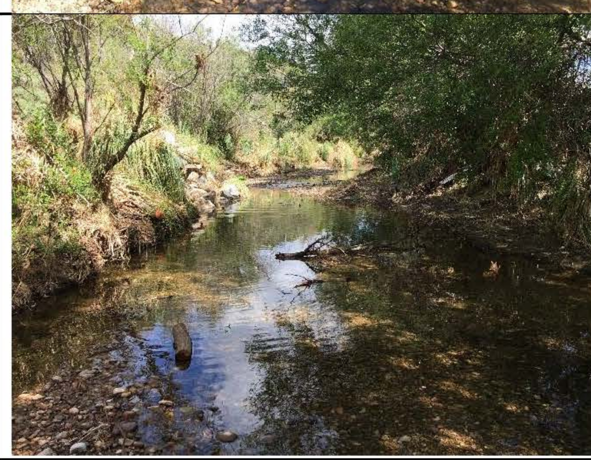
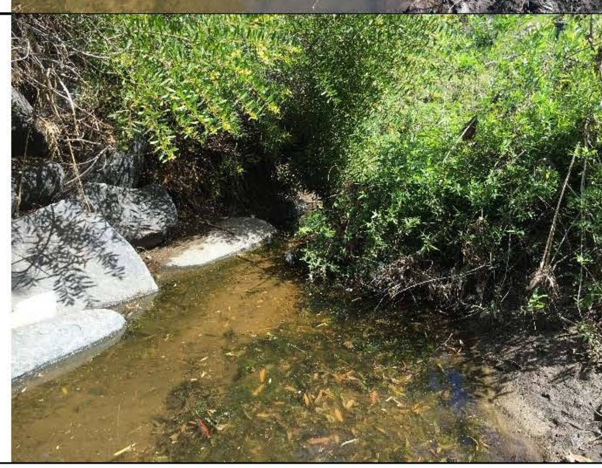
Arizona Crossing Bedload Monitoring Location	
Facing Downstream	Facing Upstream
	
	
	

Black Mountain Bedload Monitoring Location	
Facing Downstream	Facing Upstream
	
	
	

Nancy Ridge Bedload Monitoring Site	
Facing Downstream	Facing Upstream
	
	
	

Trap Channel Bedload Monitoring Site	
Facing Downstream	Facing Upstream
	
	
	

APPENDIX F
AERIAL DEPOSITION TECHNICAL MEMORANDUM

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ACRONYMS AND ABBREVIATIONS

%	percent
µg	microgram
µm	micrometer
AMEC	Amec Foster Wheeler plc
CC-CC	Carroll Canyon (used for Site ID)
CC-DM	Reference – Del Mar (used for Site ID)
CC-DW	Carroll Canyon – Downwind (used for Site ID)
CC-ER	Carroll Canyon – Eco Rentals (used for Site ID)
CC-MP	Carroll Canyon – Maddox Park (used for Site ID)
CC-SF	Carroll Canyon – Camino Santa Fe (used for Site ID)
CC-SR	Carroll Canyon – Scripps Ranch (used for Site ID)
CC-UP	Carroll Canyon – Upwind (used for Site ID)
CFR	*Code of Federal Regulations*
CV_CD	Carmel Valley – Camino Del Sur (used for Site ID)
FRM	Federal Reference Method
FRM sampler	BGI PQ100 PM_{10} Federal Reference Method sampler
ID	Identification
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
LP-PO	Los Peñasquitos – Poway (used for Site ID)
LP-PR	Los Peñasquitos – Preserve (used for Site ID)
mg/m^3	milligrams per cubic meter
NAAQS	National Ambient Air Quality Standards (40 CFR Part 50)
Optical monitor	TSI Dusttrack^{TM} II model 8530 continuous particulate monitor
PM_{10}	airborne particulate matter with a diameter of 2.5 to 10 micrometers
RPD	relative percent difference
SDRWQCB	San Diego Regional Water Quality Control Board
Sediment TMDL	Resolution Number R9-2012-0033: *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Total Maximum Daily Load for Sedimentation in Los Peñasquitos Lagoon* (SDRWQCB, 2012)
USEPA	U.S. Environmental Protection Agency
Watershed	Los Peñasquitos Lagoon Watershed
Watershed Special Study	*Los Peñasquitos Watershed Management Area Sediment Load Special Study Monitoring Report* (Amec Foster Wheeler, 2016)
WMA	watershed management area

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1.0 AERIAL DEPOSITION MONITORING OVERVIEW

This Technical Memorandum summarizes the Phase II aerial deposition monitoring conducted as part of the Los Peñasquitos Watershed Management Area (WMA) Sediment Load Special Study (Watershed Special Study) for Fiscal Year 2016 (FY16) (July 1, 2015 – June 30, 2016). Phase one occurred during FY 2015 (FY15) (July 1, 2014 – June 30, 2015).

Monitoring Schedule. In agreement with the *Los Peñasquitos Watershed Management Area Sediment Load Special Study Monitoring Plan* (Amec Foster Wheeler, 2016), ambient air quality was monitored during FY16 for particulate matter from 2.5 to 10 micrometers in diameter (PM_{10}). Monitoring was conducted at eleven monitoring locations located within and around the greater Los Peñasquitos WMA with an emphasis on the Carroll Canyon Creek subwatershed. Monitoring locations are distributed by one location in Del Mar, seven in the Carroll Canyon Creek subwatershed, two in the Los Peñasquitos Creek subwatershed, and one in the Carmel Valley Creek subwatershed. Each of the three monitored dry weather events had three discrete 24-hour sampling periods. For every sampling event, one sampling period was conducted on a weekend; the other two on weekdays.

Sampling Equipment. Aerial deposition sampling used two types of sampling equipment: (a) an optical TSI Dusttrack™ II model 8530 continuous concentration particulate size monitor (Optical), and (b) a filter-based BGI PQ100 PM_{10} Federal Reference Method sampler (FRM), designated No. RFPS-1298-124 by the U.S. Environmental Protection Agency (USEPA). Consistent with the Phase I implementation of the Watershed Special Study during FY15, Phase II continued to utilize three FRM samplers for reference at the same monitoring locations in conjunction with Optical monitors.

Comparison of Samplers. Deploying the Optical monitor and the FRM sampler synchronously provides reference data for the direct-reading Optical monitors with the USEPA-compliant ambient air monitoring filter-based FRM samplers. The FRM samples provide an air pollutant concentration in milligrams of pollutant per cubic meter at a sensed atmospheric pressure and temperature for the sampling period. The Optical monitor readings provide 5 minute interval direct-read concentrations and subsequent calculated mean concentrations using the same flow speed as the FRM. Using both sampling methods allows the potential bias of the Optical readings to be considered and potentially statistically adjusted, if needed, based off the FRM results. Relative percent difference (RPD) using the FRM as the reference value was calculated for each sampling period and shows the Optical values have a mean RPD of 108.44% compared to the FRM samples. Although the RPD is high, this is due to very low concentrations measured that are within 10 times the laboratory reporting limit and standard flow volume. RPD calculations for low concentrations such as those measured during this program mischaracterize what are actually very small differences in concentration.

Sampling Results. Findings of monitoring during FY16 indicate that the aerial contribution of sediment to the Los Peñasquitos WMA is negligible relative to sediment loads estimated during storm flows directly in the creeks, primarily associated with hydromodification and erosive characteristics of the WMA creek channels. Optical values were generally low and negligible with marginal increases around anthropogenic disturbances, particularly in the Carroll Canyon Creek subwatershed. Results from all sampling events for both the 24-hour mean Optical concentrations and the gravimetric analysis from the FRM value sampled over 24-hours were below 0.6 micrograms per cubic meter.

2.0 AERIAL DEPOSITION MONITORING

This section provides an overview of the Phase II Watershed Special Study aerial deposition monitoring and objectives, including the sampling equipment, sampling methods, and sampling locations. For a complete discussion of this monitoring program, refer to the *Los Peñasquitos Watershed Management Area Sediment Load Special Study Monitoring Plan* (Amec Foster Wheeler, 2015).

2.1 MONITORING SCHEDULE

The monitoring schedule and activities were conducted in agreement with the *Los Peñasquitos Watershed Management Area Sediment Load Special Study Monitoring Plan* (Amec Foster Wheeler, 2015). Monitoring was conducted over the course of three dry weather events at eleven monitoring locations located within and around the greater Los Peñasquitos WMA. Monitoring locations are identified within their subwatershed and include five monitoring locations from the Phase I implementation in the Carroll Canyon Creek subwatershed, and an additional six monitoring locations as part of the Phase II implementation. Total monitoring locations are distributed with one in Del Mar (the reference monitoring location), seven in the Carroll Canyon Creek subwatershed, two in the Los Peñasquitos Creek subwatershed, and one in the Carmel Valley Creek subwatershed. Each of the three dry weather events had three discrete 24-hour sampling periods. For every sampling event, one sampling period was conducted on a weekend; the other two were conducted on weekdays. This was done to capture different conditions based on anthropogenic activities. Sampling for events 5 and 6 were conducted back-to-back based on planned demolition of the Del Mar City Hall building, which was the reference monitoring location. At the time of sampling, demolition was planned for February 2016.

Table 2-1 presents the monitoring schedule for each sampling event and 24-hour period over the course of the Phase II implementation of the Watershed Special Study.

2.2 SAMPLING METHODOLOGY AND EQUIPMENT

Two types of sampling equipment were used for this study: (a) an optical TSI Dusttrack™ II model 8530 continuous concentration particulate size monitor (Optical), and (b) a filter-based BGI PQ100 PM_{10} Federal Reference Method sampler (FRM), designated No. RFPS-1298-124 by the U.S. Environmental Protection Agency. Consistent with the Phase I implementation of the Watershed Special Study during FY15, Phase II continued to utilize three FRM samplers for reference at the same monitoring locations in conjunction with Optical monitors. Optical monitors were utilized at the eleven monitoring locations.

Table 2-1.
Phase II Monitoring Schedule 2015-2016

Monitoring Schedule	
Dry Weather 4[1]	
Dry Weather 4, Day 4	Wednesday, 11/18/2015 – Thursday, 11/19/2015
Dry Weather 4, Day 5	Saturday, 11/21/2015 – Sunday, 11/22/2015
Dry Weather 4, Day 6	Monday, 11/23/2015 – Tuesday, 11/24/2015
Dry Weather 5	
Dry Weather 5, Day 1	Saturday, 1/16/2016 – Sunday, 1/17/2016
Dry Weather 5, Day 2	Monday, 1/18/2016 – Tuesday, 1/19/2016
Dry Weather 5, Day 3	Wednesday, 1/20/2016 – Thursday, 1/21/2016
Dry Weather 6	
Dry Weather 6, Day 1	Saturday, 1/23/2016 – Sunday, 1/24/2016
Dry Weather 6, Day 2	Monday, 1/25/2016 Tuesday, 1/26/2016
Dry Weather 6, Day 3	Wednesday, 1/27/2016 – Thursday, 1/28/2016

[1]Due to equipment failures on days 1, 2, and 3, sampling was required to continue. Successful sampling occurred on days 4, 5, and 6, after equipment unit changes were made.

The Optical monitors have a PM_{10} fitting over the inlet that allows sampling of aerodynamic diameters of 10 micrometers (µm) or less (PM_{10}). The instrument draws a continuous aerosol stream through the impaction inlet where particles with a greater than 10 µm are removed. The sample stream then passes through a sensing chamber where it is intersected by light emitted from a laser diode. The particles in the sample stream scatter light in all directions and a photodetector measures the proportional mass concentration by internal electronics (Chung et al., 2001). An additional autozero module was placed over the inlet that zero calibrates the meter on a 4-hour interval. This autozero module will align the zero calibration point with the calibration reference dust in order to combat the zero drift that was observed to occur periodically during the Phase I implementation, which resulted in a significant percentage of lost valid measurements during FY15. The samplers were programmed to record at 5-minute intervals within a 24 hour period for a total of 288 readings per sampling period. Recorded values are presented in a concentration versus time graphical representation and statistically summarized in Section 2.1. Statistical analysis of the Optical monitors evaluates the total number of optical measurements compared to valid optical measurements, the minimum and maximum Optical values, and the mean value over each 24-hour sampling period for each sampling event and the overall mean for the Phase II implementation of the Watershed Special Study. Non-valid optical measurements occur when the final reading is negative or there was no reading due to equipment failure.

The FRM sampler is a well impactor ninety-six (WINS impactor) followed by a Teflon® filter. Particles in the sample stream with an aerodynamic diameter greater than 10 µm are captured by the WINS impactor, while smaller particles are collected on the downstream 46-millimeter (mm) Teflon® filter. The concentration of airborne particulate matter was determined by pre- and post-weighing of the Teflon filter and then dividing the accumulated mass by the volume of air that was sampled (Chung et al., 2001).

The relative percent difference (RPD) between the two sampling methods used during this study was calculated to detect differences between their monitoring methods. Utilizing the two methods simultaneously, the monitoring program complied with the ambient monitoring standards of the U.S. Environmental Protection Agency (USEPA) and provides a reference value in conjunction with direct-read measurements.

Relative Percent Difference for this study is calculated by taking the absolute difference between the Optical monitor value and the FRM reference value divided by the value of their arithmetic mean. This is then multiplied by 100.

$$\%RPD = \left(\frac{|X1-X2|}{\bar{X}}\right) \times 100$$

X1 = (reference value), FRM sampler value

X2 = Optical Monitor value

X = Arithmetic Mean of all X values

2.2.1 Use of Optical (Continuous Concentration) Monitors

The Optical monitors were used at all eleven monitoring locations and programmed to collect readings at 5-minute intervals. These readings can be observed individually to observe trends, as well as be averaged or a 24-hour period. The meters are calibrated within the design limits (once per year) of the recommended calibration period for operation to Arizona1 test dust[1]. An additional event-specific baseline test was performed in a closed environment to assess the differences in output of the individual Optical monitors over a 24-hour period during this period. The baseline test correction was applied to each raw Optical value. Additionally, each raw Optical value was corrected utilizing the ambient aerosol density correction ratio of Optical concentrations over the Arizona1 test dust reference concentration, as established by Wallace et al (2011).

The correction factors resulting from the baseline test and Wallace et al. (2011) are presented in Table 2-2.

[1] The Arizona1 test dust provides a calibration of the sampler and the average density of ambient aerosols as presented by *Validation of Continuous Particle Monitors for Personal, Indoor and outdoor Exposures,* Lance Wallace et.al. (2011).

Table 2-2.
Optical monitor Correction Factors

Site Name	Correction to Optical Monitor
Baseline Correction for Event 4 (mg/m^3)	
CC-CC (Carroll Canyon)	-0.000968184
CC-DM (Reference - Del Mar)	-0.000507218
CC-DW (Carroll Canyon- Downwind)	0.002608024
CC-ER (Carroll Canyon - Eco Rentals)	-0.002268842
CC-MP (Carroll Canyon - Maddox Park)	-0.001280036
CC-SF (Carroll Canyon - Camino Santa Fe)	0.004336649
CC-SR (Carroll Canyon - Scripps Ranch)	0.000652634
CV-CD (Carmel Valley - Camino Del Sur)	-0.000964467
LP-PO (Los Peñasquitos - Poway)	0.000399069
LP-PR (Los Peñasquitos - Preserve)	-0.000929289
Baseline Correction for Event 5 and 6 (mg/m^3)	
CC-CC (Carroll Canyon)	-0.005477466
CC-DM (Reference - Del Mar)	-0.007231789
CC-DW (Carroll Canyon- Downwind)	0.02769846
CC-ER (Carroll Canyon - Eco Rentals)	-0.0030608
CC-MP (Carroll Canyon - Maddox Park)	-0.00318117
CC-SF (Carroll Canyon - Camino Santa Fe)	-0.005045089
CC-SR (Carroll Canyon - Scripps Ranch)	0.000152163
CV-CD (Carmel Valley - Camino Del Sur)	-0.004727466
LP-PO (Los Peñasquitos - Poway)	-0.003218207
LP-PR (Los Peñasquitos - Preserve)	-0.002107096
CC-CC (Carroll Canyon)	0.00619846
Wallace et al, *Ambient Aerosol Density Correction*	
$Gravimetric\ Concentration\ or\ Actual\ Concentration, \frac{\mu g}{m^3} = \frac{DustTrak\ Concentration}{2.64}$	

µg = micrograms; mg = milligrams; m^3 = cubic meter

2.2.2 Use of Federal Reference Method Samplers

The filter-based FRM samplers were used at three of the eleven monitoring locations during the Special Study. Each filter was analyzed by gravimetric analyses for PM_{10} by Title 40 Code of Federal Regulations (40 CFR) Part 50 Appendix J, was conducted by Eurofins Air Toxics, Inc., Laboratories, a laboratory certified by the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC) 17025:2005, located in Folsom, California. The final net weight of the gravimetric analysis can be calculated with the total sensed flow to produce an air pollutant concentration in parts per million by volume. Laboratory reports are presented in Appendix A.

2.3 MONITORING LOCATIONS

Details of the eleven monitoring locations are presented in Table 2-3 and include the site name, subwatershed, site ID and the approximate latitude and longitude. Figure 2-1 presents the monitoring locations throughout the WMA.

The eleven monitoring locations during Phase II are described below.

CC-CC (Carroll Canyon): This station is at an elevated location within the Carroll Canyon Creek channel, off Roselle Street near the Carroll Canyon Sediment TMDL monitoring location.

CC-DM (Reference - Del Mar): This station is on top of Del Mar City Hall near the corner of 11th Street and Camino Del Mar. This is the reference site for the aerial deposition portion of the Watershed Special Study, and was selected as a station away from anthropogenic influence during the prevalent weather patterns. This location is slightly outside of the WMA; however, it was deemed as a suitable, representative location for minimal to no anthropogenic disturbance. Furthermore, wind patterns are not bound to WMA boundaries in the same ways hydrology is bound.

CC-DW (Carroll Canyon - Downwind): This station is on top of San Diego Fire Station 44 at the intersection of Black Mountain Road and Maya Linda Road.

CC-ER (Carroll Canyon – Eco Rentals): This station is located at the northwest corner on top of the facility housing Eco Rentals Solutions and other businesses located at 7340 Trade Street and overlooks the aggregate mine and Carroll Canyon Creek to the north.

CC-MP (Carroll Canyon – Maddox Park): This station is at an elevated location at the southwest corner of Maddox Park, off Flanders Drive and northwest of Jonas Salk Elementary School.

CC-SF (Carroll Canyon – Camino Santa Fe): This station is at an elevated location to the west of the intersection of Camino Ruiz and Carroll Canyon Road, adjacent to the walking path and Carroll Canyon Creek.

CC-SR (Carroll Canyon – Scripps Ranch): This station is at an elevated location in Scripps Ranch at the northern end cul-de-sac of Rue Biarritz.

CC-UP (Carroll Canyon - Upwind): This station is located on top of San Diego Fire Station 41 near the corner where Scranton Road turns into Carroll Canyon Road.

CV-CD (Carmel Valley – Camino Del Sur): This station is at an elevated location on top of an outfall structure southwest of the intersection of Camino Del Sur and Torrey Santa Fe Road.

LP-PO (Los Peñasquitos - Poway): This station is at an elevated location in Poway at the southern end Cul-De-Sac of Bowron Road.

LP-PR (Los Peñasquitos - Preserve): This station is at an elevated location centrally located within the Los Peñasquitos Preserve, north of the waterfall site.

**Table 2-3.
Phase I and II Aerial Deposition Sampling Locations
in Los Peñasquitos Watershed Management Area**

Site Name	Subwatershed	Site ID	Latitude	Longitude
USEPA Federal Reference Method (FRM) Monitoring Stations[1]				
Reference - Del Mar	Los Peñasquitos Lagoon	CC-DM[2]	32.95497	-117.26404
Carroll Canyon - Upwind	Carroll Canyon Creek	CC-UP	32.89019	-117.20006
Carroll Canyon - Downwind	Carroll Canyon Creek	CC-DW	32.90134	-117.12352
Optical monitor Method Monitoring Stations				
Carroll Canyon - Optical[3]	Carroll Canyon Creek	CC-CC	32.89794	-117.22160
Reference - Del Mar[3]	Los Peñasquitos Lagoon	CC-DM[2]	32.95497	-117.26404
Carroll Canyon – Downwind[3]	Carroll Canyon Creek	CC-DW	32.90134	-117.12352
Carroll Canyon – Eco Rentals[4]	Carroll Canyon Creek	CC-ER	32.89016	-117.16418
Carroll Canyon – Maddox Park[4]	Carroll Canyon Creek	CC-MP	32.90592	-117.15722
Carroll Canyon – Camino Santa Fe[4]	Carroll Canyon Creek	CC-SF	32.89814	-117.17733
Carroll Canyon – Scripps Ranch[3]	Carroll Canyon Creek	CC-SR	32.90038	-11707338
Carroll Canyon – Upwind[3]	Carroll Canyon Creek	CC-UP	32.89019	-117.20006
Carmel Valley – Camino Del Sur	Carmel Valley Creek	CV-CD	32.95640	-117.15349
Los Peñasquitos - Poway	Los Peñasquitos Creek	LP-PO	32.95236	-117.04531
Los Peñasquitos - Preserve	Los Peñasquitos Creek	LP-PR	32.92701	-117.177333

[1]USEPA = U.S. Environmental Protection Agency
[2]Reference – Del Mar is located in the Los Peñasquitos Lagoon subwatershed, yet uses the CC-DM nomenclature that suggests otherwise in order to be consistent with Phase I monitoring.
[3]Sites monitored during the Phase I Watershed Special Study for Aerial Deposition.
4Additional sites added to the monitoring program by the City of San Diego. Resources for these additional sites was provided by the City of San Diego, not by RA supported efforts.

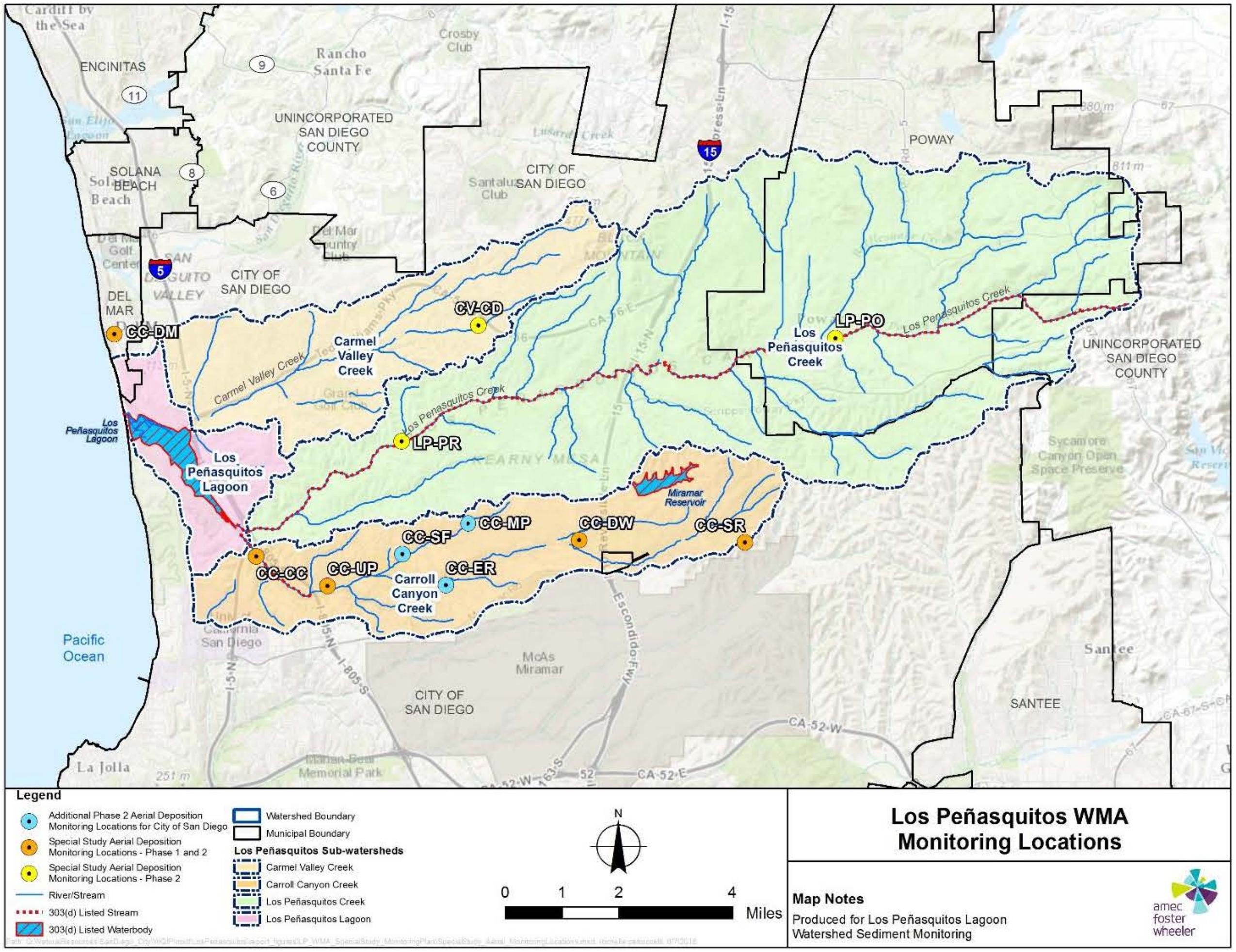


Figure 2-1.
Phase I Aerial Deposition Sampling Locations in Los Peñasquitos Watershed Management Area

3.0 MONITORING RESULTS

This section presents the results of the Phase II aerial deposition monitoring conducted as part of the Watershed Special Study. Summary tables are presented in Tables 3-1 through 3-5 and are organized by the 24-hour sampling period day, the sampling event, and the totals for each sampling event, and for the overall Phase II implementation of the Watershed Special Study.

Sampling event results presented in Section 3.2 provide the quantitative data of ambient PM_{10} using the Optical monitor and the FRM sampler methods organized by monitoring location for each sampling event. Meteorological conditions are summarized using wind roses and are presented in conjunction with graphs for Optical monitoring concentration versus time.

3.1 SUMMARY DATA

Section 3.1 presents the summary data for sampling events Dry Weather 4 through Dry Weather 6. This data is presented as mean and total values for each 24 hour sampling period, sampling event, and through the entire Watershed Special Study. Additionally, mean and total values are presented for each monitoring location.

Summary totals and mean values for each sampling event are presented in Table 3-1 through Table 3-3. Totals and mean values for the entire monitoring period are presented in Table 3-4. Totals and mean values for each monitoring location are presented in Table 3-5.

**Table 3-1.
Dry Weather 4 Summary**

Sampling Period ID (Sampling Event, Day)	24 Hour Period End Date	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)**	Relative Percent Difference (%)*
CC-CC (Carroll Canyon)									
Dry Weather 4, Day 4	11/20/2015	288	288	0.0019	0.0136	0.0019	0.0062	N/A	N/A
Dry Weather 4, Day 5	11/22/2014	288	288	0.00001	0.0057	0.0011	0.0028	N/A	N/A
Dry Weather 4, Day 6	11/24/2014	288	288	0.0023	0.0125	0.0026	0.0065	N/A	N/A
Totals/Averages	--	864	864	0.0014	0.0106	0.0019	0.0051	N/A	N/A
RF-DM (Reference - Del Mar)									
Dry Weather 4, Day 4	11/20/2015	288	288	0.0009	0.0199	0.0035	0.0065	0.0291	126.51
Dry Weather 4, Day 5	11/22/2014	288	288	0.0006	0.0210	0.0029	0.0032	0.0166	134.97
Dry Weather 4, Day 6	11/24/2014	288	288	0.0021	0.0222	0.0039	0.0075	0.0266	111.60
Totals/Averages	--	864	864	0.0012	0.0210	0.0034	0.0058	0.0241	124.36
CC-DW (Carroll Canyon- Downwind)									
Dry Weather 4, Day 4	11/20/2015	288	288	0.0025	0.0142	0.0022	0.0049	0.0249	133.93
Dry Weather 4, Day 5	11/22/2014	288	288	0.0017	0.0332	0.0023	0.0033	0.0166	133.47
Dry Weather 4, Day 6	11/24/2014	288	288	0.0010	0.0139	0.0018	0.0060	0.0374	144.42
Totals/Averages	--	864	864	0.0017	0.0204	0.0021	0.0048	0.0263	137.27
CC-ER (Carroll Canyon - Eco Rentals)									
Dry Weather 4, Day 4	11/20/2015	288	288	0.0013	0.0570	0.0066	0.0079	N/A	N/A
Dry Weather 4, Day 5	11/22/2014	288	245	0.0003	0.0067	0.0012	0.0015	N/A	N/A
Dry Weather 4, Day 6	11/24/2014	288	288	0.0022	0.0329	0.0034	0.0062	N/A	N/A
Totals/Averages	--	864	821	0.0013	0.0322	0.0037	0.0052	N/A	N/A
CC-MP (Carroll Canyon - Maddox Park)									
Dry Weather 4, Day 4	11/20/2015	288	248	0.0002	0.0153	0.0037	0.0057	N/A	N/A
Dry Weather 4, Day 5	11/22/2014	288	262	0.0003	0.0332	0.0039	0.0038	N/A	N/A

Table 3-1.
Dry Weather 4 Summary (continued)

Sampling Period ID (Sampling Event, Day)	24 Hour Period End Date	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)**	Relative Percent Difference (%)*
Dry Weather 4, Day 6	11/24/2014	288	288	0.0022	0.0154	0.0030	0.0064	N/A	N/A
Totals/Averages	--	864	798	0.0009	0.0213	0.0036	0.0053	N/A	N/A
CC-SF (Carroll Canyon - Camino Santa Fe)									
Dry Weather 4, Day 4	11/20/2015	288	288	0.0032	0.0354	0.0056	0.0088	N/A	N/A
Dry Weather 4, Day 5	11/22/2014	288	288	0.0024	0.0134	0.0010	0.0042	N/A	N/A
Dry Weather 4, Day 6	11/24/2014	288	288	0.0016	0.0145	0.0026	0.0069	N/A	N/A
Totals/Averages	--	864	864	0.0024	0.0211	0.0031	0.0066	N/A	N/A
CC-SR (Carroll Canyon - Scripps Ranch)									
Dry Weather 4, Day 4	11/20/2015	288	266	0.0002	0.0037	0.0008	0.0016	N/A	N/A
Dry Weather 4, Day 5	11/22/2014	288	288	0.0002	0.0043	0.0011	0.0018	N/A	N/A
Dry Weather 4, Day 6	11/24/2014	288	288	0.0002	0.0124	0.0025	0.0040	N/A	N/A
Totals/Averages	--	864	842	0.0002	0.0068	0.0015	0.0025	N/A	N/A
CC-UP (Carroll Canyon - Upwind)									
Dry Weather 4, Day 4	11/20/2015	288	262	0.00001	0.0277	0.0051	0.0071	0.0291	121.53
Dry Weather 4, Day 5	11/22/2014	288	262	0.0000	0.0118	0.0015	0.0030	0.0125	121.90
Dry Weather 4, Day 6	11/24/2014	288	288	0.0019	0.0125	0.0022	0.0059	0.2163	189.41
Totals/Averages	--	864	812	0.0006	0.0173	0.0030	0.0053	0.0860	144.2778
CV-CD (Carmel Valley - Camino Del Sur)									
Dry Weather 4, Day 4	11/20/2015	288	288	0.0005	0.0070	0.0016	0.0031	N/A	N/A
Dry Weather 4, Day 5	11/22/2014	288	288	0.0002	0.0043	0.0011	0.0018	N/A	N/A
Dry Weather 4, Day 6	11/24/2014	288	288	0.0013	0.0096	0.0018	0.0046	N/A	N/A
Totals/Averages	--	864	864	0.0007	0.0070	0.0015	0.0032	N/A	N/A
LP-PO (Los Penasquitos - Poway)									

Table 3-1.
Dry Weather 4 Summary (continued)

Sampling Period ID (Sampling Event, Day)	24 Hour Period End Date	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)**	Relative Percent Difference (%)*
Dry Weather 4, Day 4	11/20/2015	288	288	0.0000	0.0136	0.0032	0.0040	N/A	N/A
Dry Weather 4, Day 5	11/22/2014	288	288	0.0000	0.0152	0.0031	0.0040	N/A	N/A
Dry Weather 4, Day 6	11/24/2014	288	288	0.0004	0.0117	0.0028	0.0056	N/A	N/A
Totals/Averages	--	864	864	0.0001	0.0135	0.0030	0.0045	N/A	N/A
LP-PR (Los Penasquitos - Preserve)									
Dry Weather 4, Day 4	11/20/2015	288	225	0.0003	0.0072	0.0018	0.0042	N/A	N/A
Dry Weather 4, Day 5	11/22/2014	288	226	0.0003	0.0041	0.0009	0.0024	N/A	N/A
Dry Weather 4, Day 6	11/24/2014	288	265	0.0015	0.1003	0.0117	0.0095	N/A	N/A
Totals/Averages	--	864	716	0.0007	0.0372	0.0048	0.0054	N/A	N/A
Dry Weather 4 (DW4) Totals									
Totals/Averages	--	9504	9173	0.0010	0.0190	0.0029	0.0049	0.0455	135.3040

Notes: Values Not Available = "--", Not Applicable = N/A. Data from Days 1 through 3 are not included for presentation due to equipment failure during this monitoring period. *Reference value for Relative Percent Difference (PDF) calculation is the FRM value. ** milligrams of pollutant per cubic meter of air at sensed atmospheric pressure and temperature.

Table 3-2.
Dry Weather 5 Summary

Sampling Period ID (Sampling Event, Day)	24 Hour Period End Date	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)**	Relative Percent Difference (%)*
CC-CC (Carroll Canyon)									
Dry Weather 5, Day 1	1/17/2016	288	282	0.0002	0.0233	0.0062	0.0107	N/A	N/A
Dry Weather 5, Day 2	1/19/2016	288	288	0.00020	0.0180	0.0039	0.0047	N/A	N/A
Dry Weather 5, Day 3	1/21/2016	288	218	0.0002	0.0248	0.0069	0.0105	N/A	N/A
Totals/Averages	--	864	788	0.0002	0.0220	0.0057	0.0086	N/A	N/A
RF-DM (Reference - Del Mar)									
Dry Weather 5, Day 1	1/17/2016	288	288	0.0014	0.0230	0.0057	0.0093	0.0316	108.66
Dry Weather 5, Day 2	1/19/2016	288	288	0.0007	0.0753	0.0080	0.0116	0.0474	121.21
Dry Weather 5, Day 3	1/21/2016	288	283	0.0007	0.0325	0.0074	0.0111	0.0042	90.66
Totals/Averages	--	864	859	0.0009	0.0436	0.0070	0.0107	0.0277	106.84
CC-DW (Carroll Canyon - Downwind)									
Dry Weather 5, Day 1	1/17/2016	288	288	0.0120	0.0351	0.0072	0.0234	0.0128	58.33
Dry Weather 5, Day 2	1/19/2016	288	288	0.0023	0.0258	0.0061	0.0086	0.0128	39.00
Dry Weather 5, Day 3	1/21/2016	288	288	0.0112	0.0321	0.0052	0.0184	0.0128	36.16
Totals/Averages	--	864	864	0.0085	0.0310	0.0062	0.0168	0.0128	44.50
CC-ER (Carroll Canyon - Eco Rentals)									
Dry Weather 5, Day 1	1/17/2016	288	288	0.0015	0.0208	0.0057	0.0102	N/A	N/A
Dry Weather 5, Day 2	1/19/2016	288	281	0.0004	0.0284	0.0052	0.0057	N/A	N/A
Dry Weather 5, Day 3	1/21/2016	288	218	0.0004	0.0204	0.0049	0.0092	N/A	N/A
Totals/Averages	--	864	787	0.0007	0.0232	0.0053	0.0084	N/A	N/A
CC-MP (Carroll Canyon - Maddox Park)									
Dry Weather 5, Day 1	1/17/2016	288	283	0.0003	0.0291	0.0079	0.0123	N/A	N/A
Dry Weather 5, Day 2	1/19/2016	288	288	0.0003	0.0174	0.0041	0.0051	N/A	N/A

Table 3-2.
Dry Weather 5 Summary (continued)

Sampling Period ID (Sampling Event, Day)	24 Hour Period End Date	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)**	Relative Percent Difference (%)*
Dry Weather 5, Day 3	1/21/2016	288	225	0.0003	0.0151	0.0040	0.0080	N/A	N/A
Totals/Averages	--	864	796	0.0003	0.0205	0.0054	0.0084	N/A	N/A
CC-SF (Carroll Canyon - Camino Santa Fe)									
Dry Weather 5, Day 1	1/17/2016	288	215	0.0004	0.0201	0.0050	0.0122	N/A	N/A
Dry Weather 5, Day 2	1/19/2016	288	236	0.0004	0.0257	0.0062	0.0067	N/A	N/A
Dry Weather 5, Day 3	1/21/2016	288	211	0.0004	0.0151	0.0042	0.0088	N/A	N/A
Totals/Averages	--	864	662	0.0004	0.0203	0.0051	0.0092	N/A	N/A
CC-SR (Carroll Canyon - Scripps Ranch)									
Dry Weather 5, Day 1	1/17/2016	288	288	0.0020	0.0171	0.0037	0.0076	N/A	N/A
Dry Weather 5, Day 2	1/19/2016	288	288	0.0016	0.0239	0.0046	0.0075	N/A	N/A
Dry Weather 5, Day 3	1/21/2016	288	288	0.0004	0.0160	0.0039	0.0040	N/A	N/A
Totals/Averages	--	864	864	0.0013	0.0190	0.0041	0.0064	N/A	N/A
CC-UP (Carroll Canyon - Upwind)									
Dry Weather 5, Day 1	1/17/2016	288	288	0.0016	0.0100	0.0018	0.0044	0.0168	116.33
Dry Weather 5, Day 2	1/19/2016	288	286	0.0001	0.0228	0.0049	0.0057	0.0083	37.98
Dry Weather 5, Day 3	1/21/2016	288	233	0.0001	0.0293	0.0083	0.0121	0.0083	36.89
Totals/Averages	--	864	807	0.0006	0.0207	0.0050	0.0074	0.0111	63.73
CV-CD (Carmel Valley - Camino Del Sur)									
Dry Weather 5, Day 1	1/17/2016	288	288	0.0007	0.0249	0.0072	0.0107	N/A	N/A
Dry Weather 5, Day 2	1/19/2016	288	288	0.0007	0.0173	0.0044	0.0049	N/A	N/A
Dry Weather 5, Day 3	1/21/2016	288	234	0.0003	0.0173	0.0050	0.0071	N/A	N/A
Totals/Averages	--	864	810	0.0005	0.0199	0.0055	0.0076	N/A	N/A
LP-PO (Los Penasquitos - Poway)									

Table 3-2.
Dry Weather 5 Summary (continued)

Sampling Period ID (Sampling Event, Day)	24 Hour Period End Date	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)**	Relative Percent Difference (%)*
Dry Weather 5, Day 1	1/17/2016	288	288	0.0007	0.0477	0.0095	0.0138	N/A	N/A
Dry Weather 5, Day 2	1/19/2016	288	288	0.0019	0.0204	0.0039	0.0063	N/A	N/A
Dry Weather 5, Day 3	1/21/2016	288	258	0.0003	0.0098	0.0030	0.0029	N/A	N/A
Totals/Averages	--	864	576	0.0010	0.0260	0.0055	0.0077	N/A	N/A
LP-PR (Los Penasquitos - Preserve)									
Dry Weather 5, Day 1	1/17/2016	288	258	0.0016	0.0152	0.0044	0.0042	N/A	N/A
Dry Weather 5, Day 2	1/19/2016	288	241	0.0001	0.0088	0.0015	0.0032	N/A	N/A
Dry Weather 5, Day 3	1/21/2016	288	264	0.0001	0.0111	0.0028	0.0043	N/A	N/A
Totals/Averages	--	864	763	0.0006	0.0117	0.0029	0.0039	N/A	N/A
Dry Weather 5 (DW5) Totals									
Totals/Averages	--	9504	8576	0.0014	0.0234	0.0052	0.0086	0.0172	71.6910

Notes: Values Not Available = "--", Not Applicable = N/A. * Reference value for Relative Percent Difference (PDF) Calculation is the FRM value. ** milligrams of pollutant per cubic meter of air at sensed atmospheric pressure and temperature.

Table 3-3.
Dry Weather 6 Summary

Sampling Period ID (Sampling Event, Day)	24 Hour Period End Date	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)**	Relative Percent Difference (%)*
CC-CC (Carroll Canyon)									
Dry Weather 6, Day 1	1/24/2016	288	287	0.0002	0.0214	0.0045	0.0047	N/A	N/A
Dry Weather 6, Day 2	1/26/2016	288	261	0.00020	0.0089	0.0023	0.0052	N/A	N/A
Dry Weather 6, Day 3	1/28/2016	288	273	0.0002	0.0127	0.0020	0.0041	N/A	N/A
Totals/Averages	--	864	821	0.0002	0.0143	0.0029	0.0047	N/A	N/A
RF-DM (Reference - Del Mar)									
Dry Weather 6, Day 1	1/24/2016	288	288	0.0042	0.0239	0.0040	0.0100	0.0416	122.17
Dry Weather 6, Day 2	1/26/2016	288	288	0.0008	0.0208	0.0038	0.0052	0.0208	119.92
Dry Weather 6, Day 3	1/28/2016	288	288	0.0034	0.0519	0.0067	0.0091	0.0582	145.88
Totals/Averages	--	864	864	0.0028	0.0322	0.0048	0.0081	0.0402	129.32
CC-DW (Carroll Canyon - Downwind)									
Dry Weather 6, Day 1	1/24/2016	288	288	0.0015	0.0098	0.0019	0.0057	0.0171	100.45
Dry Weather 6, Day 2	1/26/2016	288	288	0.0000	0.0258	0.0038	0.0053	0.0300	140.01
Dry Weather 6, Day 3	1/28/2016	288	288	0.0011	0.0288	0.0035	0.0054	0.0512	162.06
Totals/Averages	--	864	864	0.0009	0.0215	0.0031	0.0054	0.0328	134.17
CC-ER (Carroll Canyon - Eco Rentals)									
Dry Weather 6, Day 1	1/24/2016	288	280	0.0004	0.0068	0.0016	0.0039	N/A	N/A
Dry Weather 6, Day 2	1/26/2016	288	277	0.0004	0.0204	0.0024	0.0037	N/A	N/A
Dry Weather 6, Day 3	1/28/2016	288	288	0.0011	0.0235	0.0038	0.0047	N/A	N/A
Totals/Averages	--	864	845	0.0006	0.0169	0.0026	0.0041	N/A	N/A
CC-MP (Carroll Canyon - Maddox Park)									
Dry Weather 6, Day 1	1/24/2016	288	288	0.0003	0.0166	0.0047	0.0052	N/A	N/A
Dry Weather 6, Day 2	1/26/2016	288	255	0.0003	0.0185	0.0029	0.0035	N/A	N/A

Table 3-3.
Dry Weather 6 Summary (continued)

Sampling Period ID (Sampling Event, Day)	24 Hour Period End Date	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)**	Relative Percent Difference (%)*
Dry Weather 6, Day 3	1/28/2016	288	260	0.0003	0.0435	0.0038	0.0044	N/A	N/A
Totals/Averages	--	864	803	0.0003	0.0262	0.0038	0.0044	N/A	N/A
CC-SF (Carroll Canyon - Camino Santa Fe)									
Dry Weather 6, Day 1	1/24/2016	288	235	0.0004	0.0257	0.0056	0.0107	N/A	N/A
Dry Weather 6, Day 2	1/26/2016	288	239	0.0004	0.0201	0.0038	0.0045	N/A	N/A
Dry Weather 6, Day 3	1/28/2016	288	271	0.0004	0.0386	0.0060	0.0056	N/A	N/A
Totals/Averages	--	864	745	0.0004	0.0281	0.0051	0.0069	N/A	N/A
CC-SR (Carroll Canyon - Scripps Ranch)									
Dry Weather 6, Day 1	1/24/2016	288	288	0.0008	0.0069	0.0013	0.0049	N/A	N/A
Dry Weather 6, Day 2	1/26/2016	288	288	0.0001	0.0069	0.0018	0.0026	N/A	N/A
Dry Weather 6, Day 3	1/28/2016	288	269	0.0001	0.0038	0.0011	0.0017	N/A	N/A
Totals/Averages	--	864	845	0.0003	0.0059	0.0014	0.0030	N/A	N/A
CC-UP (Carroll Canyon - Upwind)									
Dry Weather 6, Day 1	1/24/2016	288	288	0.00010	0.0084	0.0019	0.0045	0.0083	59.50
Dry Weather 6, Day 2	1/26/2016	288	277	0.0001	0.0168	0.0025	0.0049	0.0125	86.48
Dry Weather 6, Day 3	1/28/2016	288	288	0.0012	0.0198	0.0027	0.0054	0.0249	128.47
Totals/Averages	--	864	853	0.0005	0.0150	0.0024	0.0050	0.0152	91.48
CV-CD (Carmel Valley - Camino Del Sur)									
Dry Weather 6, Day 1	1/24/2016	288	288	0.0007	0.0219	0.0068	0.0096	N/A	N/A
Dry Weather 6, Day 2	1/26/2016	288	212	0.0003	0.0090	0.0023	0.0037	N/A	N/A
Dry Weather 6, Day 3	1/28/2016	288	278	0.0003	0.0064	0.0015	0.0029	N/A	N/A
Totals/Averages	--	864	778	0.0004	0.0124	0.0036	0.0054	N/A	N/A
LP-PO (Los Penasquitos - Poway)									

Table 3-3.
Dry Weather 6 Summary (continued)

Sampling Period ID (Sampling Event, Day)	24 Hour Period End Date	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)**	Relative Percent Difference (%)*
Dry Weather 6, Day 1	1/24/2016	288	288	0.0015	0.0181	0.0029	0.0052	N/A	N/A
Dry Weather 6, Day 2	1/26/2016	288	248	0.0003	0.0337	0.0047	0.0058	N/A	N/A
Dry Weather 6, Day 3	1/28/2016	288	288	0.0003	0.0219	0.0031	0.0043	N/A	N/A
Totals/Averages	--	864	824	0.0007	0.0246	0.0036	0.0051	N/A	N/A
LP-PR (Los Penasquitos - Preserve)									
Dry Weather 6, Day 1	1/24/2016	288	277	0.0001	0.0080	0.0011	0.0032	N/A	N/A
Dry Weather 6, Day 2	1/26/2016	288	288	0.0008	0.0046	0.0006	0.0026	N/A	N/A
Dry Weather 6, Day 3	1/28/2016	288	288	0.0020	0.0054	0.0006	0.0028	N/A	N/A
Totals/Averages	--	864	853	0.0010	0.0060	0.0008	0.0028	N/A	N/A
Dry Weather 6 (DW6) Totals									
Totals/Averages	--	9504	8807	0.0007	0.0185	0.0031	0.0050	0.0294	118.3265

Notes: Values Not Available = "--", Not Applicable = N/A. * Reference value for Relative Percent Difference (PDF) Calculation is the FRM value. ** milligrams of pollutant per cubic meter of air at sensed atmospheric pressure and temperature.

Table 3-4.
2015-2016 Summary

Event ID	Time Period	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)	Relative Percent Difference (%)*
Phase II Air Deposition Dry Weather Event Totals									
Dry Weather 4	11/18/2015 - 11/24/2015	9504	9173	0.0010	0.0190	0.0029	0.0049	0.0455	135.3040
Dry Weather 5	1/18/2016 - 1/21/2016	9504	8834	0.0014	0.0234	0.0052	0.0086	0.0172	71.6910
Dry Weather 6	1/23/2016 - 1/28/2016	9504	9095	0.0007	0.0185	0.0031	0.0050	0.0294	118.3265
Totals/Averages	--	28512	27102	0.0010	0.0203	0.0037	0.0062	0.0307	108.4405
		Total Percent of Valid Measurements							
		95.05%							

Notes: Values Not Available = "--", Not Applicable = N/A. * Reference value for Relative Percent Difference (PDF) Calculation is the FRM value. ** milligrams of pollutant per cubic meter of air at sensed atmospheric pressure and temperature.

Table 3-5.
Monitoring Location Summary

Monitoring Location	Time Period	Total Number of Optical Measurements (mg/m3)	Valid Optical Measurements (mg/m3)	Minimum Optical Value (mg/m3)	Maximum Optical Value (mg/m3)	Standard Deviation	Mean Value (24-Hour Average Optical) (mg/m3)	FRM Value (mg/m3)*	Relative Percent Difference (%)*
Phase II Air Deposition Dry Weather Monitoring Location Totals									
CC-CC	Dry Weather 4 – Dry Weather 6 11/18/2015 – 1/28/2016	2592	2473	0.0006	0.0157	0.0035	0.0061	--	--
CC-DM		2592	2587	0.0016	0.0323	0.0051	0.0082	0.0307	120.18
CC-DW		2592	2592	0.0037	0.0243	0.0038	0.0090	0.0240	105.31
CC-ER		2592	2453	0.0009	0.0241	0.0039	0.0059	--	--
CC-MP		2592	2397	0.0005	0.0227	0.0042	0.0060	--	--
CC-SF		2592	2271	0.0010	0.0232	0.0044	0.0076	--	--
CC-SR		2592	2551	0.0006	0.0105	0.0023	0.0040	--	--
CC-UP		2592	2472	0.0006	0.0177	0.0034	0.0059	0.0375	99.83
CV-CD		2592	2452	0.0005	0.0131	0.0035	0.0054	--	--
LP-PO		2592	2452	0.0005	0.0131	0.0035	0.0054	--	--
LP-PR		2592	2522	0.0006	0.0214	0.0040	0.0058	--	--

Notes: Values Not Available = "--", Not Applicable = N/A. * Reference value for Relative Percent Difference (PDF) Calculation is the FRM value. ** milligrams of pollutant per cubic meter of air at sensed atmospheric pressure and temperature.

3.2 SAMPLING EVENT RESULTS

3.2.1 Dry Weather 4

3.2.1.1 CC-CC (Carroll Canyon)

CC-CC (Carroll Canyon):

CC-CC is a site monitored during the Phase I and Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0051 mg/m^3.
- Mean standard deviation is $\pm$0.0019 mg/m^3

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – CC-CC Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the WNW and NW, which is the prevalent weather pattern for the region. Peak Optical monitor readings were observed close to midnight. Minimal disturbance can be observed during high traffic conditions.

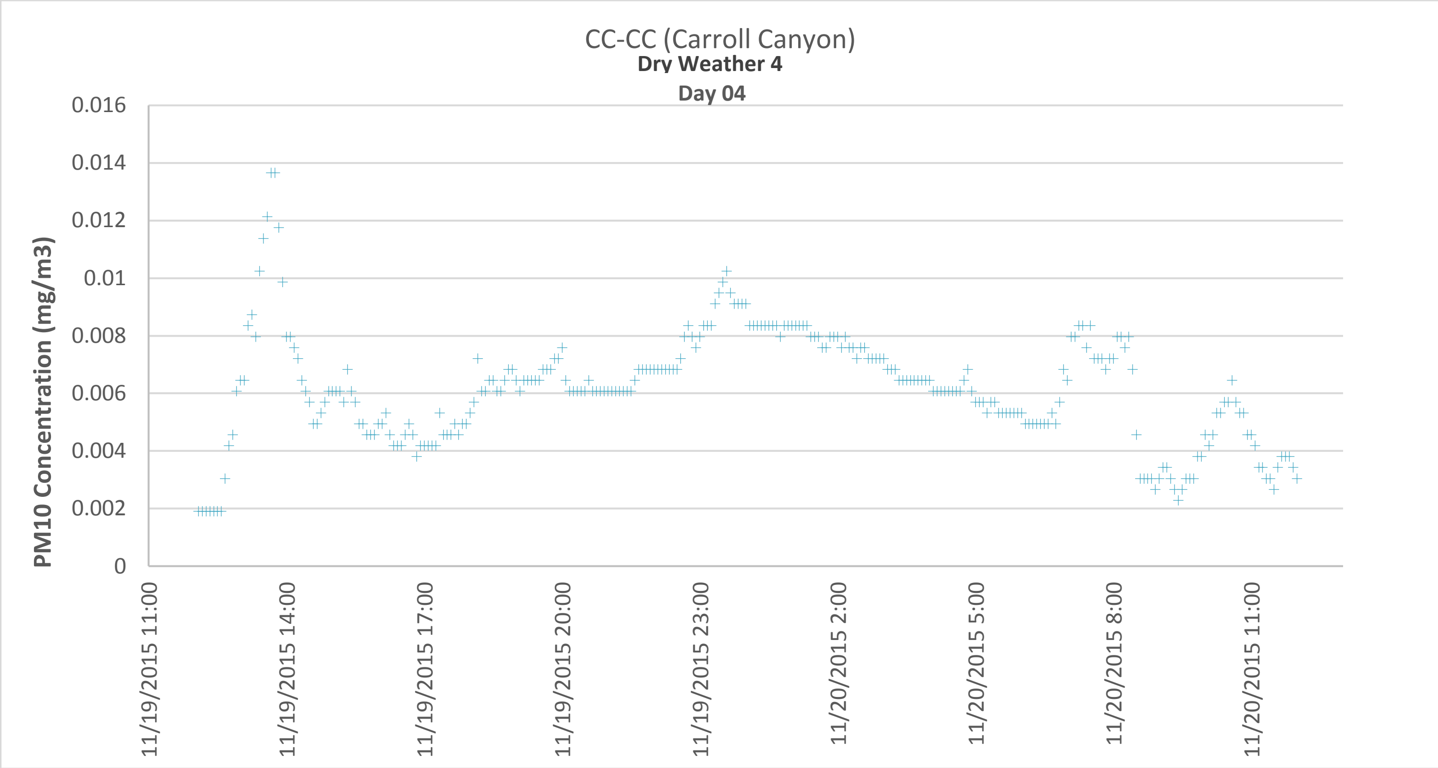
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – CC-CC Optical readings were observed at the lowest mean value for this monitoring location during sampling event Dry Weather 4, and below the mean value. Wind directions were observed primarily from the WNW and NW, which is the prevalent weather pattern for the region. Peak Optical monitor readings were observed from 17:00 to close to midnight, with a sharp decline during the late morning and early afternoon.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – CC-CC Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the NW, which is the prevalent weather pattern for the region. Peak Optical monitor readings were observed close to midnight.

Graphical representations of this data are presented in Figure 3-1 through 3-3.



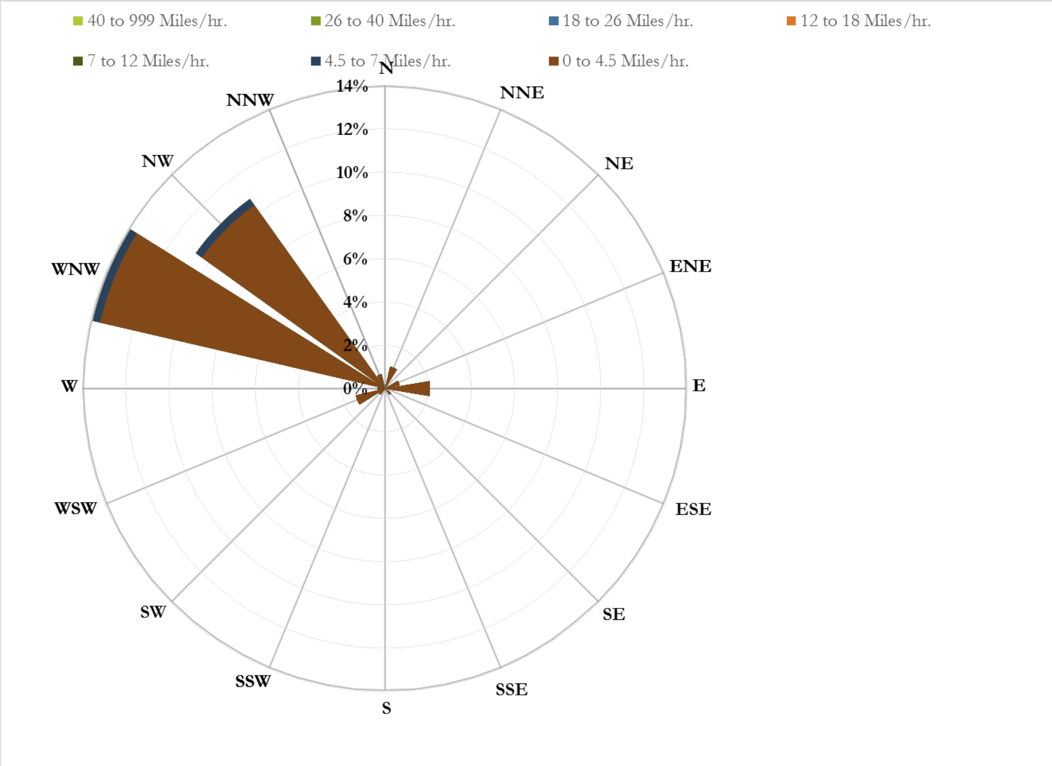
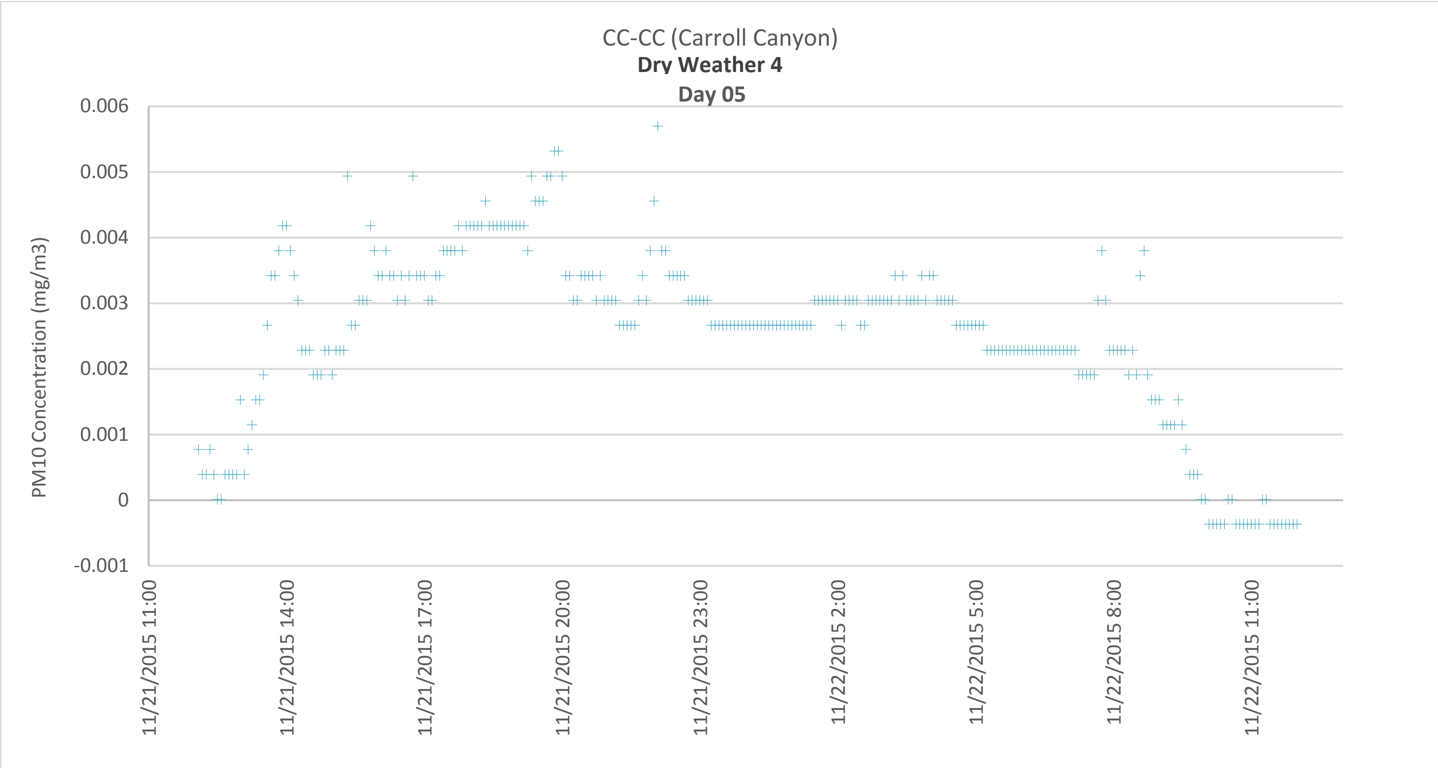


Figure 3-1.
CC-CC PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



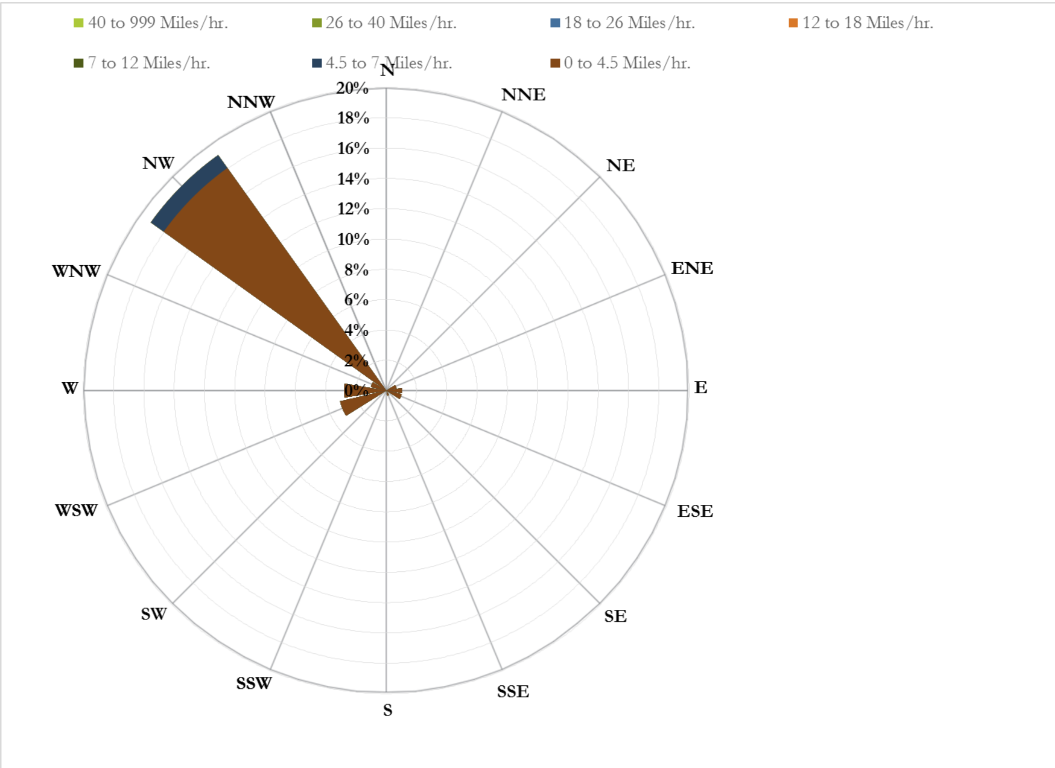
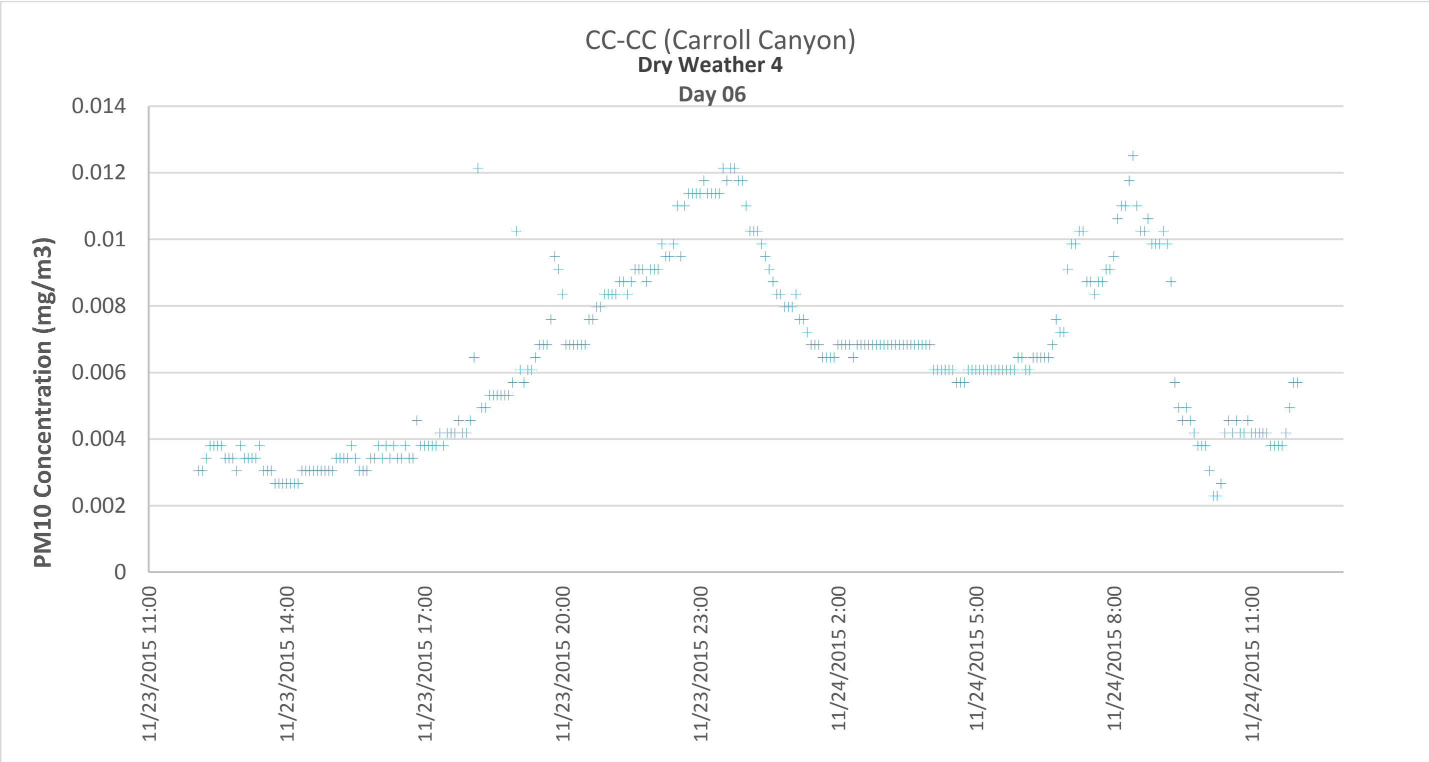


Figure 3-2.
CC-CC PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



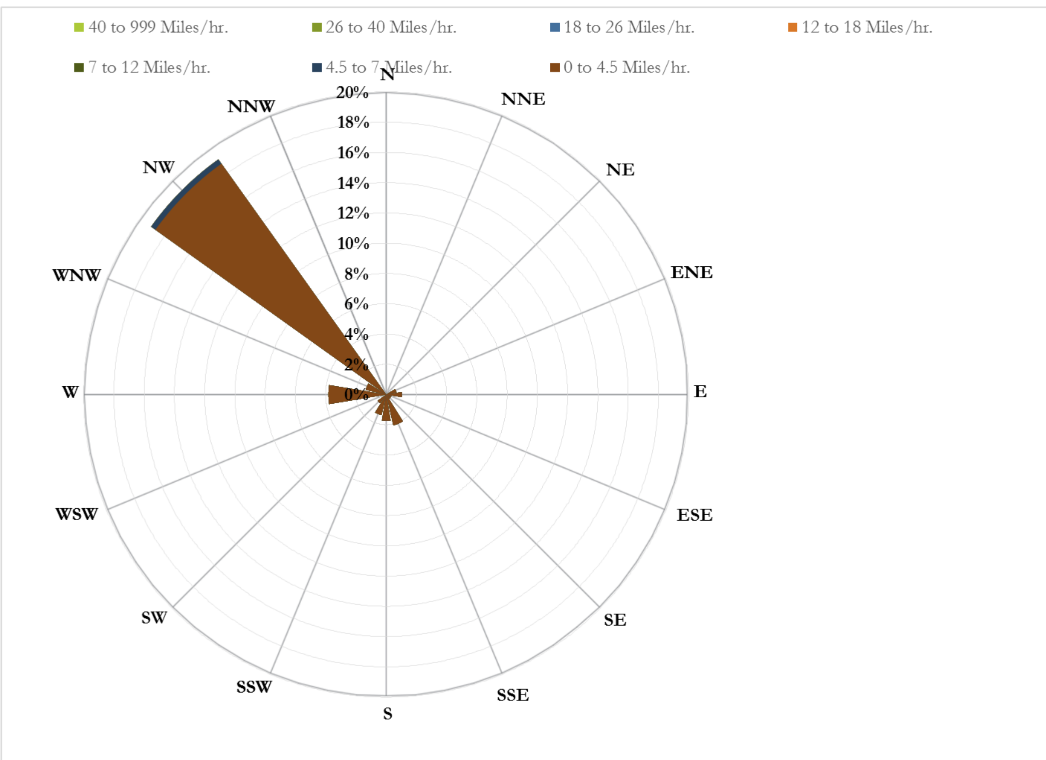


Figure 3-3.
CC-CC PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.2 CC-DM (Reference – Del Mar)

CC-DM (Reference – Del Mar):

CC-DM is a site monitored during the Phase I and Phase II Watershed Special Study and includes an Optical monitor and an FRM sampler. This is the reference site for the aerial deposition portion of the Watershed Special Study, and was selected as a station away from anthropogenic influence during the prevalent weather patterns.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0058 mg/m^3.
- Mean standard deviation is $\pm$0.0034 mg/m^3

FRM Sampler (Laboratory) Results:

- Mean values for PM_{10} was 0.0241 mg/m^3.
- Mean RPD from the FRM results to the Optical monitor results was 124.36 percent.
    - Although the RPD is high, this is due to very low concentrations measured that are within 10 times the laboratory reporting limit and standard flow volume. RPD calculations for low concentrations such as those measured during this program mischaracterize what are actually very small differences in concentration.

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – CC-DM Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the WNW, NW, and the E. Peak Optical monitor readings were observed 15:00 to 20:00.

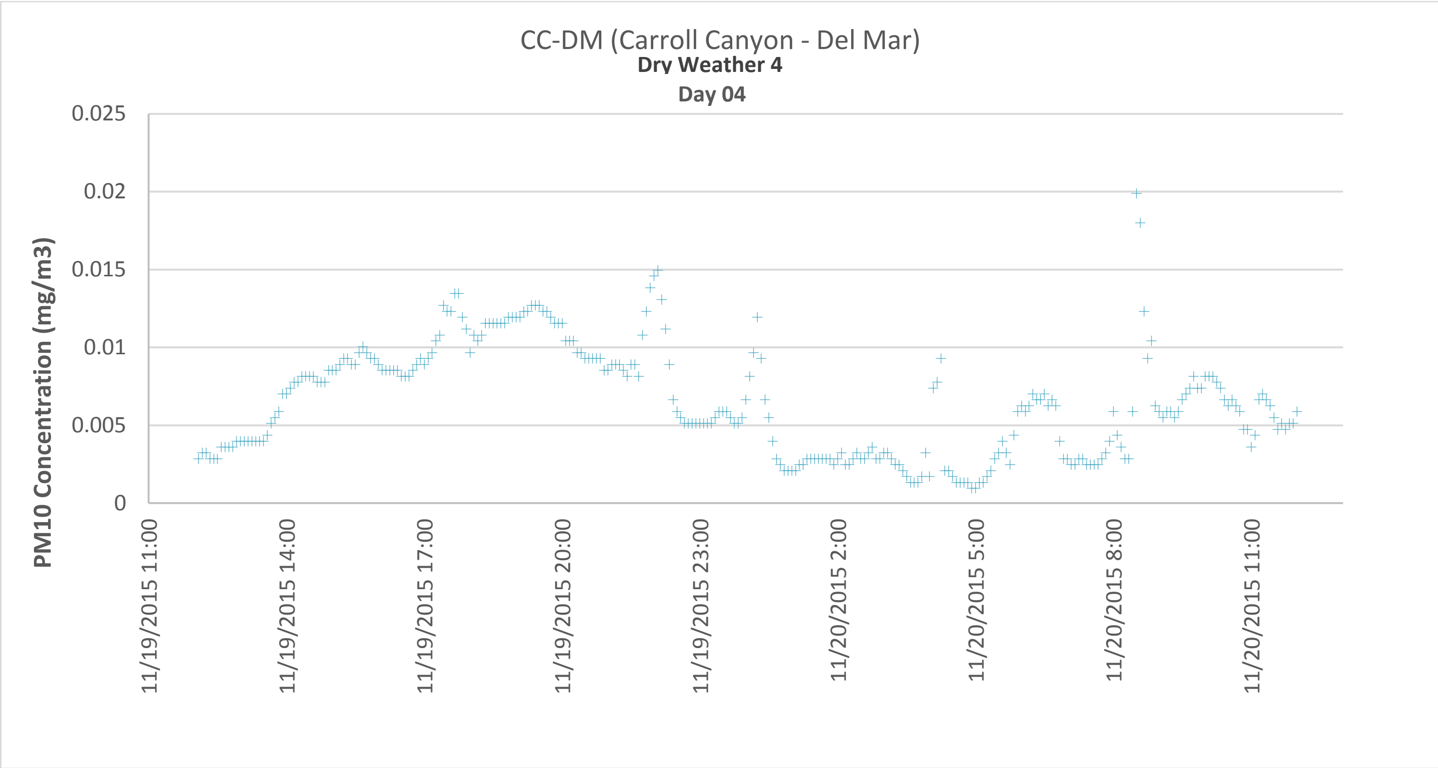
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – CC-DM Optical readings were observed at the lowest mean value for this monitoring location during sampling event Dry Weather 4, and below the mean value. Wind directions were observed primarily from the WNW, ENE and the NE, peaking at 4.5 to 7 miles per hour. Peak Optical monitor readings were observed around 15:00 and 9:00.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – CC-DM Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the WNW, NE, and ENE. Peak Optical monitor readings were observed before midnight.

Graphical representations of this data are presented in Figure 3-4 through 3-6.



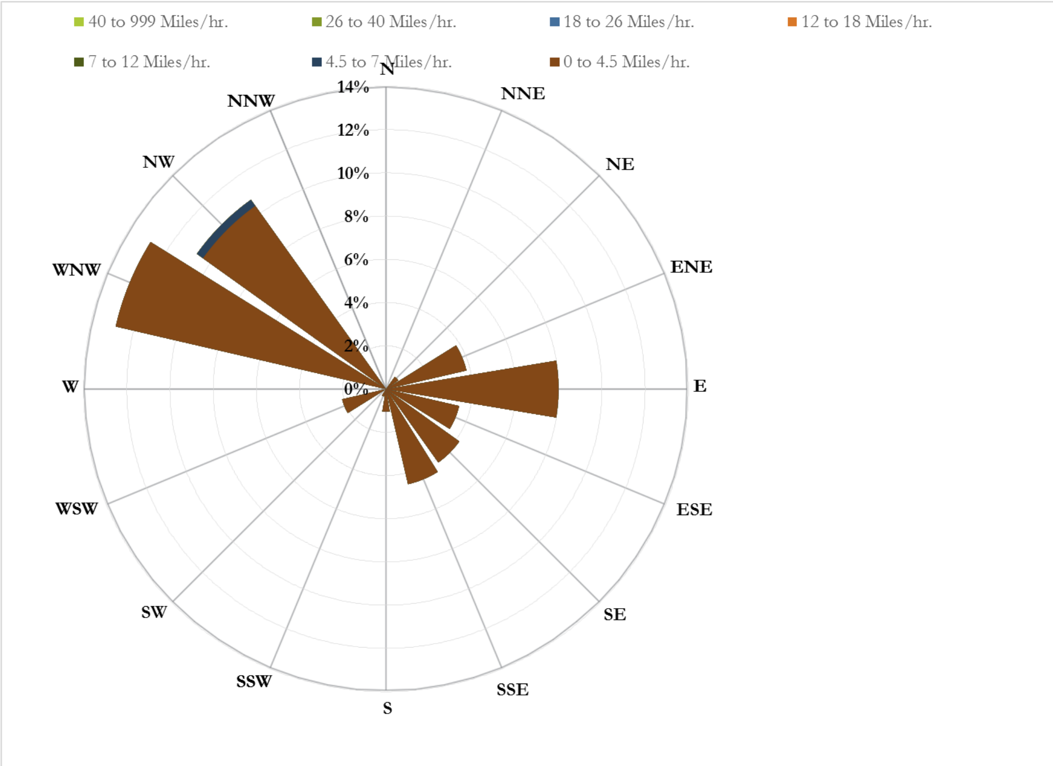
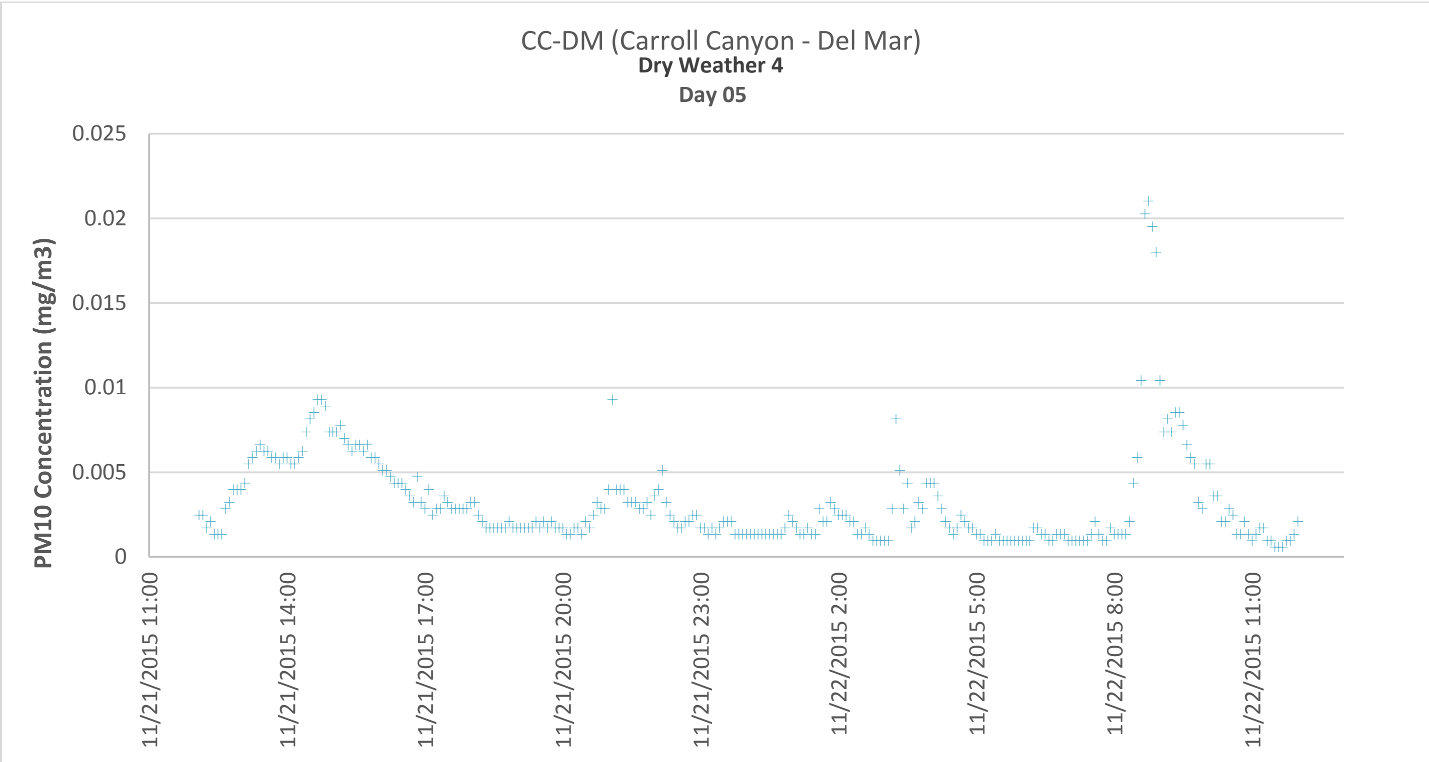


Figure 3-4.
CC-DM PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



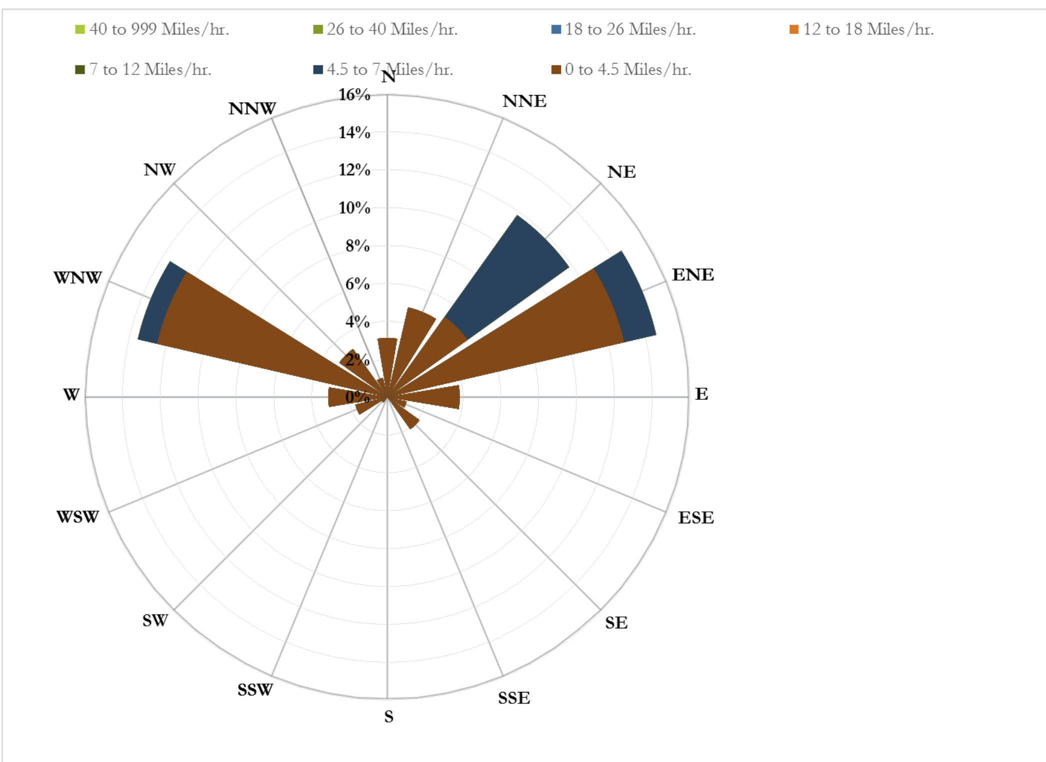
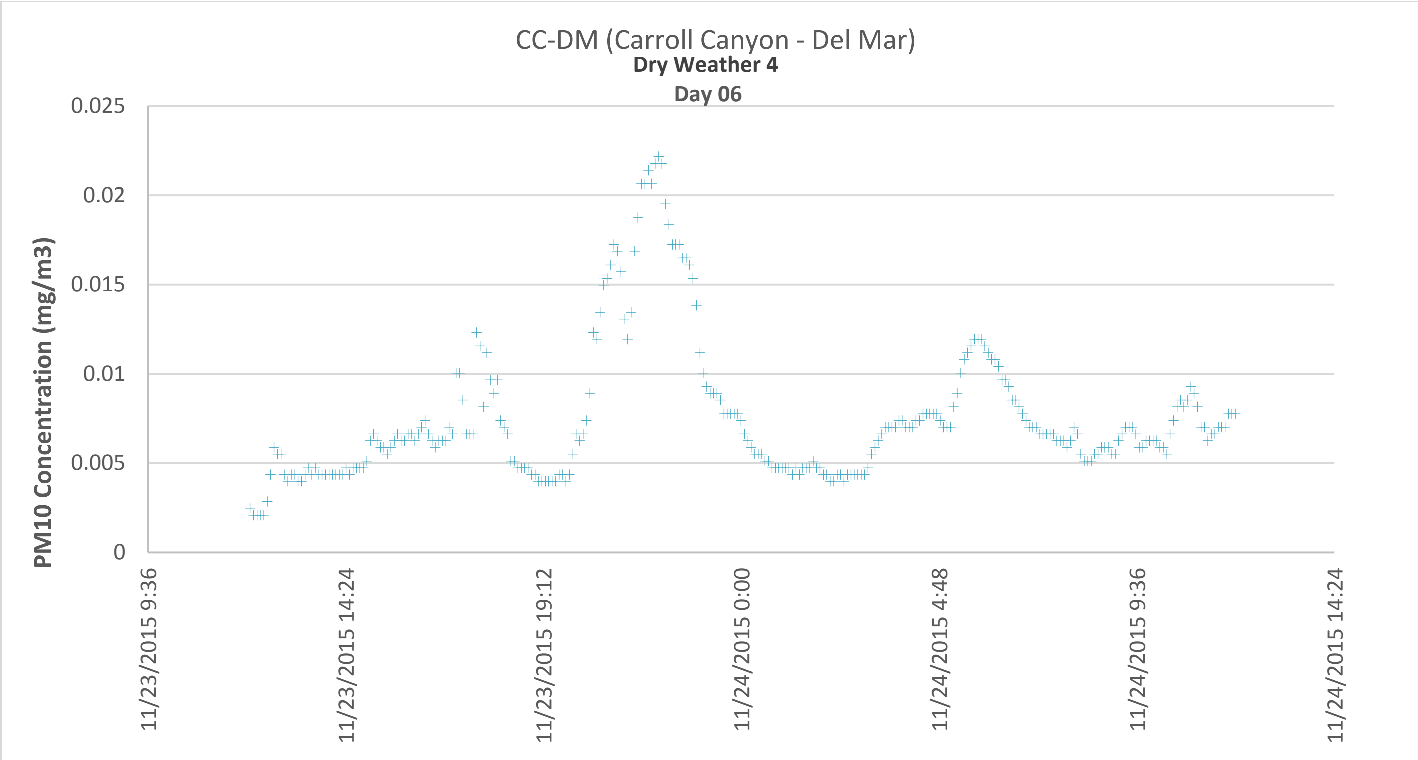


Figure 3-5.
CC-DM PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



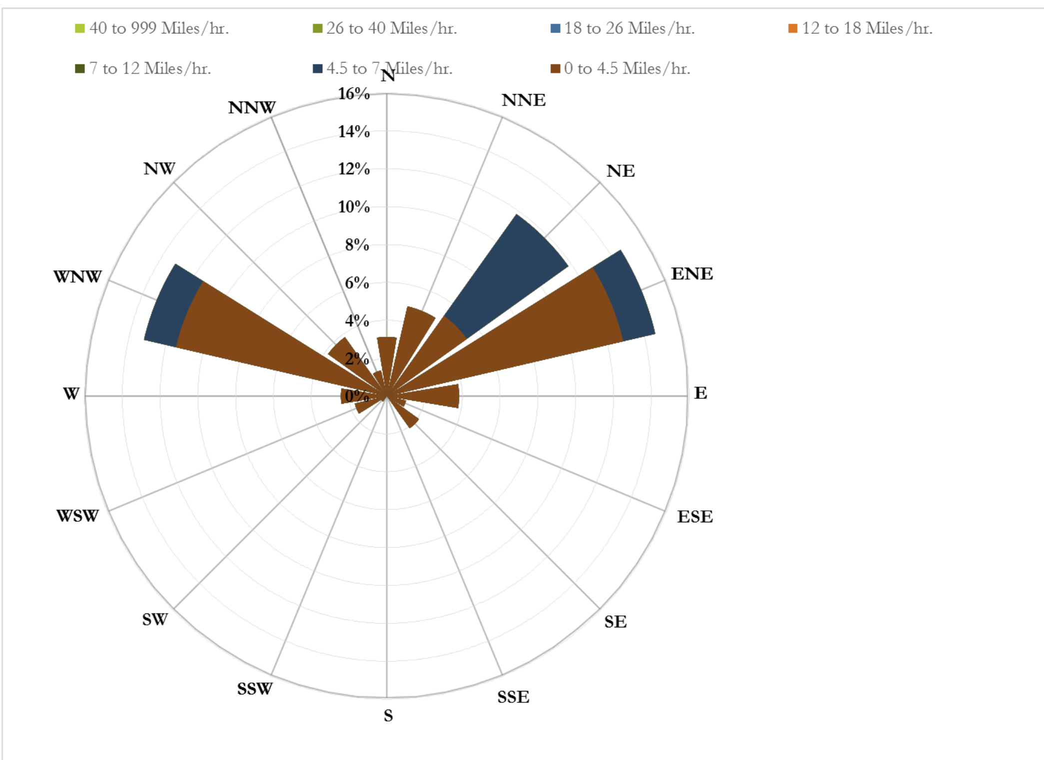


Figure 3-6.
CC-DM PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.3 CC-DW (Carroll Canyon – Downwind)

CC-DW (Carroll Canyon – Downwind):

CC-DW is a site monitored during the Phase I and Phase II Watershed Special Study and contains an Optical monitor and an FRM sampler.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0048 mg/m^3.
- Mean standard deviation is $\pm$0.0021 mg/m^3

FRM Sampler (Laboratory) Results:

- Mean value for PM_{10} was 0.0263 mg/m^3.
- Mean RPD from the FRM results to the Optical monitor results was 124.36%

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – CC-DW Optical readings were observed at the mean value of the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the SE. Peak Optical monitor readings were observed during typical increased traffic conditions.

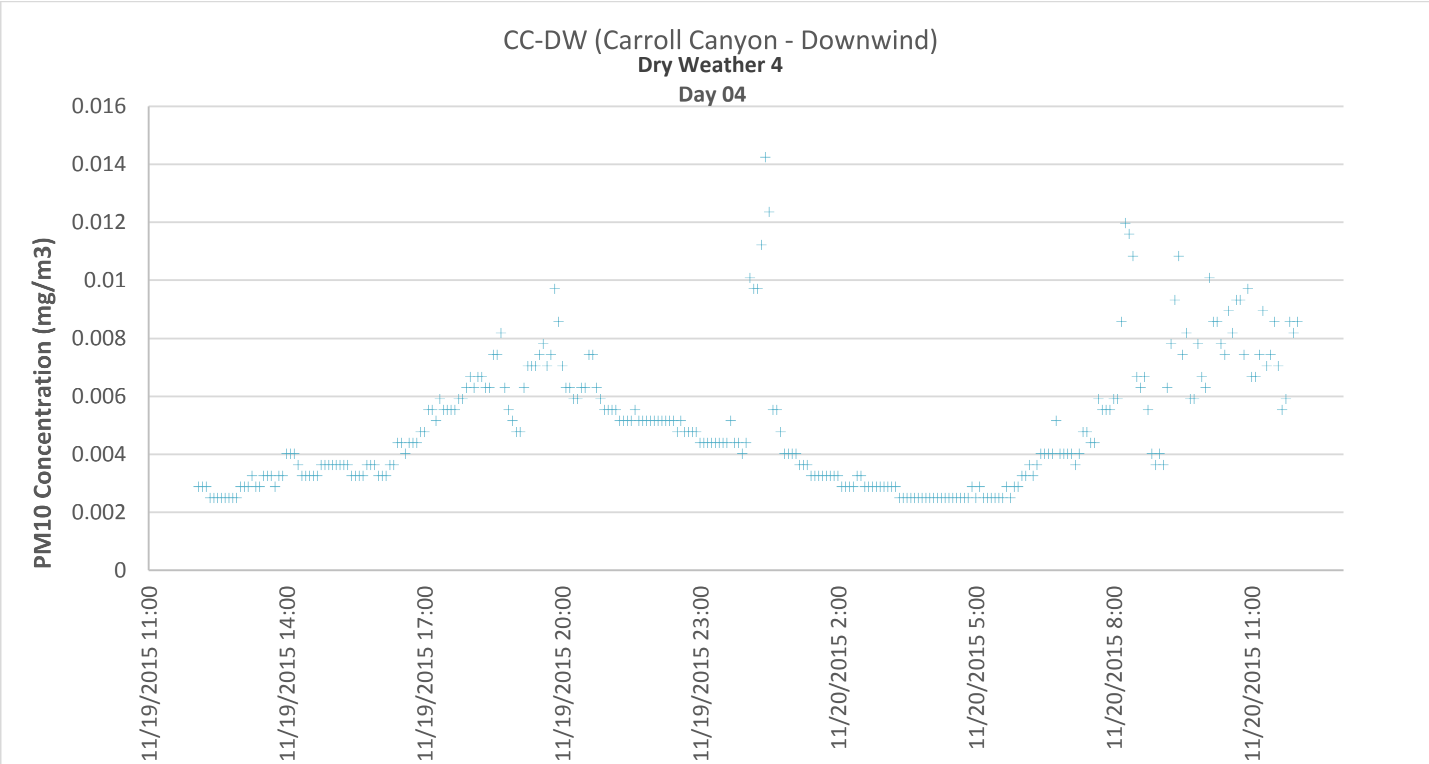
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – CC-DW Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Optical monitor readings were consistent, rising slightly during the afternoon traffic conditions.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – CC-DW Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the SE and S. Peak Optical monitor readings were observed midday, yet were generally consistent during the 24 hour period.

Graphical representations of this data is presented in Figures 3-7 through 3-9.



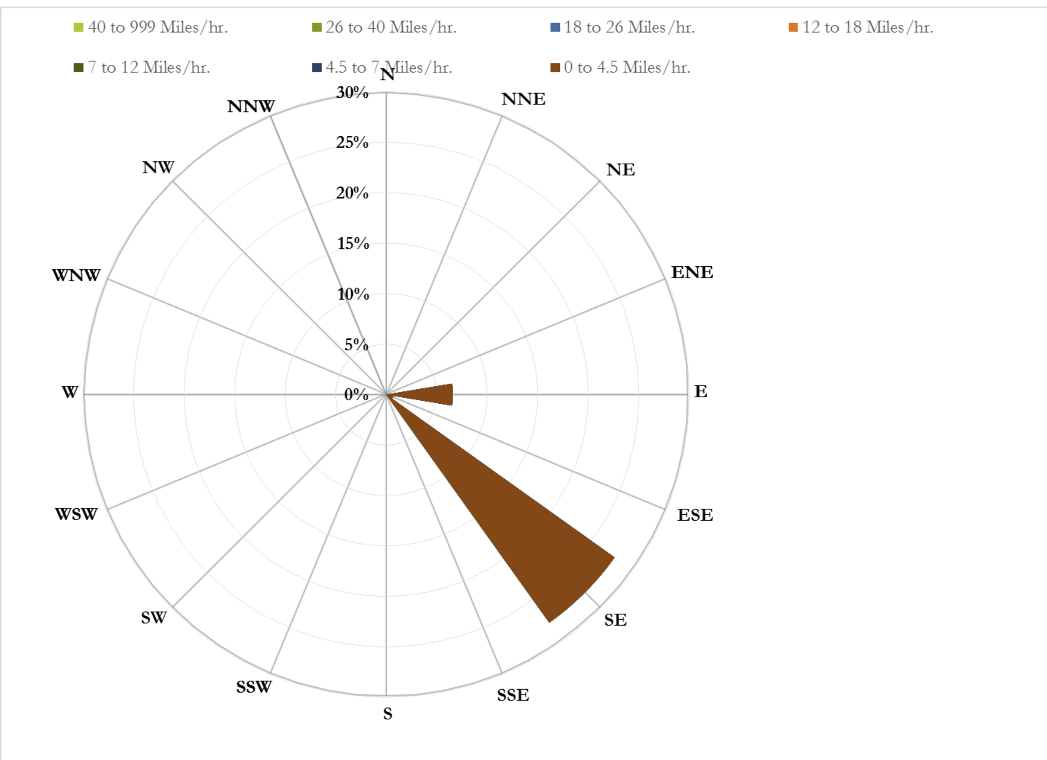
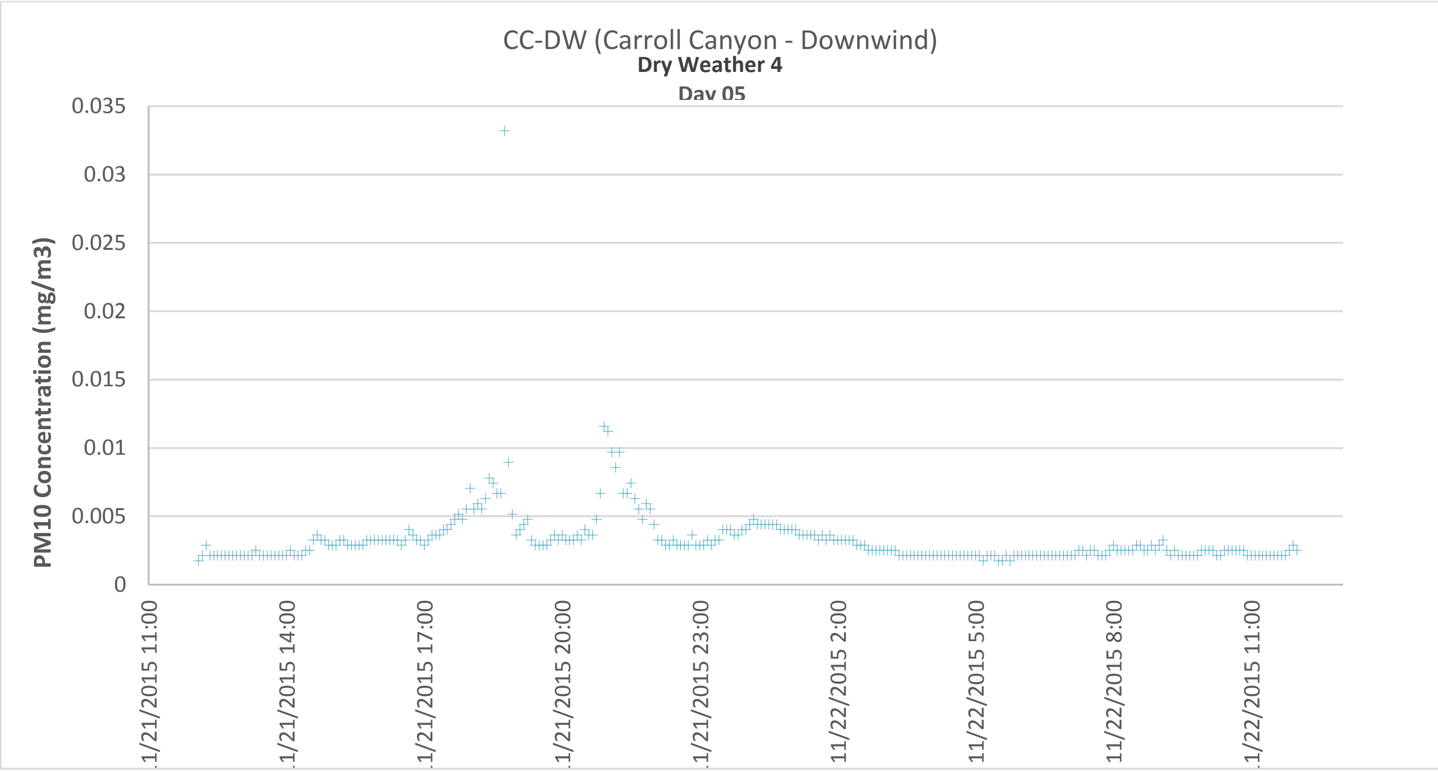


Figure 3-7.
CC-DW PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



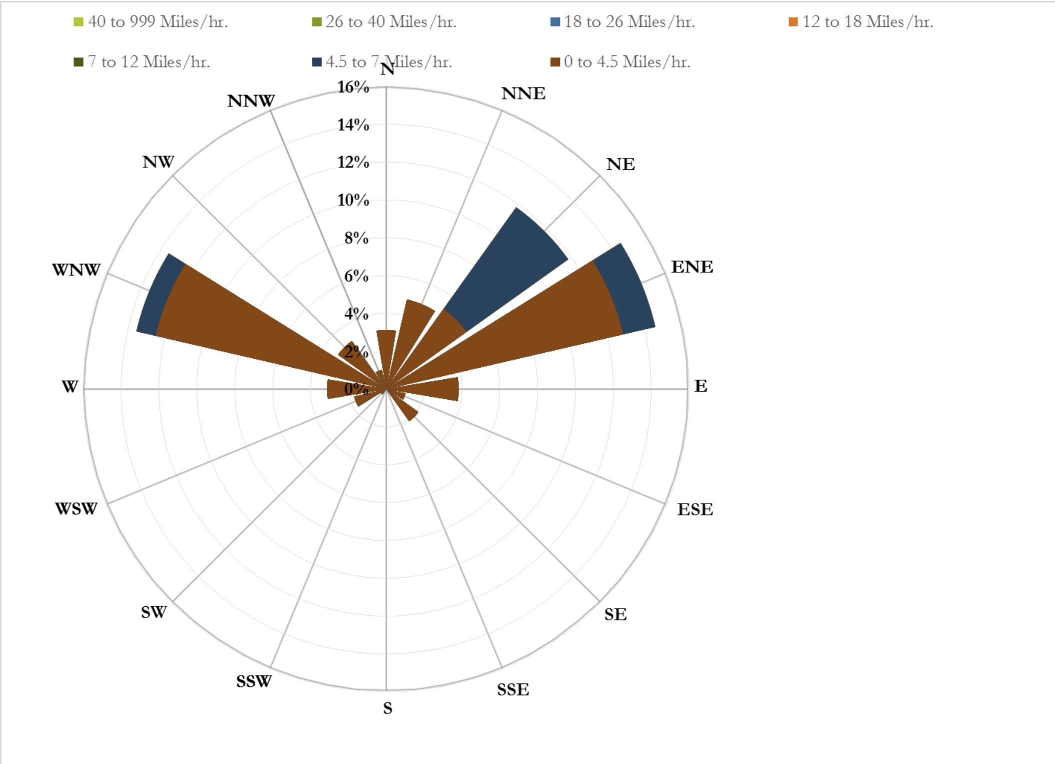
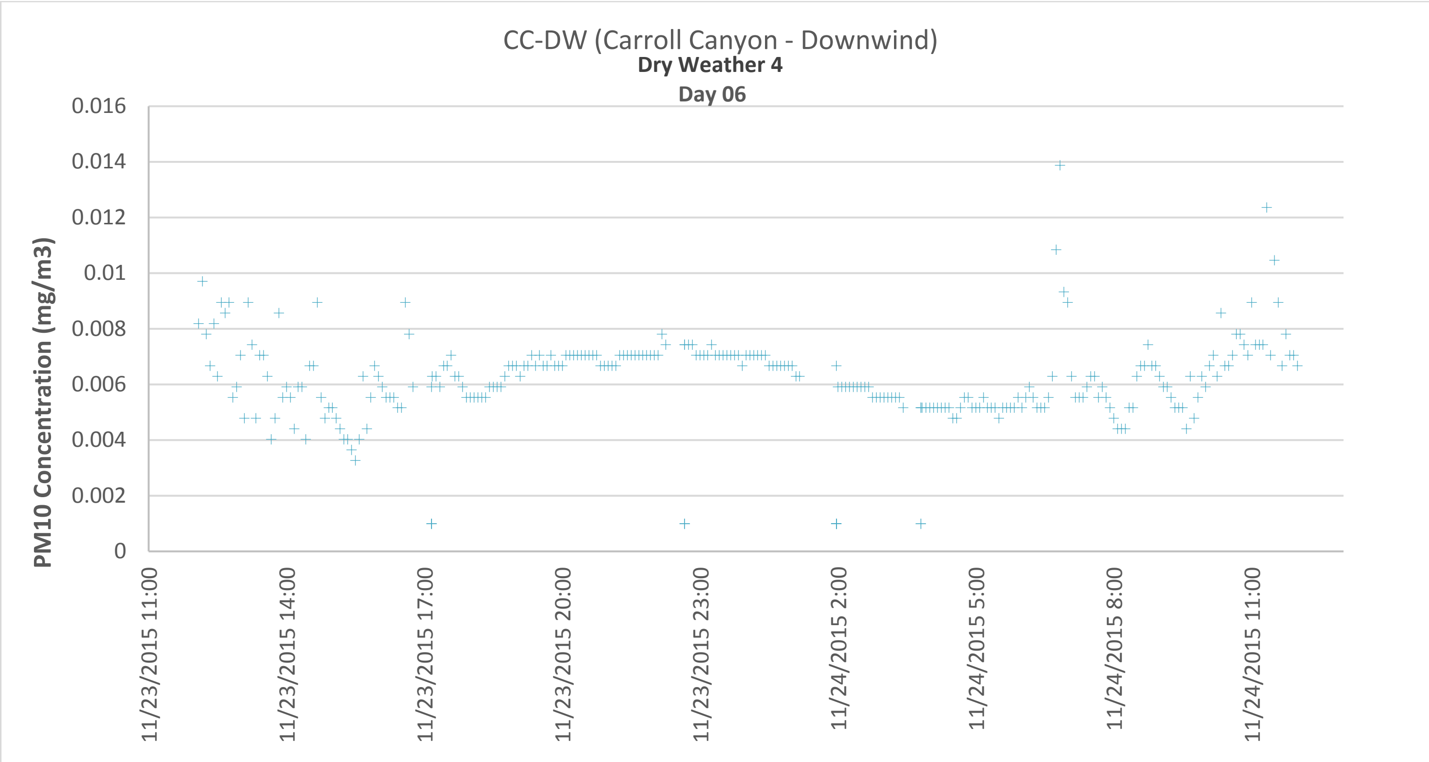


Figure 3-8.
CC-DW PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



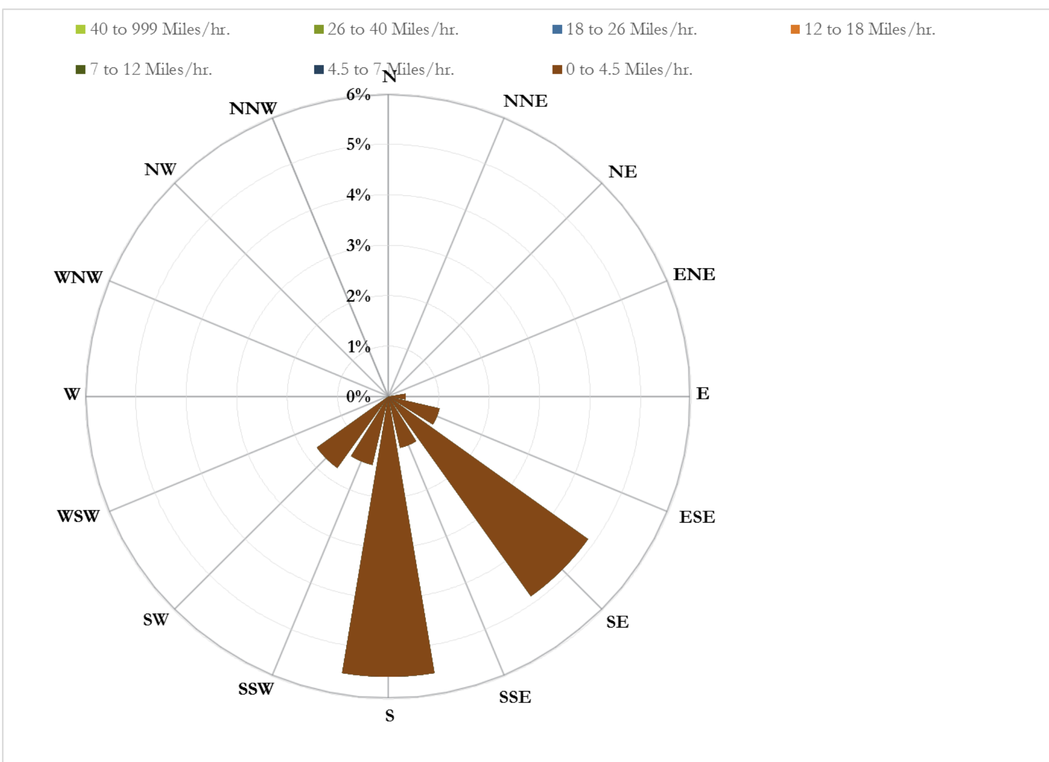


Figure 3-9.
CC-DW PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.4 CC-ER (Carroll Canyon – Eco Rental)

CC-ER (Carroll Canyon – Eco Rental):

CC-ER is a site monitored during the Phase II Watershed Special Study that was added by the City of San Diego (i.e., not funded through the RA group) and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 821 measurements were determined to be valid (95%).
- Mean values for PM_{10} were 0.0052 mg/m^3.
- Mean standard deviation is $\pm$0.0037 mg/m^3

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – CC-ER Optical readings were higher than the mean value of the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the WNW and NW. Peak Optical monitor readings were observed during the late evening and times of increased traffic during the morning.

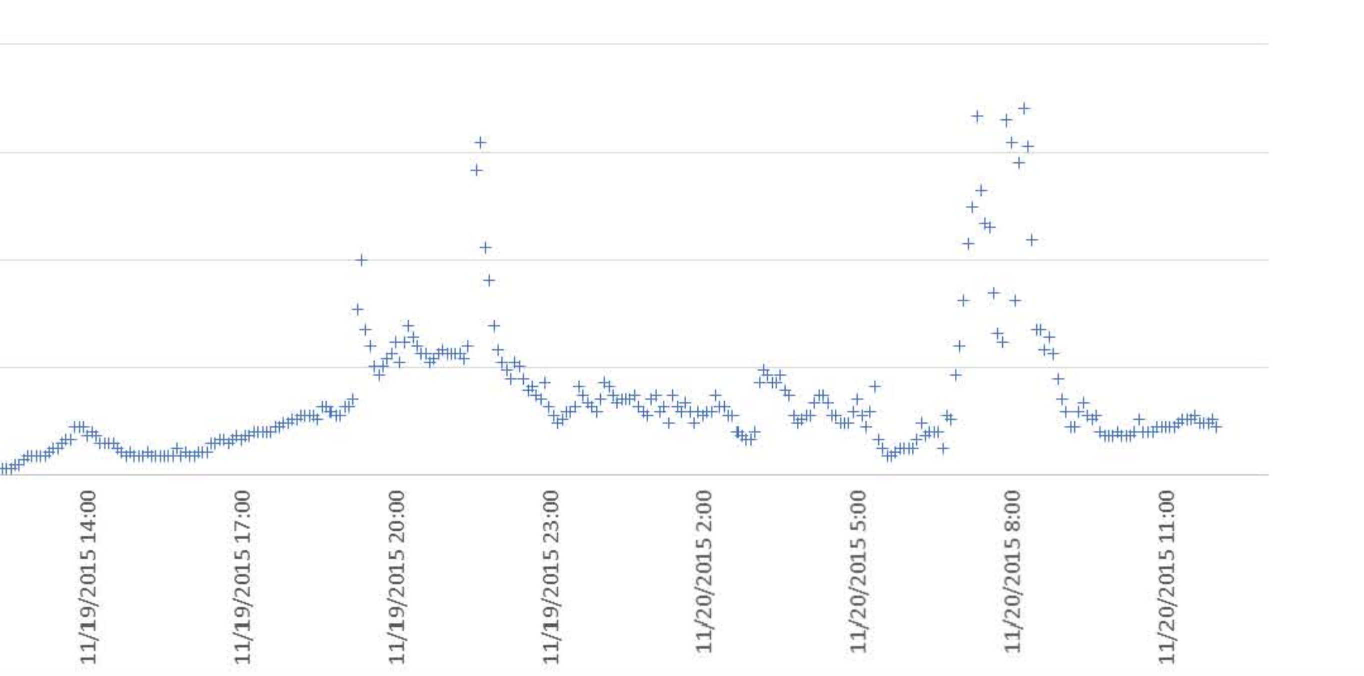
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – CC-ER Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the NW. Optical monitor readings peaked during increased afternoon traffic conditions.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – CC-ER Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed during the evening.

Graphical representations of this data is presented in Figures 3-10 through 3-12.



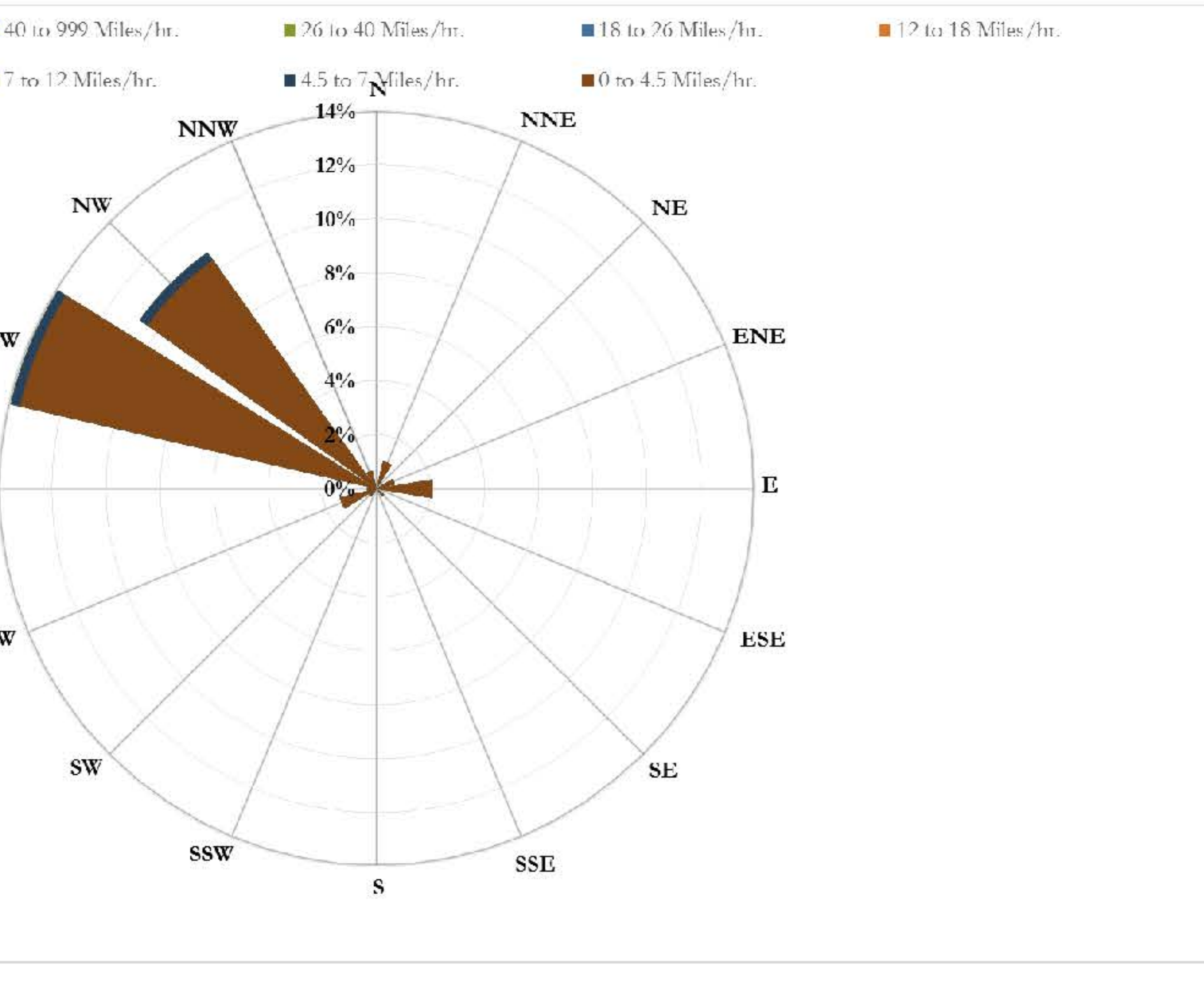
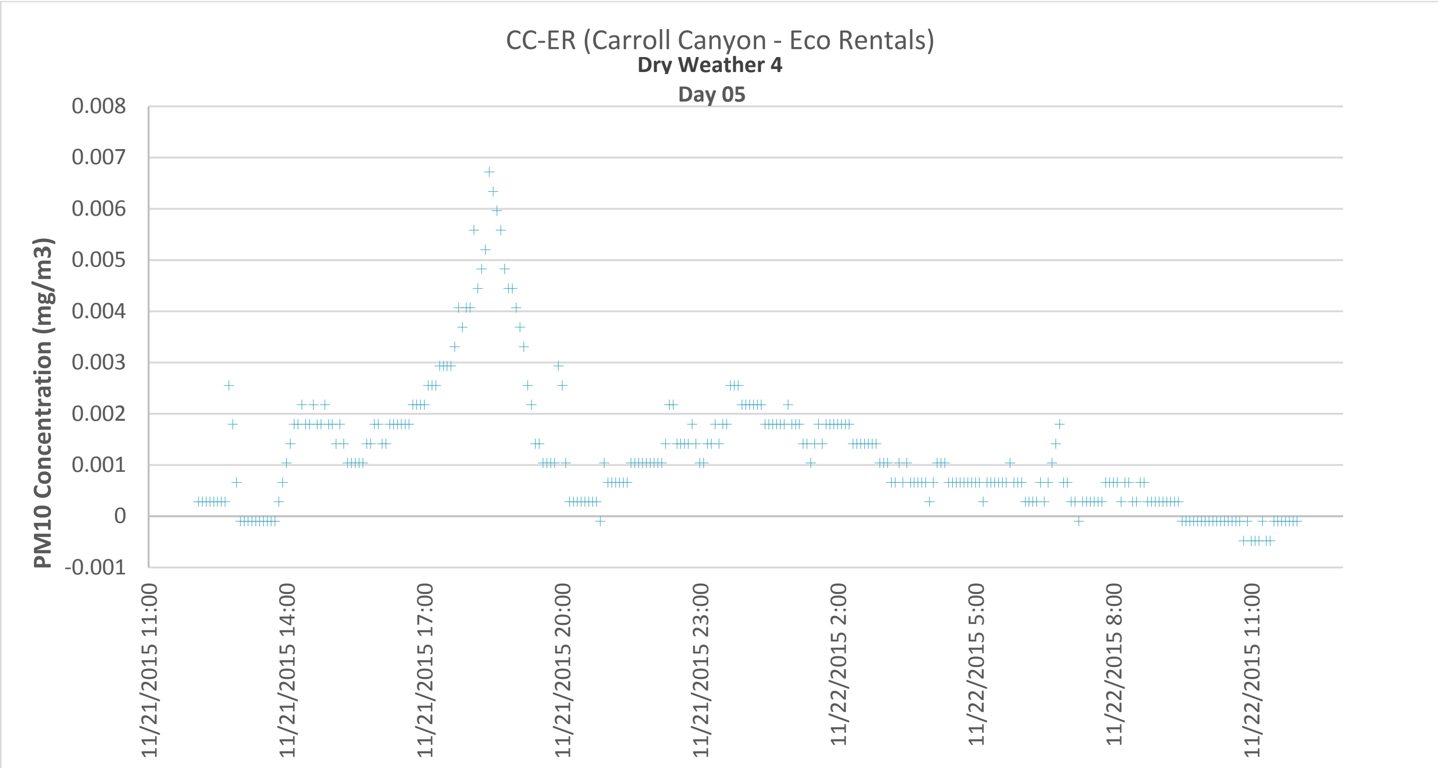


Figure 3-10.
C-ER PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



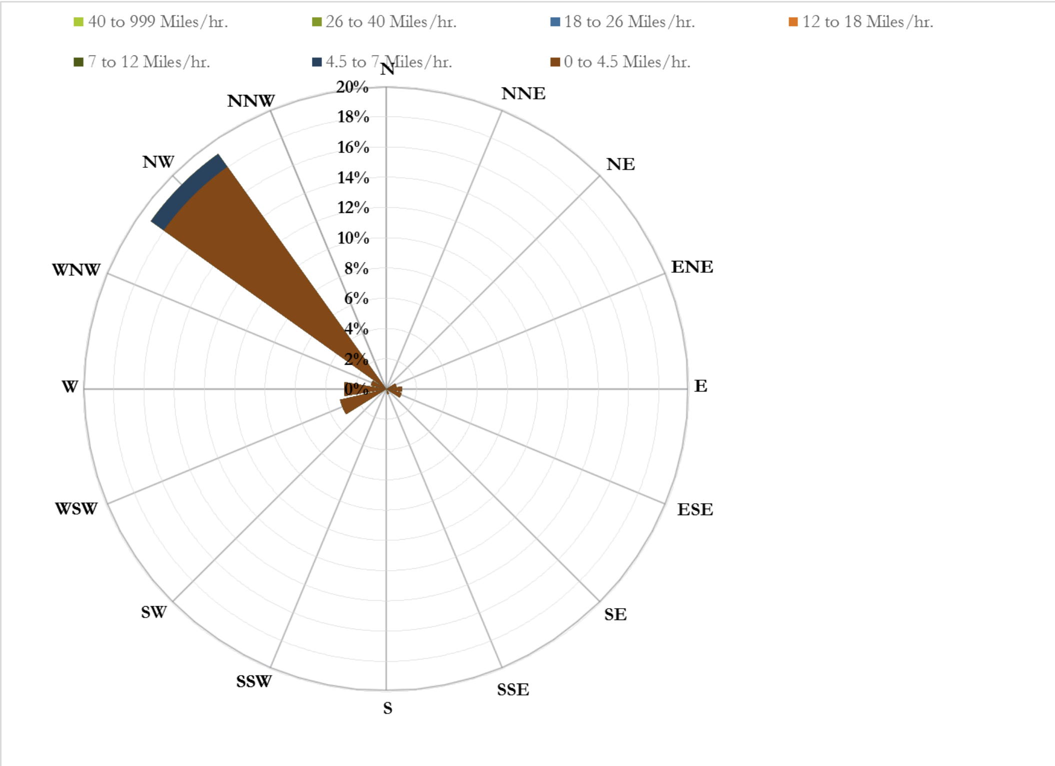
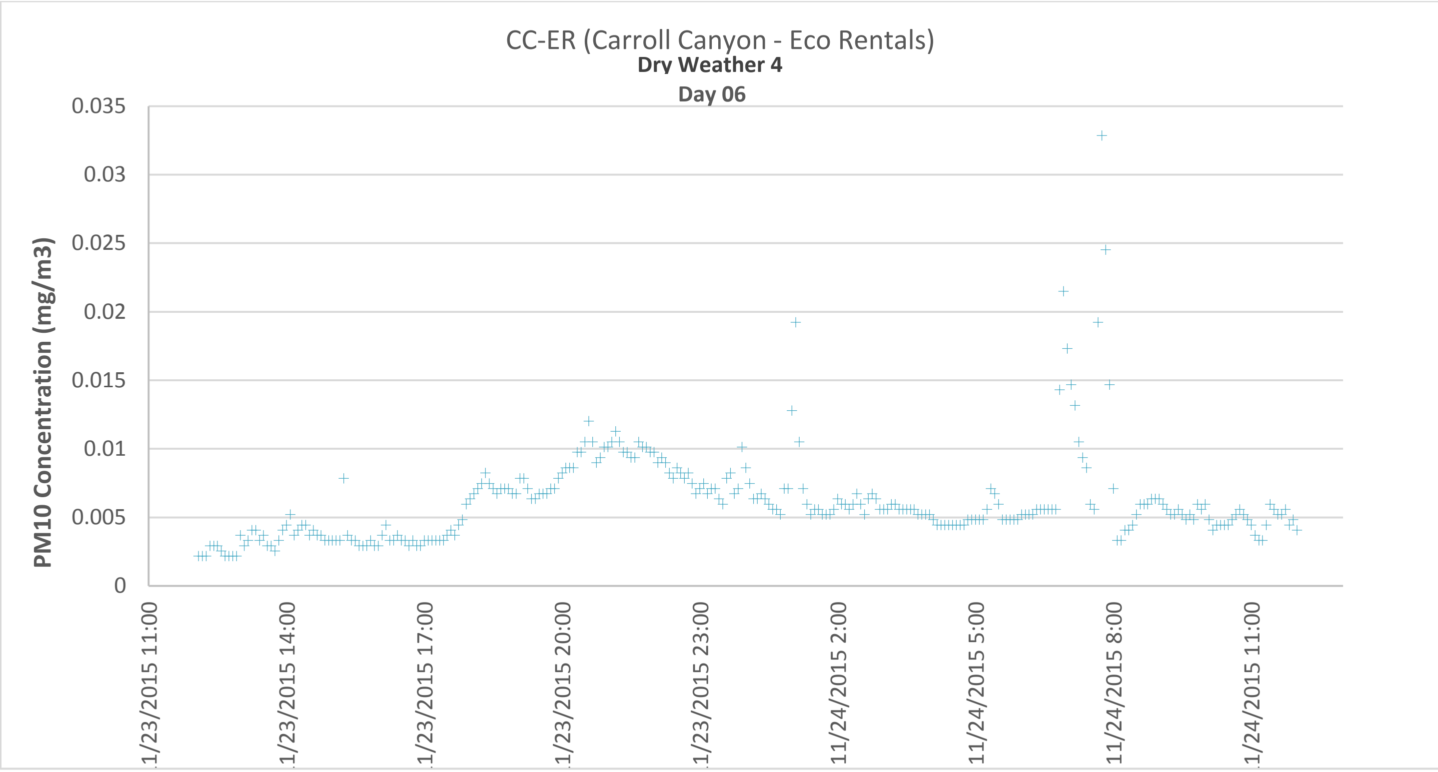


Figure 3-11.
CC-ER PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



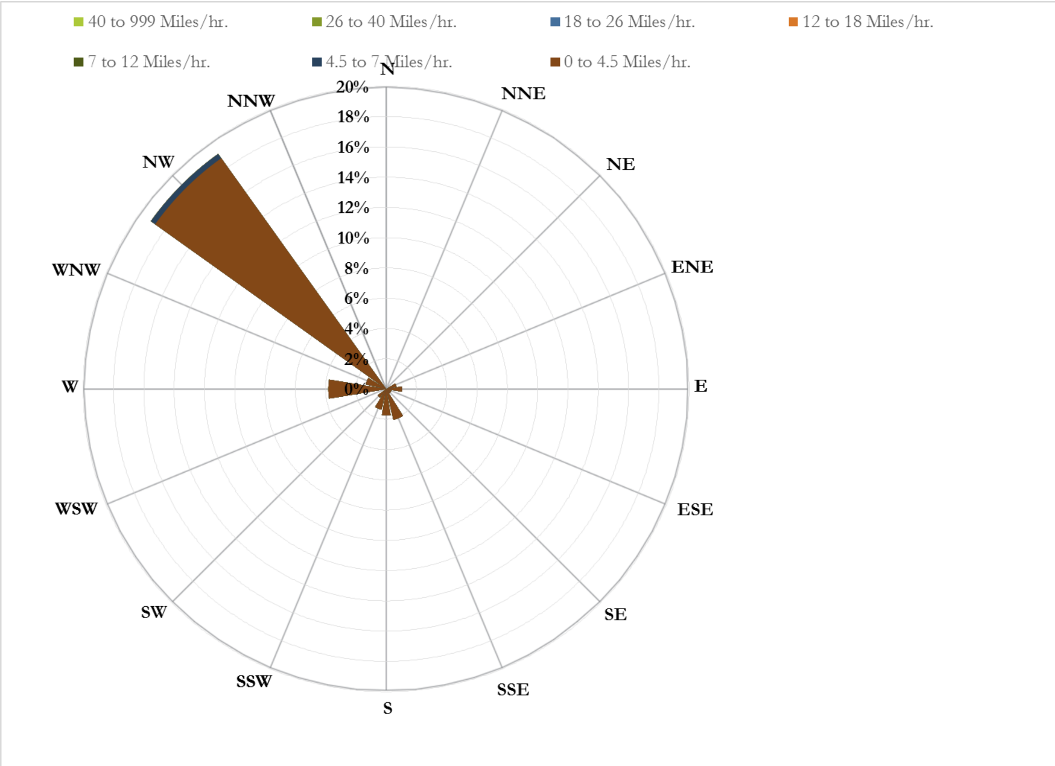


Figure 3-12.
CC-ER PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.5 CC-MP (Carroll Canyon – Maddox Park)

CC-MP (Carroll Canyon – Maddox Park):

CC-MP is a site monitored during the Phase II Watershed Special Study that was added by the City of San Diego (i.e., not funded through the RA group) and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0053 mg/m^3.
- Mean standard deviation is $\pm$0.0036 mg/m^3

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – CC-MP Optical readings were higher than the mean value of the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the SE. Peak Optical monitor readings were observed late evening and times of increased traffic during the morning.

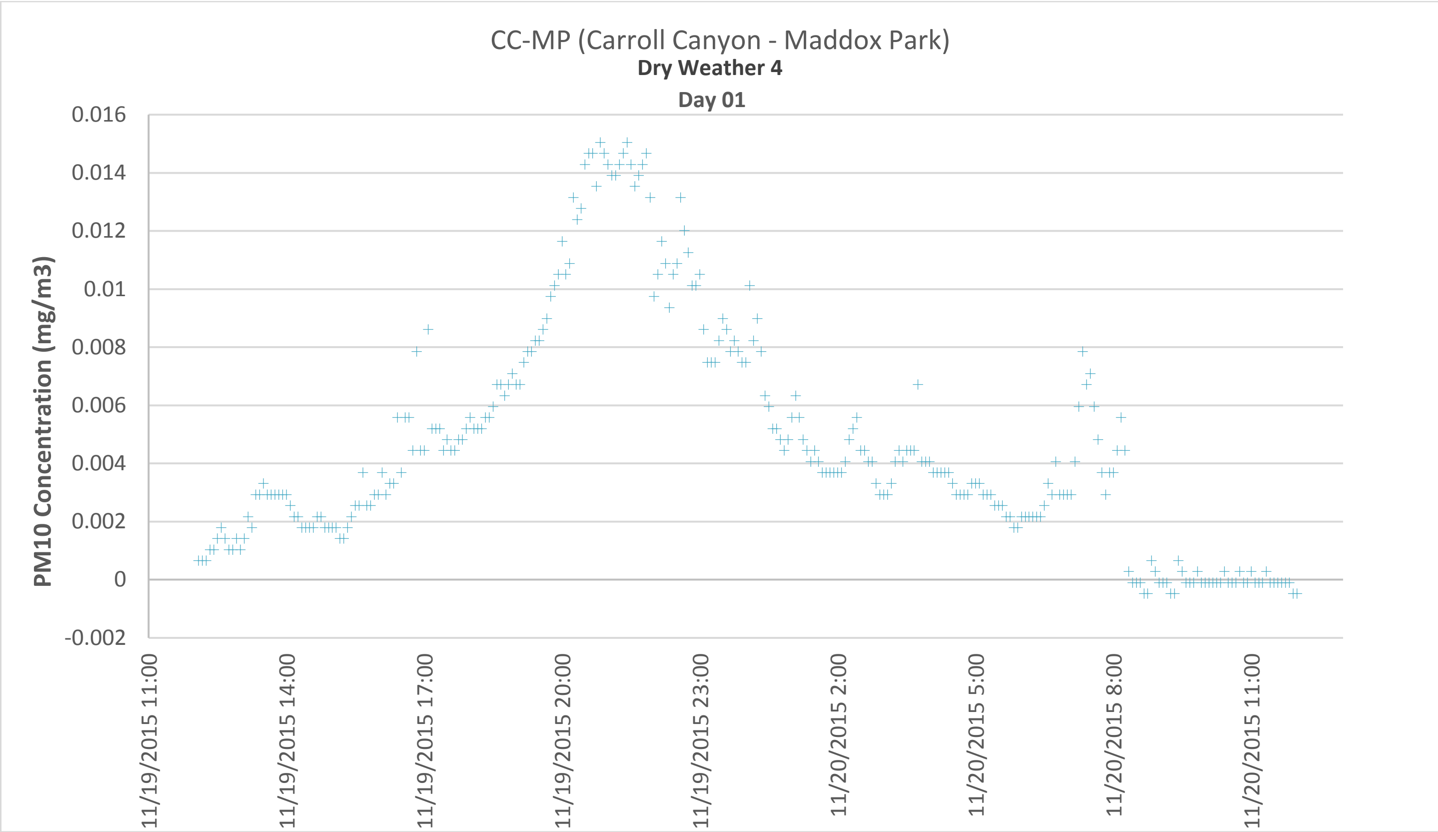
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – CC-MP Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the SW. Peak Optical monitor readings were observed late evening and times of increased traffic during the morning.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – CC-MP Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the S and SE. Peak Optical monitor readings were observed after midnight, yet were generally consistent during the 24 hour period.

Graphical representations of this data is presented in Figures 3-13 through 3-15.



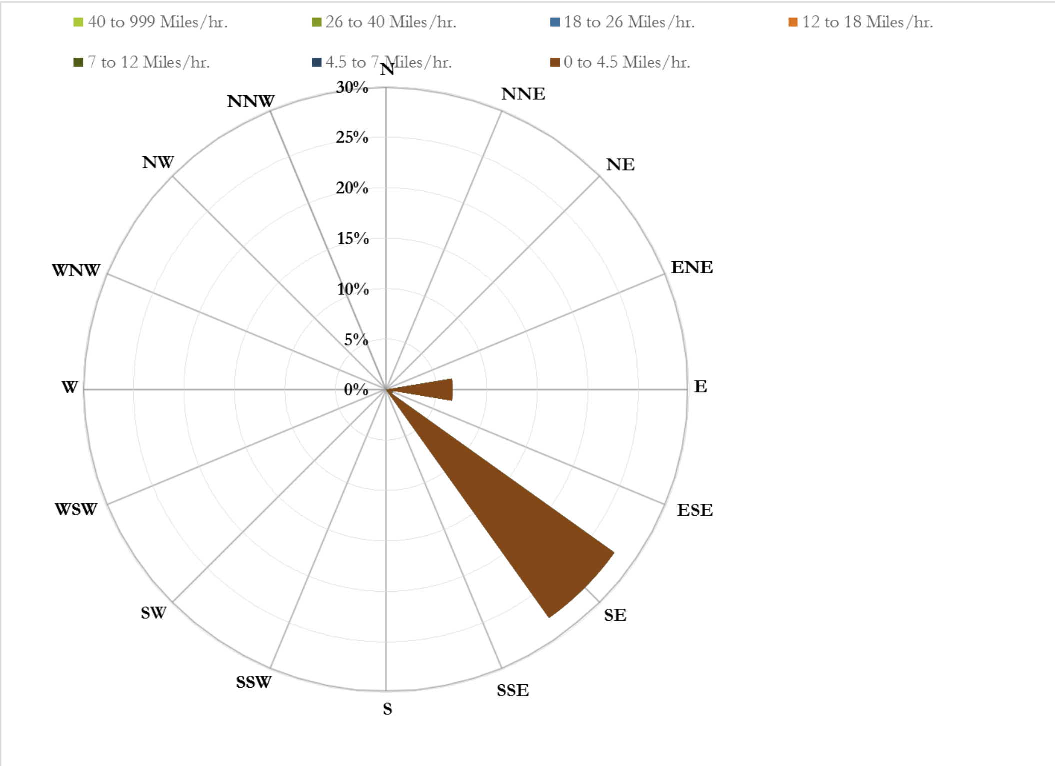
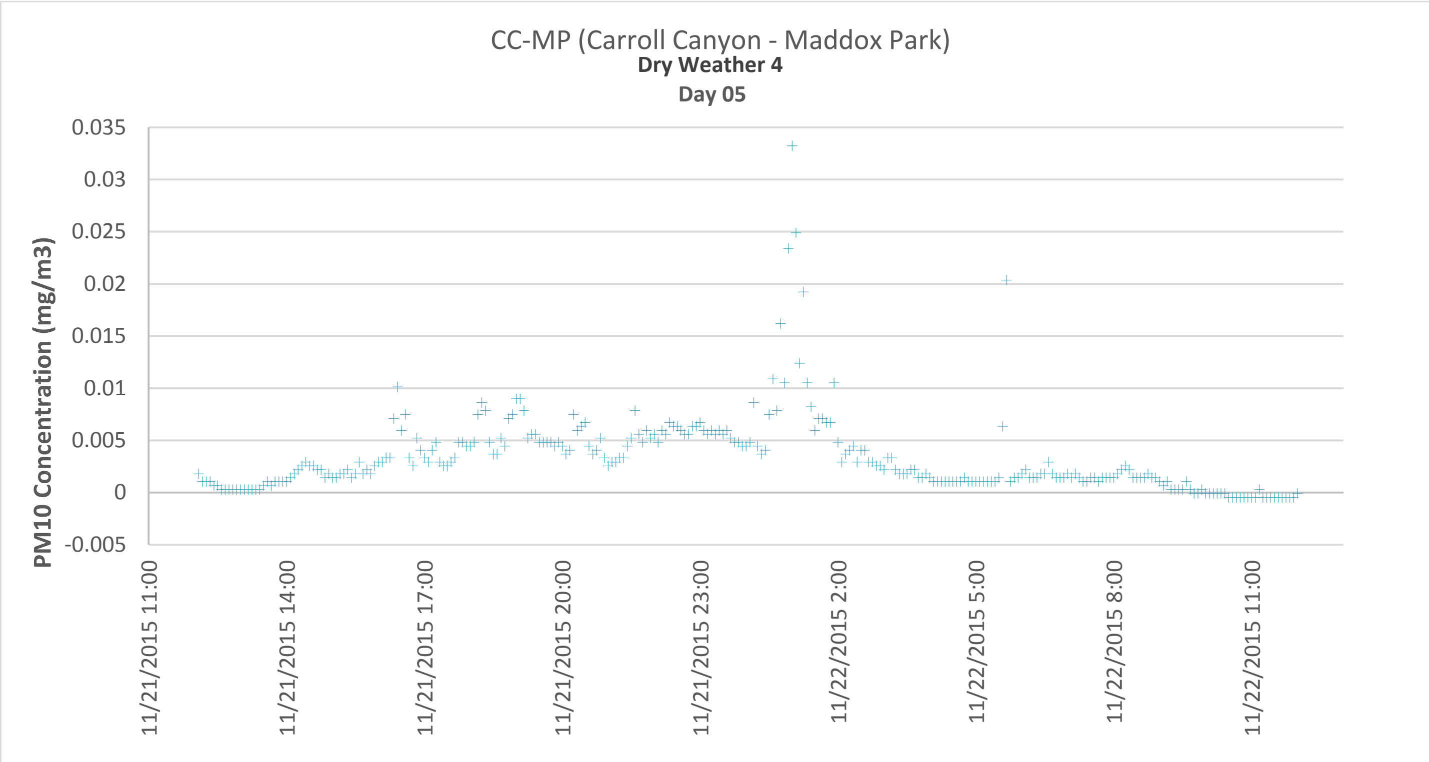


Figure 3-13.
CC-MP PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



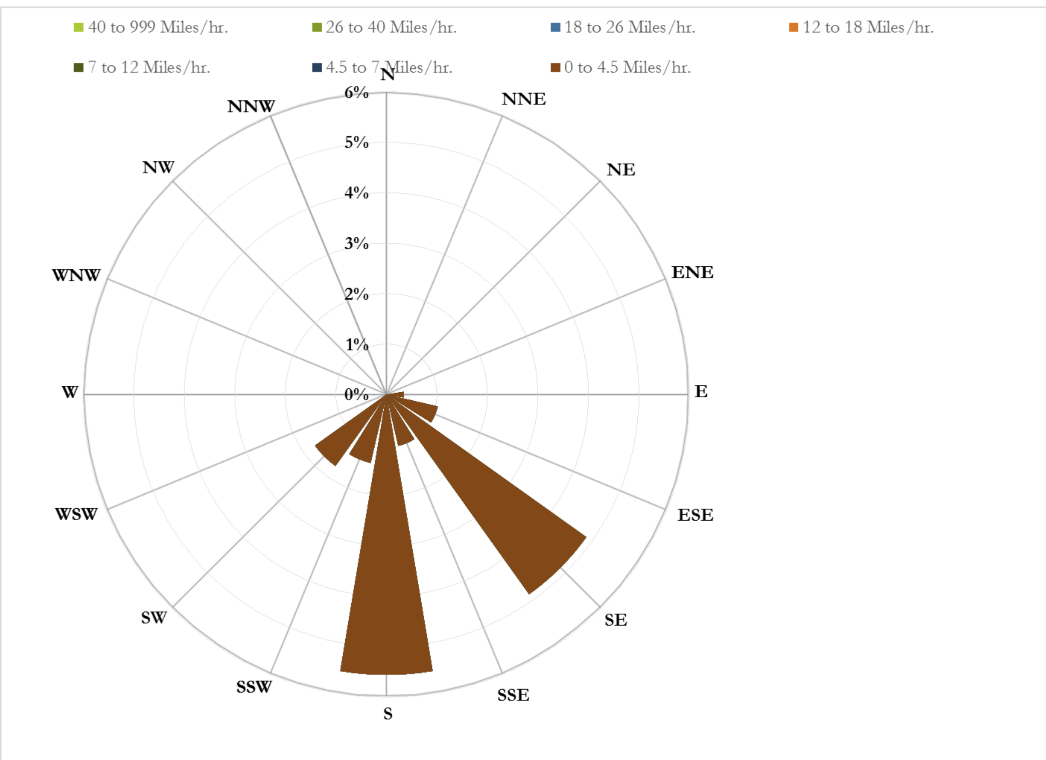
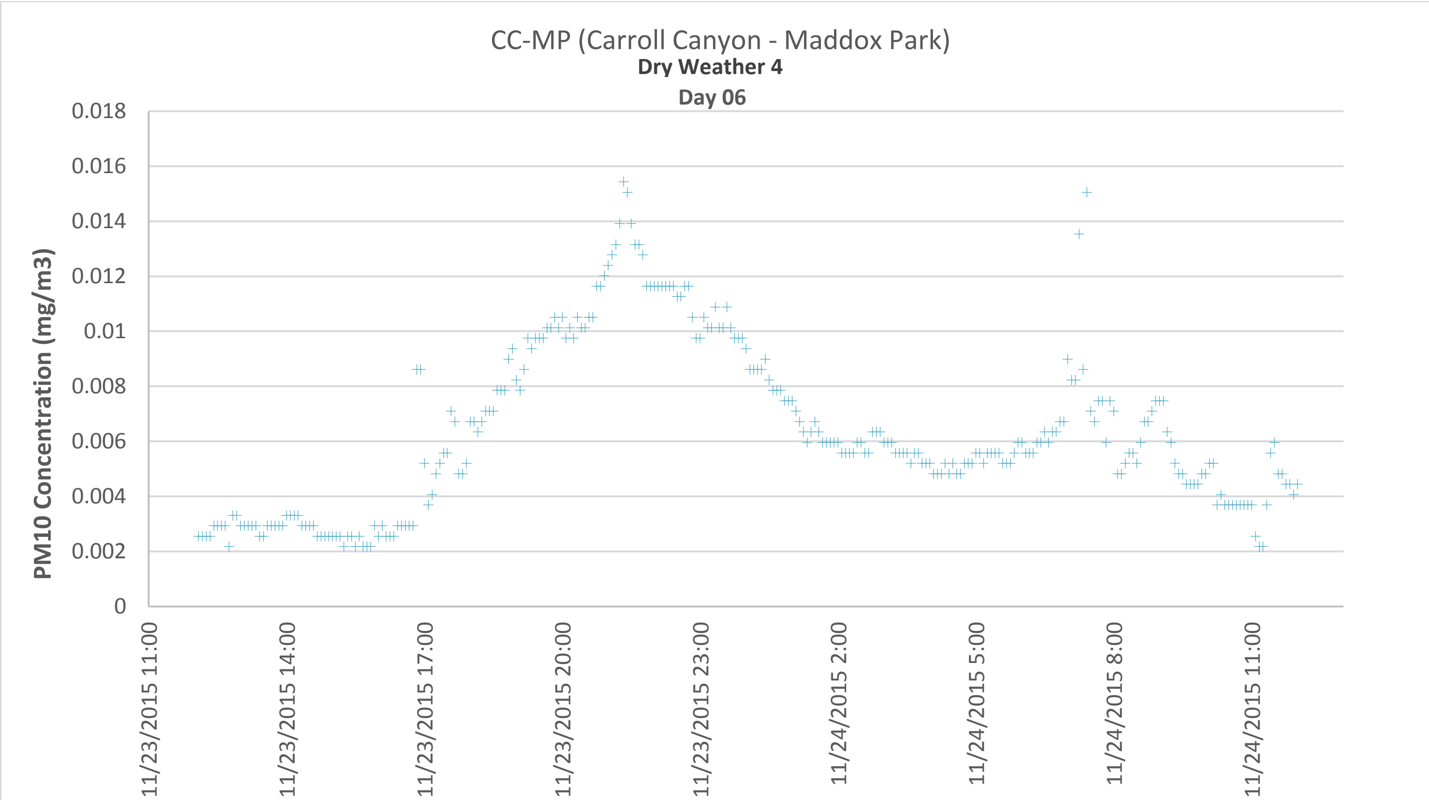


Figure 3-15.
CC-MP PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



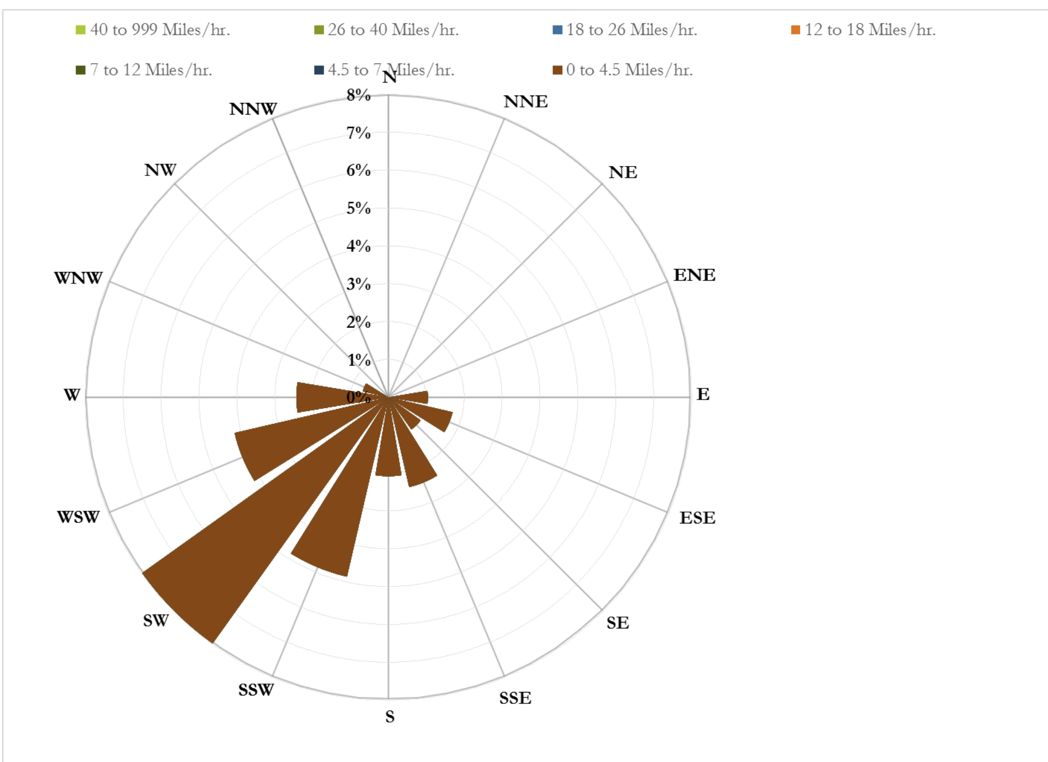


Figure 3-14.
CC-MP PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.6 CC-SF (Carroll Canyon – Camino Santa Fe)

CC-SF (Carroll Canyon – Camino Santa Fe):

CC-MP is a site monitored during the Phase II Watershed Special Study that was added by the City of San Diego (i.e., not funded through the RA group) and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0066 mg/m^3.
- Mean standard deviation is $\pm$0.0031 mg/m^3

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – CC-SF Optical readings were higher than the mean value of the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the SE. Peak Optical monitor readings were observed late evening and at times of increased traffic during the morning.

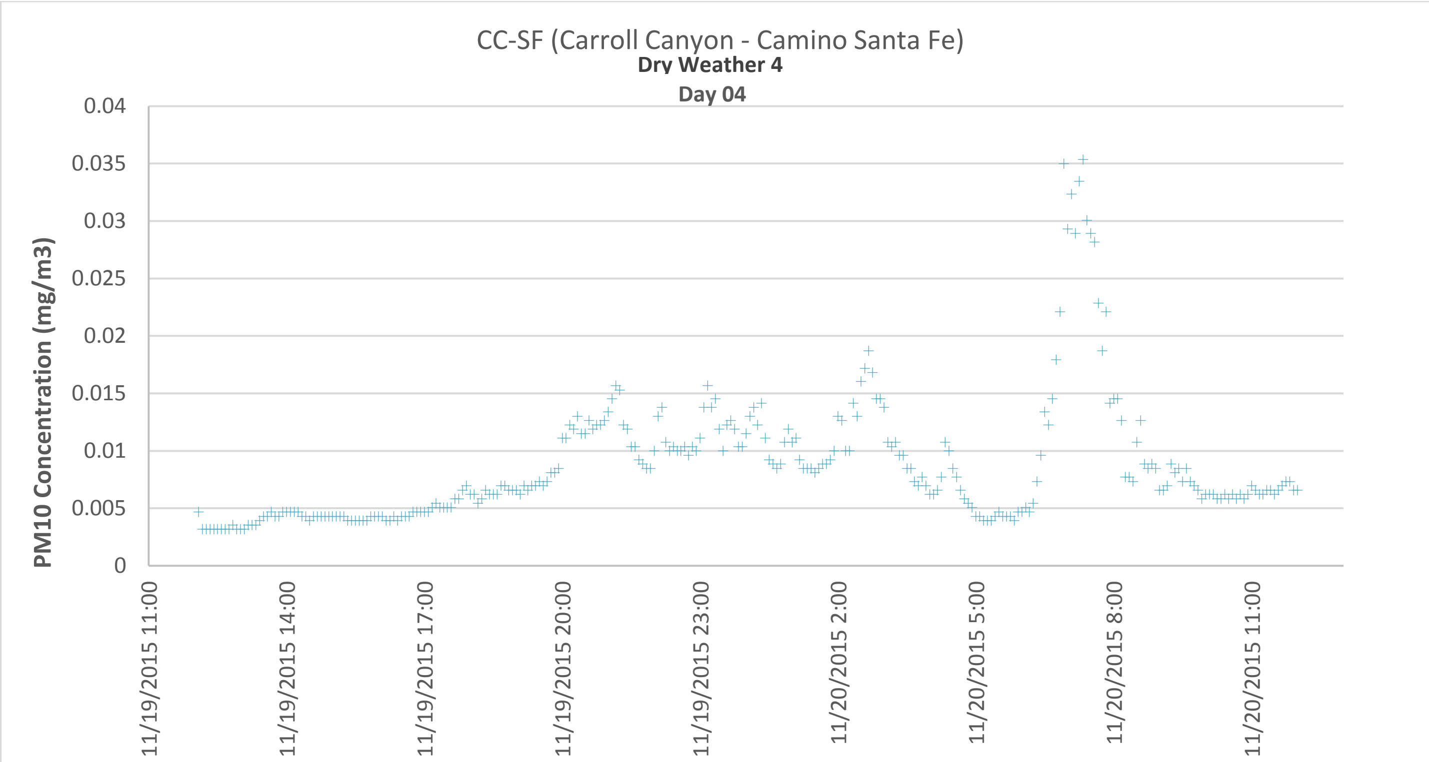
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – CC-SF Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the WSW, SW, and SSW. Optical monitor readings were consistently distributed throughout the 24 hour monitoring period.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – CC-SF Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the S and SE. Peak Optical monitor readings were observed during sundown and at times of increased traffic during the morning

Graphical representations of this data is presented in Figure 3-16 through 3-18.



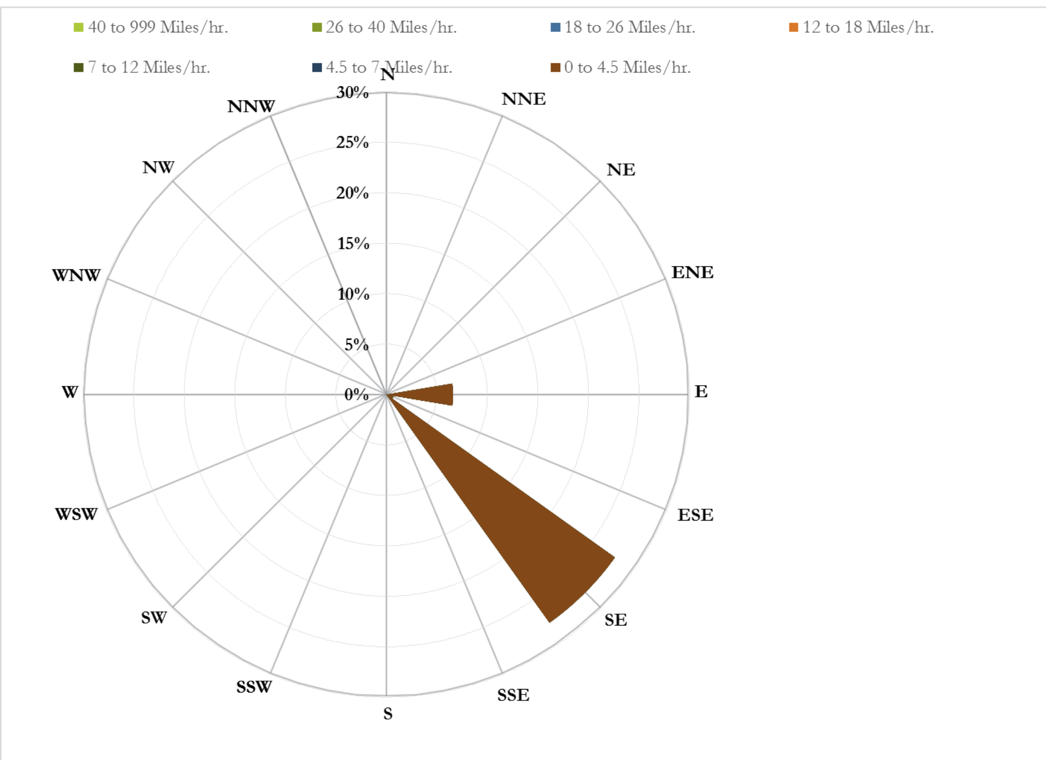
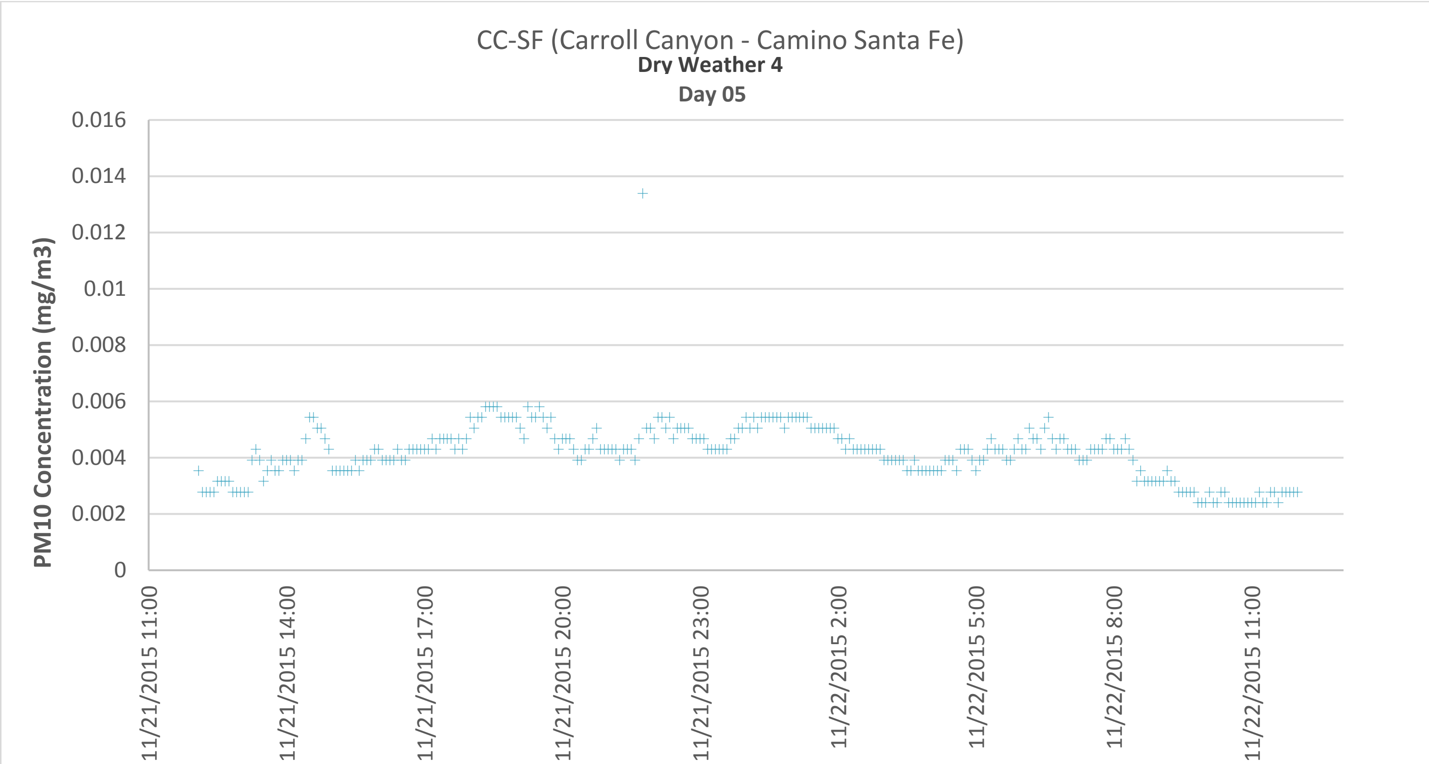


Figure 3-16.
CC-SF PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



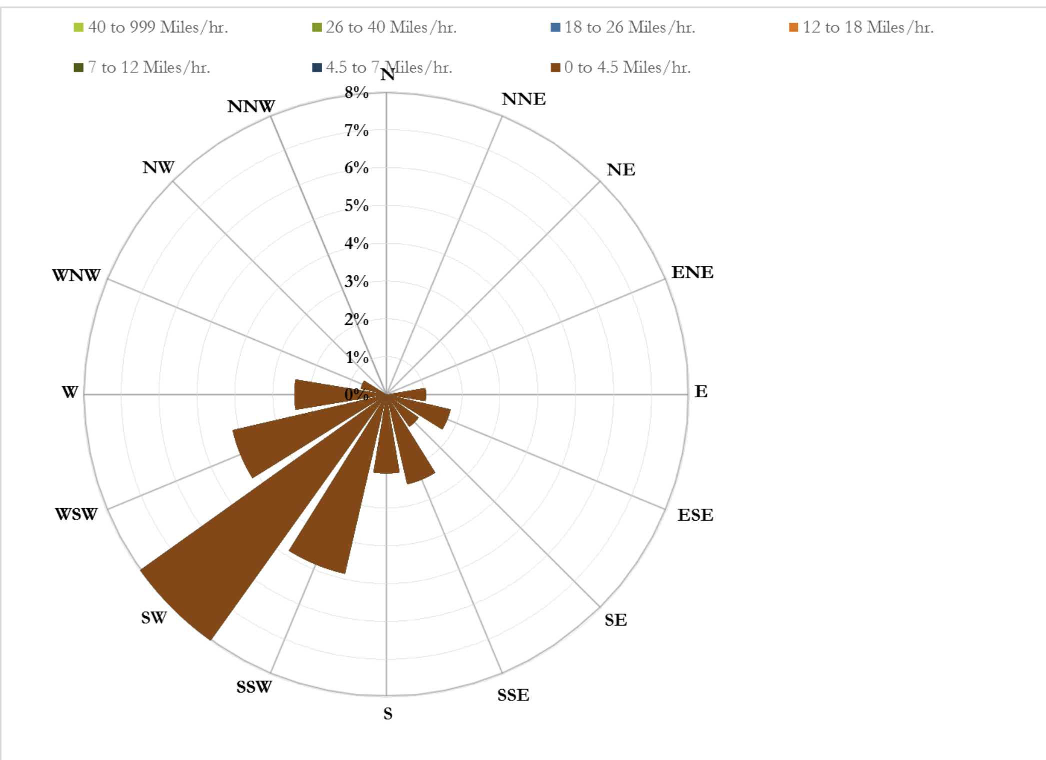
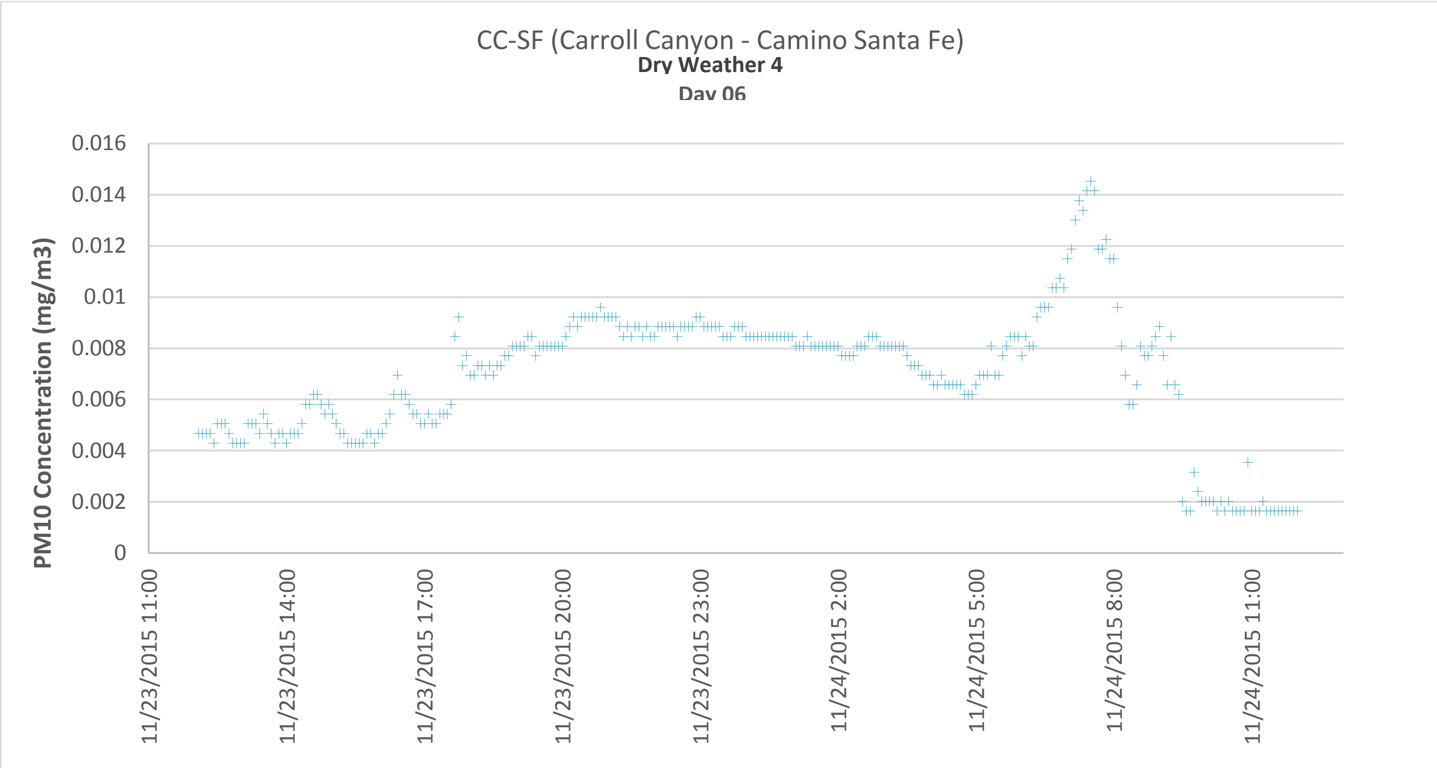


Figure 3-17.
CC-SF PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



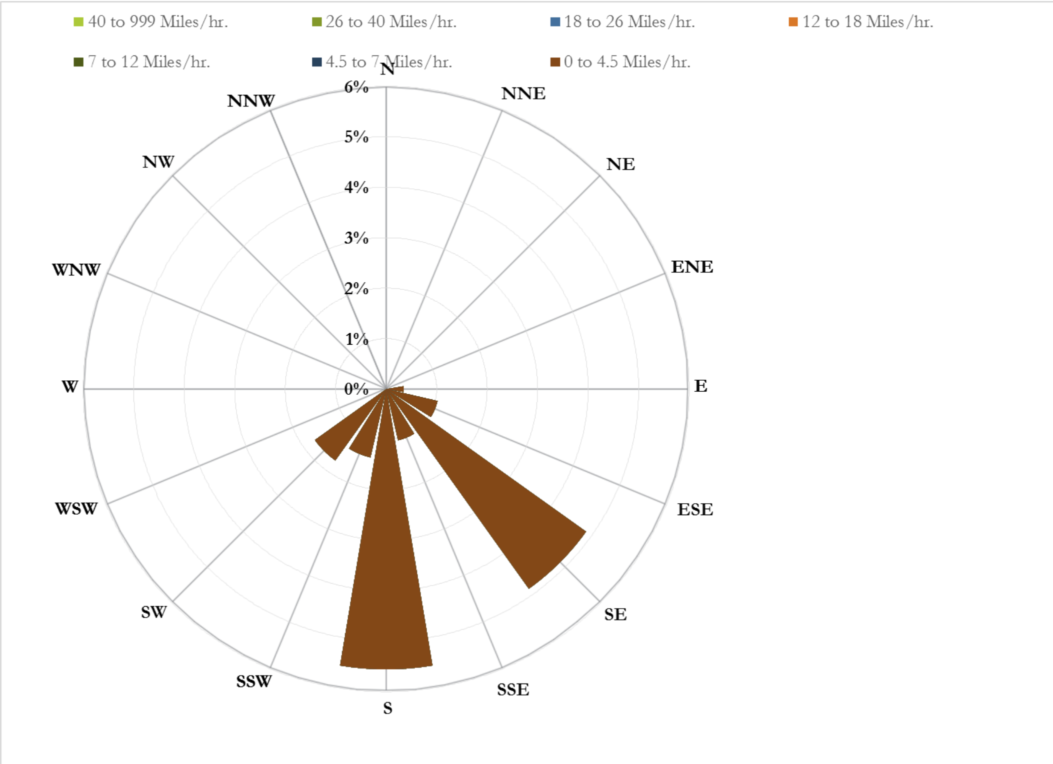


Figure 3-18.
CC-SF PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.7 CC-SR (Carroll Canyon – Scripps Ranch)

CC-SR (Carroll Canyon – Scripps Ranch):

CC-SR is a site monitored during the Phase I and 2 Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 842 measurements were determined to be valid (97%).
- Mean values for PM_{10} were 0.0025 mg/m^3.
- Mean standard deviation is $\pm$0.0015 mg/m^3

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – CC-SR Optical readings were lower than the mean value of the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the SE. Peak Optical monitor readings were observed during sundown and late morning.

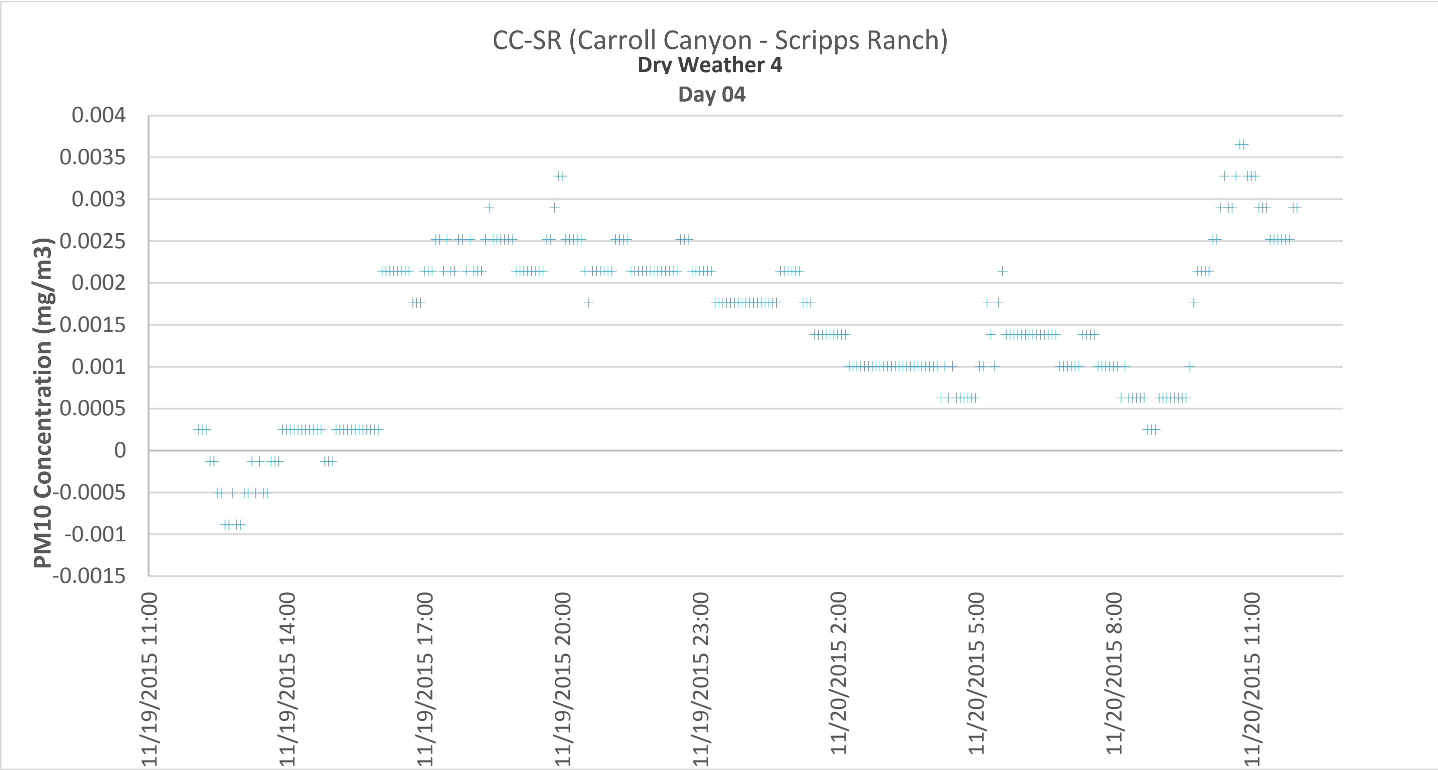
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – CC-SR Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the WSW, SW, and SSW. Optical monitor readings peaked during the evening and sundown.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – CC-SR Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the WNW, NE, and ENE. Peak Optical monitor readings were observed before midnight.

Graphical representations of this data is presented in Figure 3-19 through 3 -21.



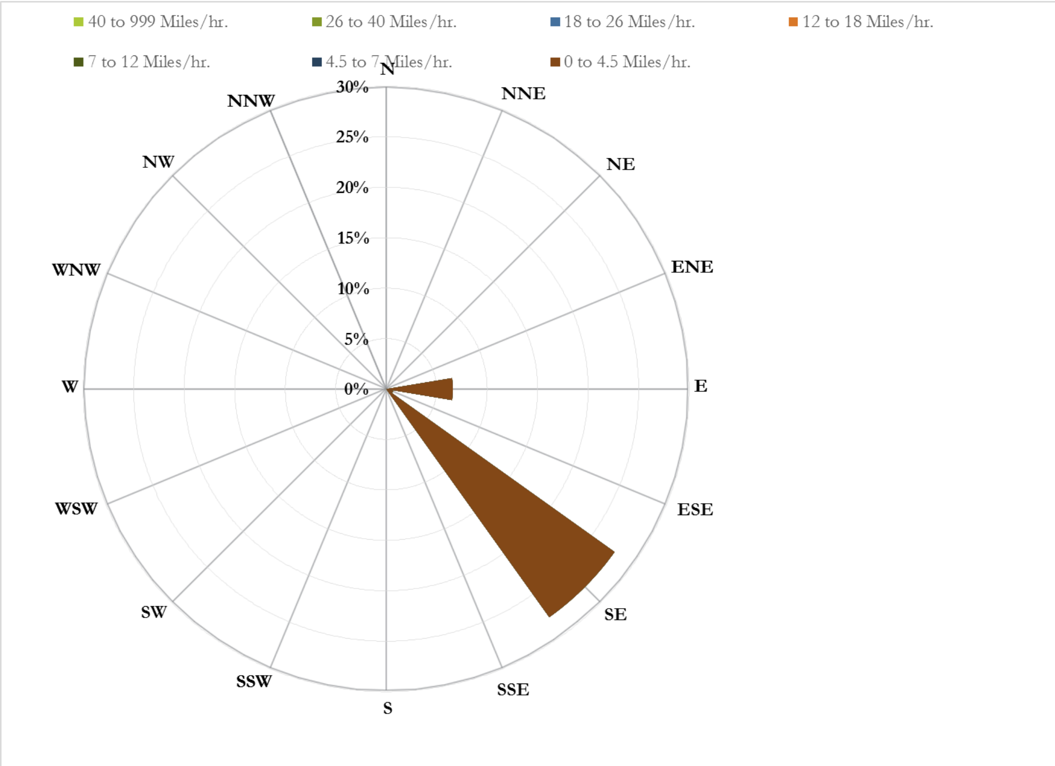
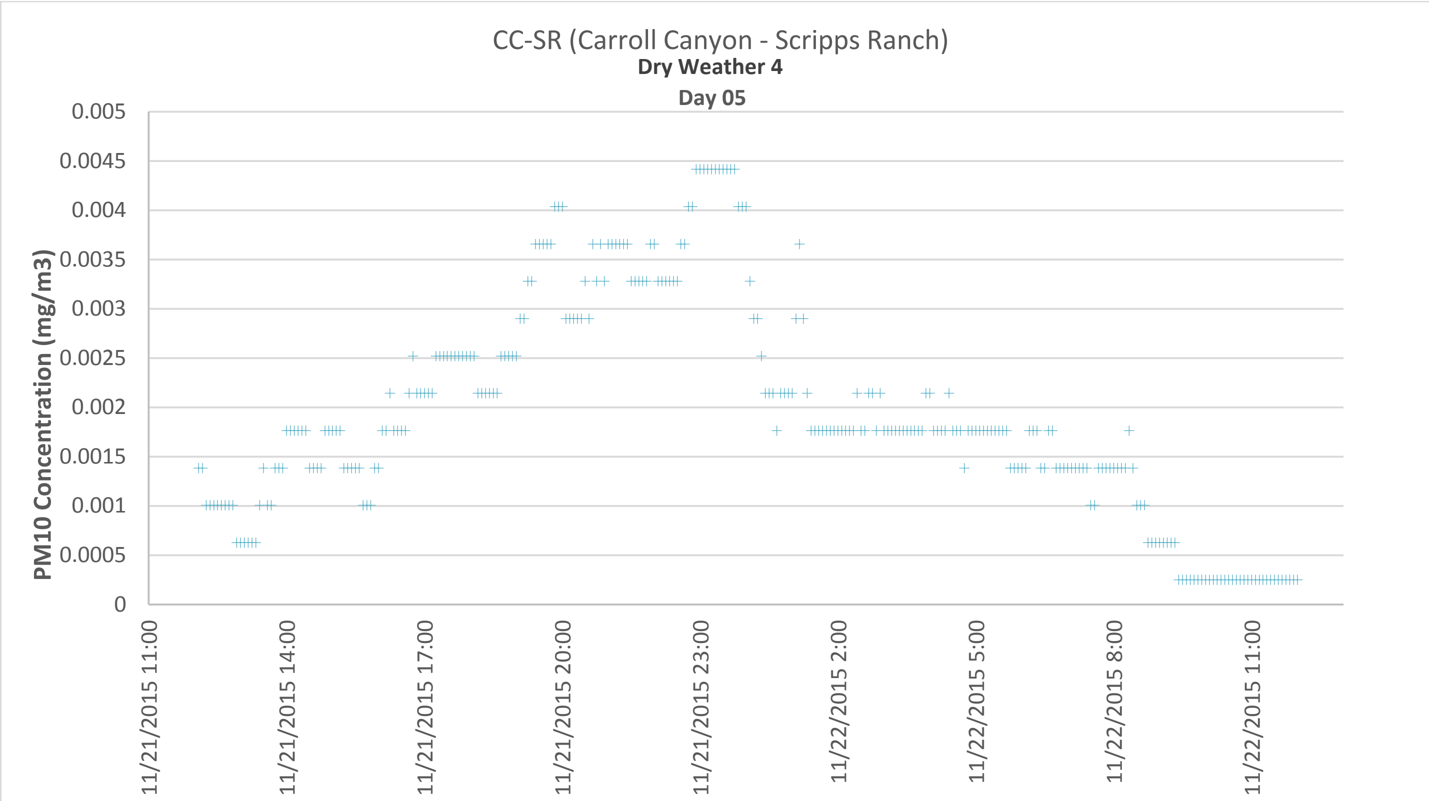


Figure 3-19.
CC-SR PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



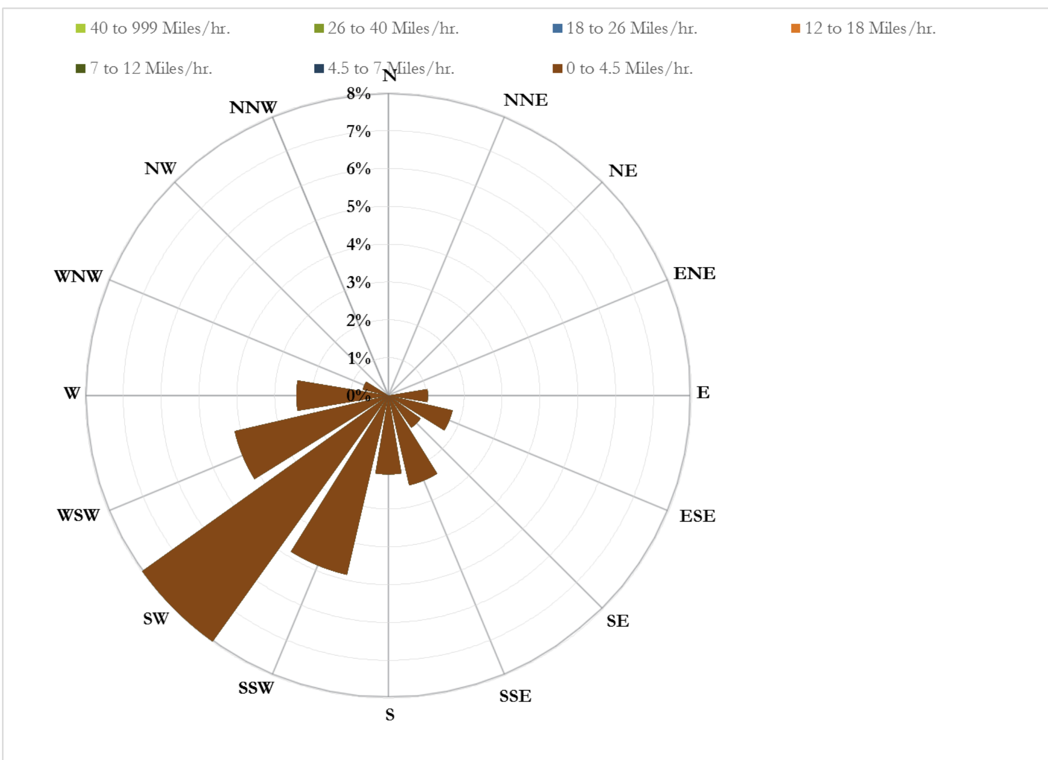
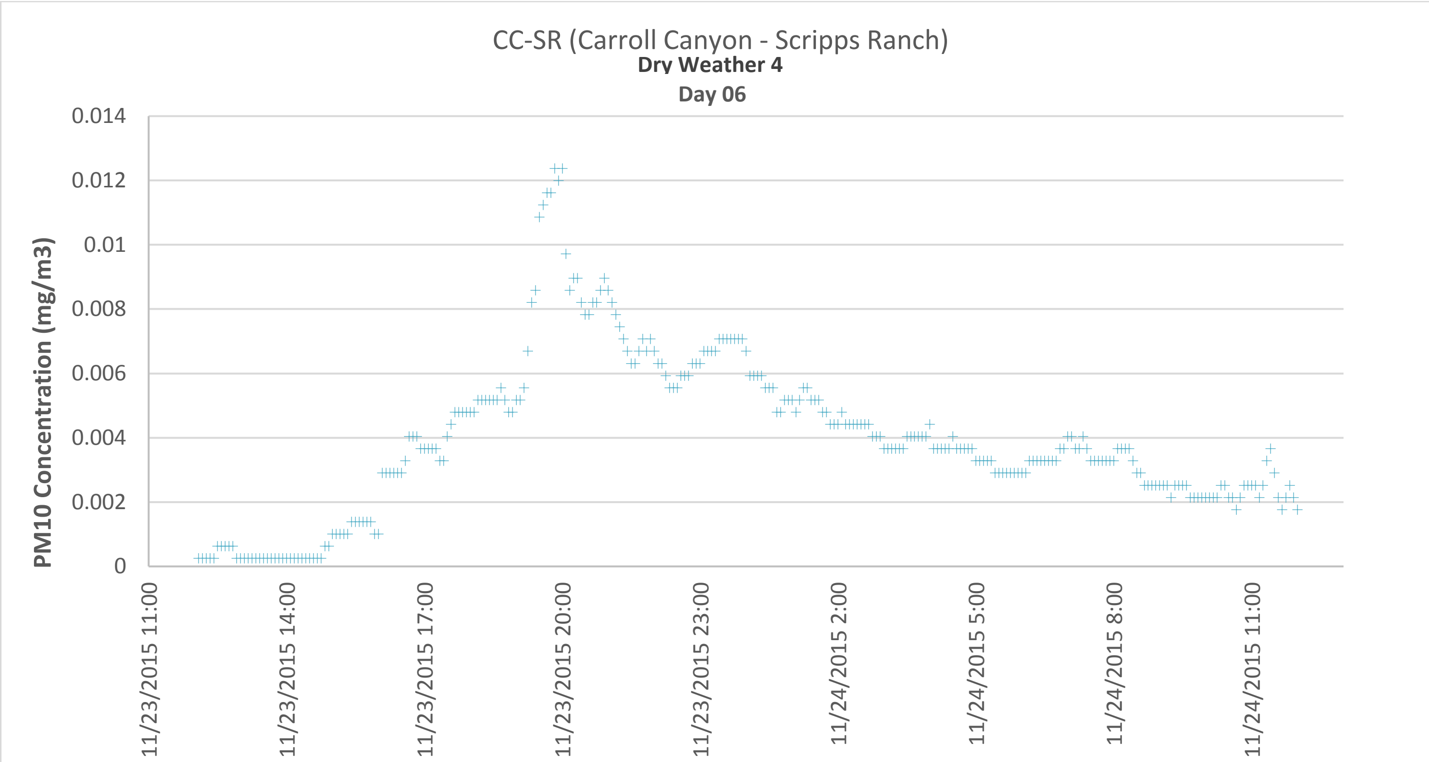


Figure 3-20.
CC-SR PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



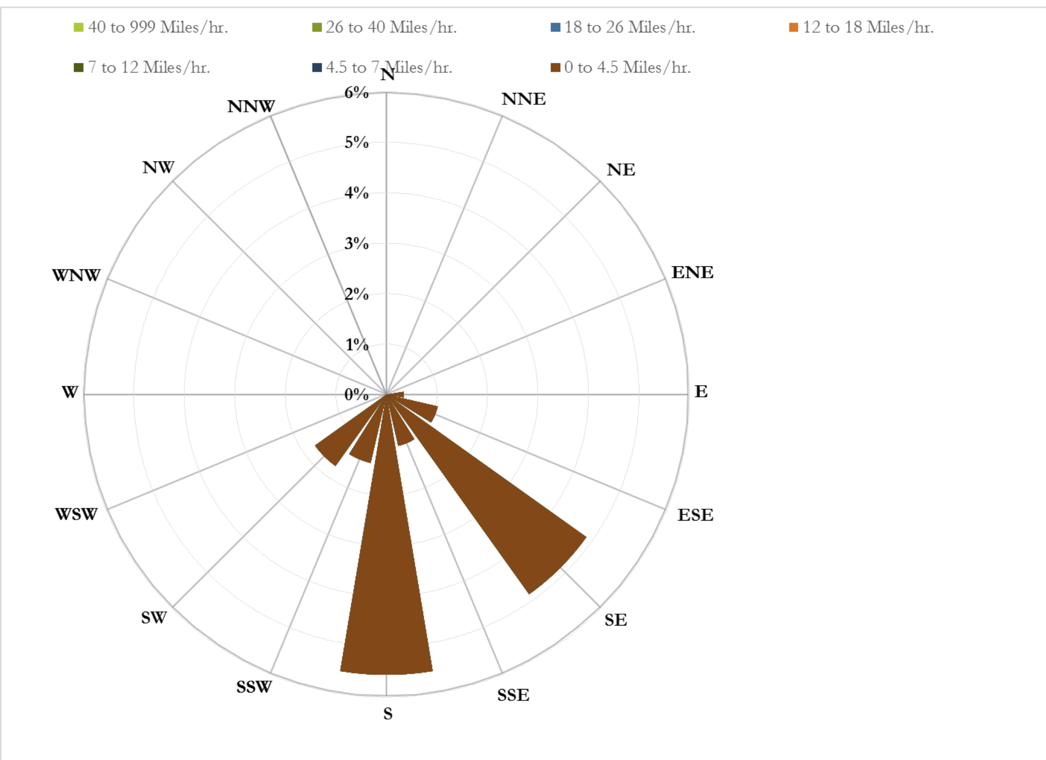


Figure 3-21.
CC-SR PM$_{10}$ Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.8 CC-UP (Carroll Canyon – Upwind)

CC-UP (Carroll Canyon – Upwind):

CC-UP is a site monitored during the Phase I and 2 Watershed Special Study and contains an Optical monitor and an FRM sampler.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 812 measurements were determined to be valid (93%).
- Mean values for PM_{10} were 0.0053 mg/m^3.
- Mean standard deviation is $\pm$0.0030 mg/m^3

FRM Sampler (Laboratory) Results:

- Mean values for PM_{10} was 0.0860 mg/m^3.
- Mean RPD from the FRM results to the Optical monitor results was 144.28%

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – CC-UP Optical readings were higher than the mean value of the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the SE. Peak Optical monitor readings were observed during sundown and late morning.

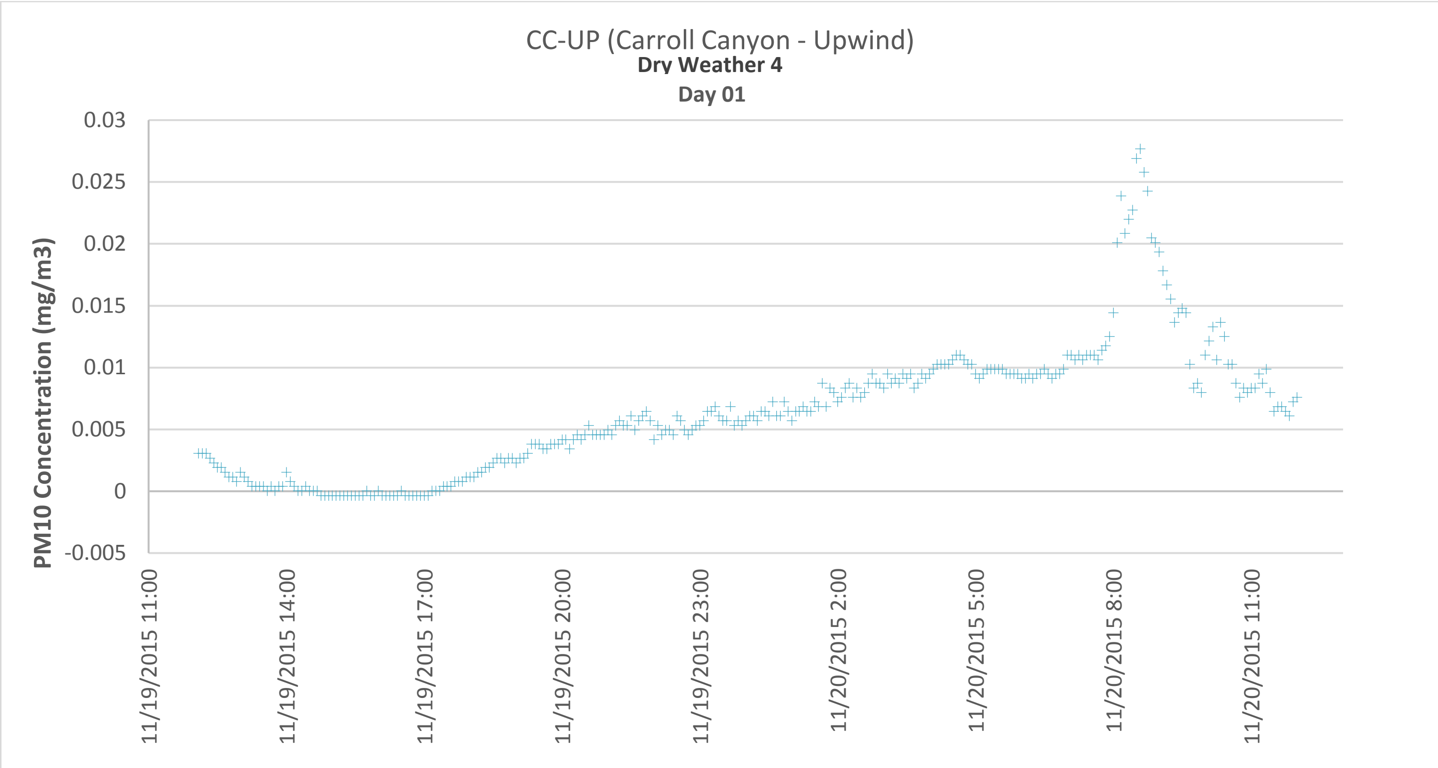
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – CC-UP Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the NW. Optical monitor readings increased during the evening and sundown.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – CC-UP Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed before midnight and during times of increased traffic in the morning.

Graphical representations of this data is presented in Figures 3-22 through 3-24.



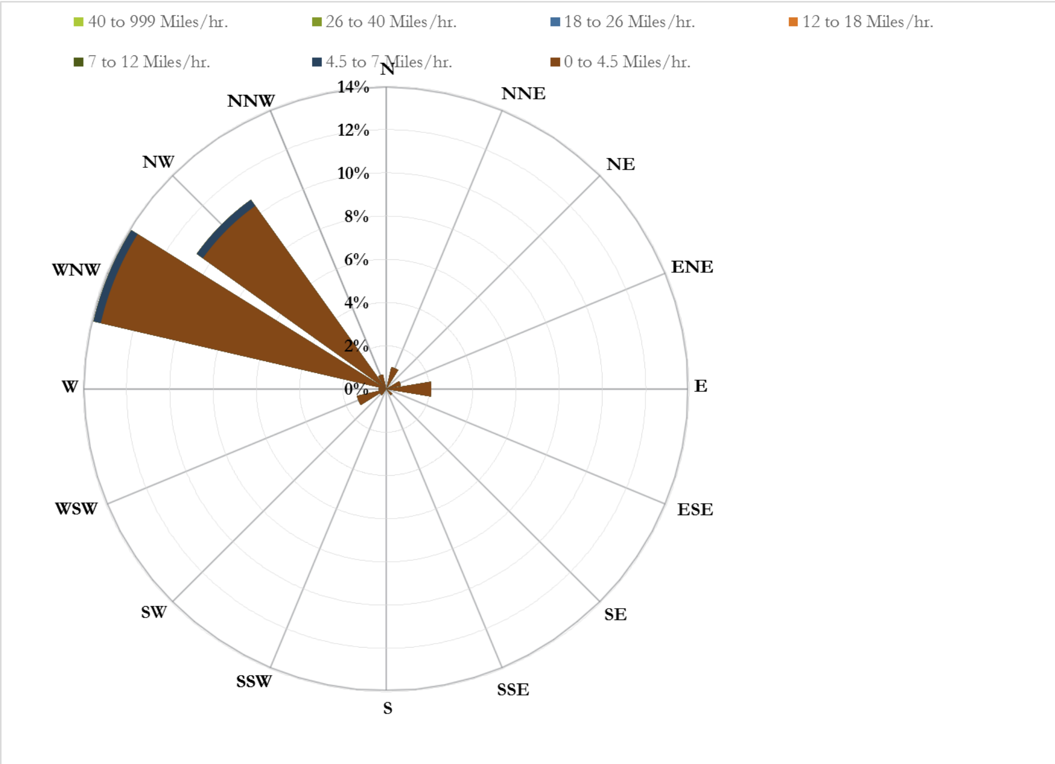
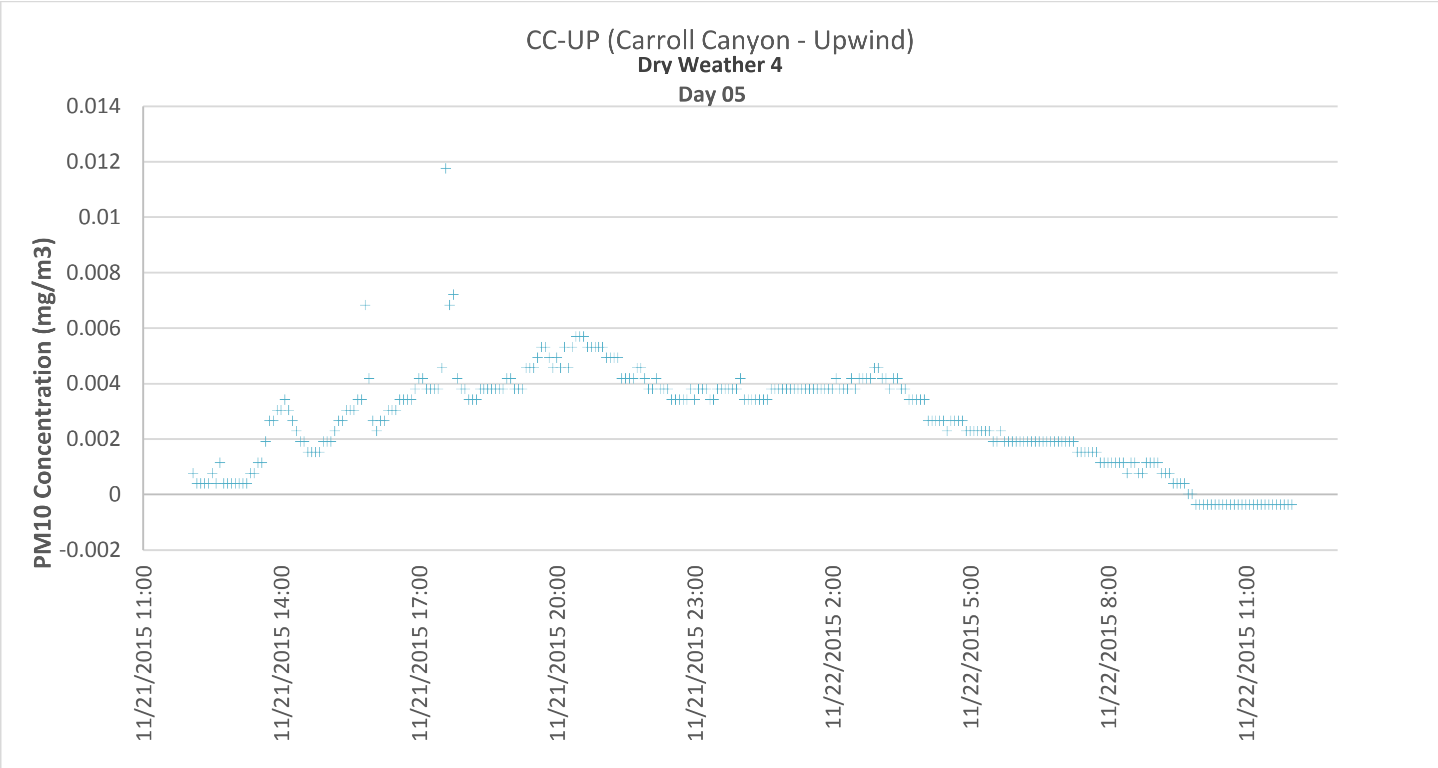


Figure 3-22.
CC-UP PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



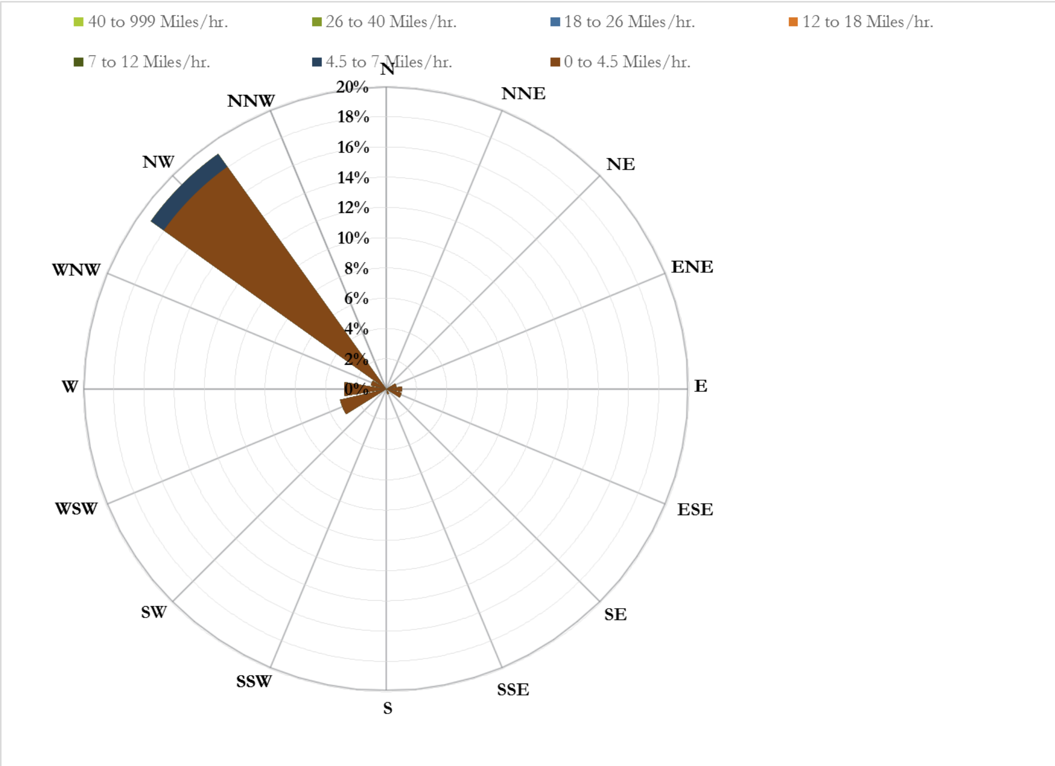
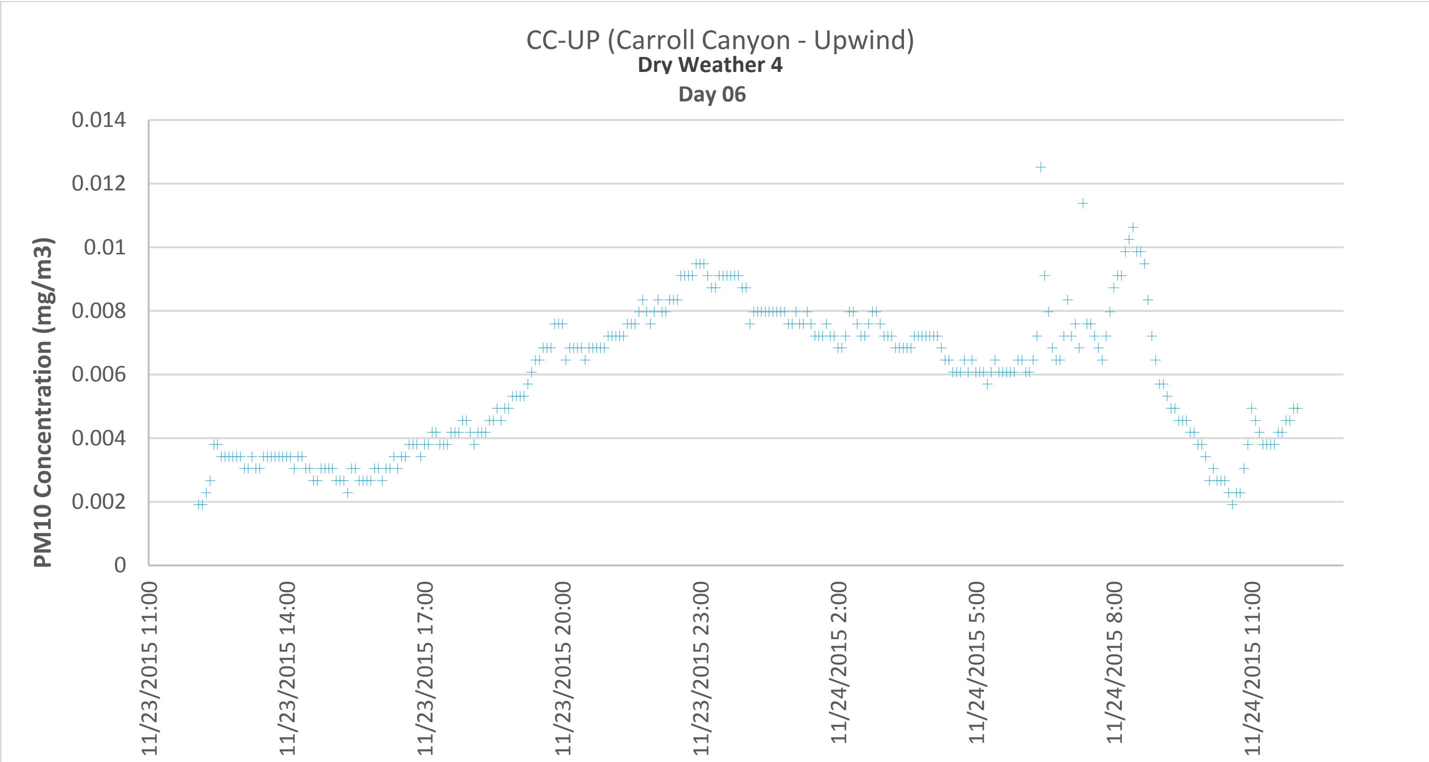


Figure 3-23.
CC-UP PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



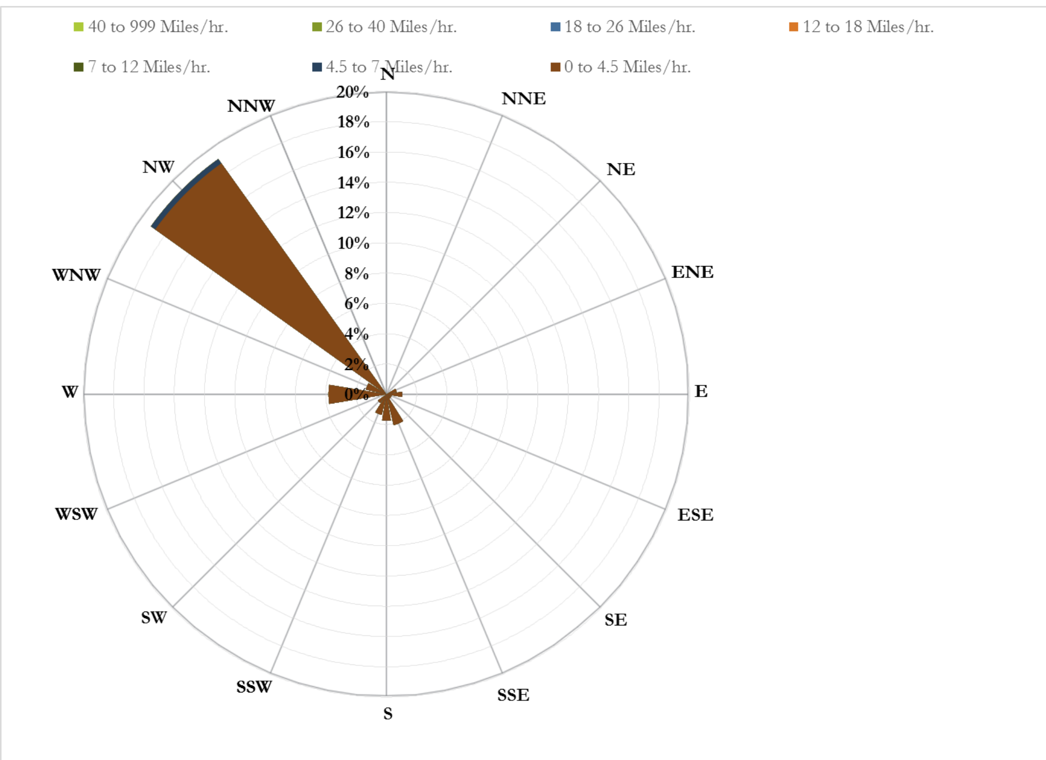


Figure 3-24.
CC-UP PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.9 CV-CD (Carmel Valley – Camino Del Sur)

CV-CD (Carmel Valley – Camino Del Sur):

CV-CD is a site monitored during the Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0032 mg/m^3.
- Mean standard deviation is $\pm$0.0015 mg/m^3

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – CV-CD Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind direction were observed primarily from the WNW, NW, and the E. Peak Optical monitor readings were observed between 15:00 to 20:00.

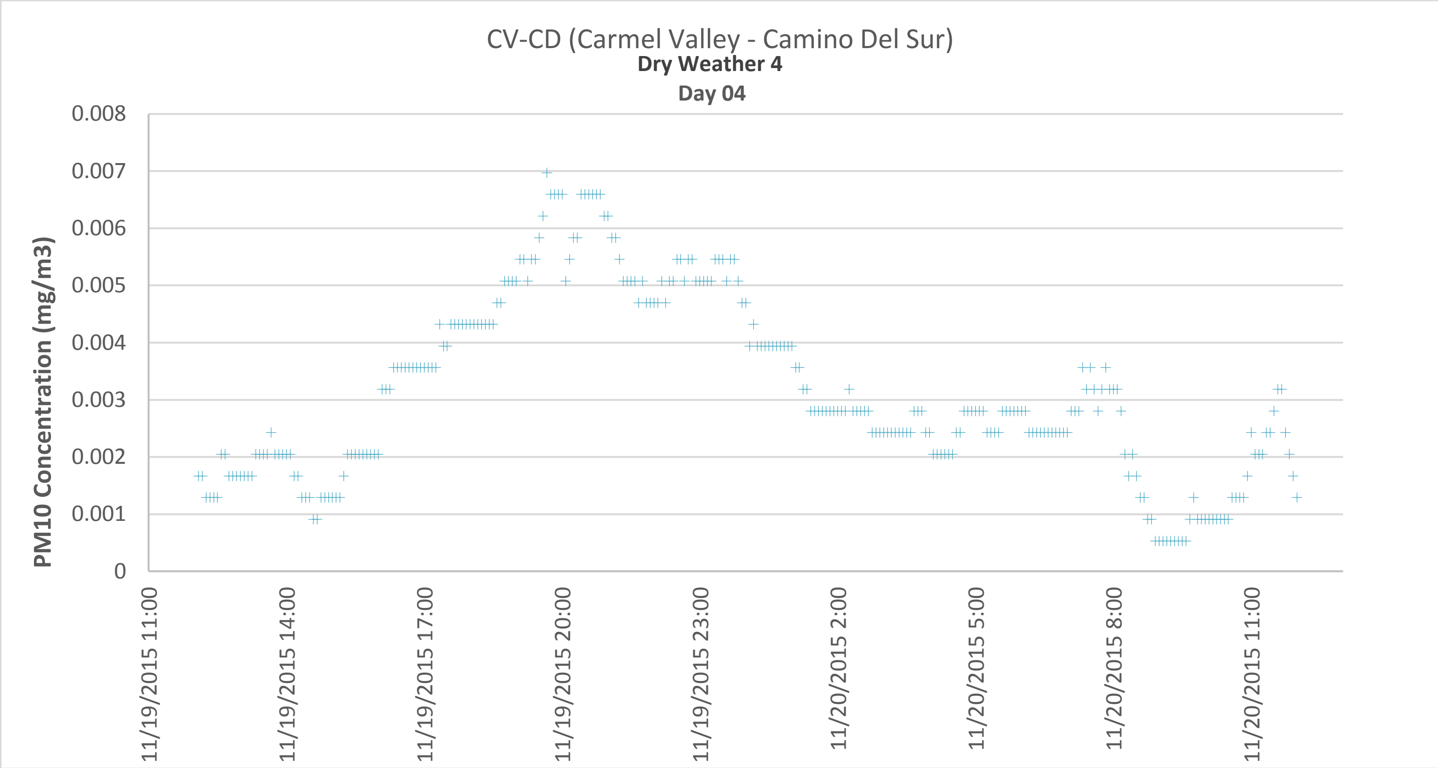
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – CV-CD Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the WNW, NE, and ENE. Peak optical monitor readings were observed before midnight.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – CV-CD Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the WNW, NE, and ENE. Peak Optical monitor readings were observed during sundown.

Graphical representations of this data are presented in Figures 3-25 through 3-27.



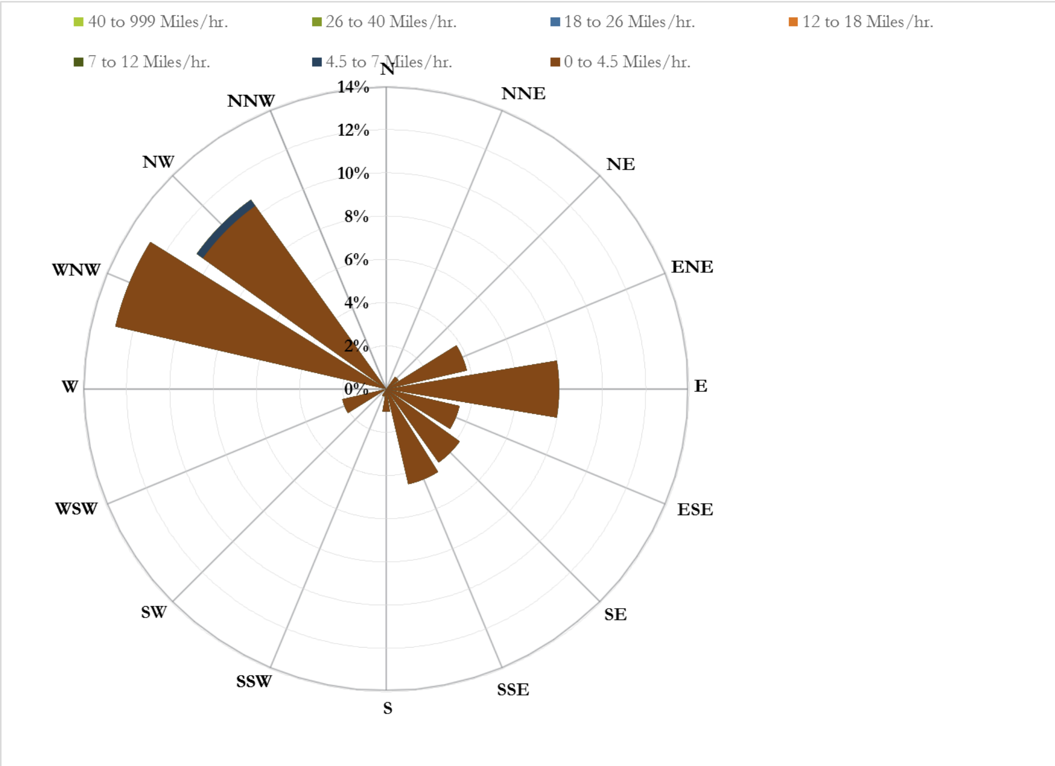
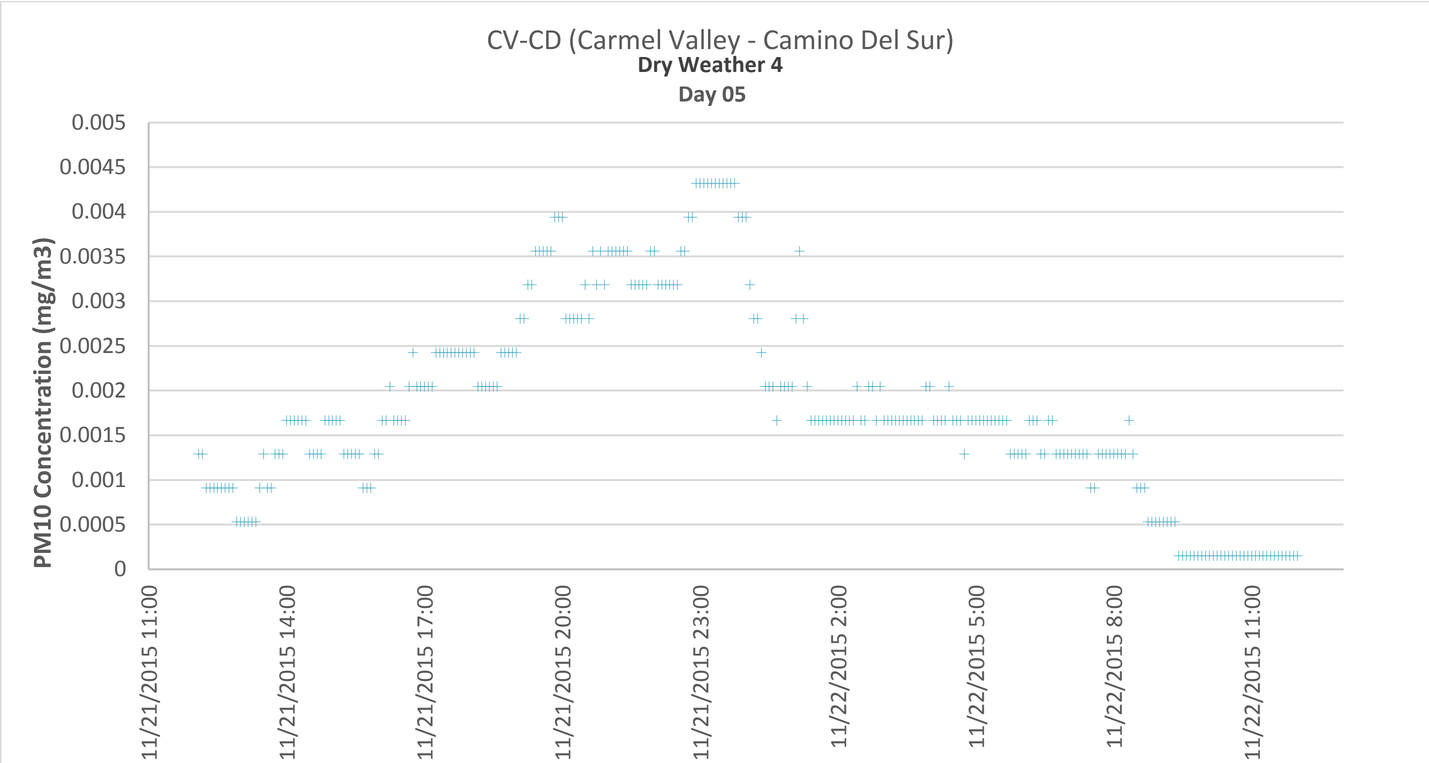


Figure 3-25.
CV-CD PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



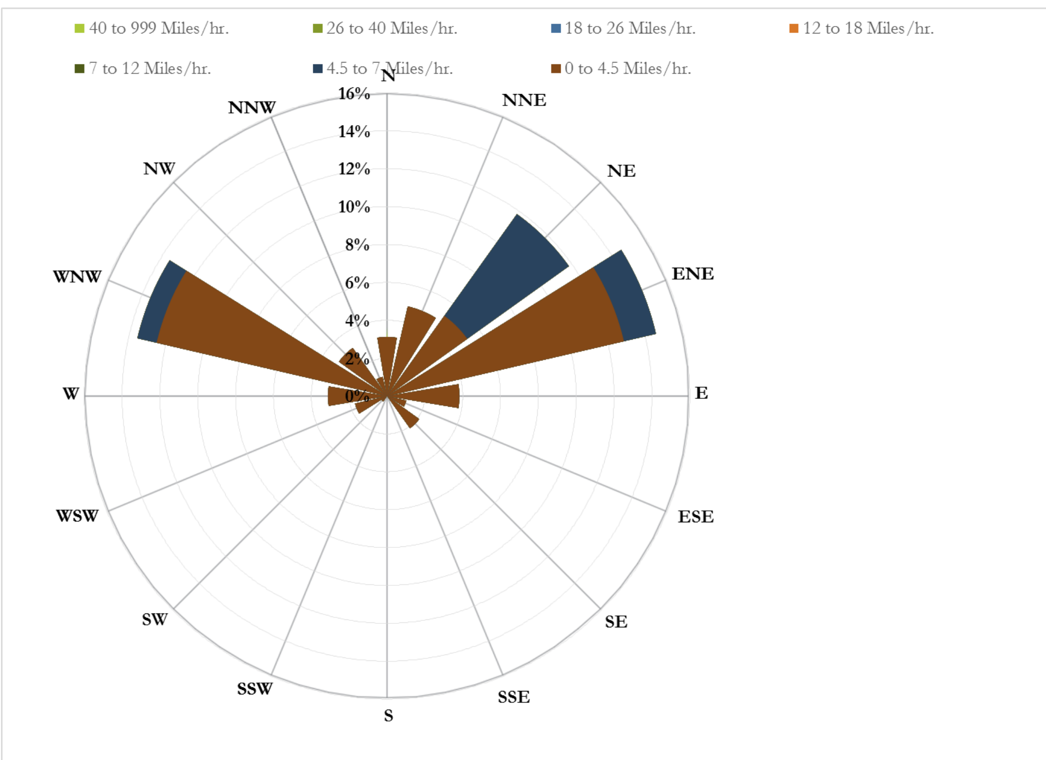
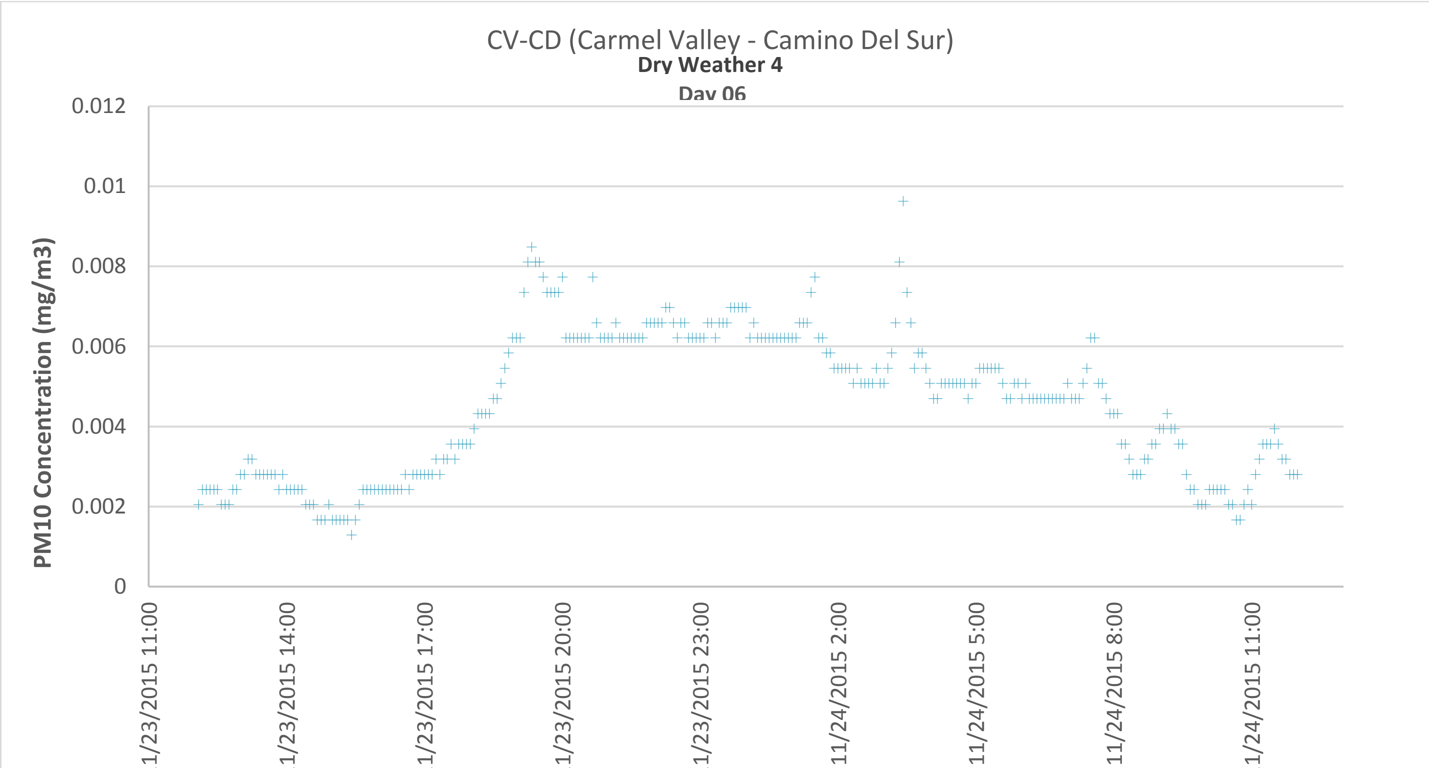


Figure 3-26.
CV-CD PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



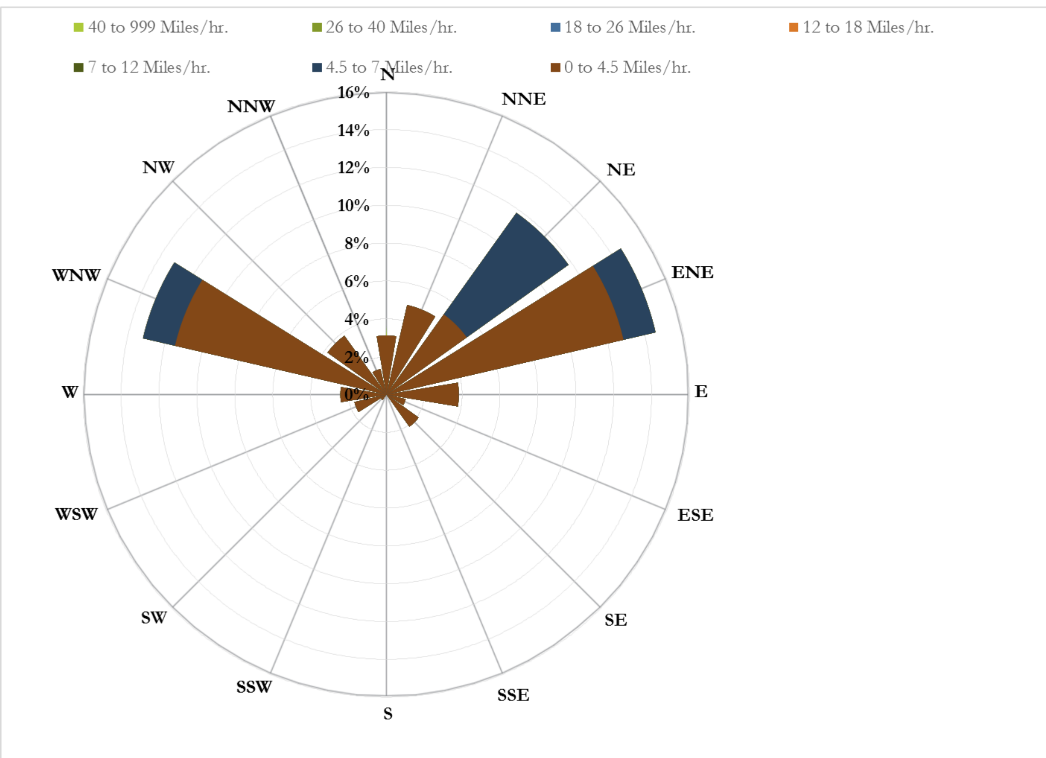


Figure 3-27.
CV-CD PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.10 LP-PO (Los Peñasquitos – Poway)

<u>*LP-PO (Los Peñasquitos – Poway):*</u>

CV-CD is a site monitored during the Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0045 mg/m^3.
- Mean standard deviation is $\pm$0.0030 mg/m^3

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind direction were observed primarily from the SE. Optical monitor readings increased during periods of increased traffic during the afternoon and morning. Peak Optical readings occurred before midnight.

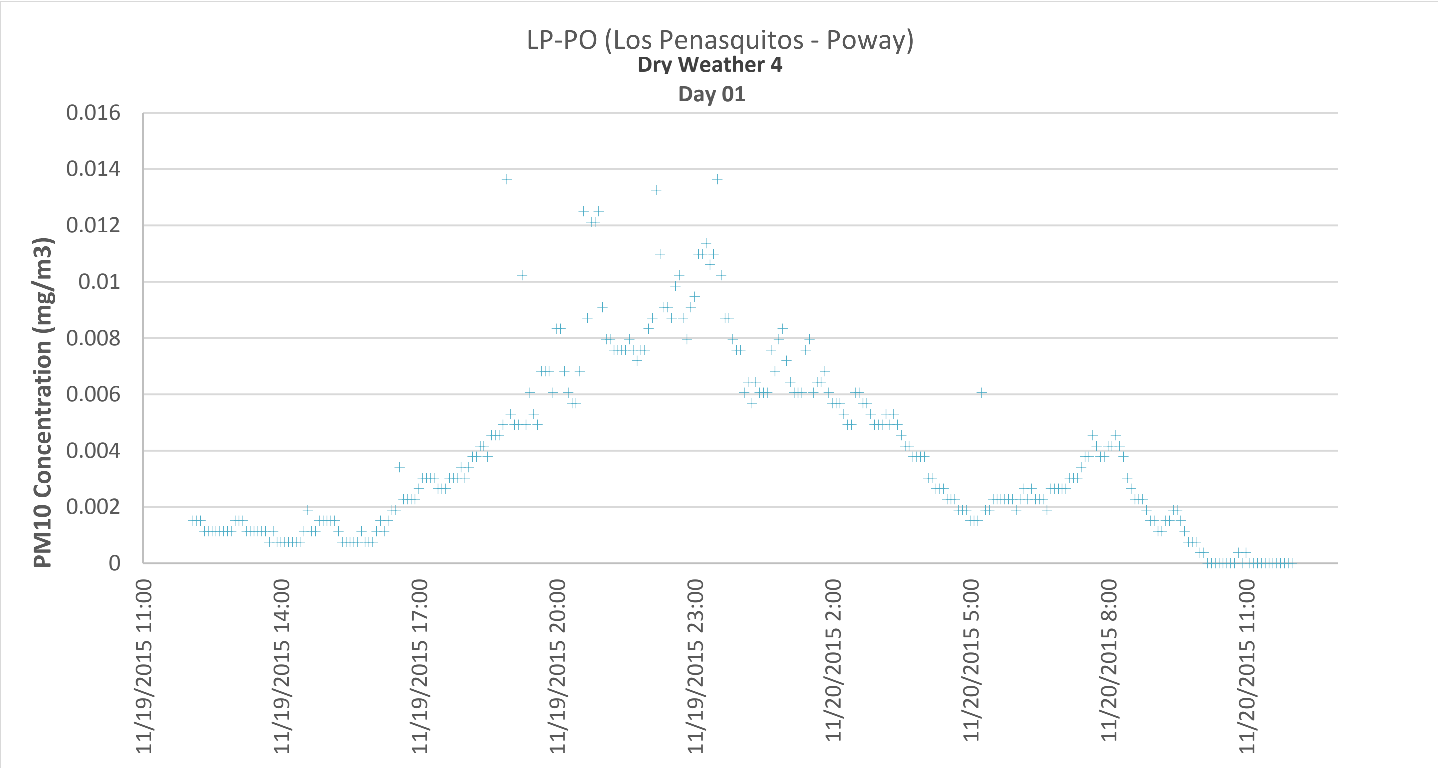
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the SW. Peak Optical monitor readings were observed during sundown prior to midnight.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – LP-PO Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the S and SE. Peak Optical monitor readings were observed before midnight. Higher Optical readings were observed during periods of increased traffic in the morning.

Graphical representations of this data are presented in Figures 3-28 through 3-30.



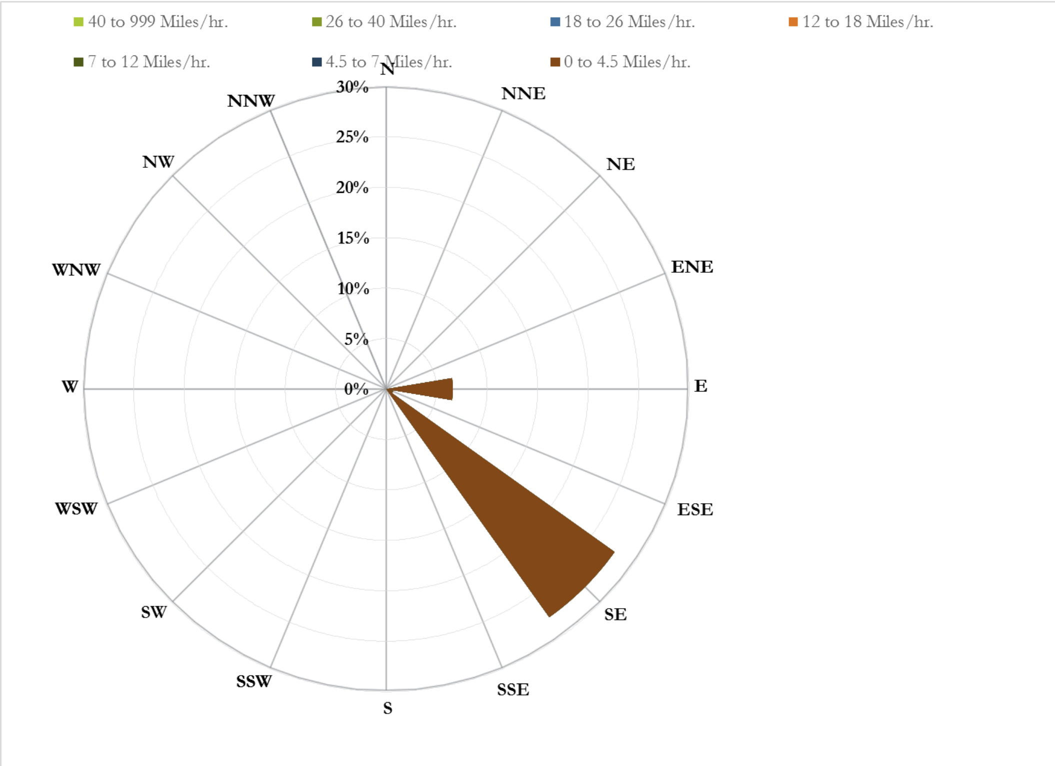
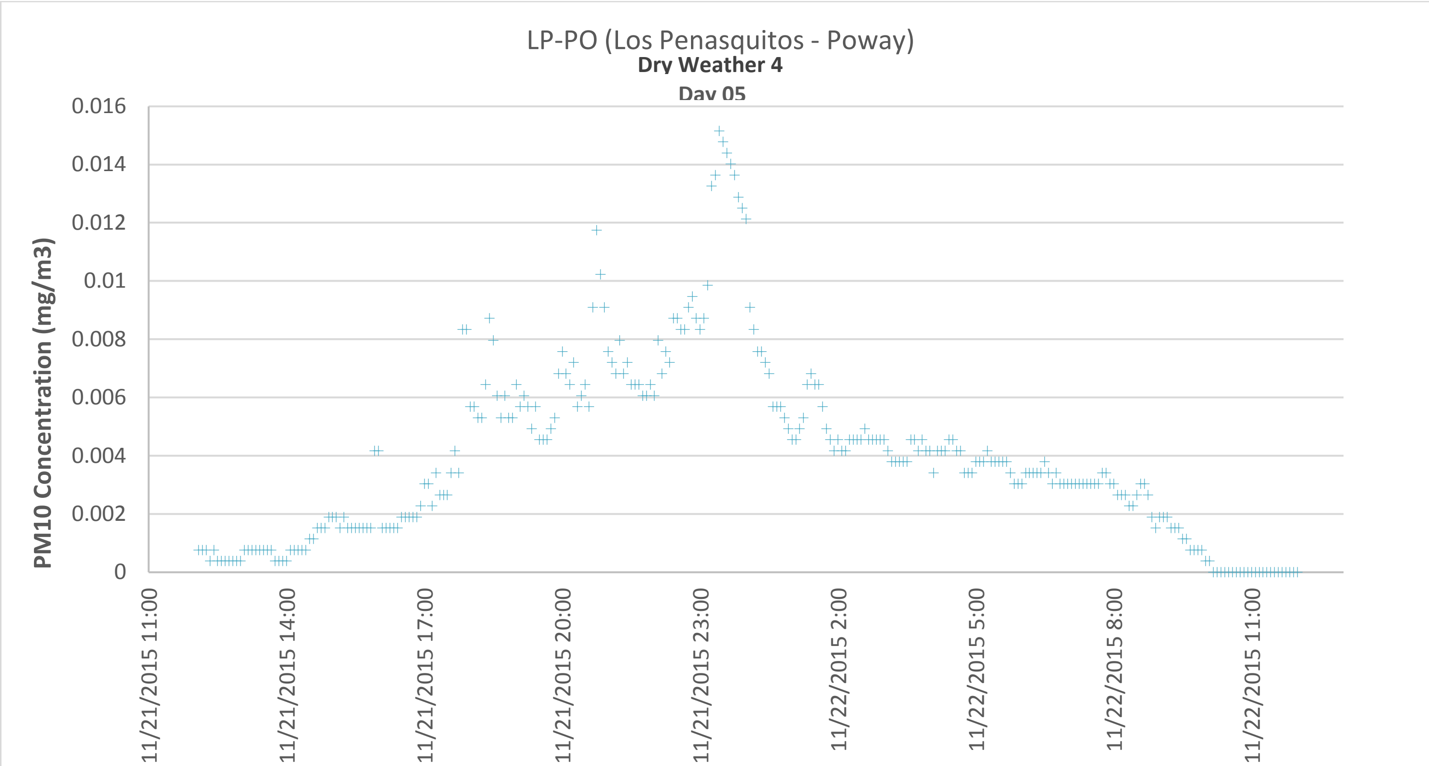


Figure 3-28.
LP-PO PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



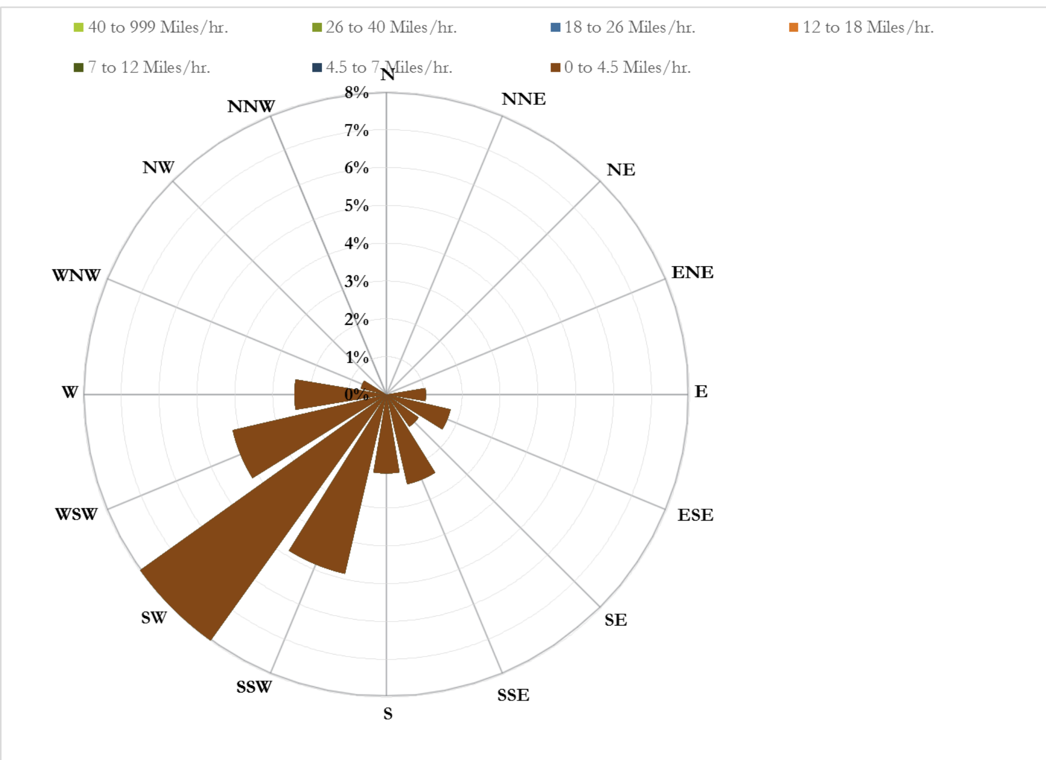
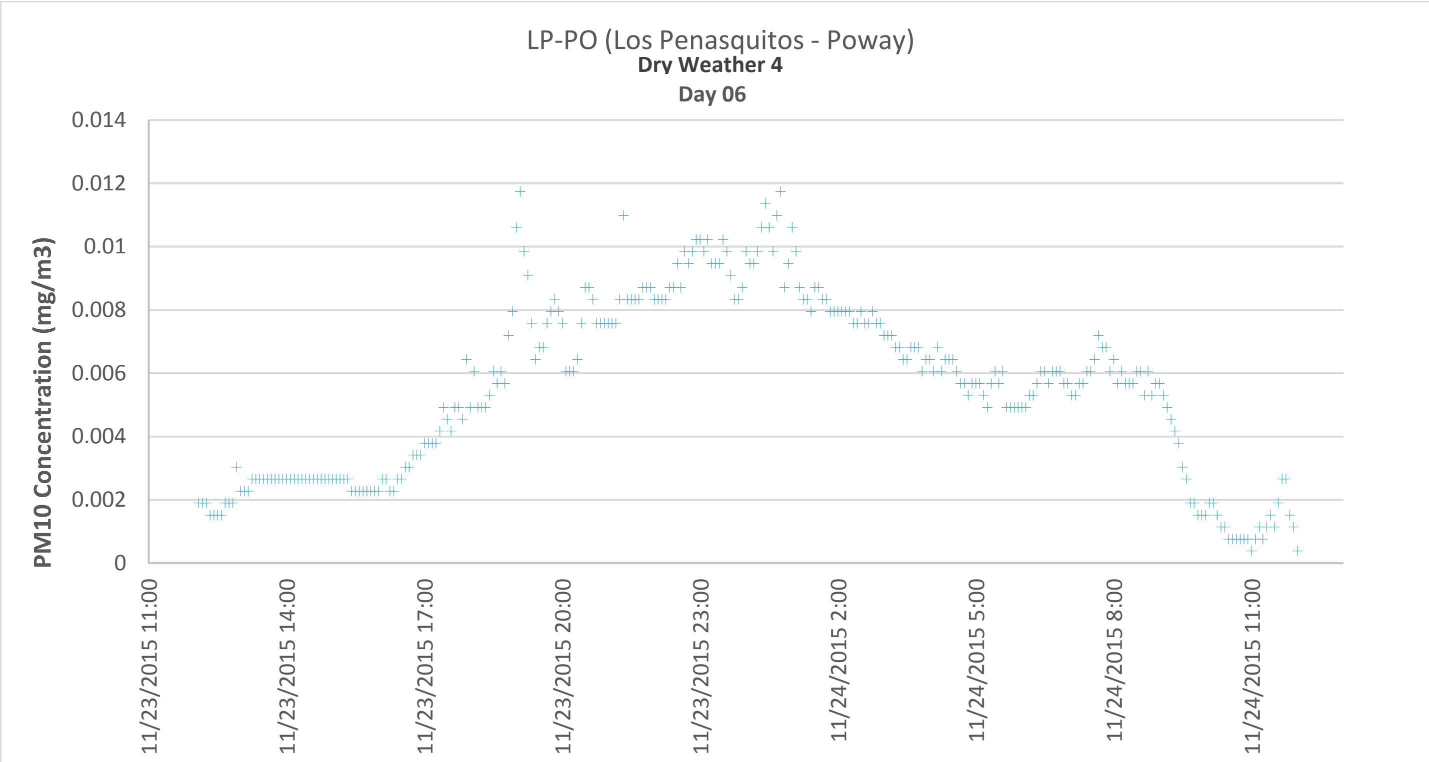


Figure 3-29.
LP-PO PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



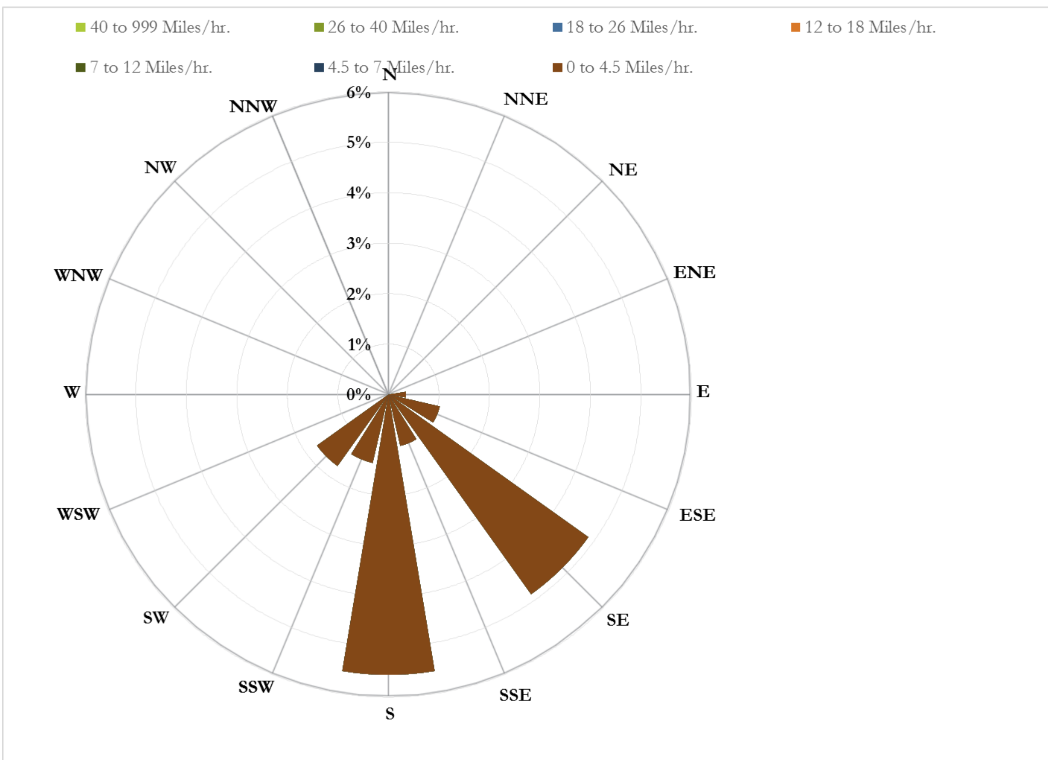


Figure 3-30.
LP-PO PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.1.11 LP-PR (Los Peñasquitos – Preserve)

LP-PR (Los Peñasquitos – Preserve):

LP-PR is a site monitored during the Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 716 measurements were determined to be valid (82%).
- Mean values for PM_{10} were 0.0054 mg/m^3.
- Mean standard deviation is $\pm$0.0048 mg/m^3

Day 4 (Wednesday, 11/18/15 – Thursday, 11/19/15)

Day 4 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind direction were observed primarily from the SE. Peak Optical readings occurred before midnight and during the morning.

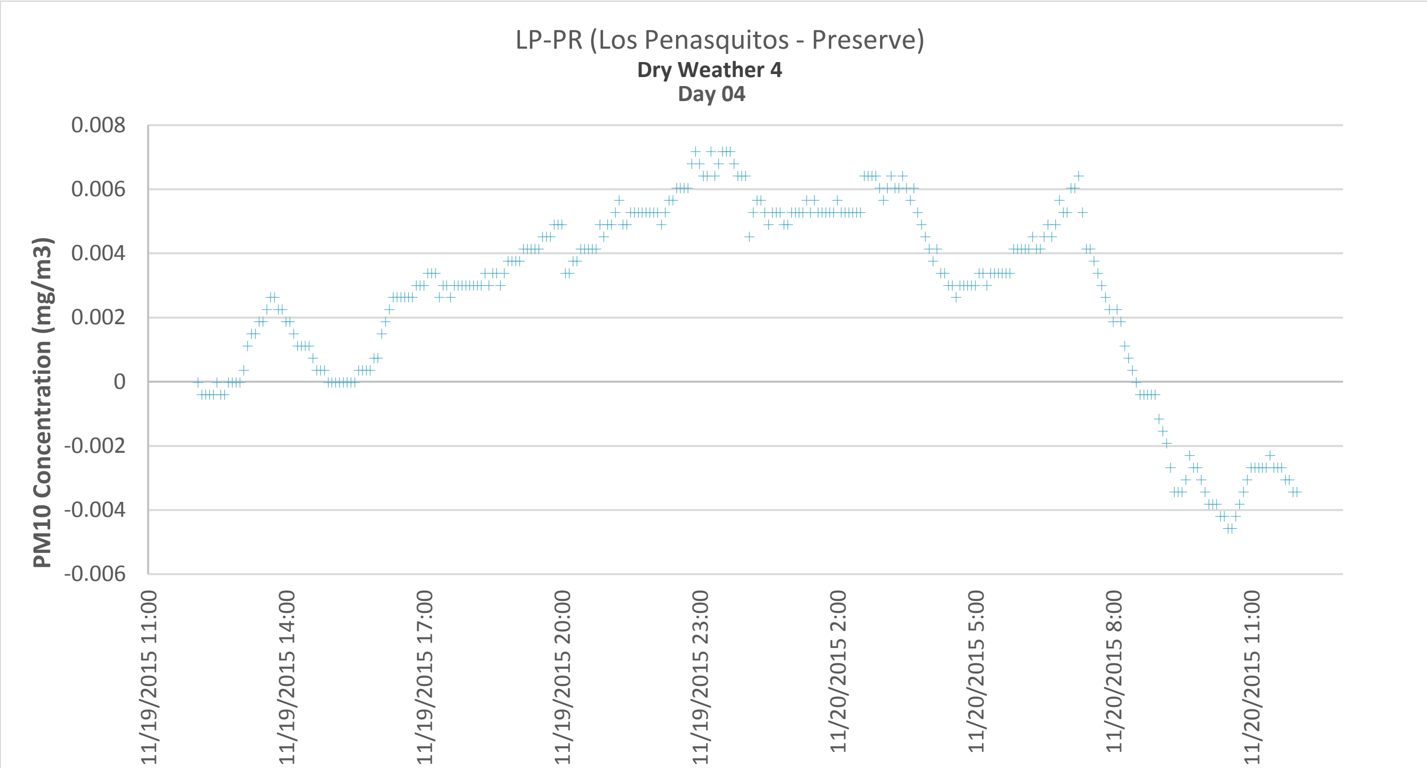
Day 5 (Saturday, 11/21/15 – Sunday, 11/22/15)

Day 5 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the SW. Peak Optical monitor readings were observed during sundown prior to midnight.

Day 6 (Monday, 11/23/15 – Tuesday, 11/24/15)

Day 6 – LP-PO Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 4. Wind directions were observed primarily from the S and SE. Peak Optical monitor readings were observed before midnight. Higher Optical readings were observed during periods of increased traffic in the morning.

Graphical representations of this data are presented in Figure 2-11.



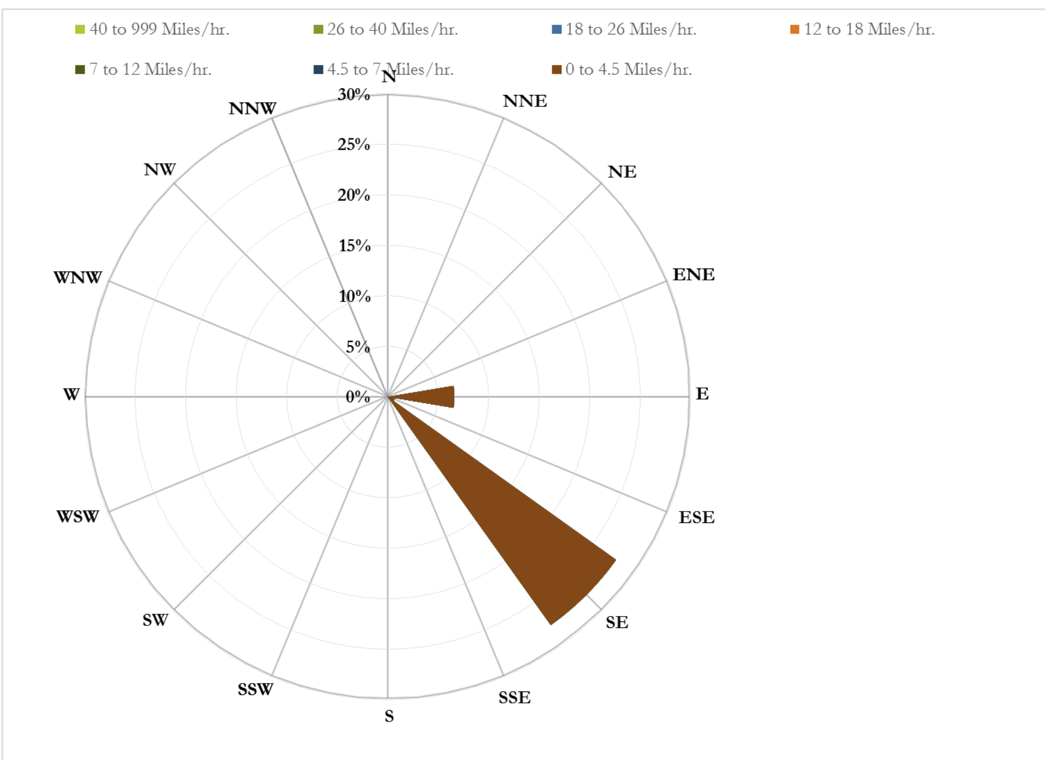
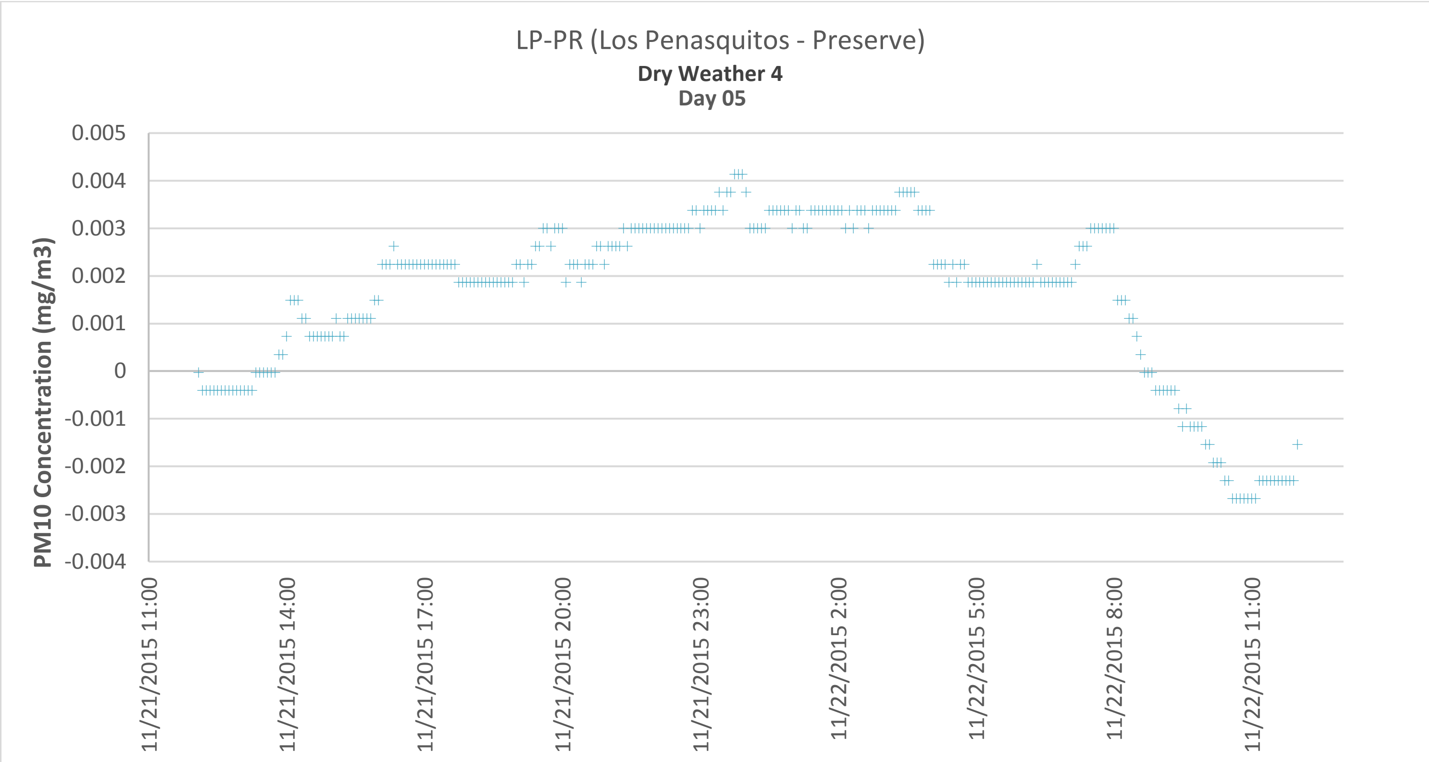


Figure 3-31.
LP-PR PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 4



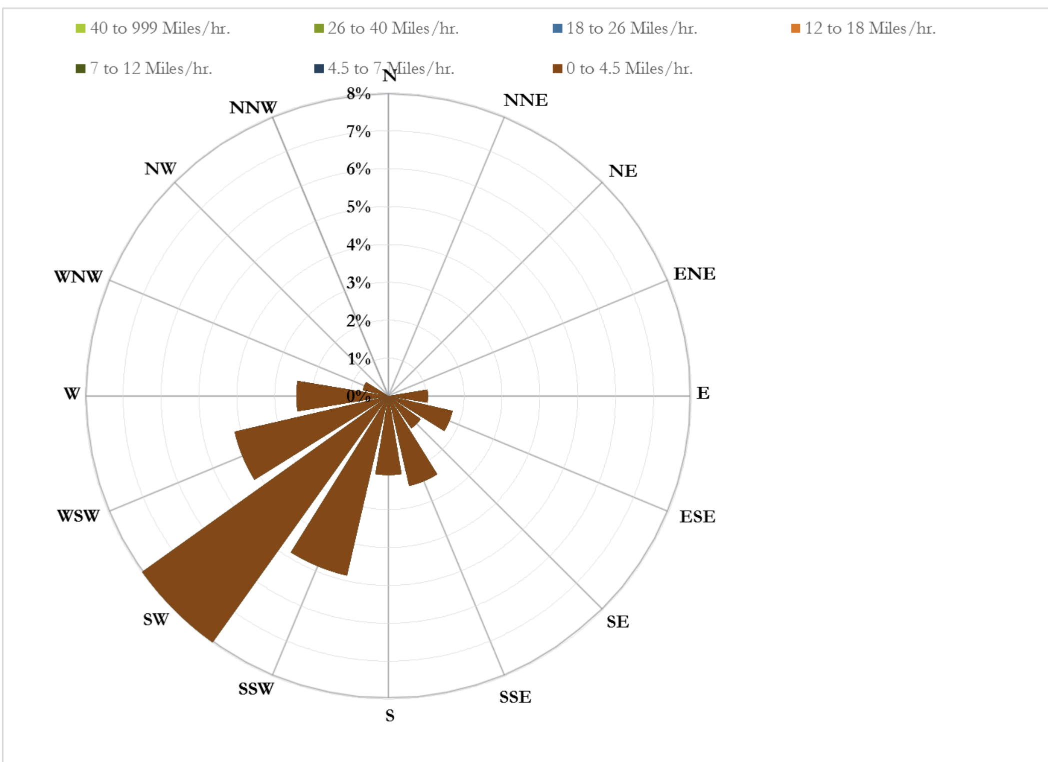
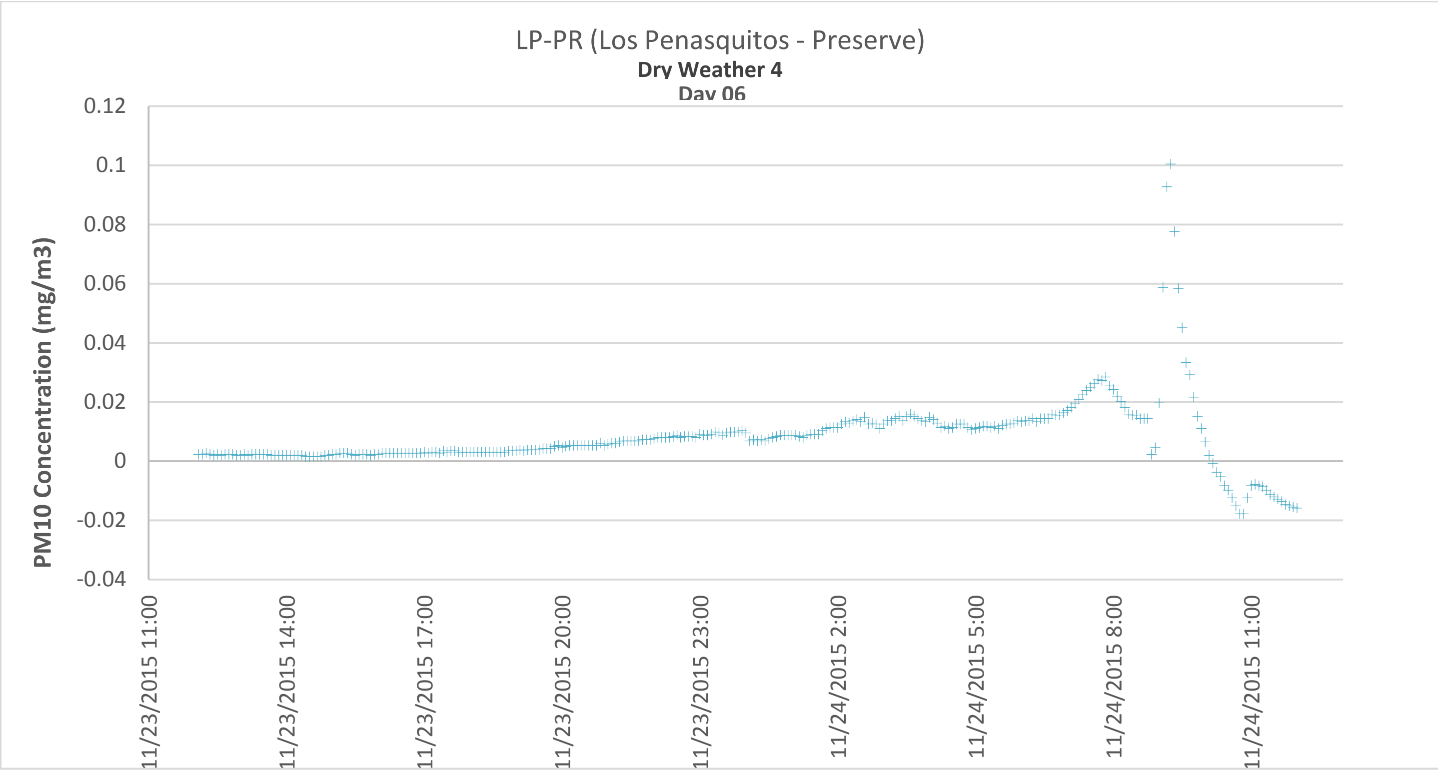


Figure 3-32.
LP-PR PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 5



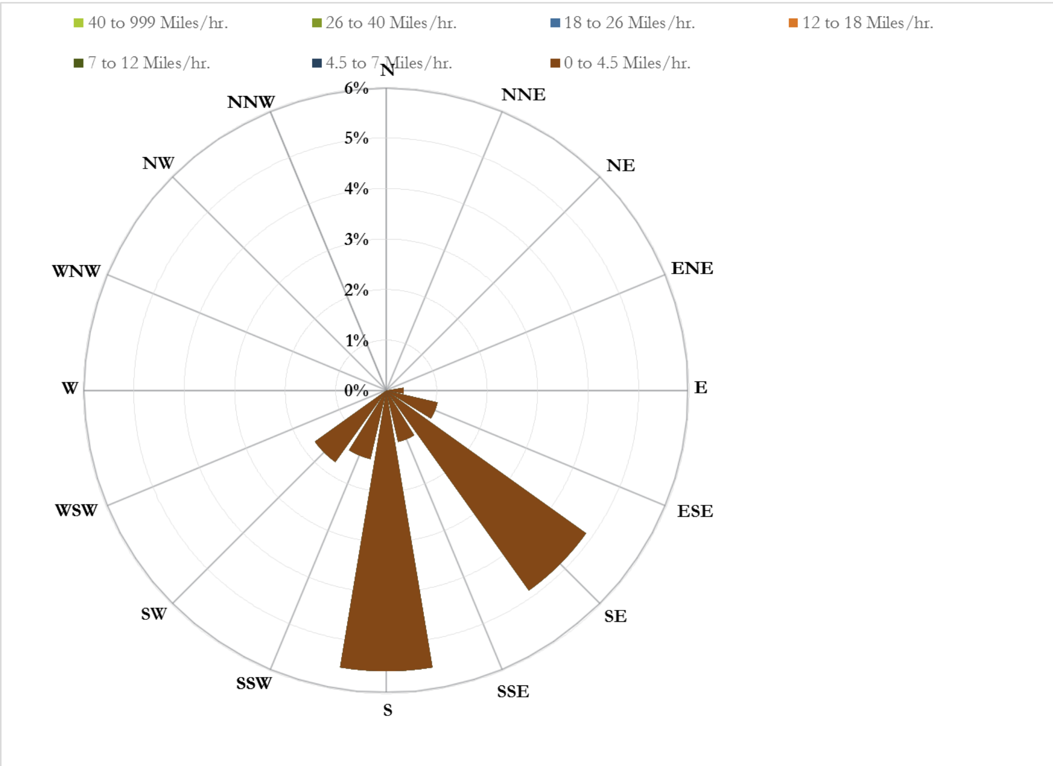


Figure 3-33.
LP-PR PM_{10} Concentrations and Wind Rose, Dry Weather 4 – Day 6

3.2.2 Dry Weather 5

3.2.2.1 CC-CC (Carroll Canyon)

CC-CC (Carroll Canyon):

CC-CC is a site monitored during the Phase I and Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 788 measurements were determined to be valid (91%).
- Mean values for PM_{10} were 0.0086 mg/m^3.
- Mean standard deviation is $\pm$0.0057 mg/m^3

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – CC-CC Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed during increased traffic conditions in the morning.

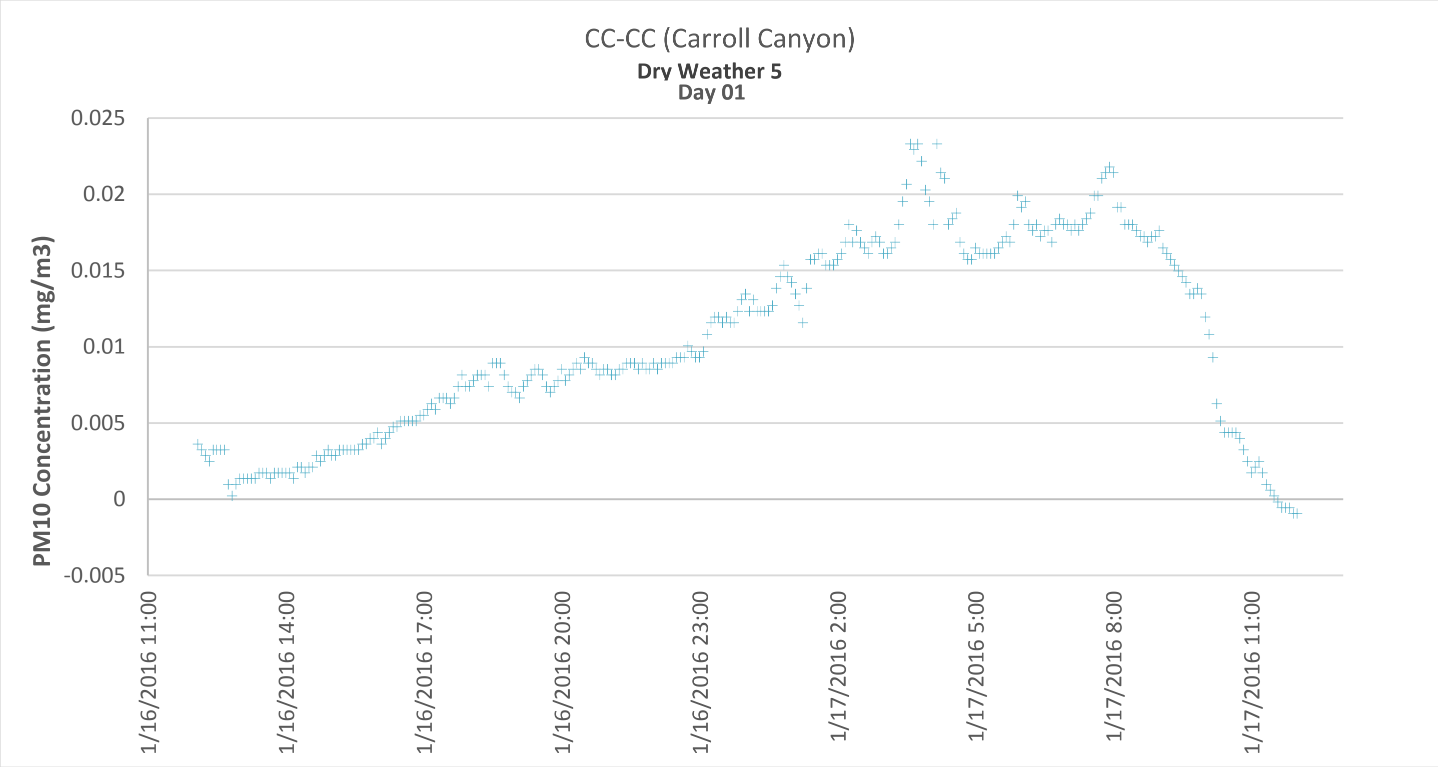
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 2 – CC-CC Optical readings were observed at a lower mean value for this monitoring location during sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed in the morning hours after sunrise.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – CC-CC Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed in the morning after sunrise.

Graphical representations of this data are presented in Figures 3-34 through 3-36.



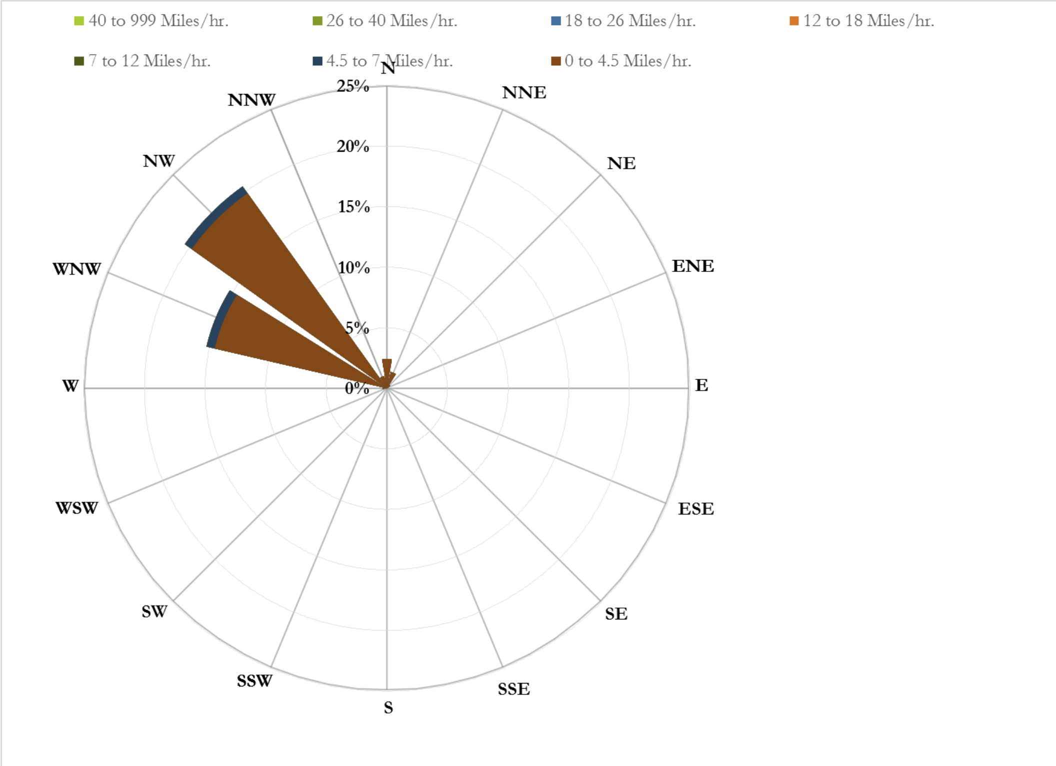
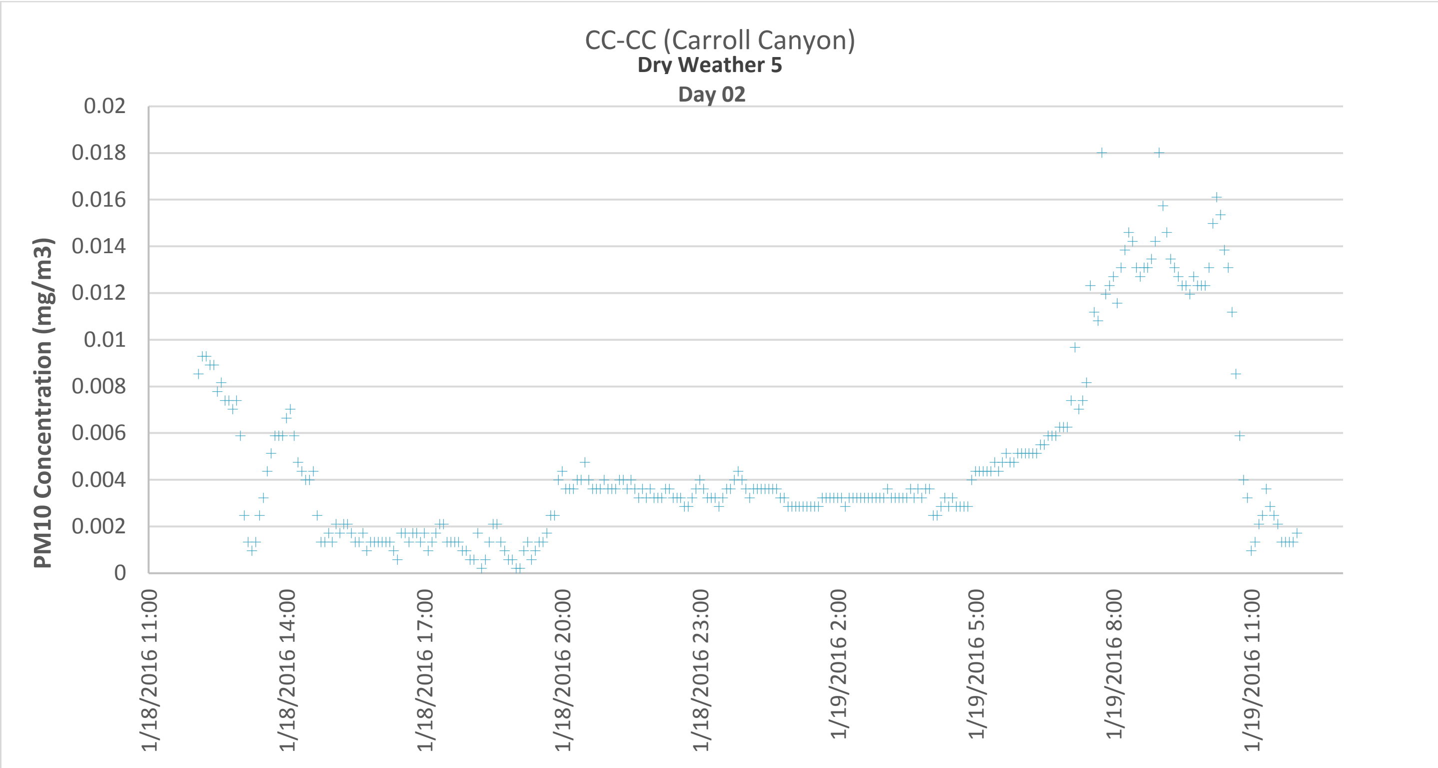


Figure 3-34.
CC-CC PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



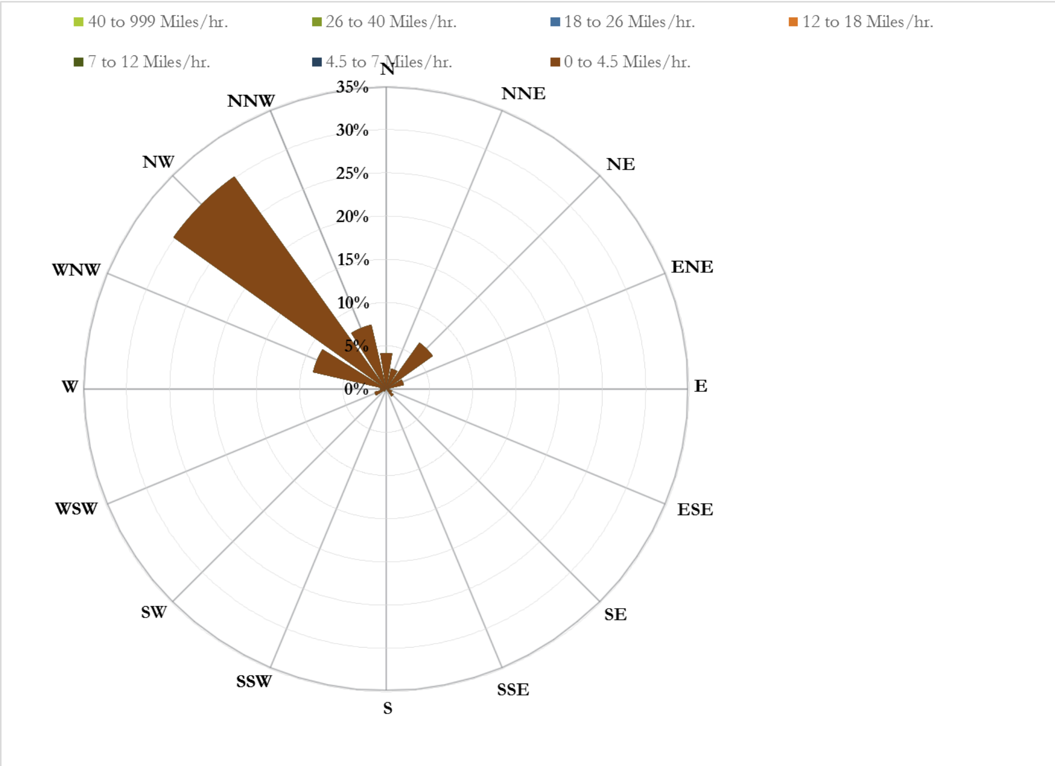
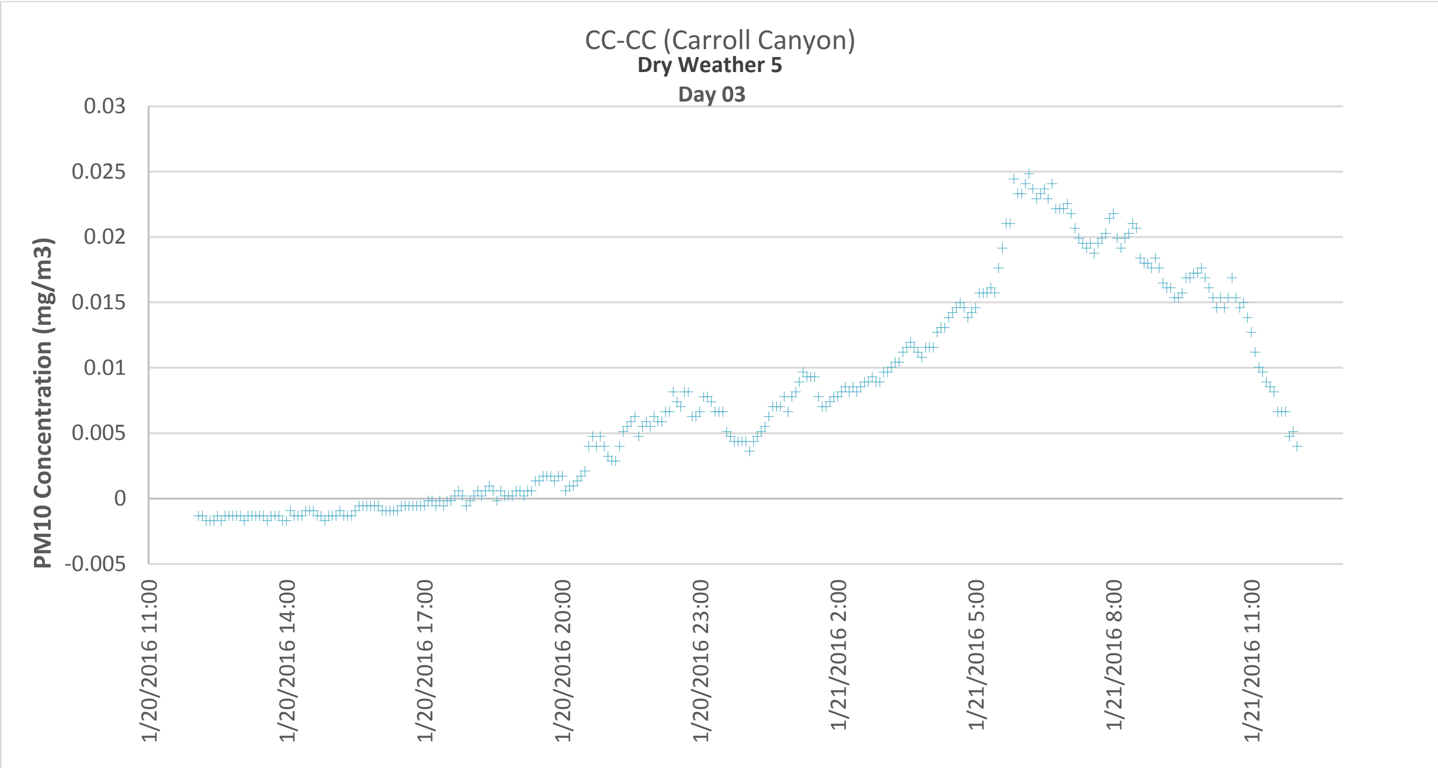


Figure 3-35.
CC-CC PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 2



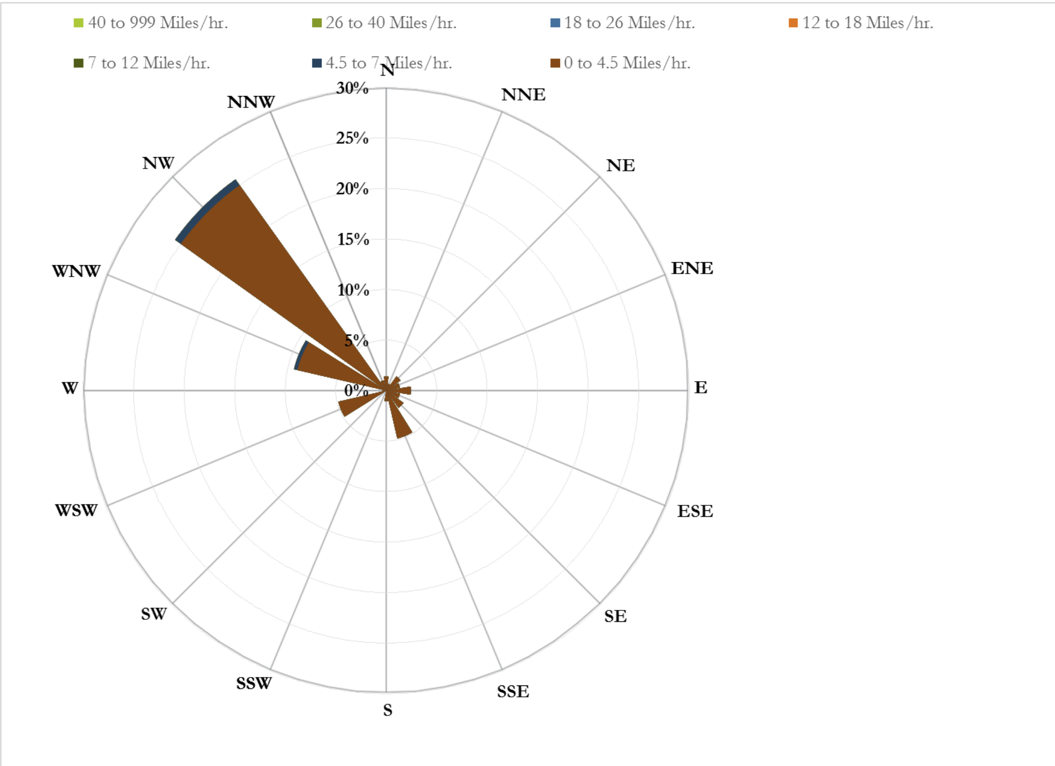


Figure 3-36.
CC-CC PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.2 CC-DM (Reference – Del Mar)

CC-DM (Reference – Del Mar):

CC-DM is a site monitored during the Phase I and Phase II Watershed Special Study and contains an Optical monitor and an FRM sampler. This is the reference site for the aerial deposition portion of the Watershed Special Study, and was selected as a station away from anthropogenic influence during the prevalent weather patterns.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 859 measurements were determined to be valid (99%).
- Mean values for PM_{10} were 0.0107 mg/m^3.
- Mean standard deviation is $\pm$0.0070 mg/m^3

FRM Sampler (Laboratory) Results:

- Mean values for PM_{10} was 0.0277 mg/m^3.
- Mean RPD from the FRM results to the Optical monitor results was 106.84%

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – CC-DM Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the W, and WSW. Peak Optical monitor readings were observed before sunrise.

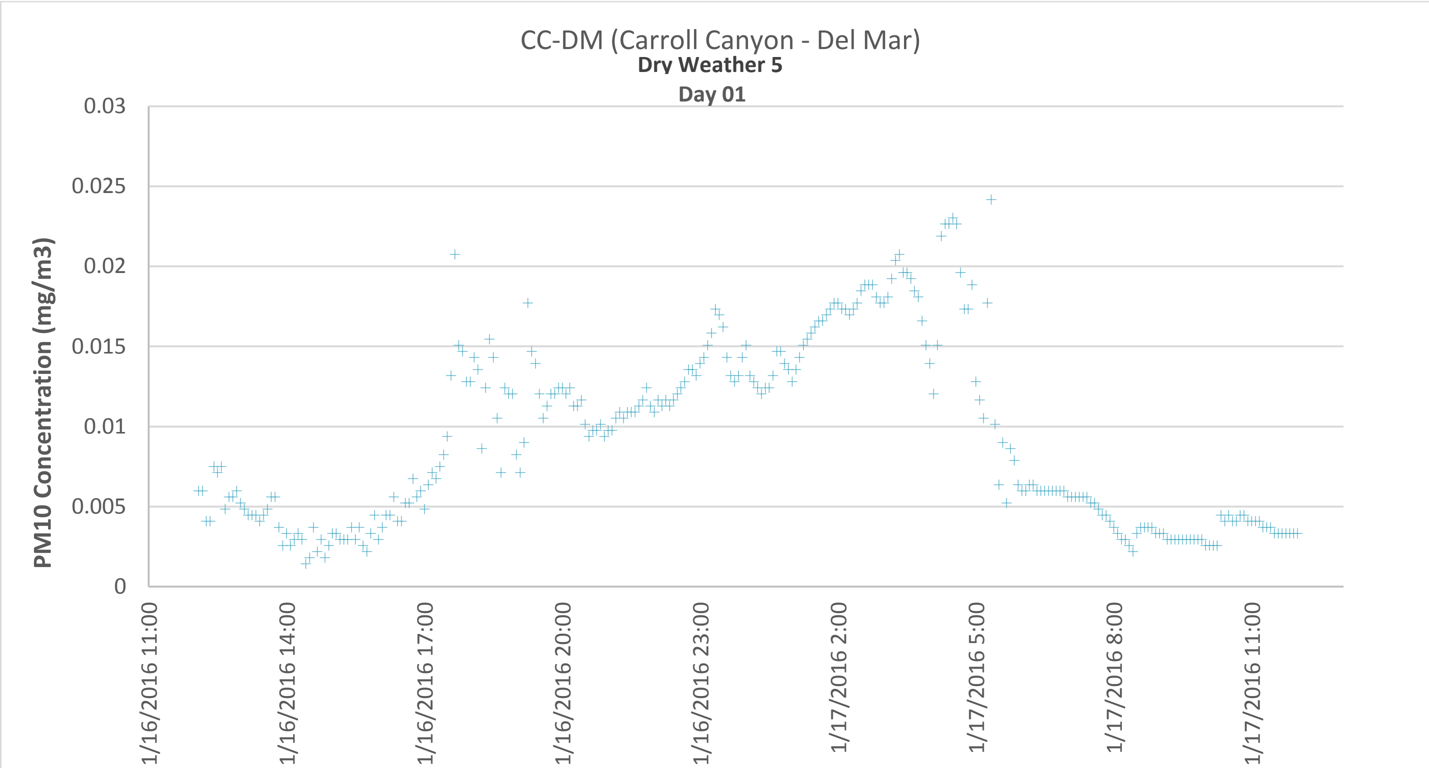
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 2 – CC-DM Optical readings were observed at a higher mean value for this monitoring location for sampling event Dry Weather 5. Wind directions were observed primarily from the NW, W, WSW, and SW. Optical monitor readings were higher late evening to midnight and in the morning after sunrise.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – CC-DM Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the WSW, SW, NE and ENE. High wind speeds were observed from the SW at 7 to 12 miles per hour. Peak Optical monitor readings were observed after sunrise through the morning.

Graphical representations of this data are presented in Figures 3-37 through 3-39.



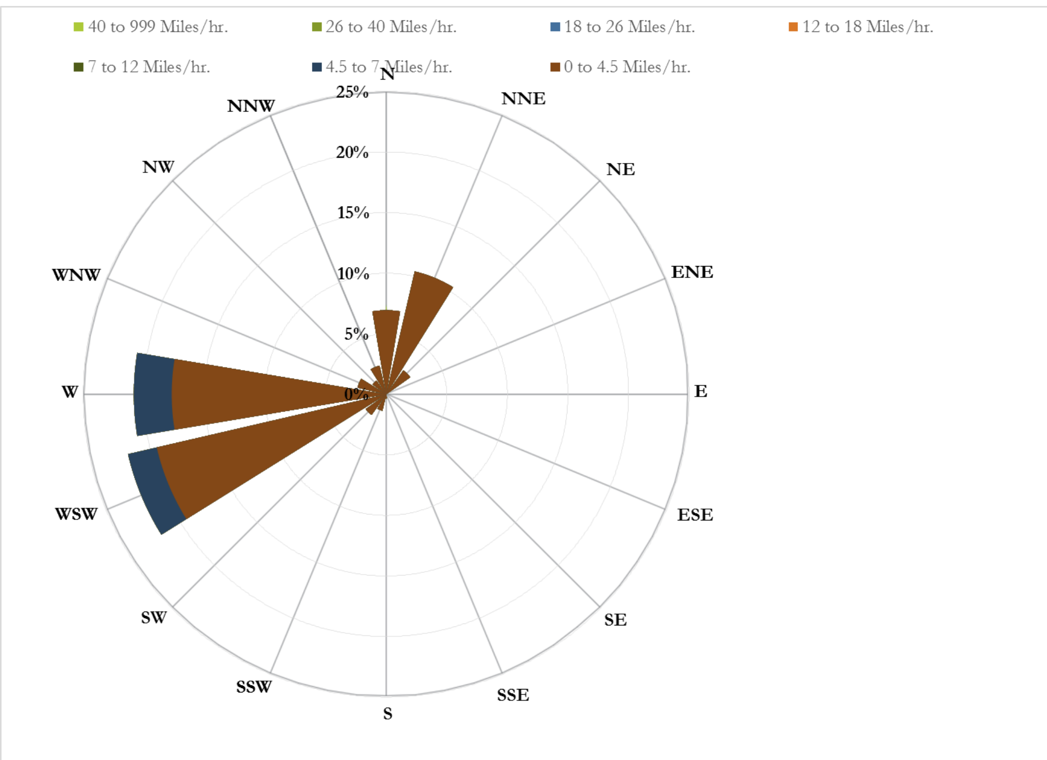
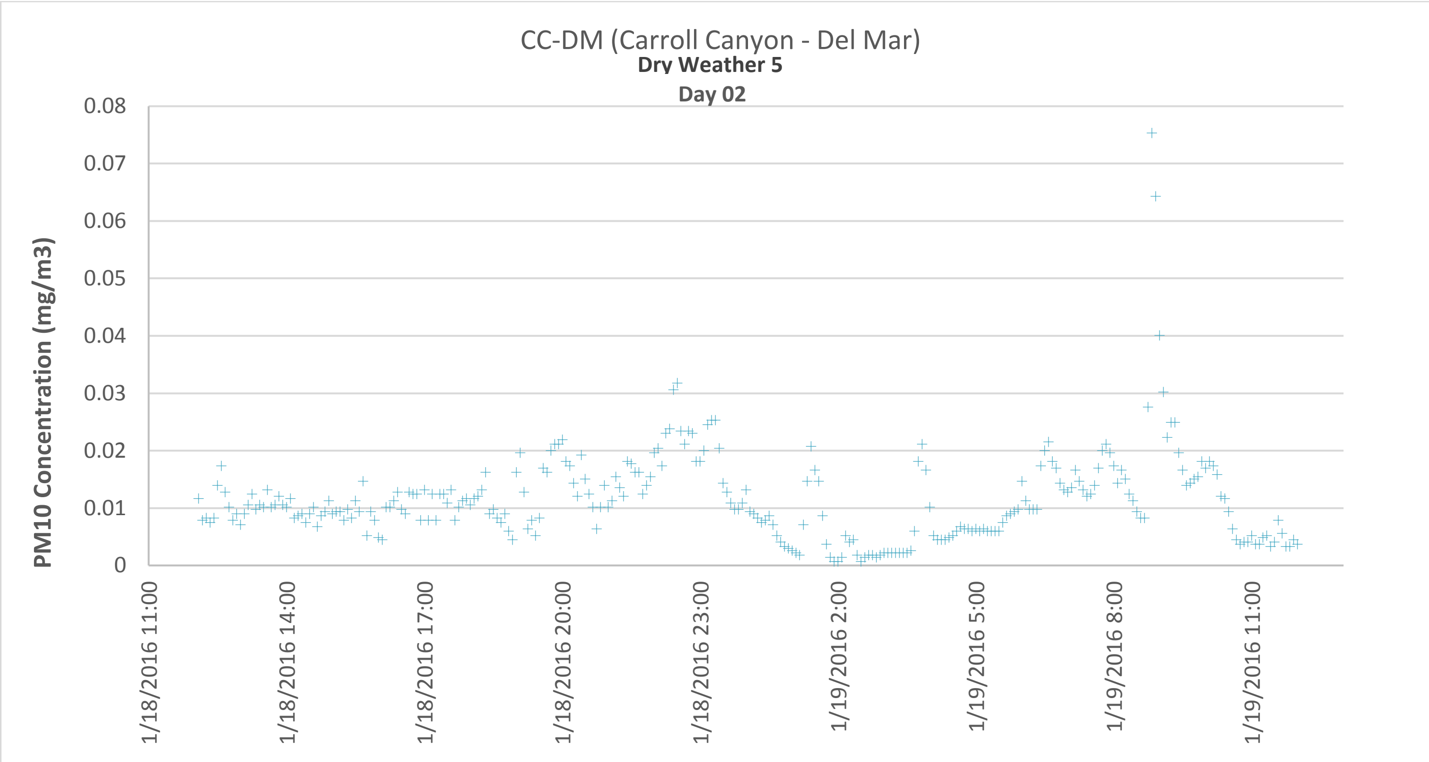


Figure 3-37.
CC-DM PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



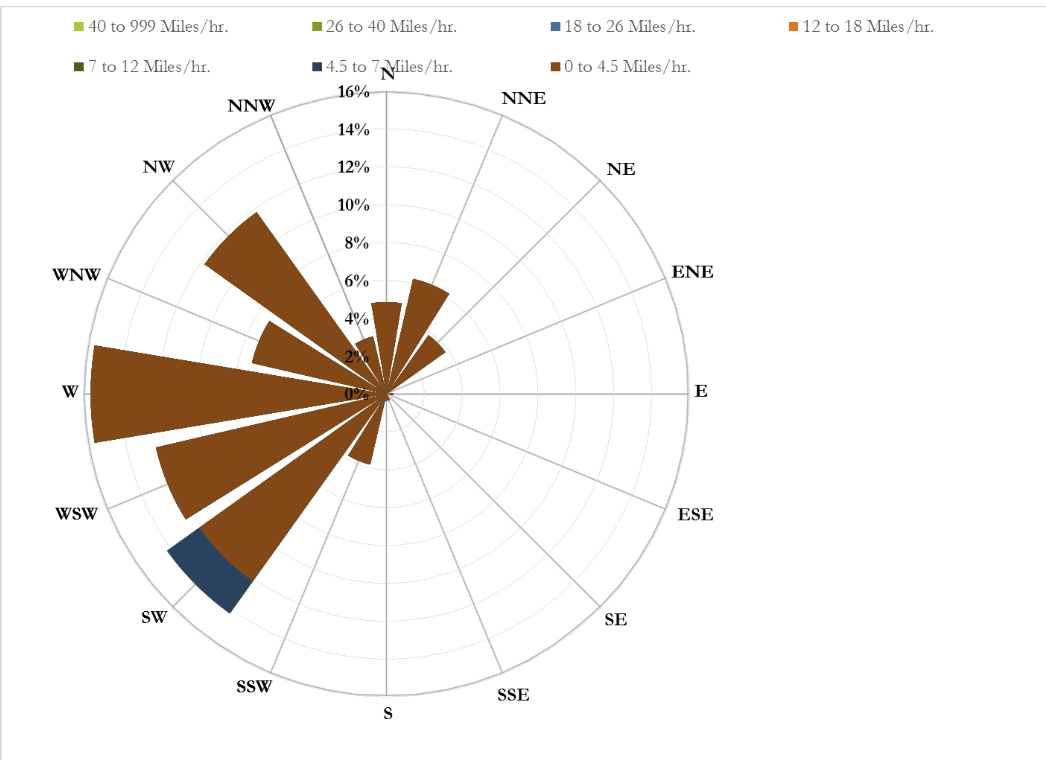
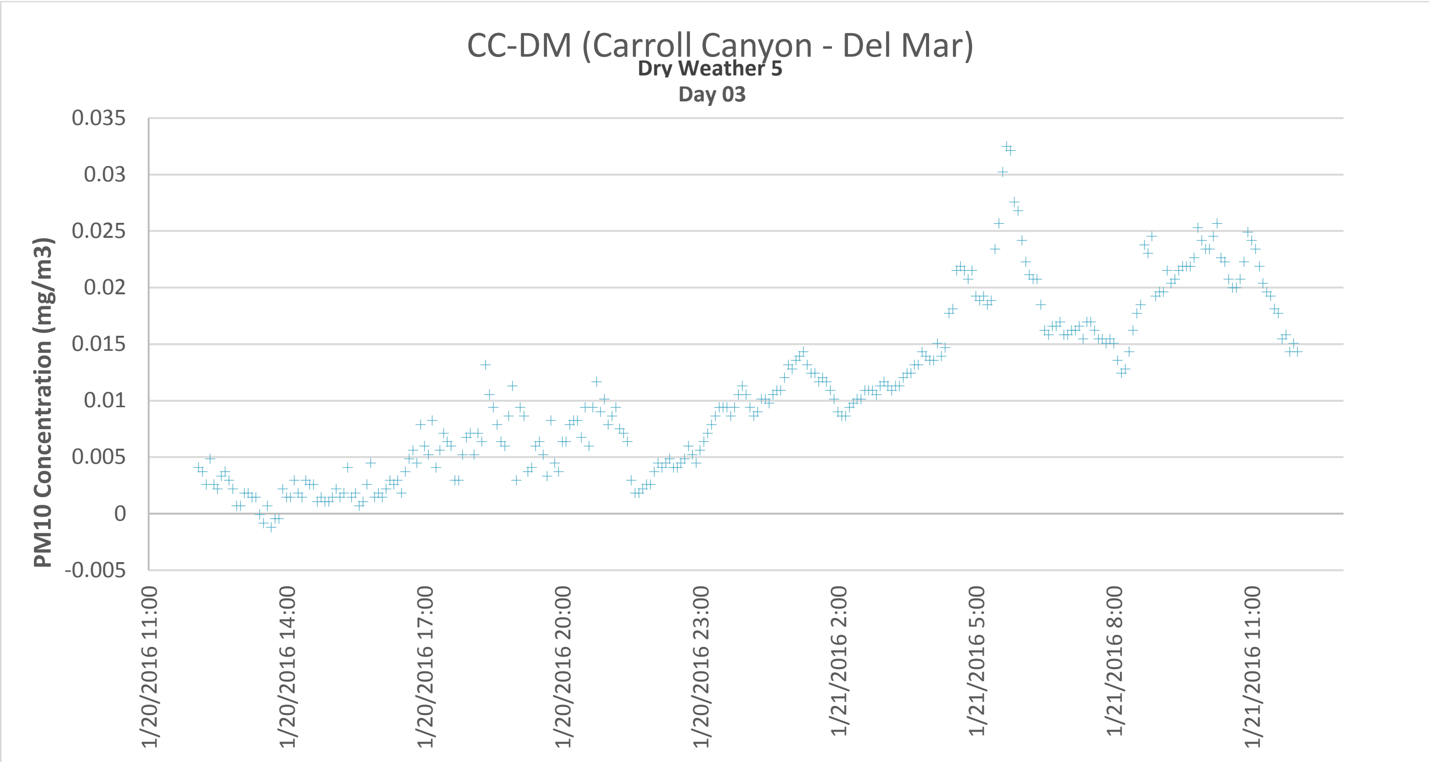


Figure 3-38.
CC-DM PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 2



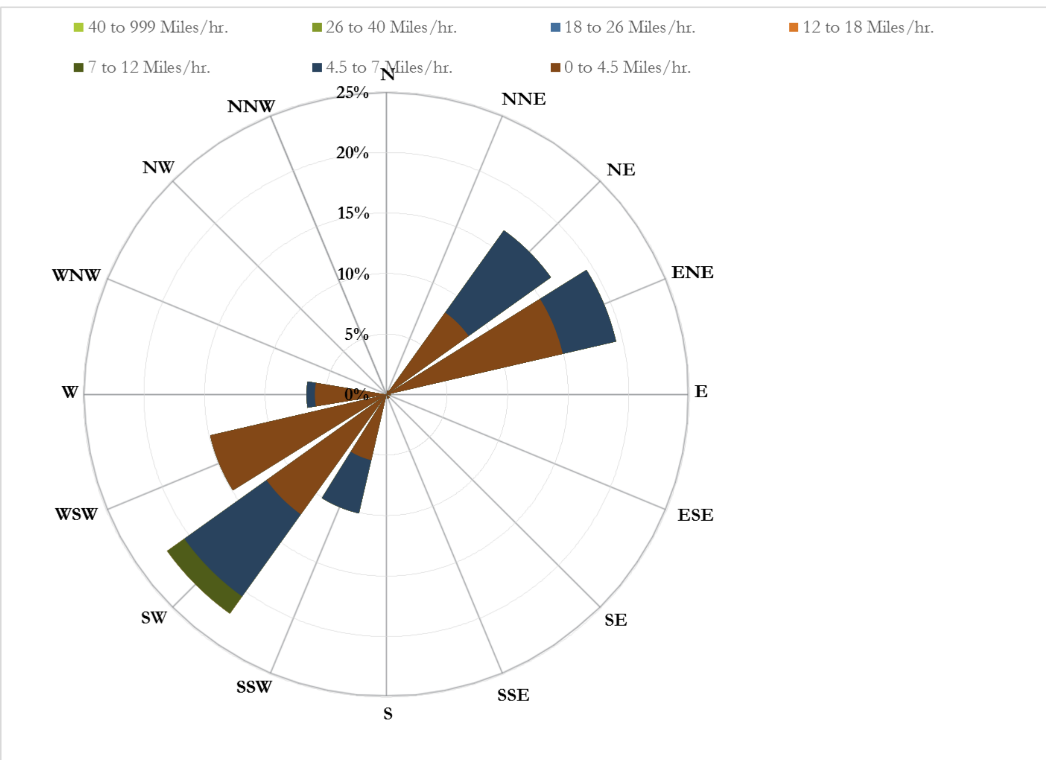


Figure 3-39.
CC-DM PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.3 CC-DW (Carroll Canyon – Downwind)

<u>*CC-DW (Carroll Canyon – Downwind)*</u>:

CC-DW is a site monitored during the Phase I and Phase II Watershed Special Study and contains an Optical monitor and an FRM sampler.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 859 measurements were determined to be valid (99%).
- Mean values for PM_{10} were 0.0168 mg/m^3.
- Mean standard deviation is $\pm$0.0070 mg/m^3

FRM Sampler (Laboratory) Results:

- Mean value for PM_{10} was 0.0.128 mg/m^3.
- Mean RPD from the FRM results to the Optical monitor results was 44.50%

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – CC-DW Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed during evening and sundown, and during increased traffic conditions in the morning.

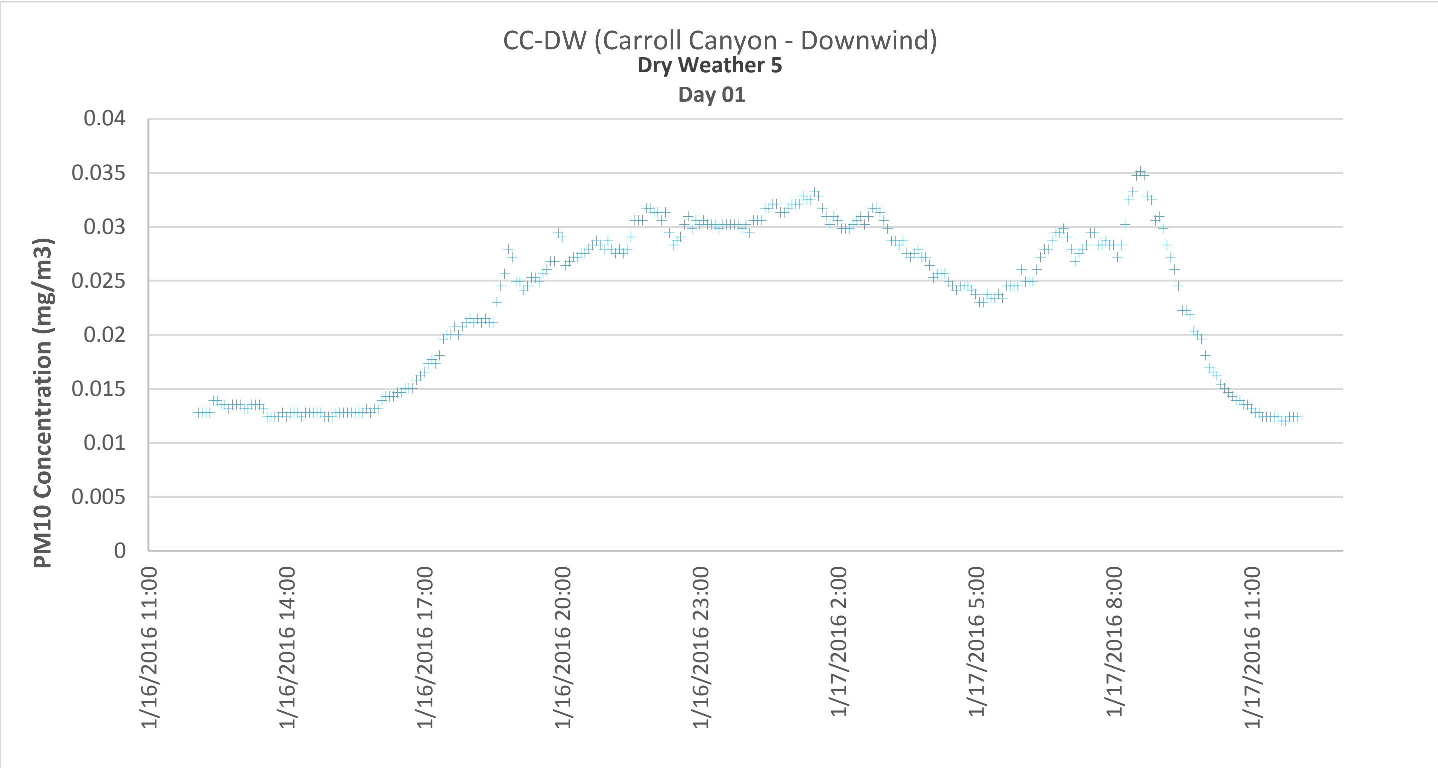
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 2 – CC-DW Optical readings were observed at the mean value of the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed during the times of increased traffic conditions in the morning.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – CC-DW Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed after sundown and during increased traffic conditions in the morning.

Graphical representations of this data is presented in Figures 3-40 through 3-42.



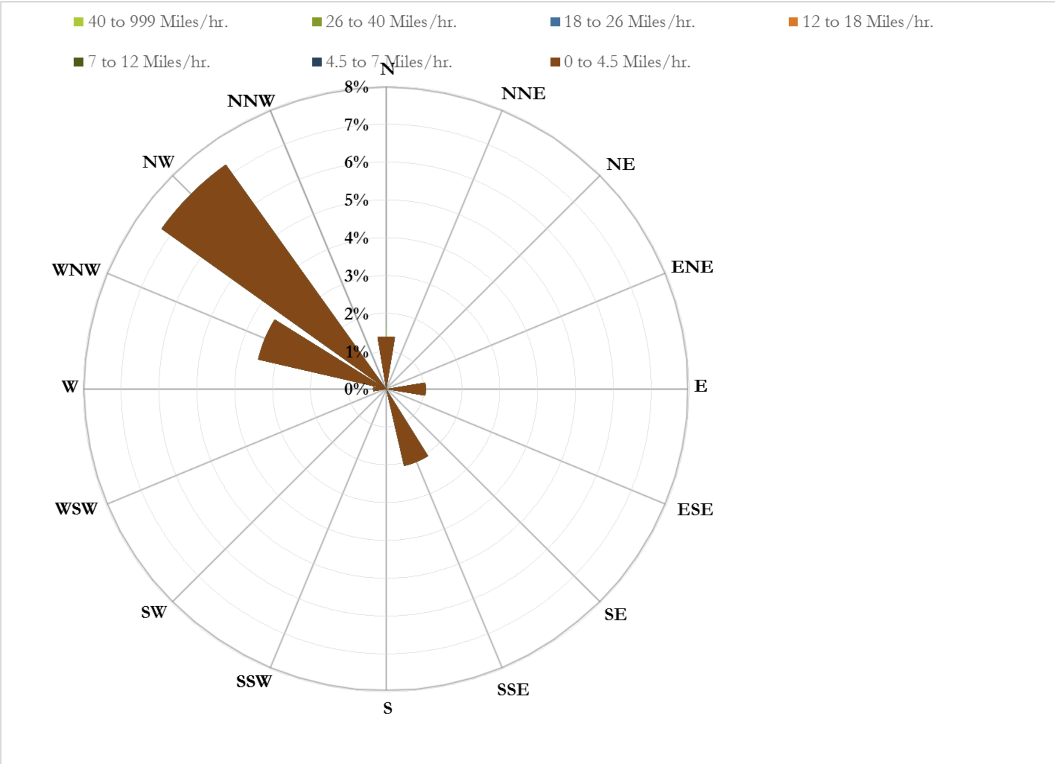
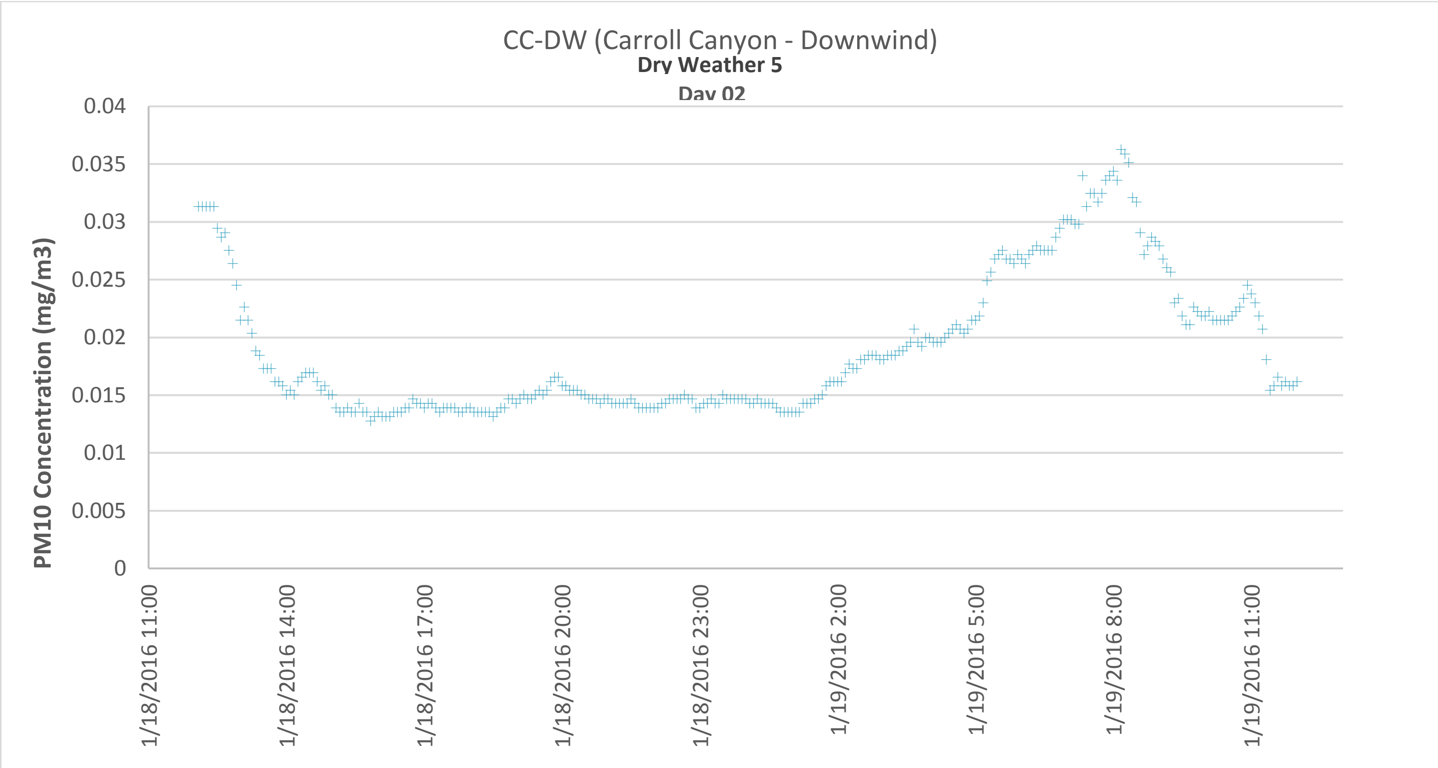


Figure 3-40.
CC-DW PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



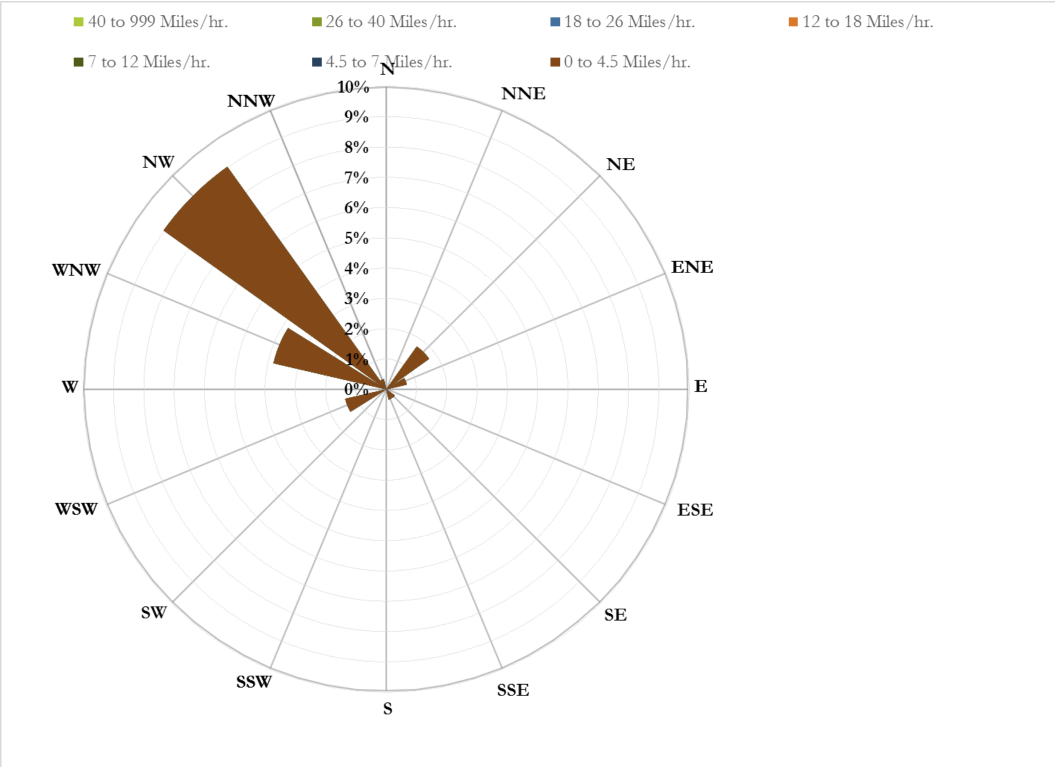
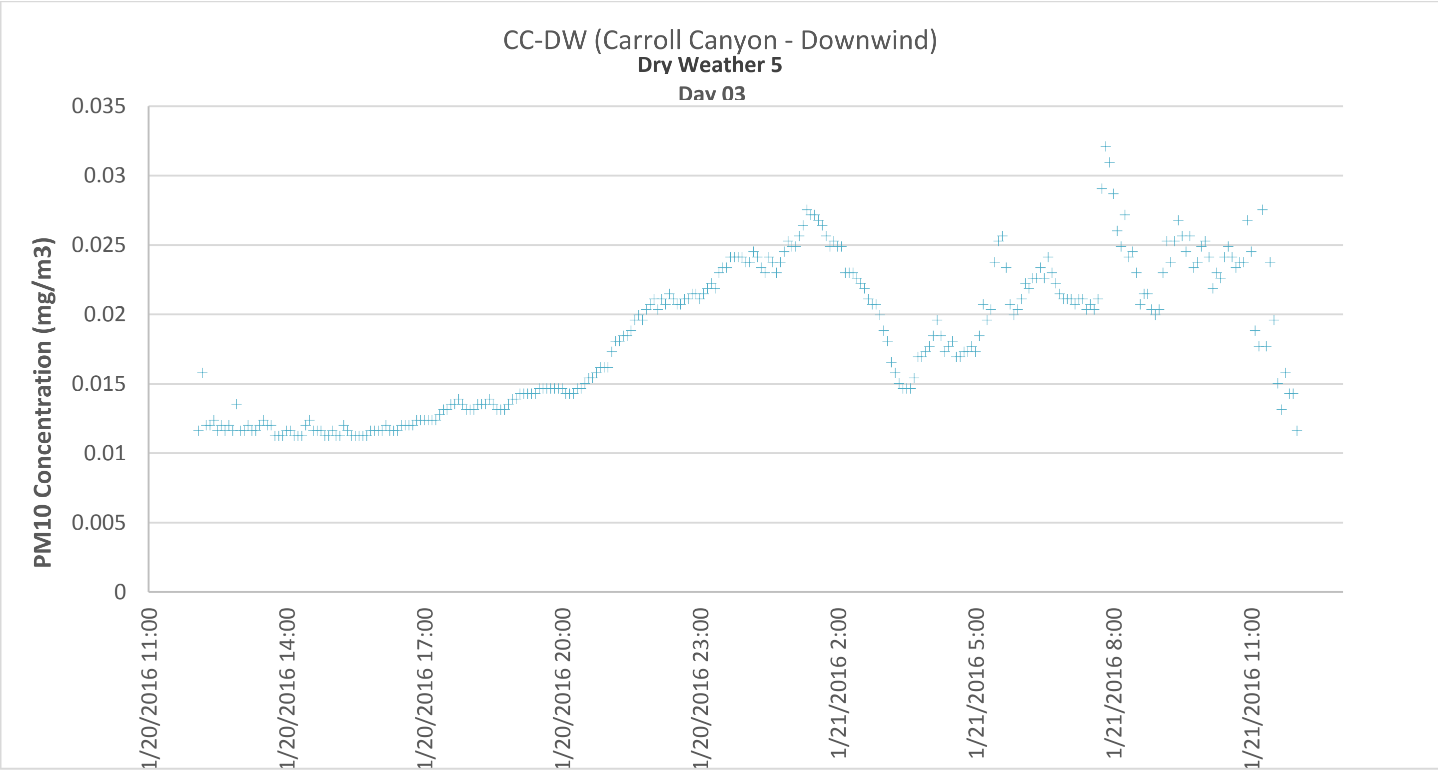


Figure 3-41.
CC-DW PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 2



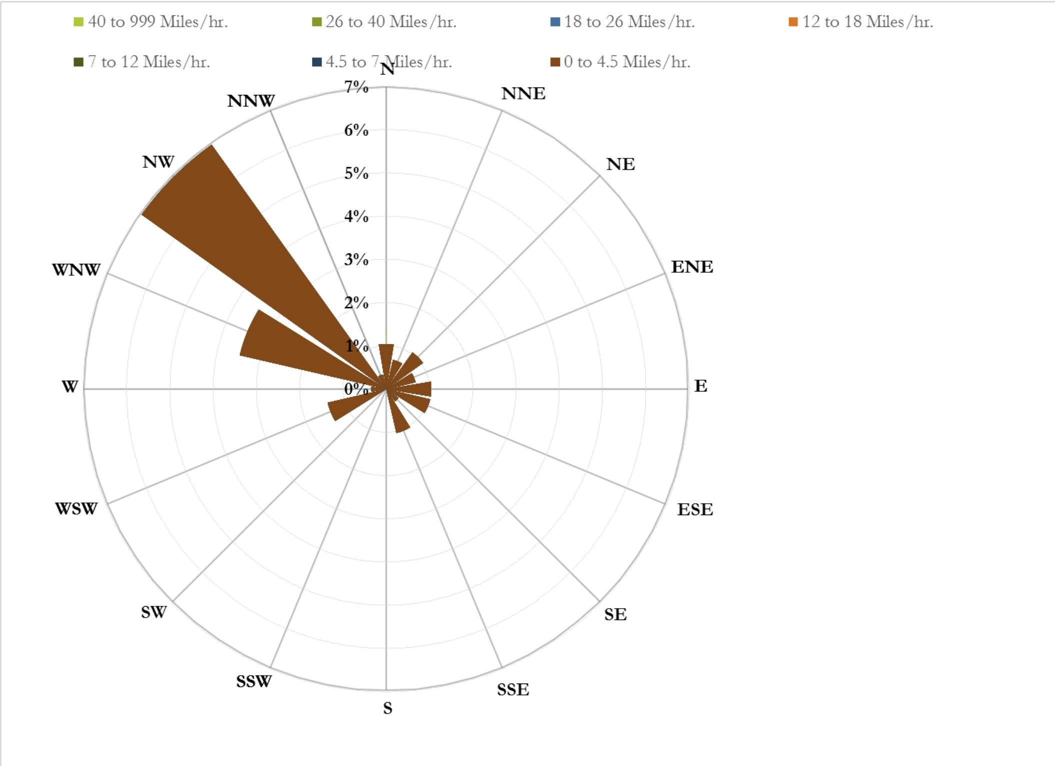


Figure 3-42.
CC-DW PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.4 CC-ER (Carroll Canyon – Eco Rental)

CC-ER (Carroll Canyon – Eco Rental):

CC-ER is a site monitored during the Phase II Watershed Special Study that was added by the City of San Diego (i.e., not funded through the Responsible Agencies[2] [RA] group) and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 787 measurements were determined to be valid (91%).
- Mean values for PM_{10} were 0.0084 mg/m^3.
- Mean standard deviation is $\pm$0.0053 mg/m^3

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – CC-ER Optical readings were higher than the mean value of the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the WNW and NW. Peak Optical monitor readings were observed during the evening and sundown, and times of increased traffic during the morning.

Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

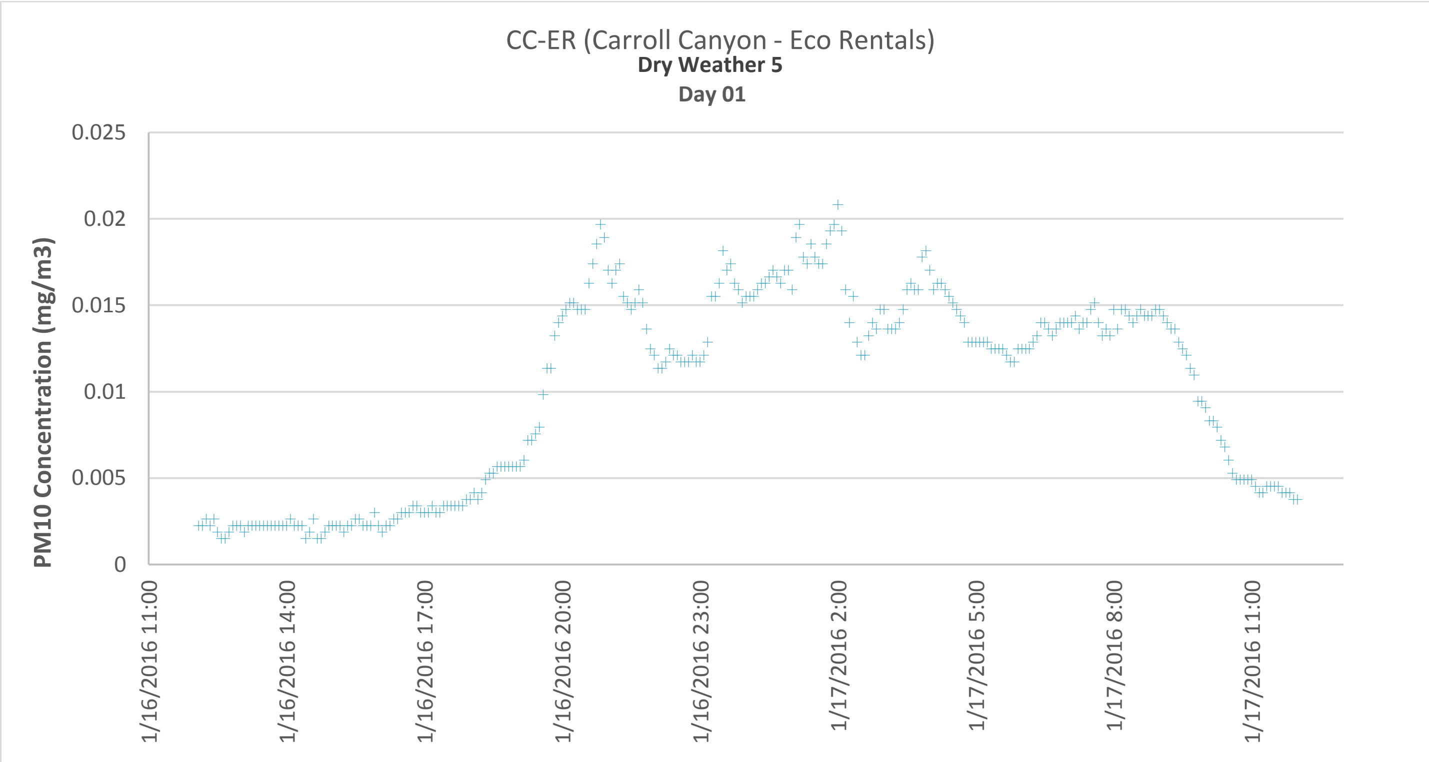
Day 2 – CC-ER Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Optical monitor readings peaked during increased traffic conditions in the morning.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – CC-ER Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed during the evening and sundown, and times of increased traffic during the morning.

Graphical representations of this data is presented in Figures 3-43 through 3-45.

[2] The Responsible Agencies (RAs) are the Cities of San Diego, Poway, and Del Mar, and the County of San Diego.



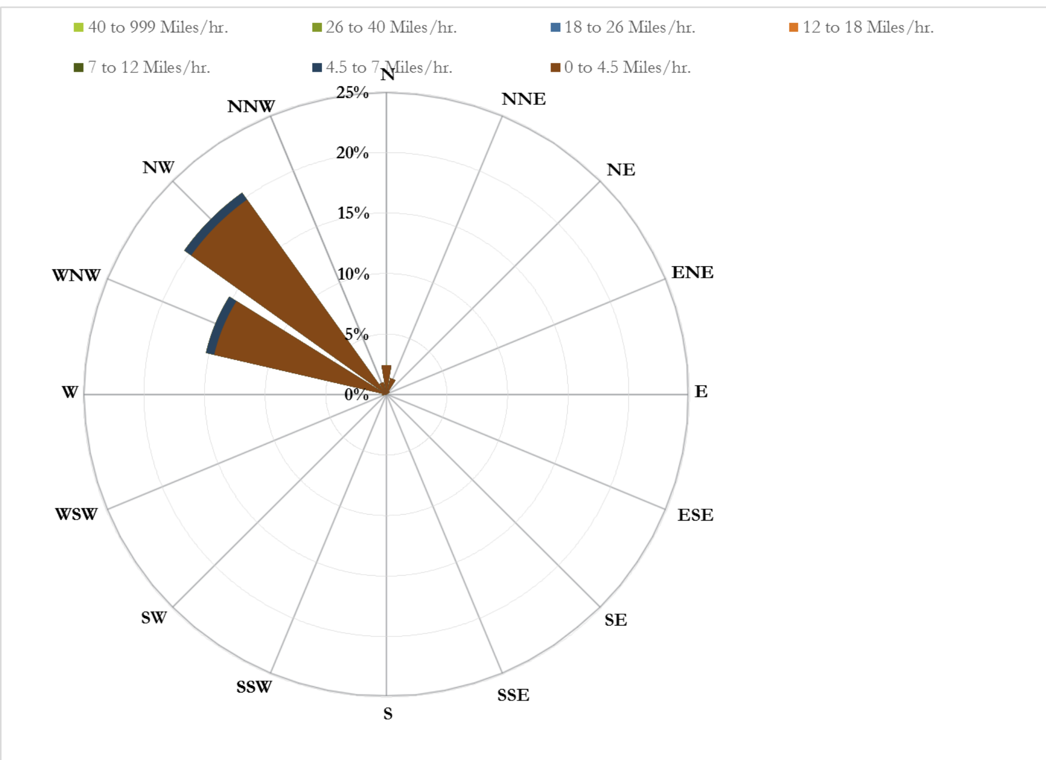
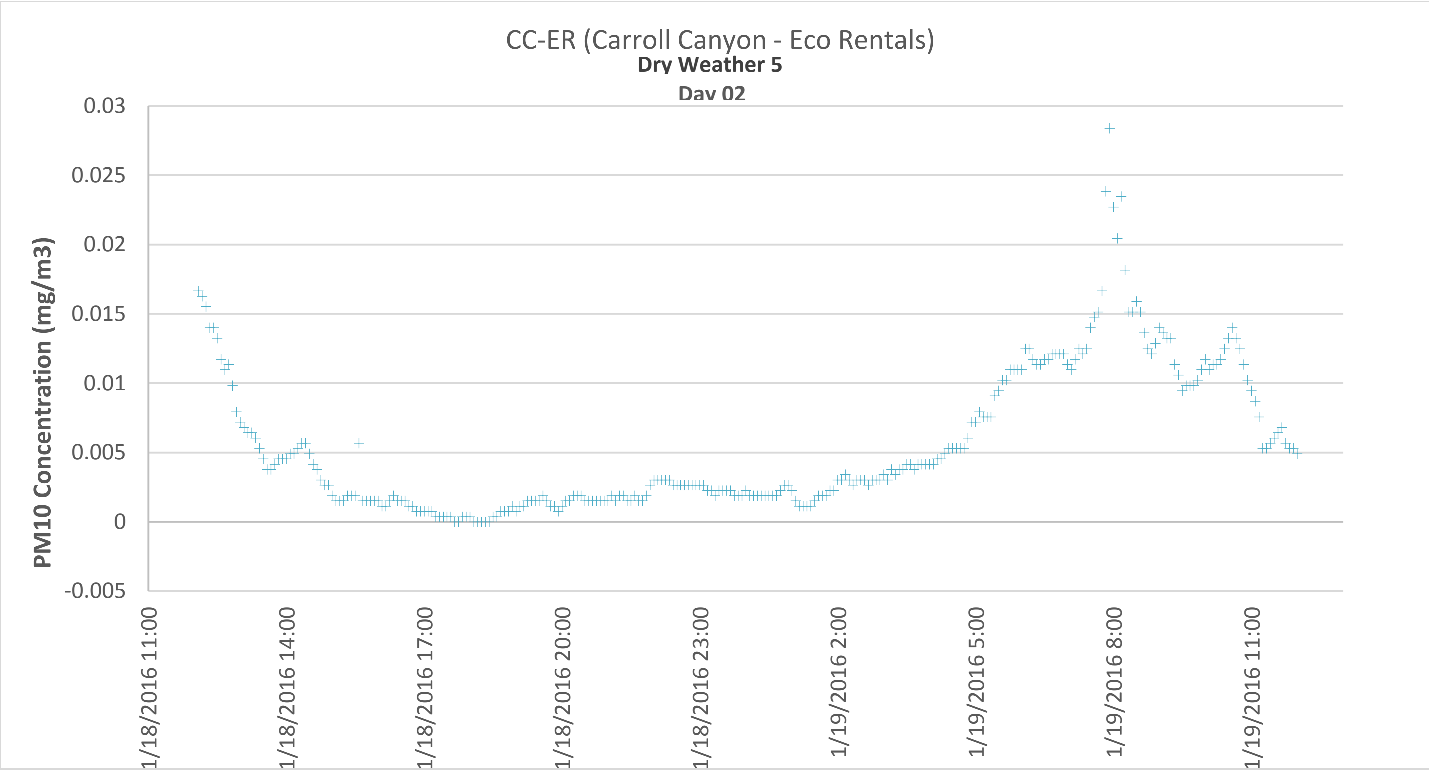


Figure 3-43.
CC-ER PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



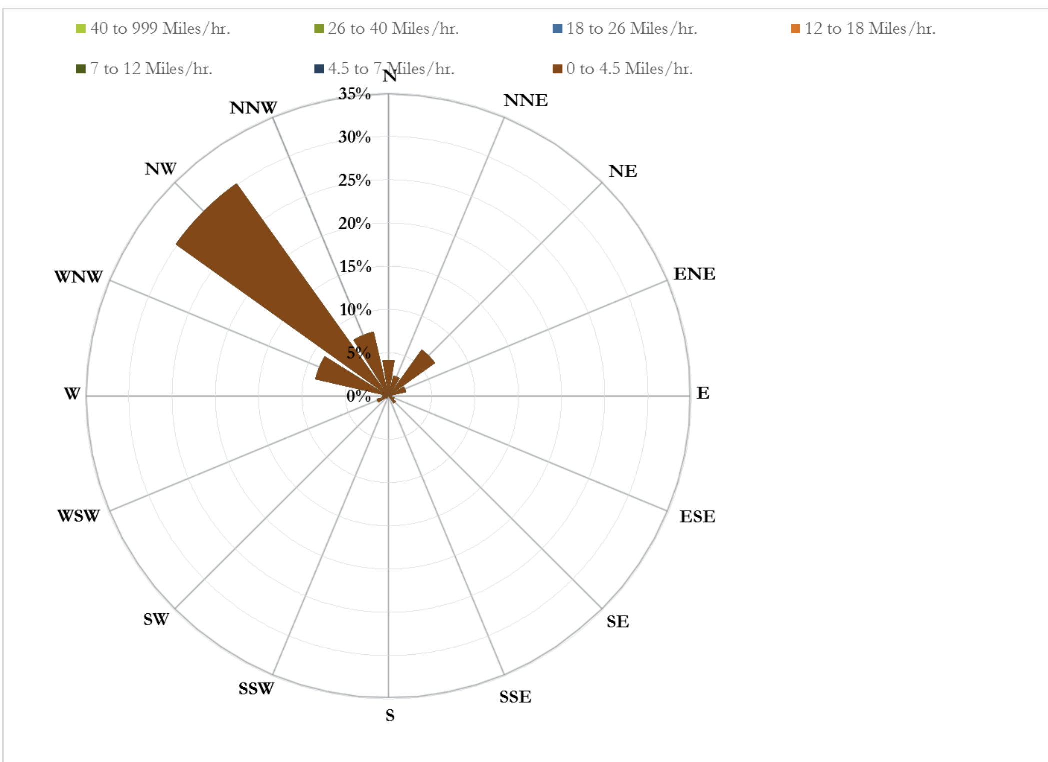
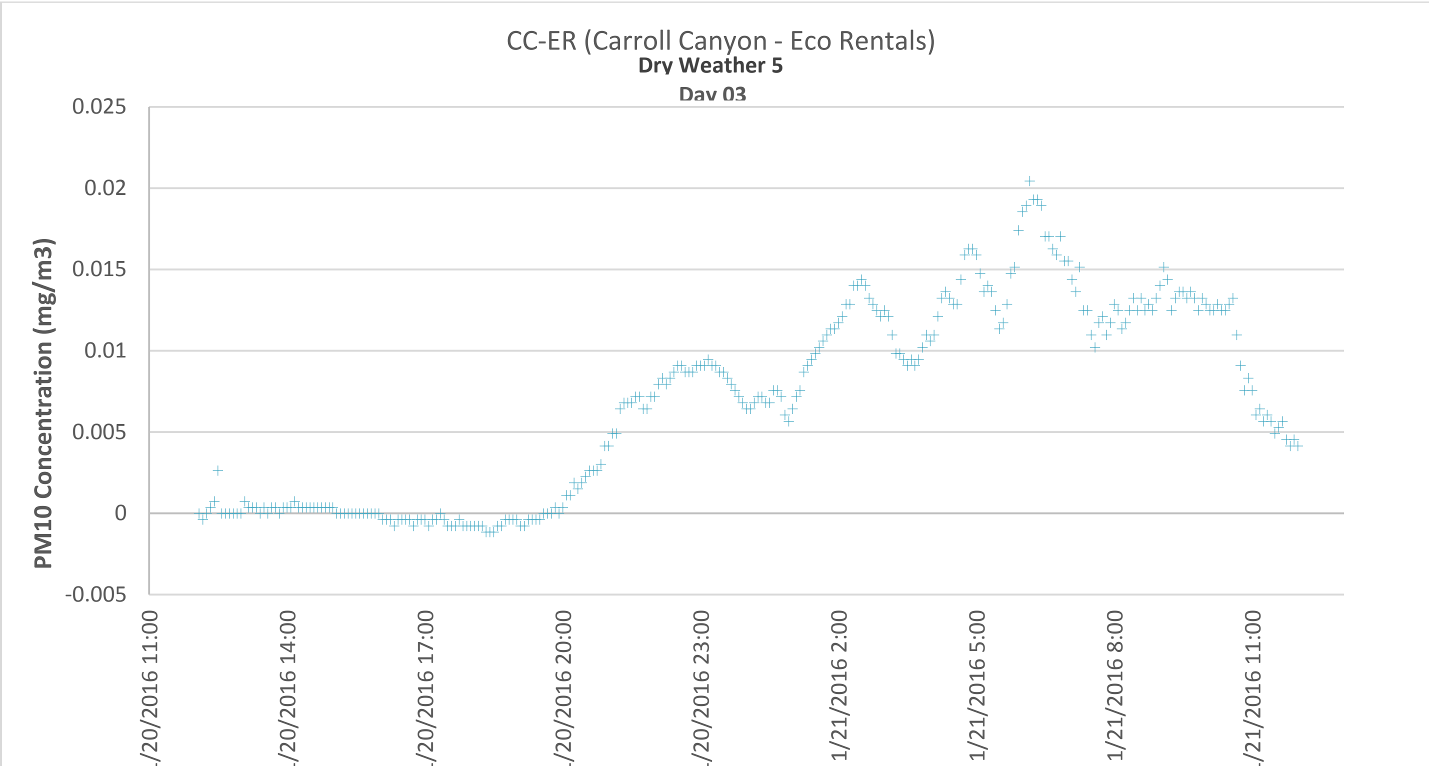


Figure 3-44.
CC-ER PM$_{10}$ Concentrations and Wind Rose, Dry Weather 5 – Day 2



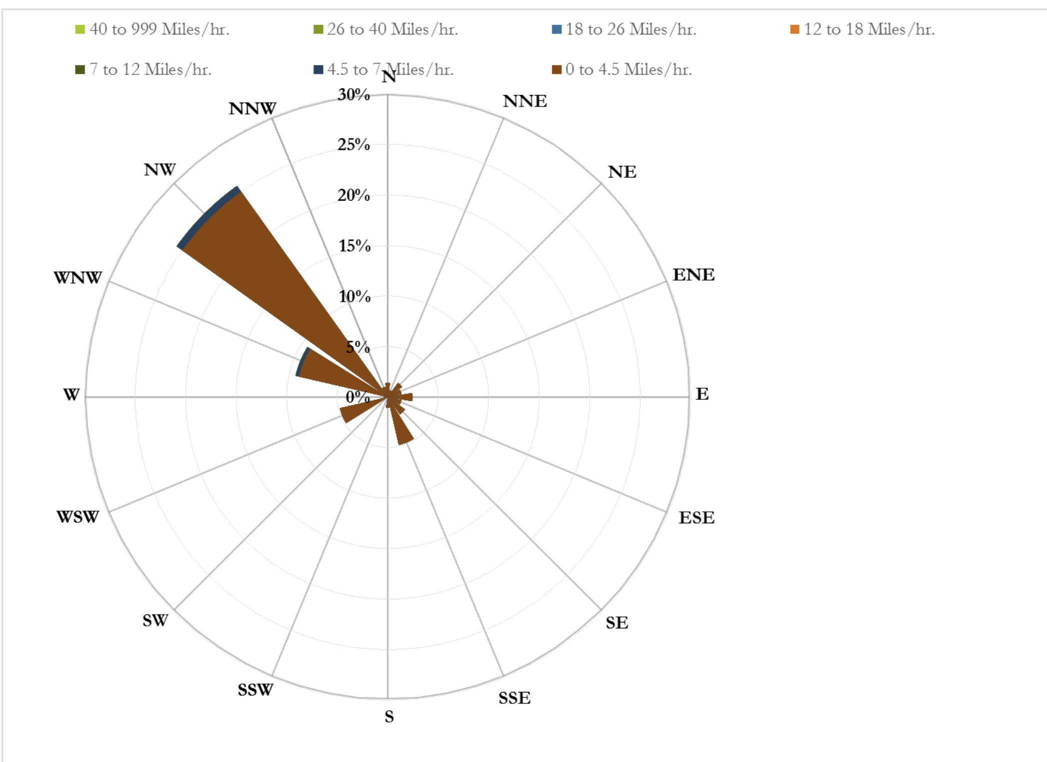


Figure 3-45.
CC-ER PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.5 CC-MP (Carroll Canyon – Maddox Park)

CC-MP (Carroll Canyon – Maddox Park):

CC-MP is a site monitored during the Phase II Watershed Special Study that was added by the City of San Diego (i.e., not funded through the RA group) and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 796 measurements were determined to be valid (91%).
- Mean values for PM_{10} were 0.0084 mg/m^3.
- Mean standard deviation is $\pm$0.0054 mg/m^3

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – CC-MP Optical readings were higher than the mean value of the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed late evening and sundown, and times of increased traffic during the morning.

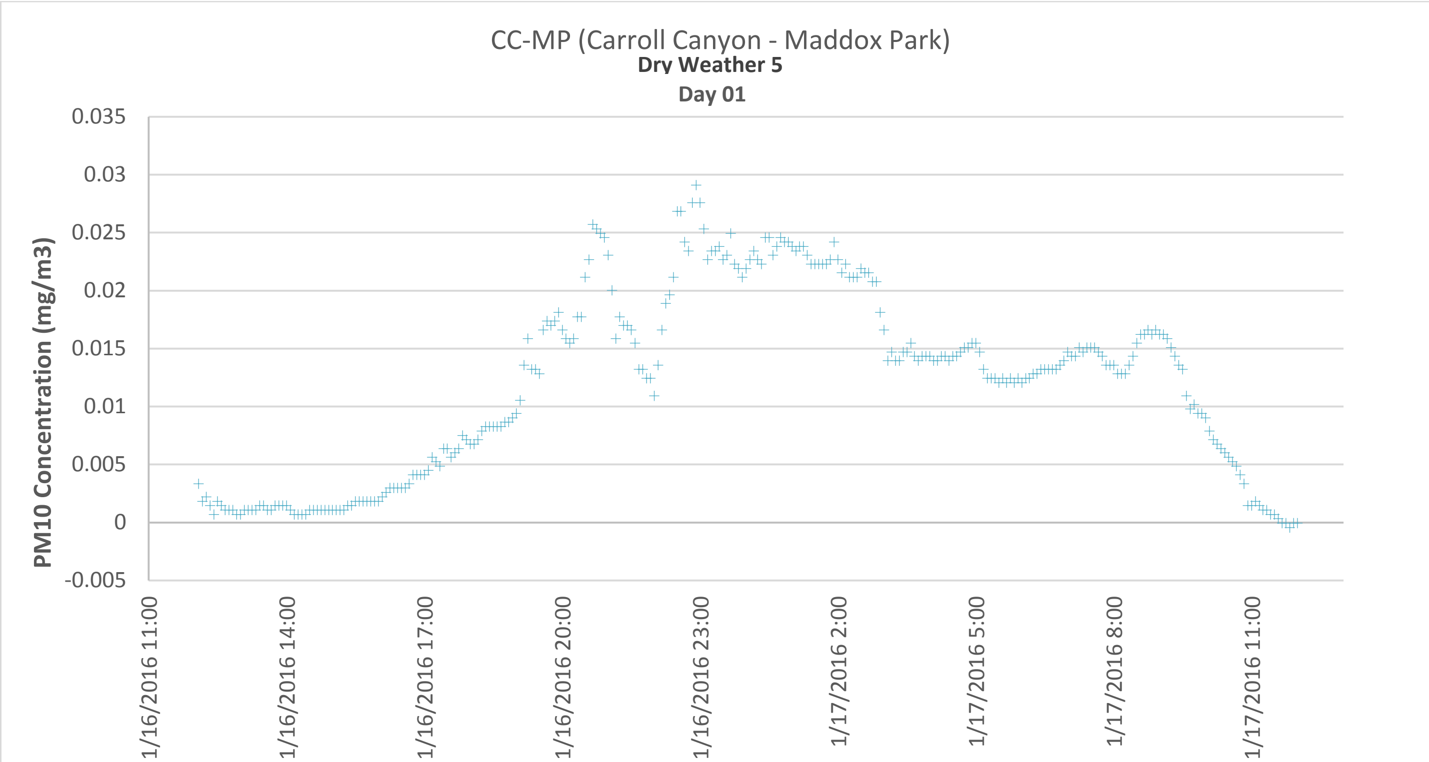
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 2 – CC-MP Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed at noon and times of increased traffic during the morning.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – CC-MP Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed late evening and sundown, and times of increased traffic during the morning.

Graphical representations of this data is presented in Figures 3-46 through 3-48.



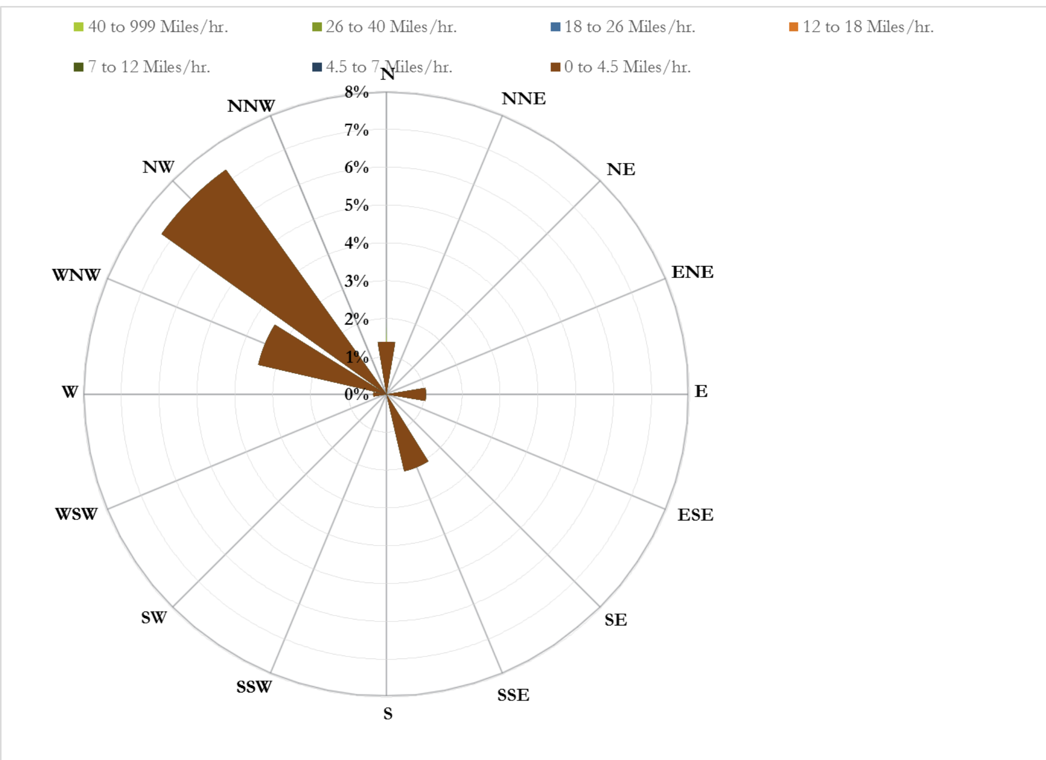
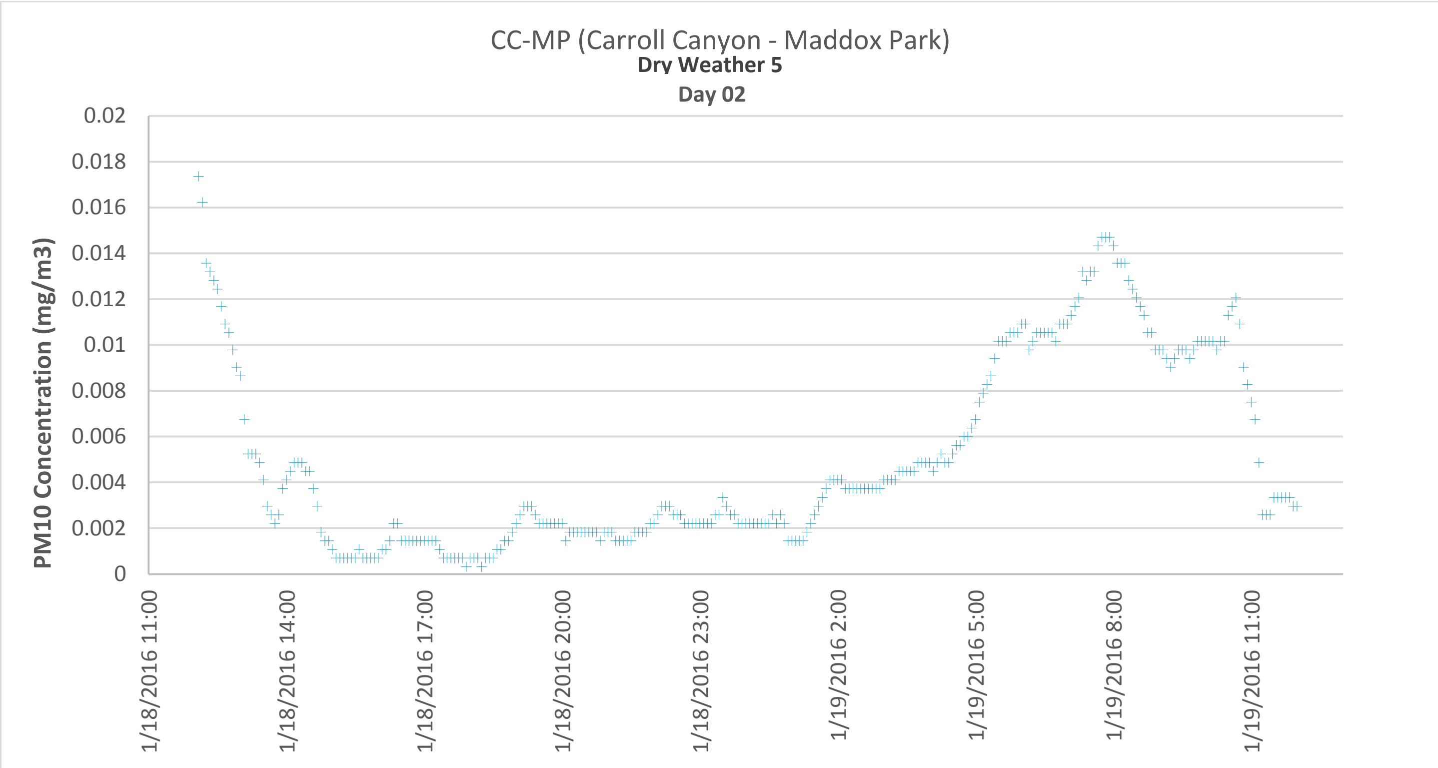


Figure 3-46.
CC-MP PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



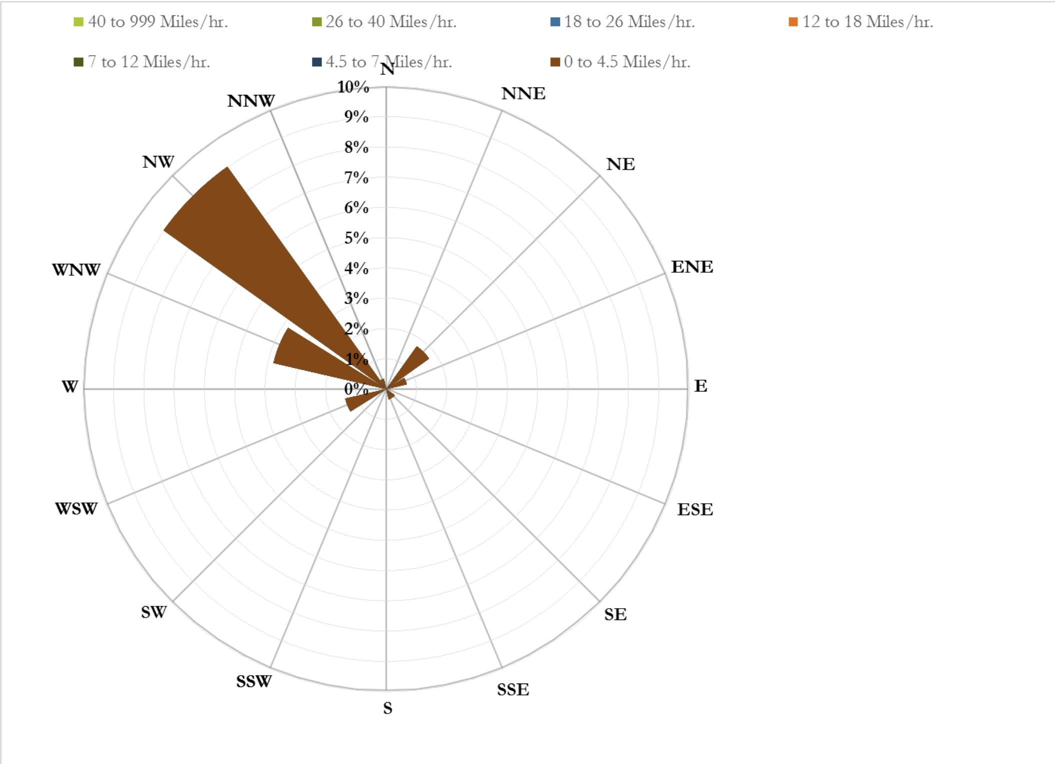
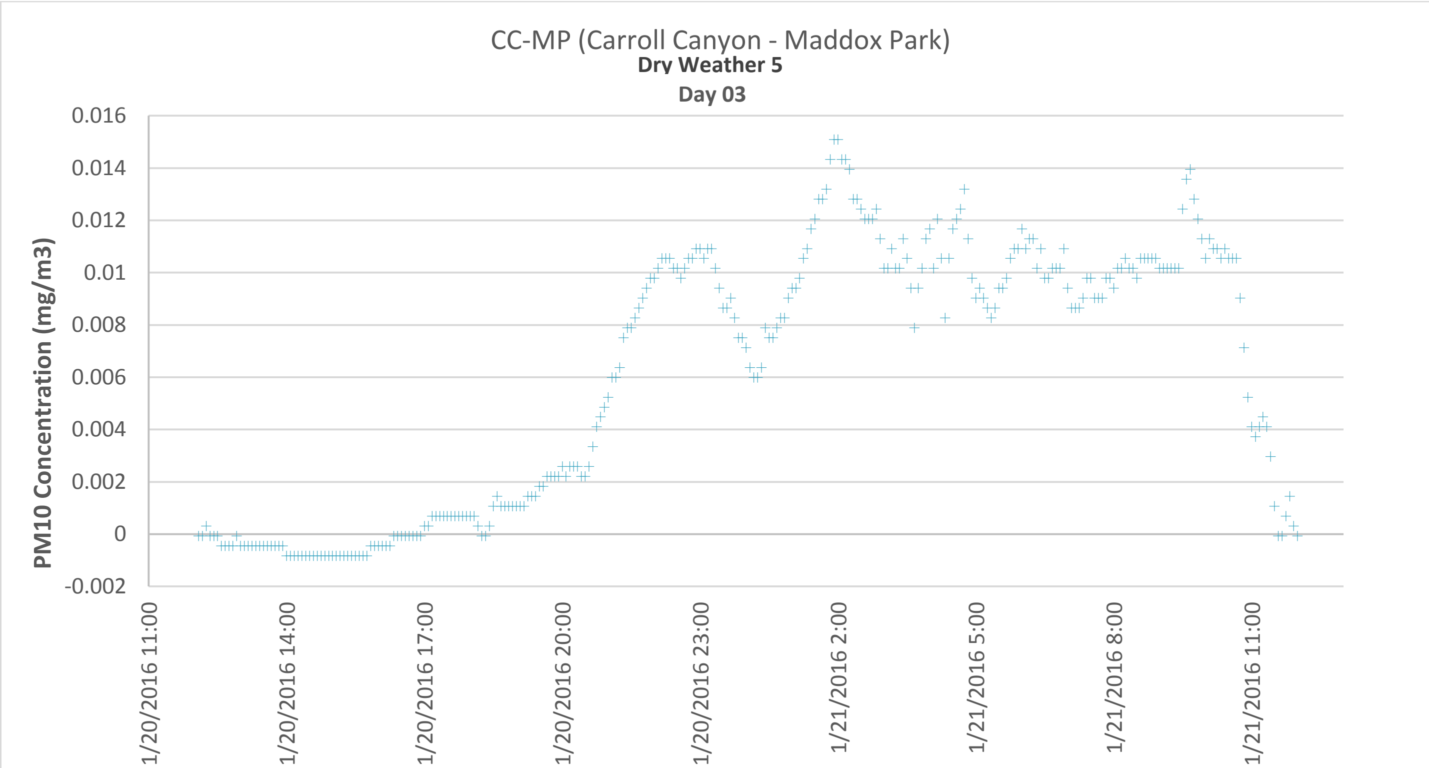


Figure 3-47.
CC-MP PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 2



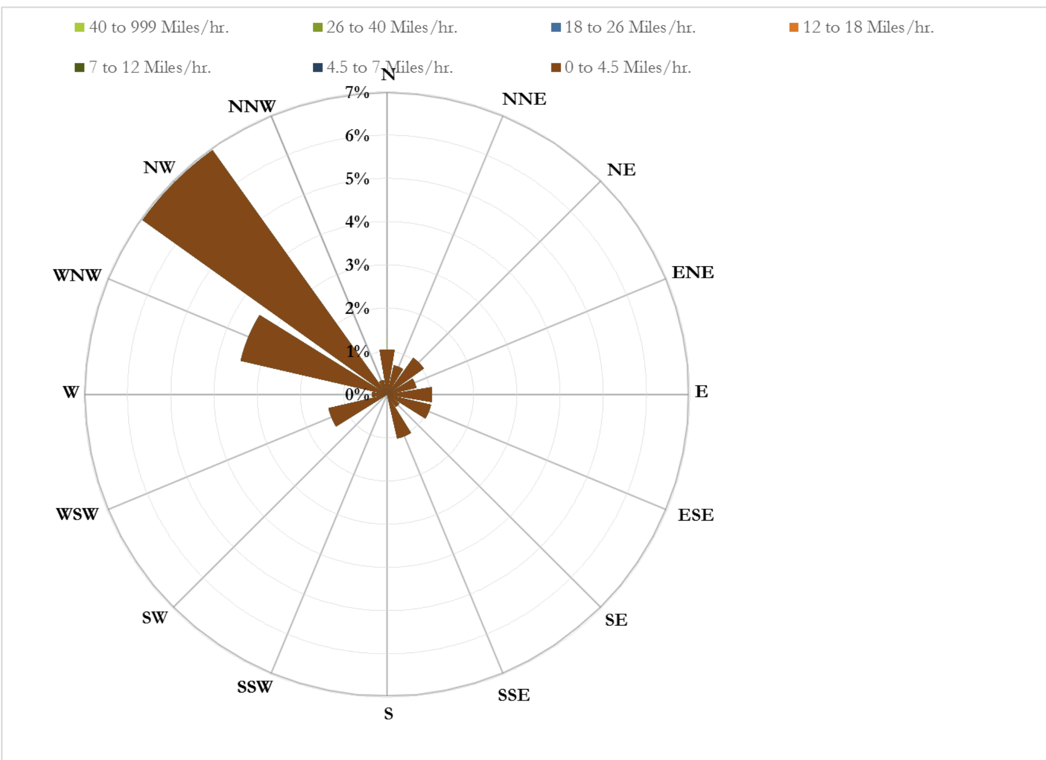


Figure 3-48.
CC-MP PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.6 CC-SF (Carroll Canyon – Camino Santa Fe)

CC-SF (Carroll Canyon – Camino Santa Fe):

CC-MP is a site monitored during the Phase II Watershed Special Study that was added by the City of San Diego (i.e., not funded through the RA group) and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 662 measurements were determined to be valid (76%).
- Mean values for PM_{10} were 0.0092 mg/m^3.
- Mean standard deviation is $\pm$0.0051 mg/m^3

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – CC-SF Optical readings were higher than the mean value of the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed late evening and sundown, at times of increased traffic during the morning.

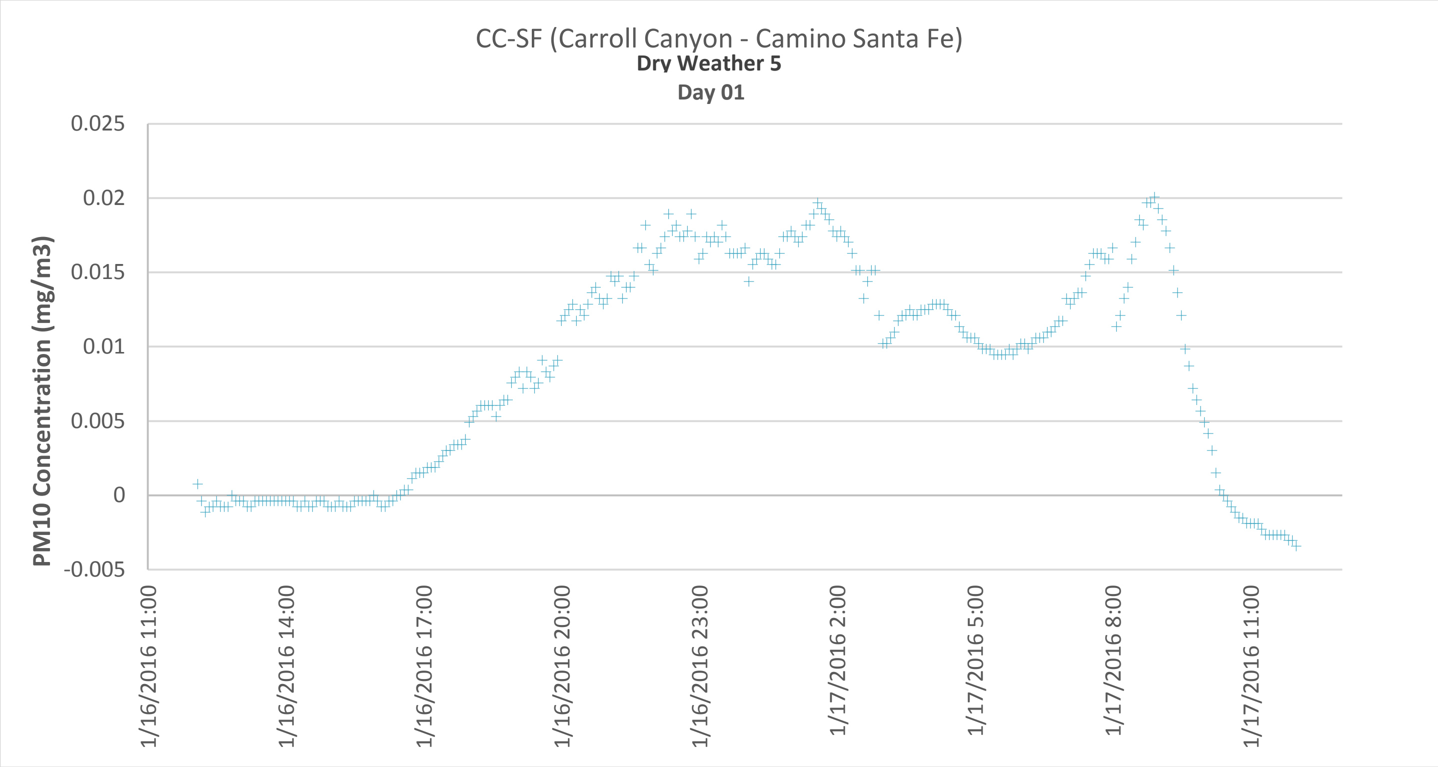
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 2 – CC-SF Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed at noon and times of increased traffic during the morning.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – CC-SF Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed after sundown and at times of increased traffic during the morning.

Graphical representations of this data is presented in Figures 3-49 through 3-51.



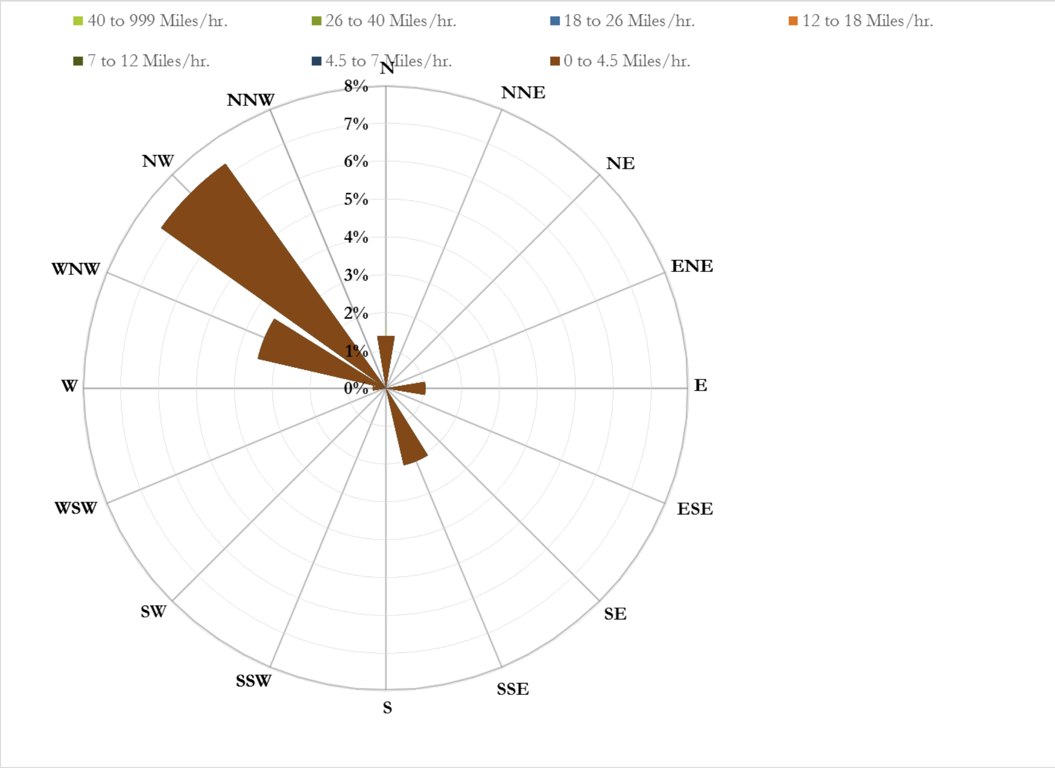
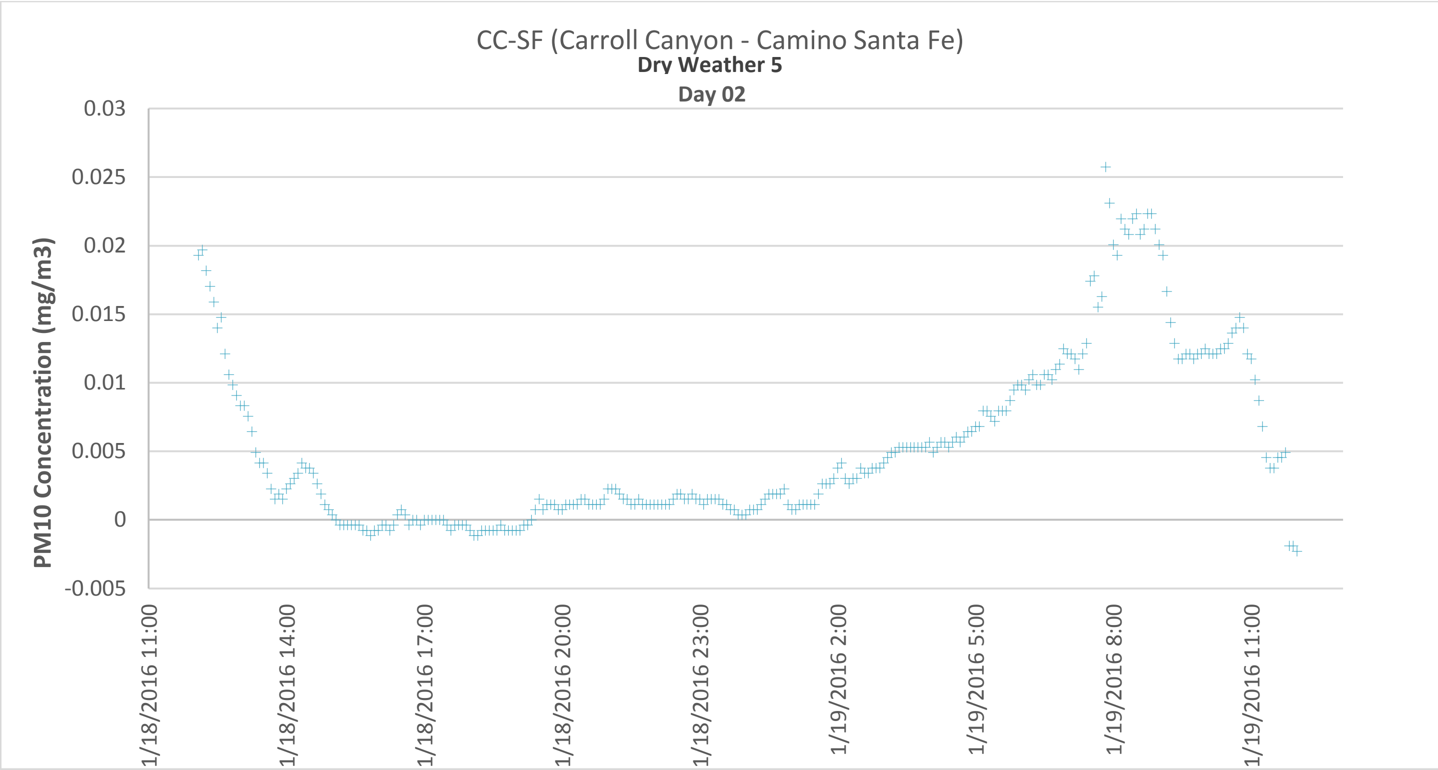


Figure 3-49.
CC-SF PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



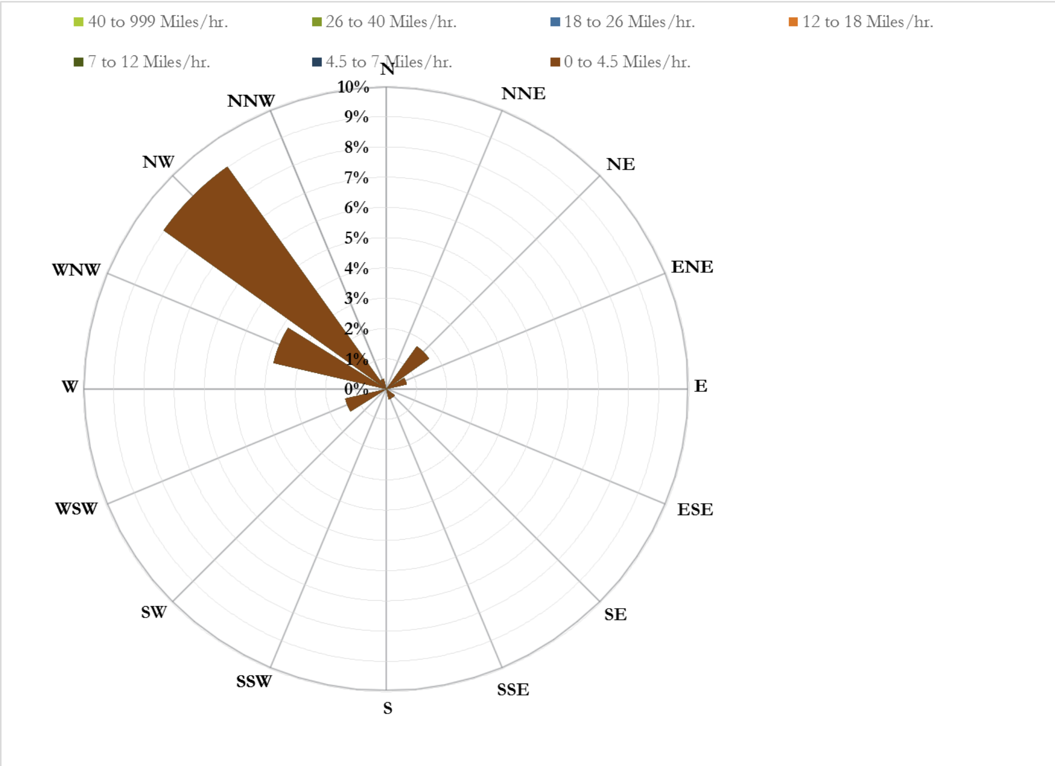
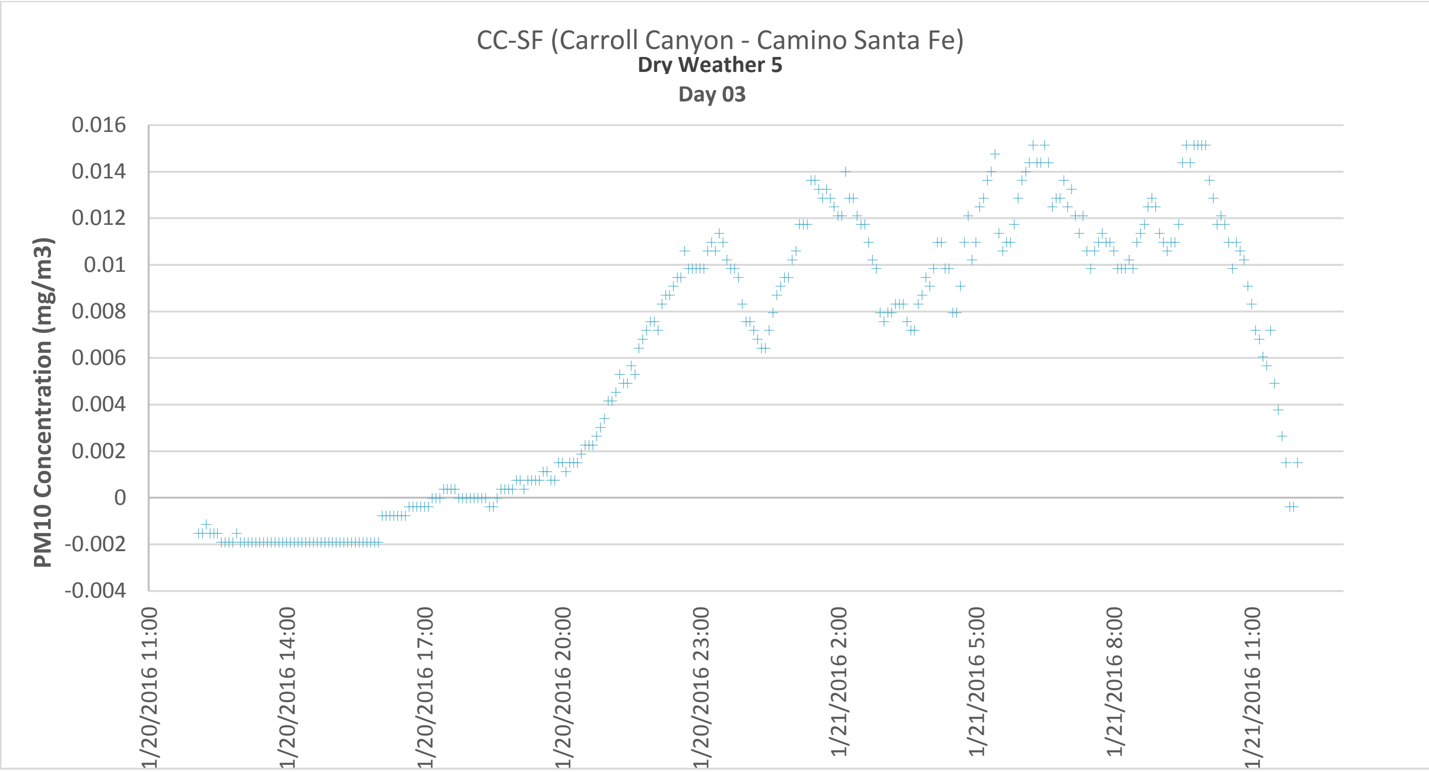


Figure 3-50.
CC-SF PM$_{10}$ Concentrations and Wind Rose, Dry Weather 5 – Day 2



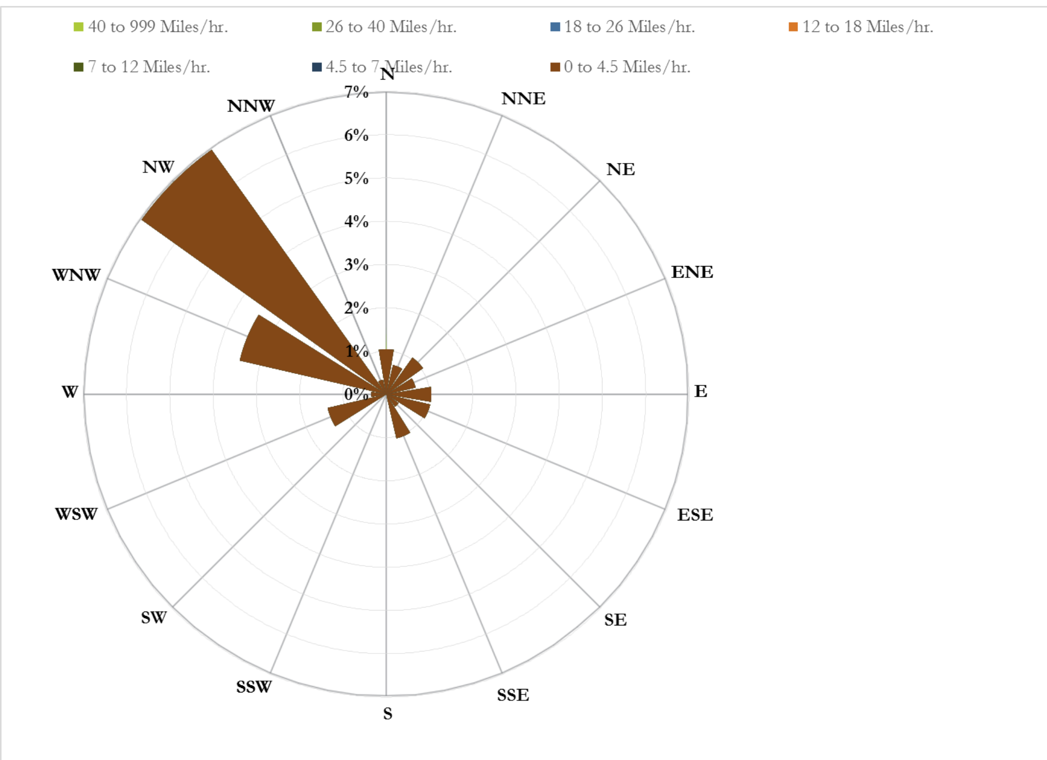


Figure 3-51.
CC-SF PM$_{10}$ Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.7 CC-SR (Carroll Canyon – Scripps Ranch)

CC-SR (Carroll Canyon – Scripps Ranch):

CC-SR is a site monitored during the Phase I and 2 Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0064 mg/m^3.
- Mean standard deviation is $\pm$0.0041 mg/m^3

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – CC-SF Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed during sundown and late morning.

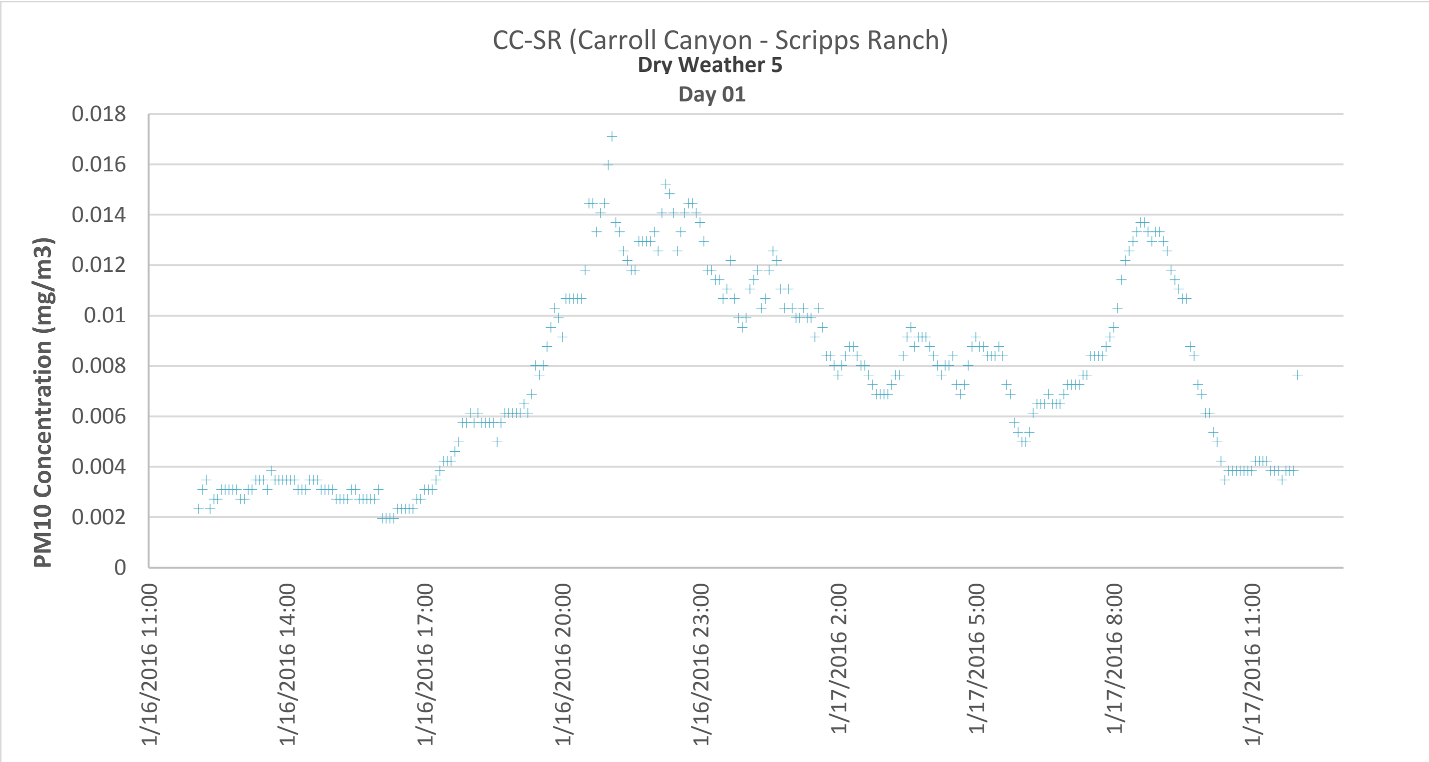
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 2 – CC-SF Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Optical monitor readings peaked around noontime and during times of increased traffic conditions in the morning.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – CC-DM Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed around midnight.

Graphical representations of this data is presented in Figures 3-52 through 3-54.



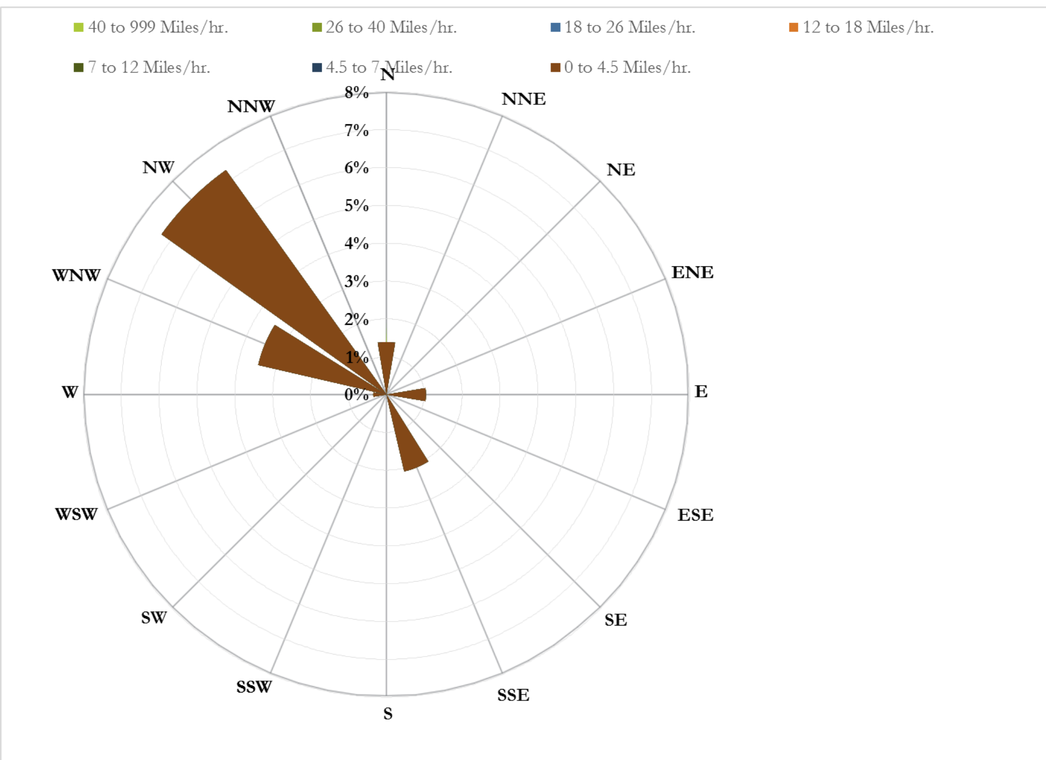
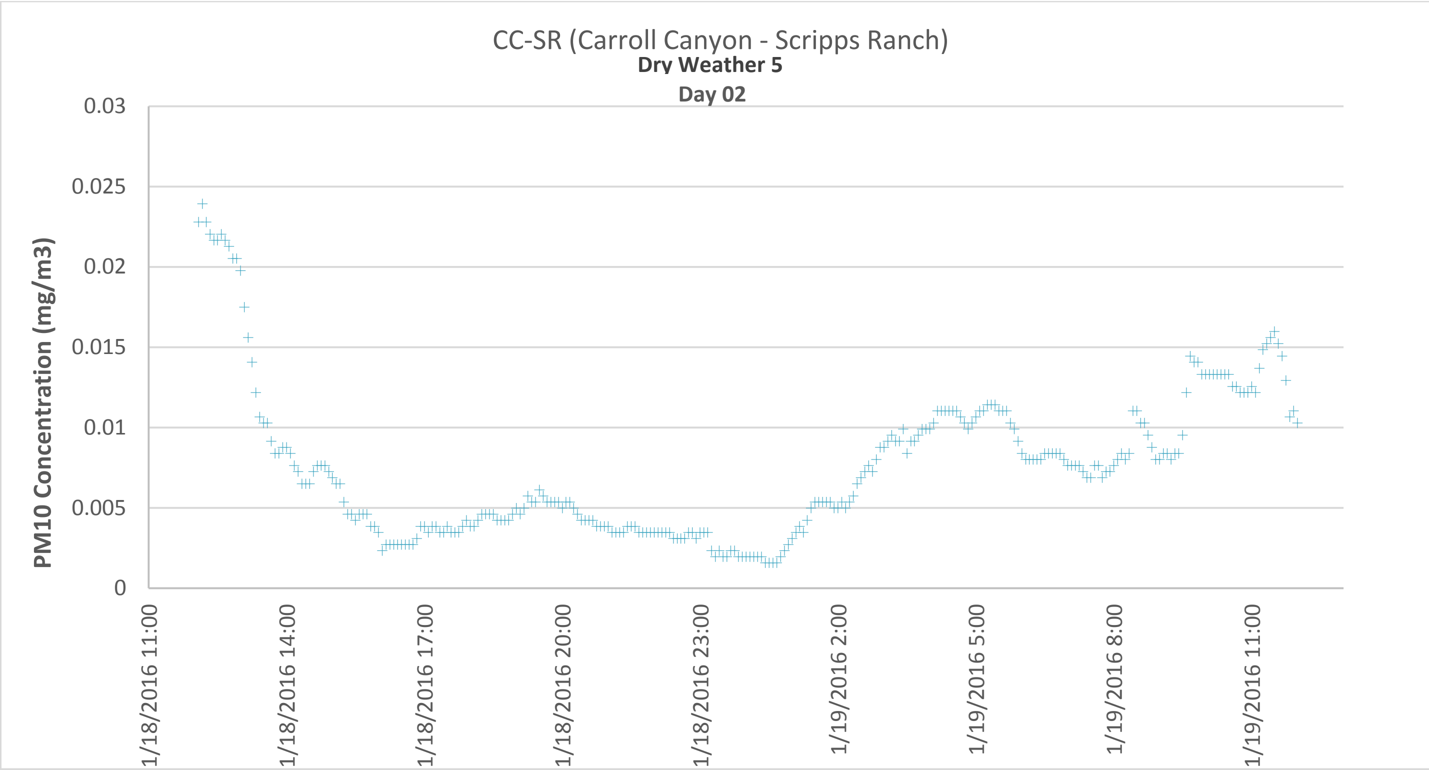


Figure 3-52.
CC-SR PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



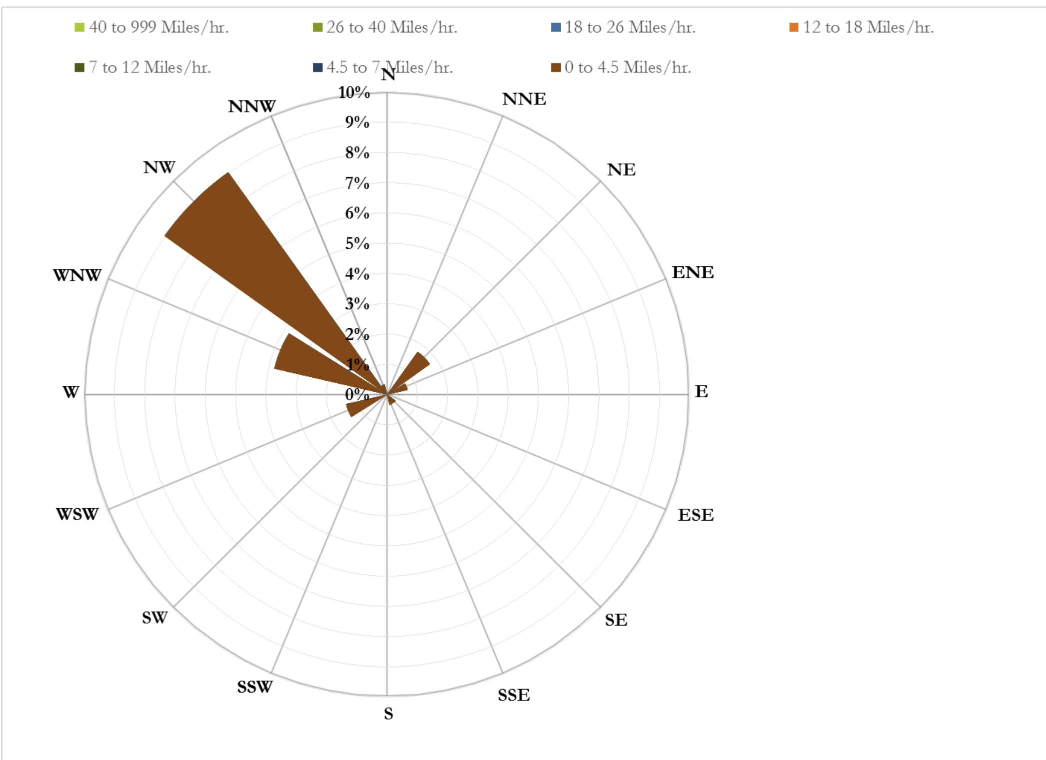
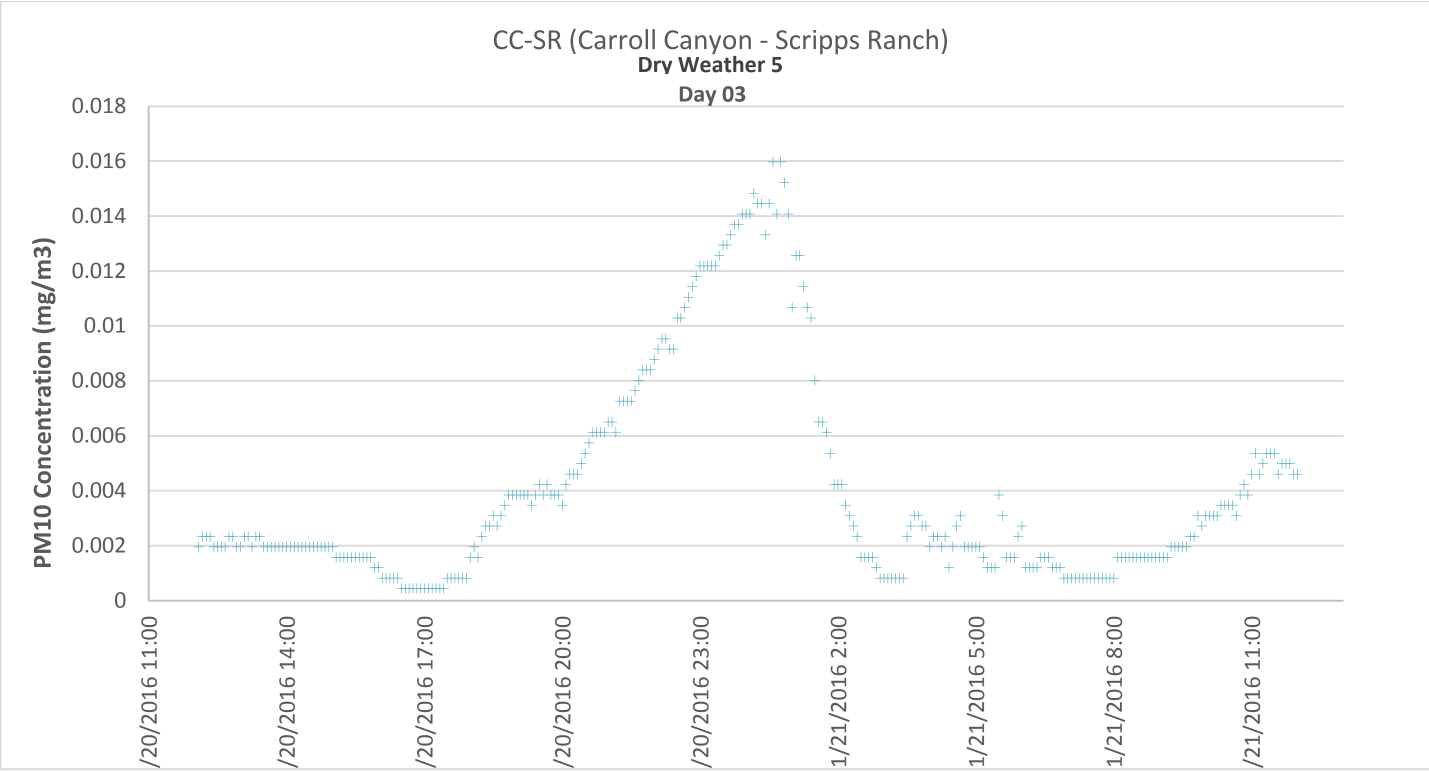


Figure 3-53.
CC-SR PM$_{10}$ Concentrations and Wind Rose, Dry Weather 5 – Day 2



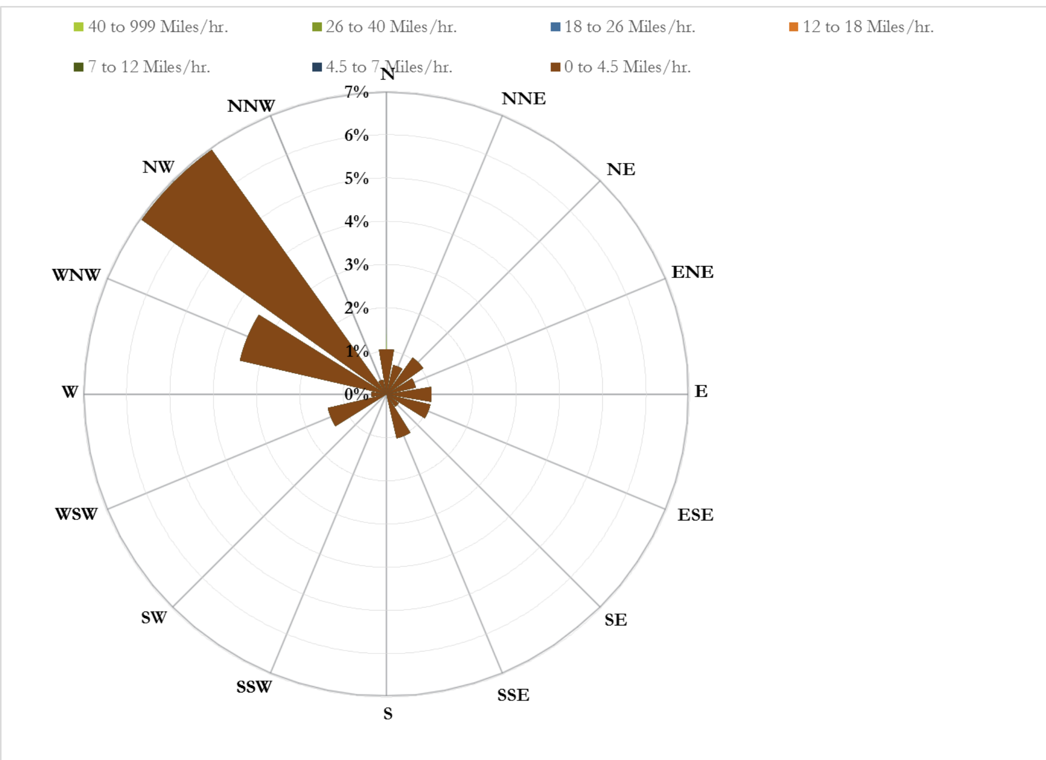


Figure 3-54.
CC-SR PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.8 CC-UP (Carroll Canyon – Upwind)

CC-UP (Carroll Canyon – Upwind):

CC-UP is a site monitored during the Phase I and 2 Watershed Special Study and contains an Optical monitor and an FRM sampler.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 807 measurements were determined to be valid (93%).
- Mean values for PM_{10} were 0.0055 mg/m^3.
- Mean standard deviation is $\pm$0.0074 mg/m^3

FRM Sampler (Laboratory) Results:

- Mean values for PM_{10} was 0.0111 mg/m^3.
- Mean RPD from the FRM results to the Optical monitor results was 63.73%

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – CC-UP Optical readings were lower than the mean value of the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed during sundown and morning.

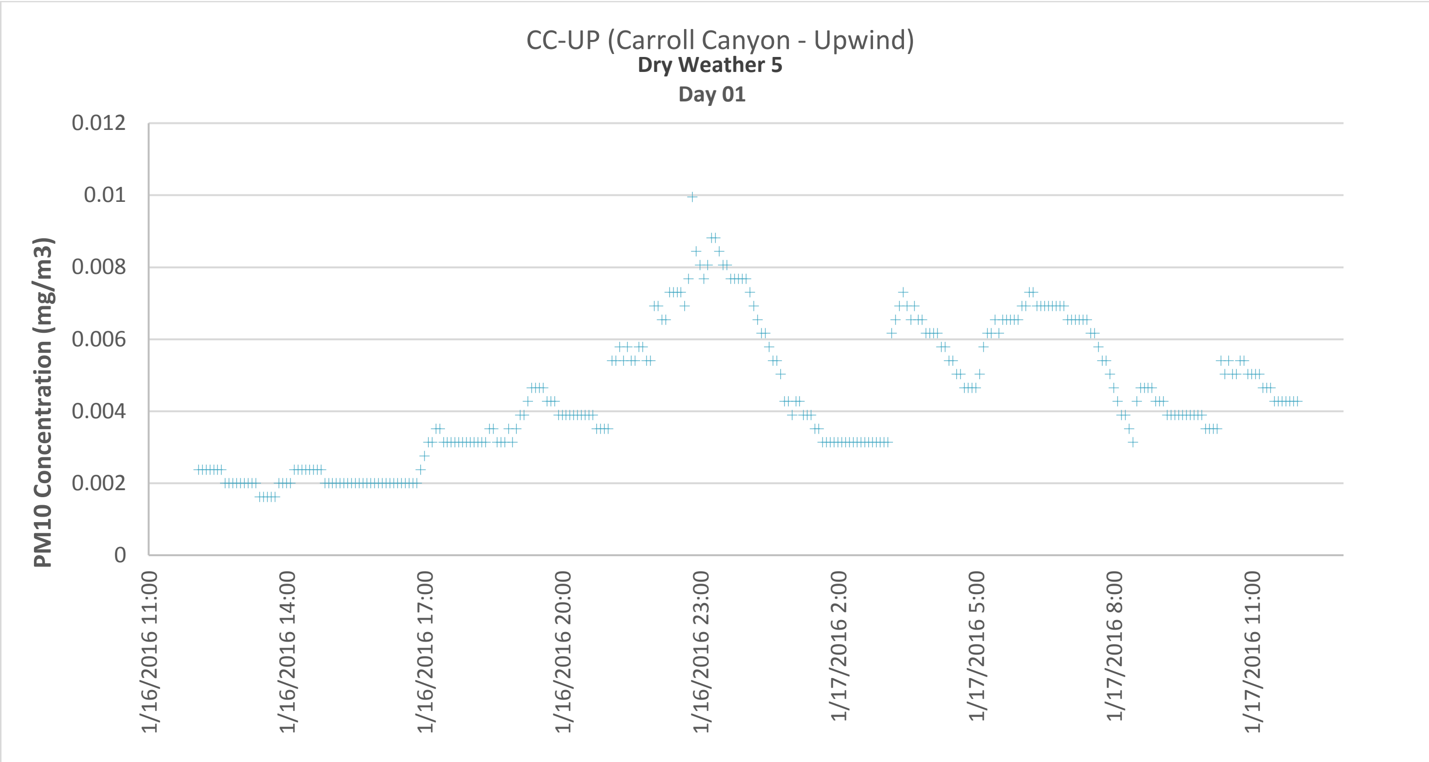
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 2 – CC-UP Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed during periods of increased traffic in the morning.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – CC-UP Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed during periods of increased traffic in the morning.

Graphical representations of this data is presented in Figures 3-55 through 3-57.



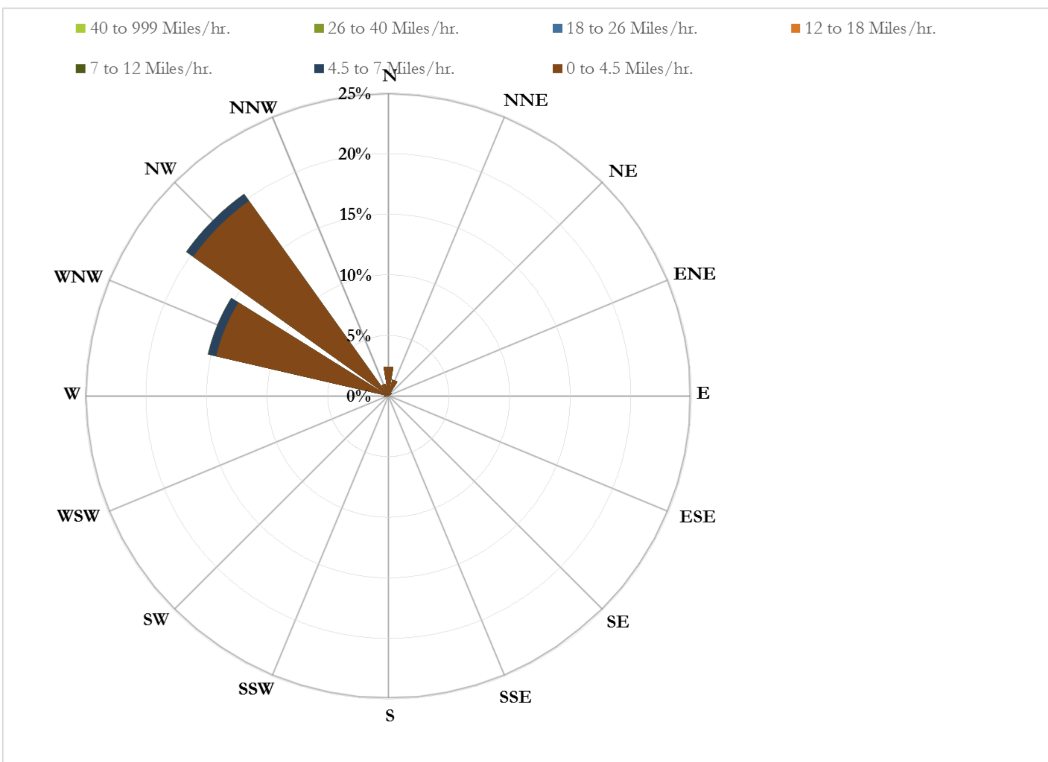
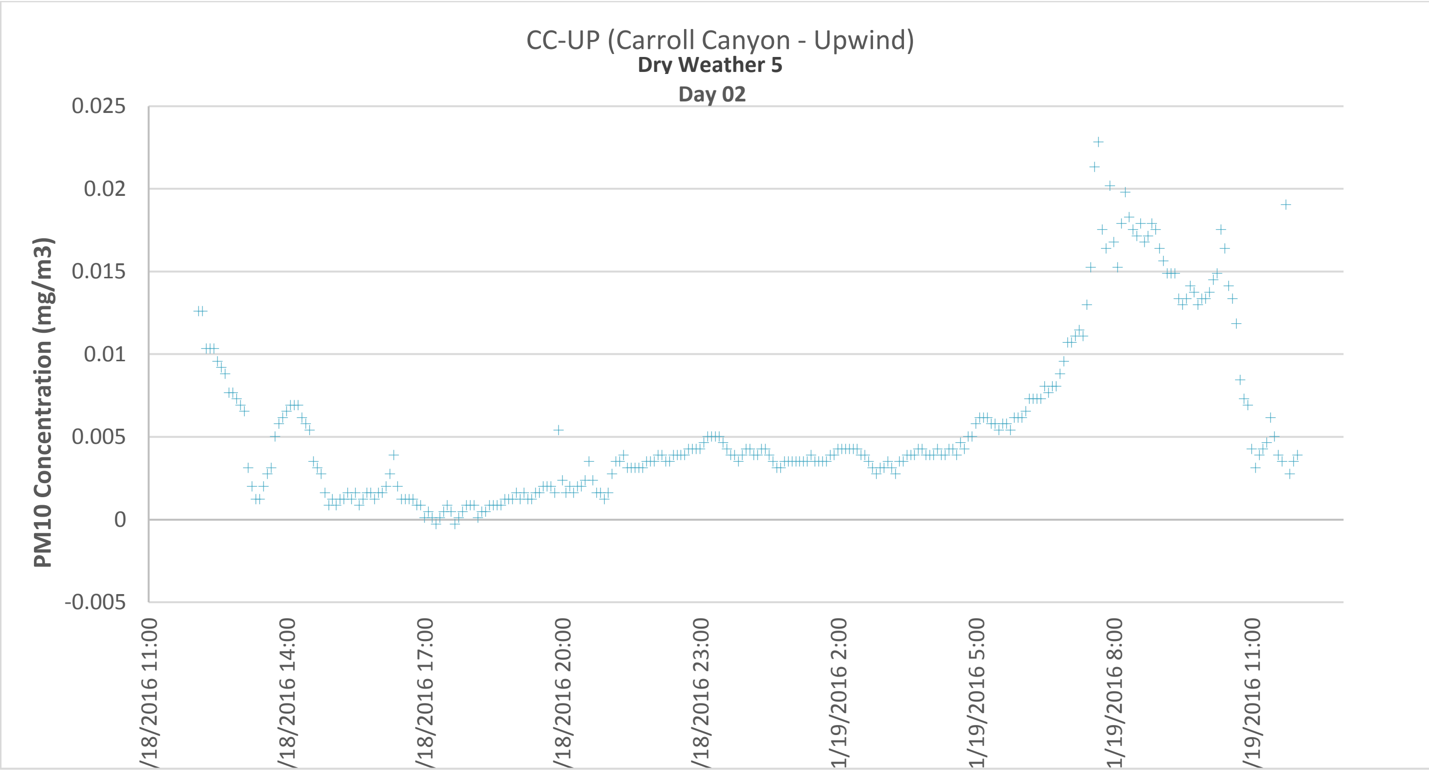


Figure 3-55.
CC-UP PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



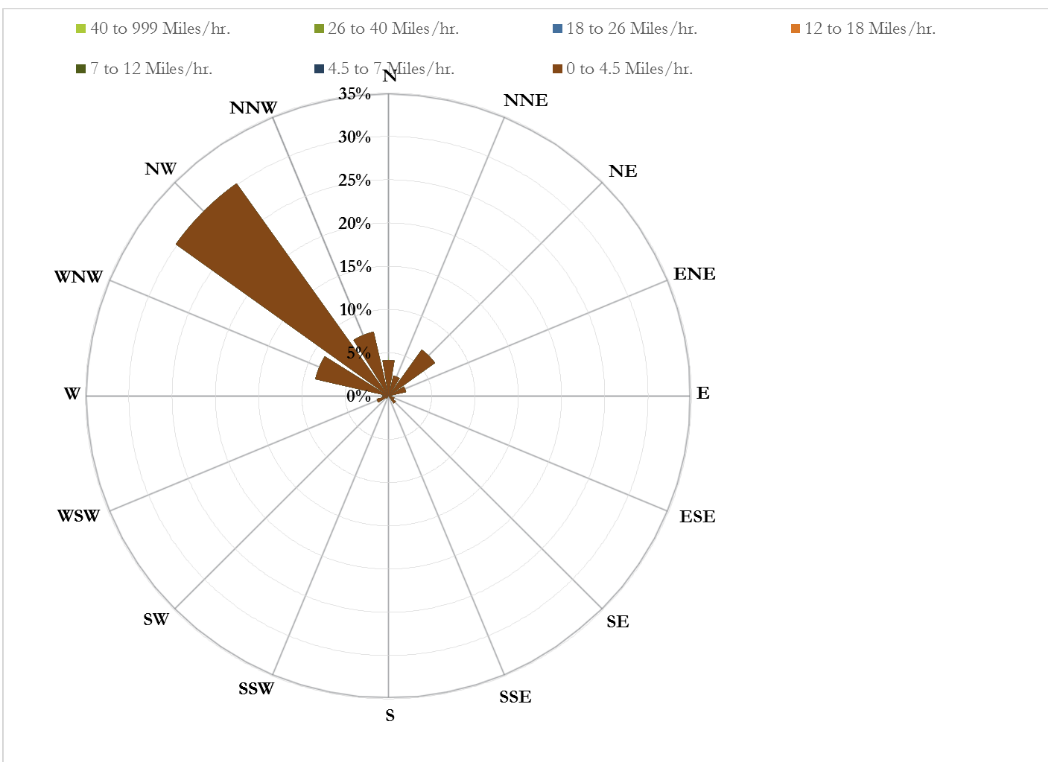
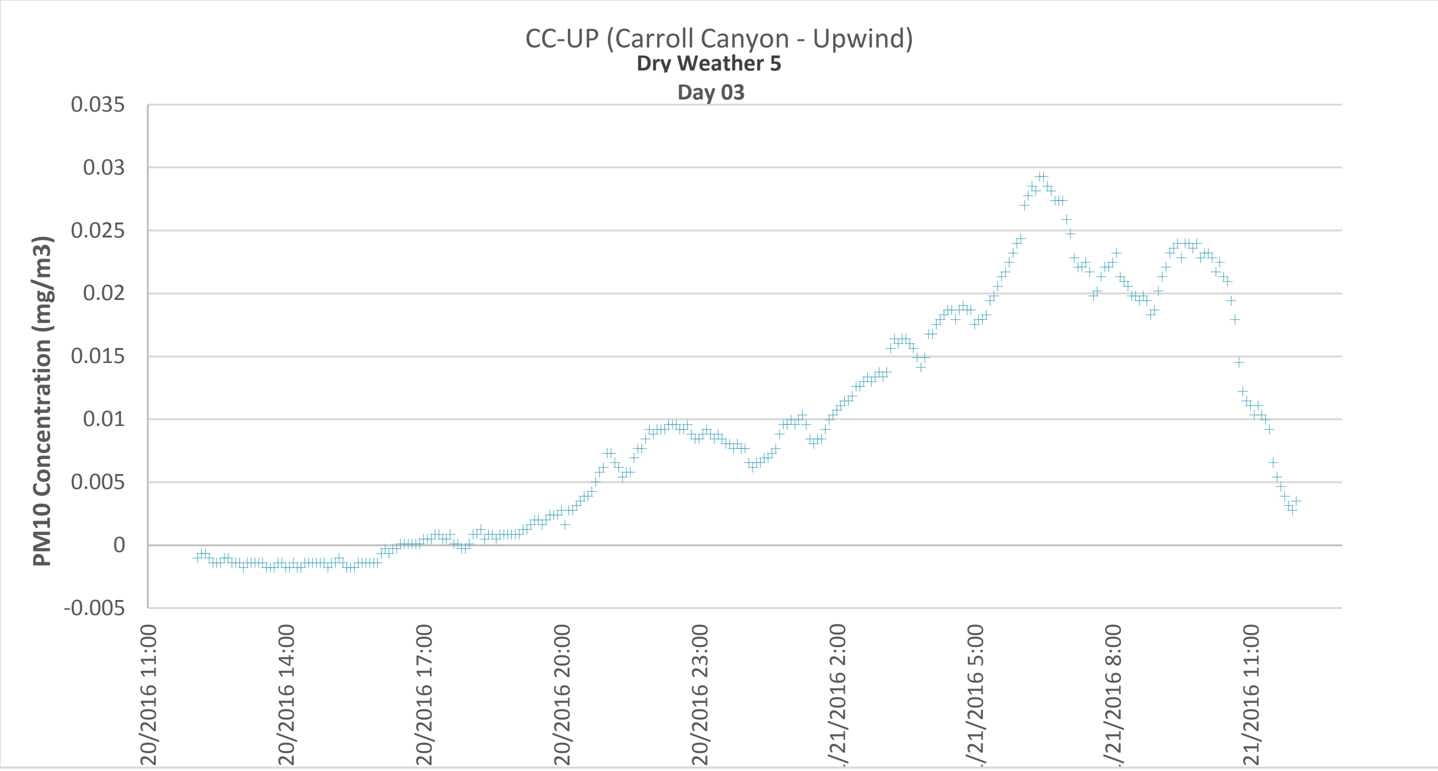


Figure 3-56.
CC-UP PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 2



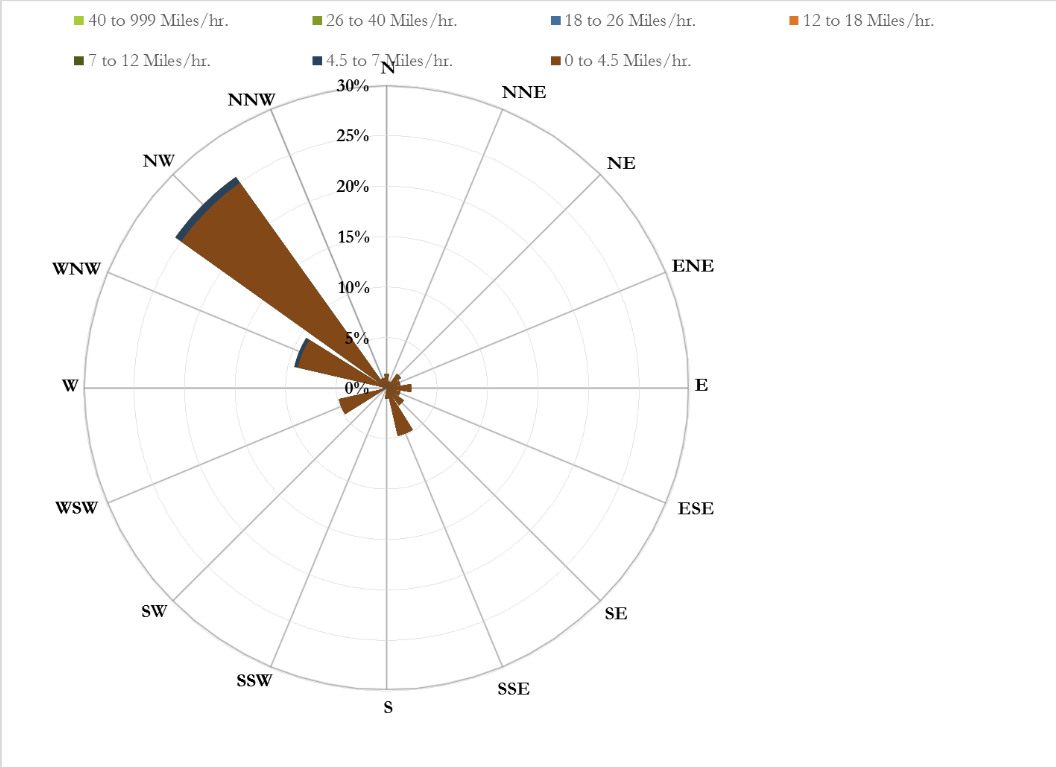


Figure 3-57.
CC-UP PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.9 CV-CD (Carmel Valley – Camino Del Sur)

CV-CD (Carmel Valley – Camino Del Sur):

CV-CD is a site monitored during the Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 810 measurements were determined to be valid (94%).
- Mean values for PM_{10} were 0.0076 mg/m^3.
- Mean standard deviation is $\pm$0.0055 mg/m^3

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – CV-CD Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind direction were observed primarily from the W and WSW. Peak Optical monitor readings were observed between around midnight and through the morning.

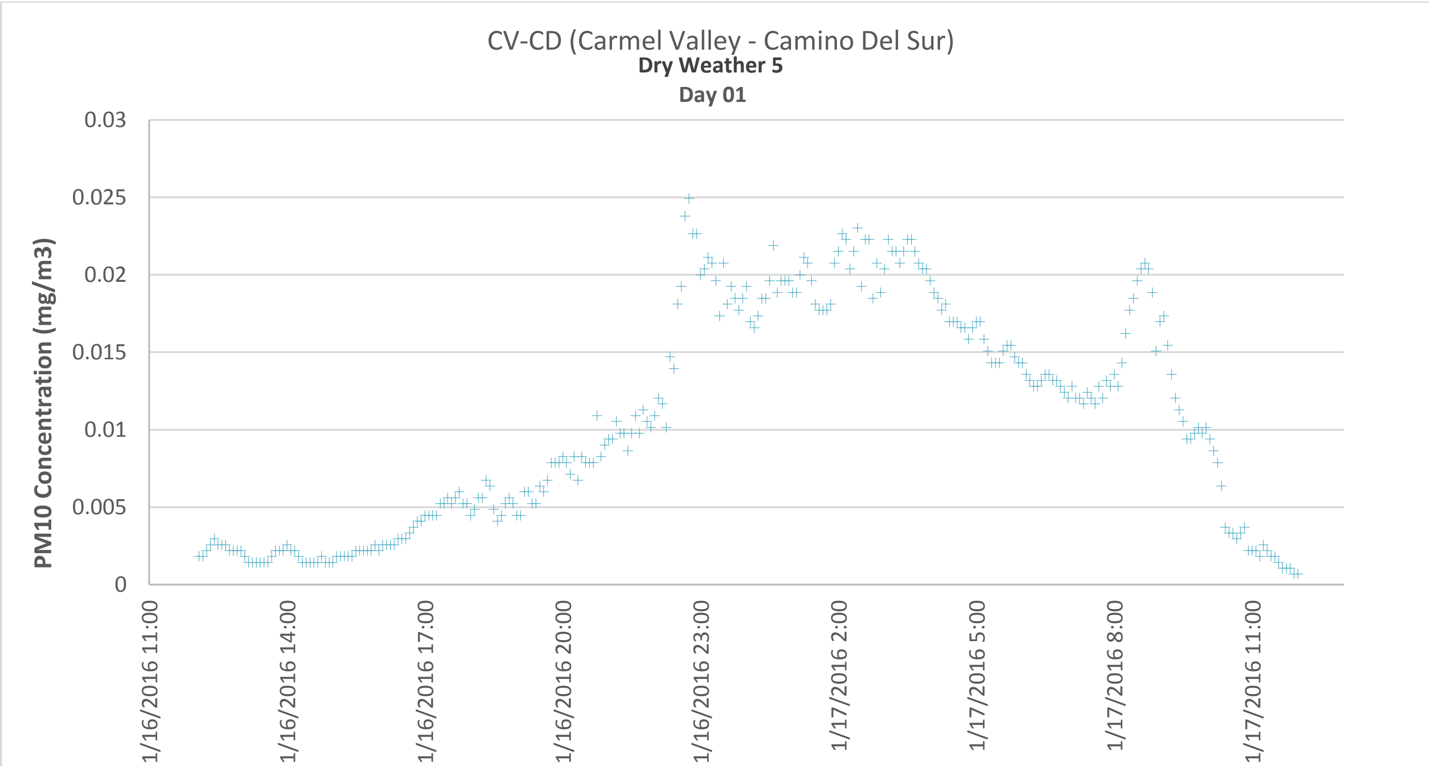
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 2 – CV-CD Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW, W, WSW, and SW. Peak optical monitor readings were observed at noontime and during periods of increased traffic in the morning.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – CV-CD Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the WSW, SW, NE, and ENE. Peak Optical monitor readings were observed during sundown.

Graphical representations of this data are presented in Figures 3-58 through 3-60.



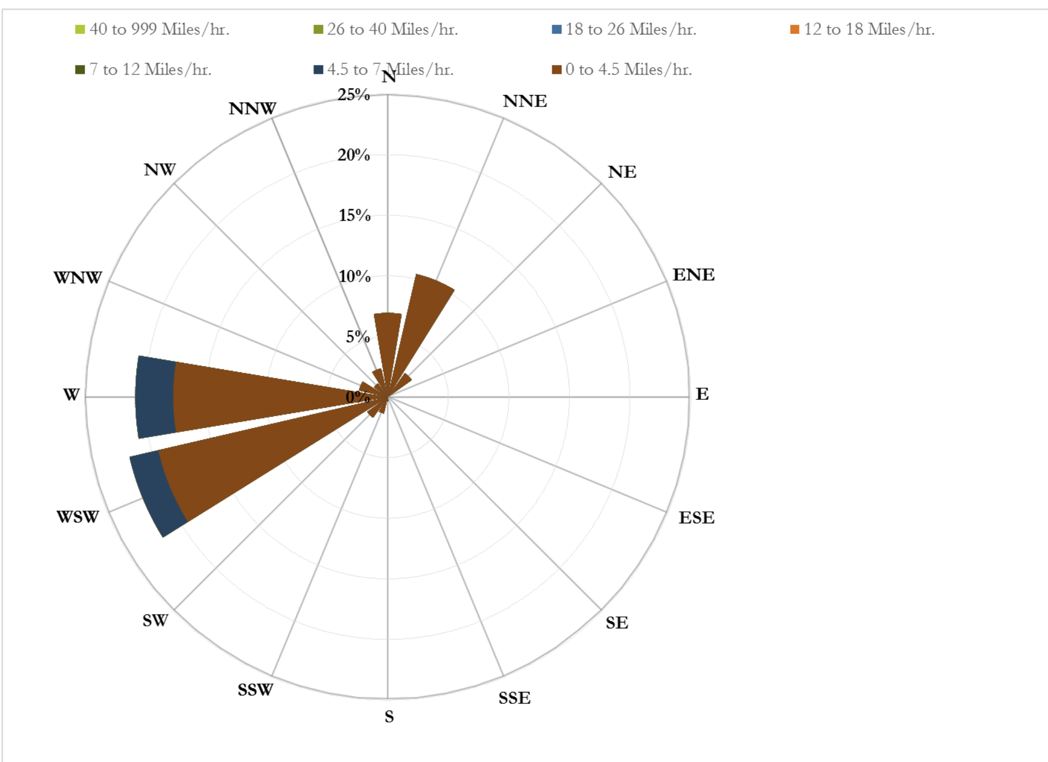
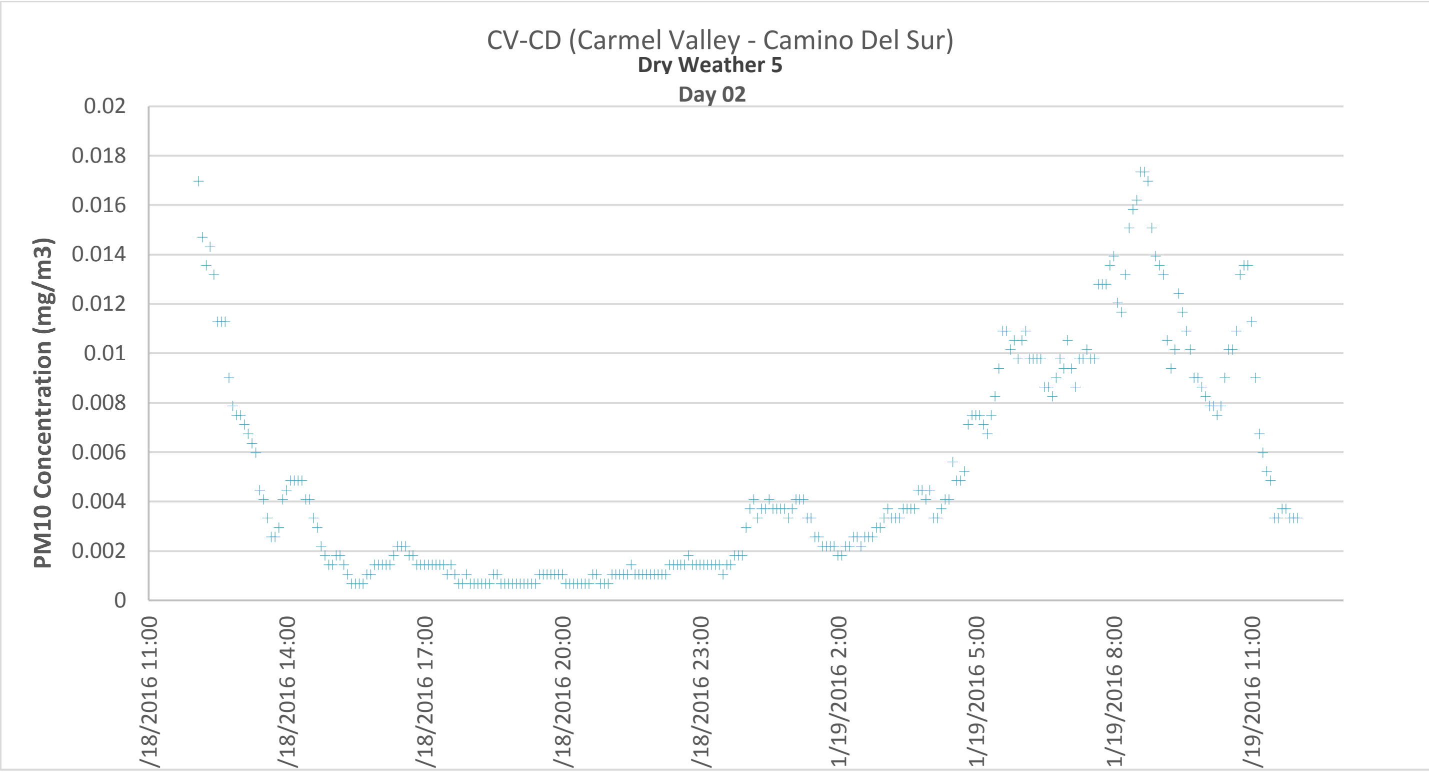


Figure 3-58.
CV-CD PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



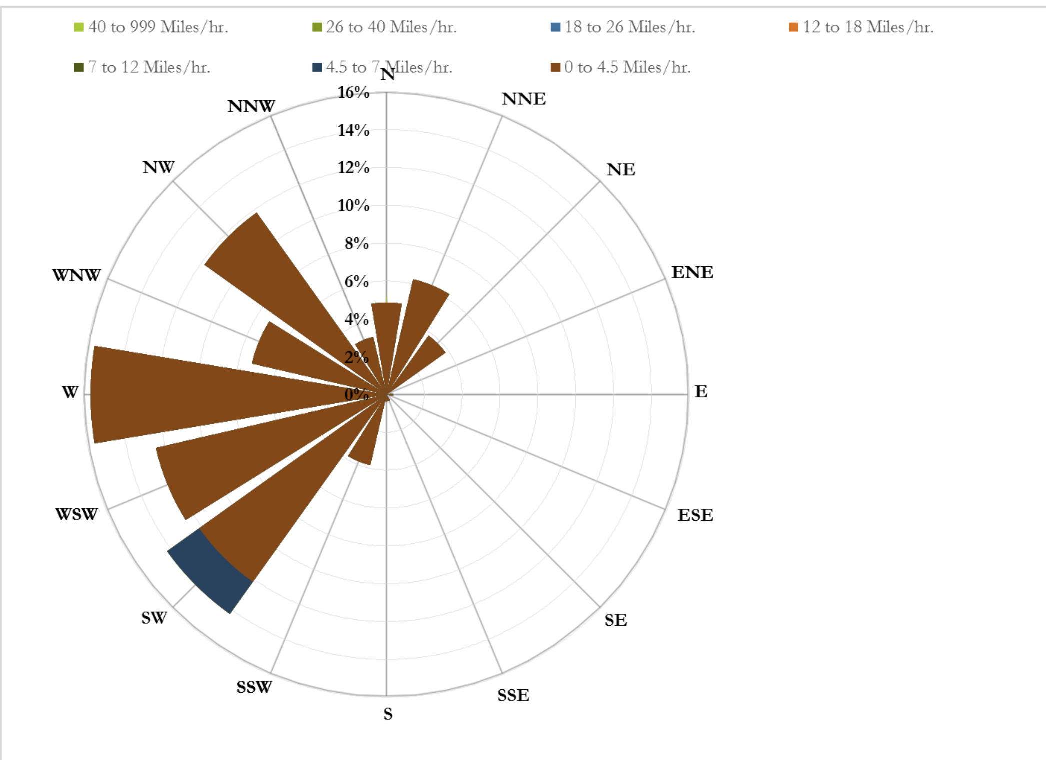
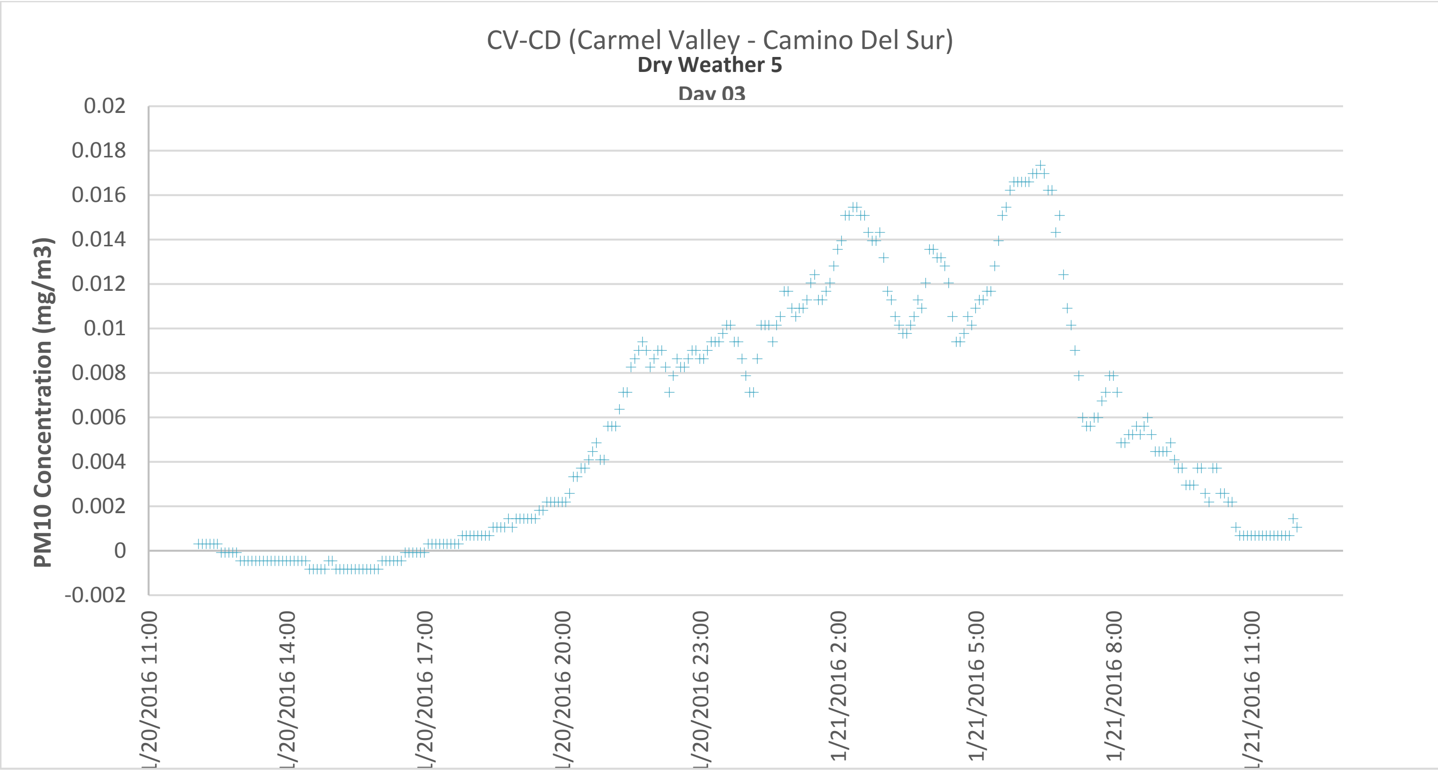


Figure 3-59.
CV-CD PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 2



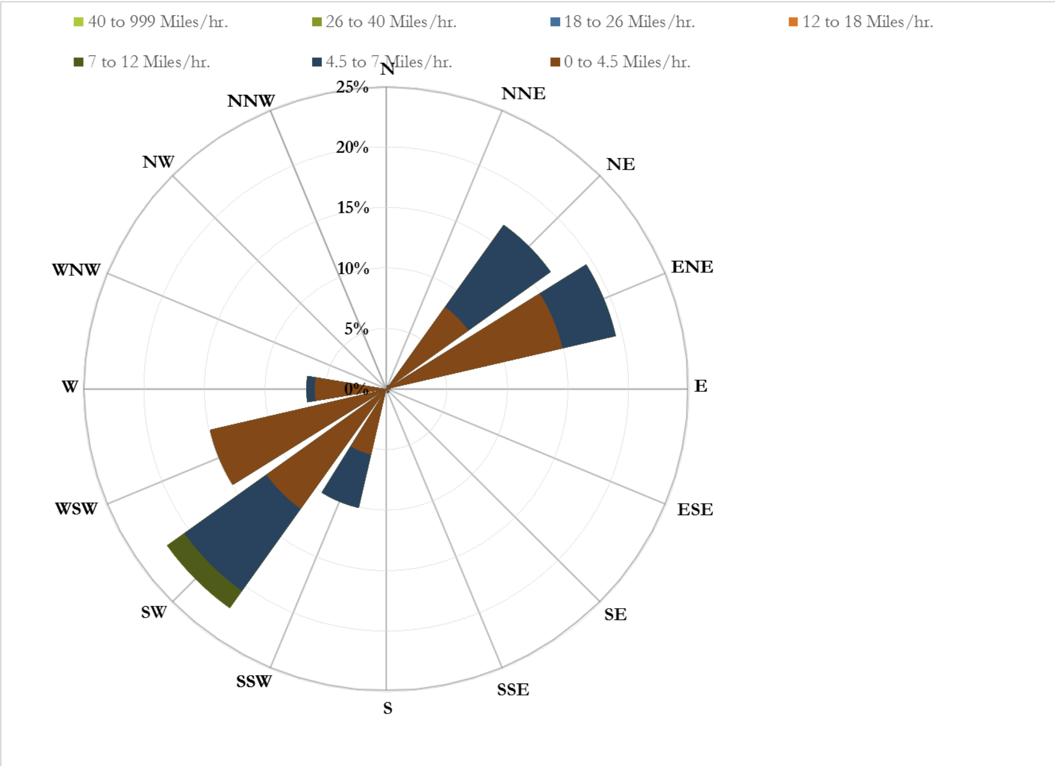


Figure 3-60.
CV-CD PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.10 LP-PO (Los Peñasquitos – Poway)

LP-PO (Los Peñasquitos – Poway):

CV-CD is a site monitored during the Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 576 measurements were determined to be valid (96%).
- Mean values for PM_{10} were 0.0077 mg/m^3.
- Mean standard deviation is $\pm$0.0055 mg/m^3

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 1 – LP-PO Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 5. Wind direction were observed primarily from the NW. Peak Optical monitor readings were observed during sundown and periods of increased traffic in the morning.

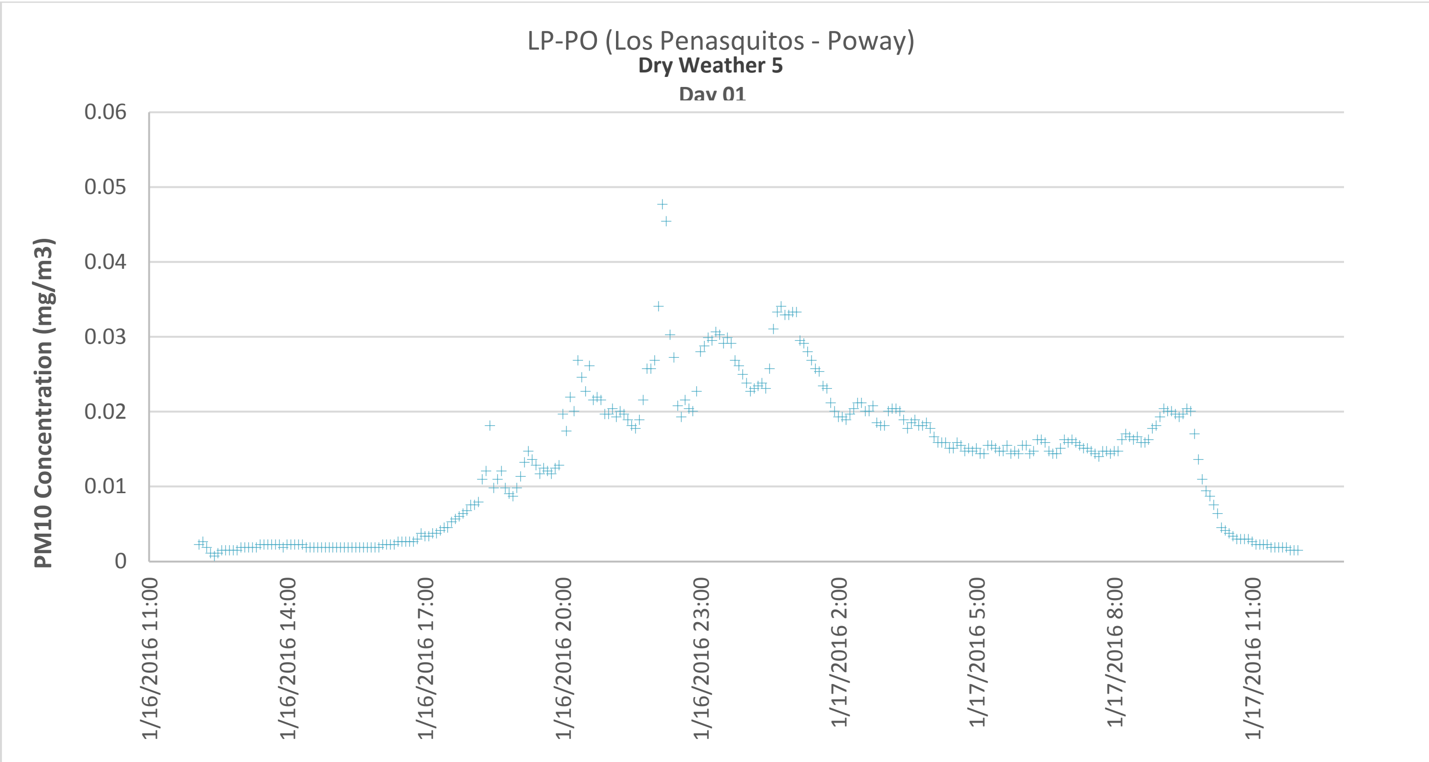
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 2 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed at noontime and during periods of increased traffic in the morning.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 3 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed at midnight.

Graphical representations of this data are presented in Figures 3-61 through 3-63.



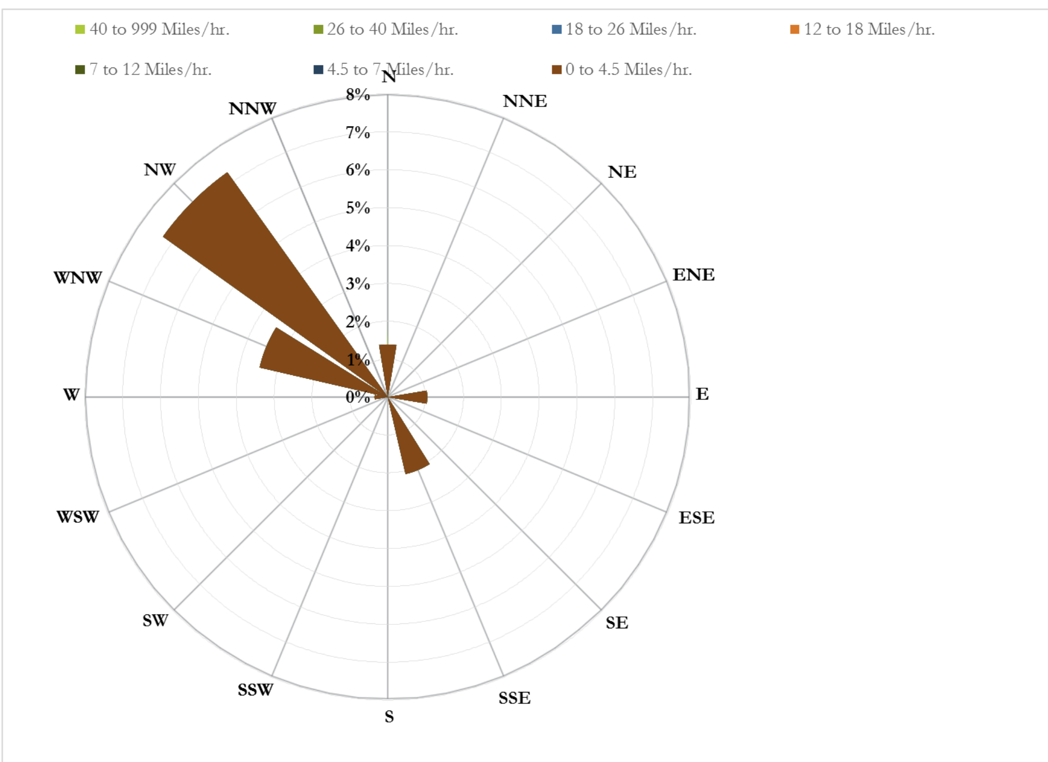
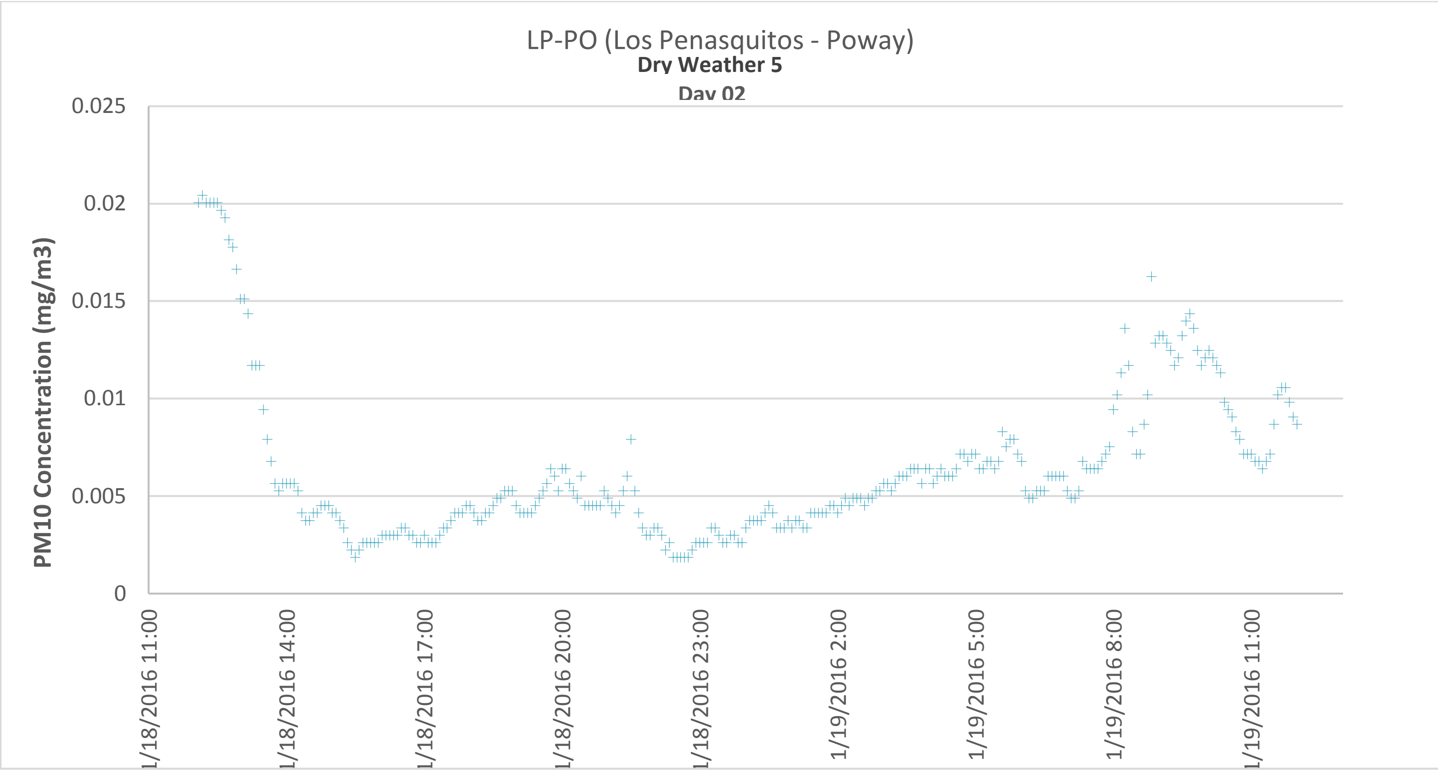


Figure 3-61.
LP-PO PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



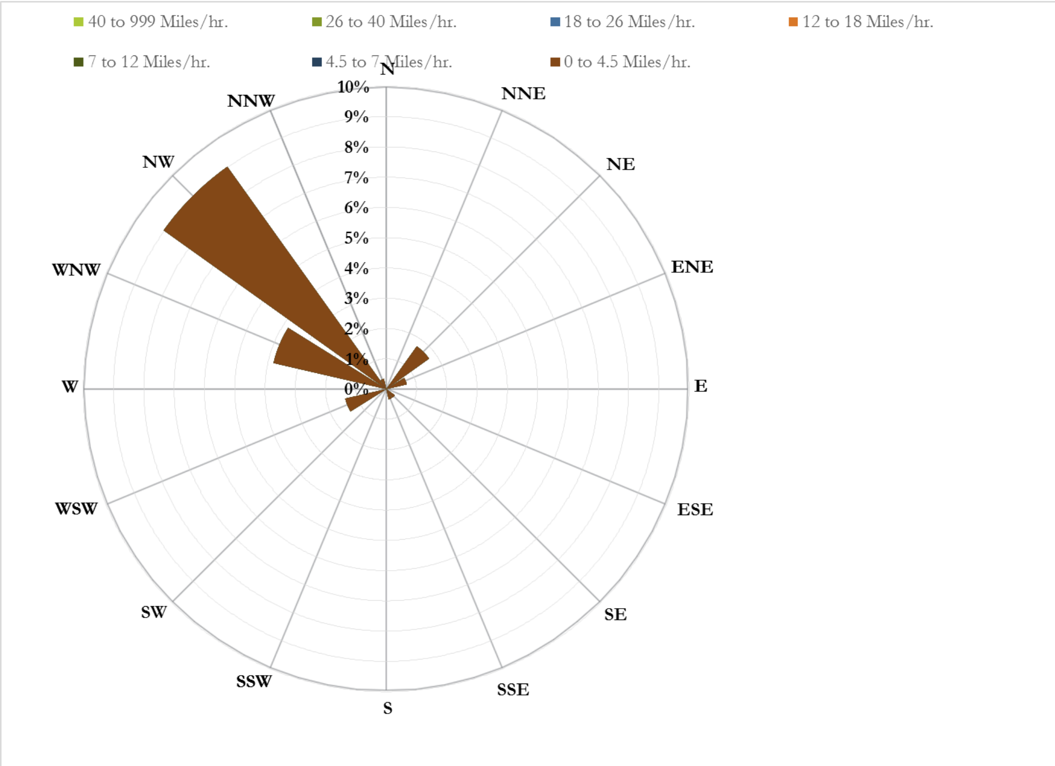
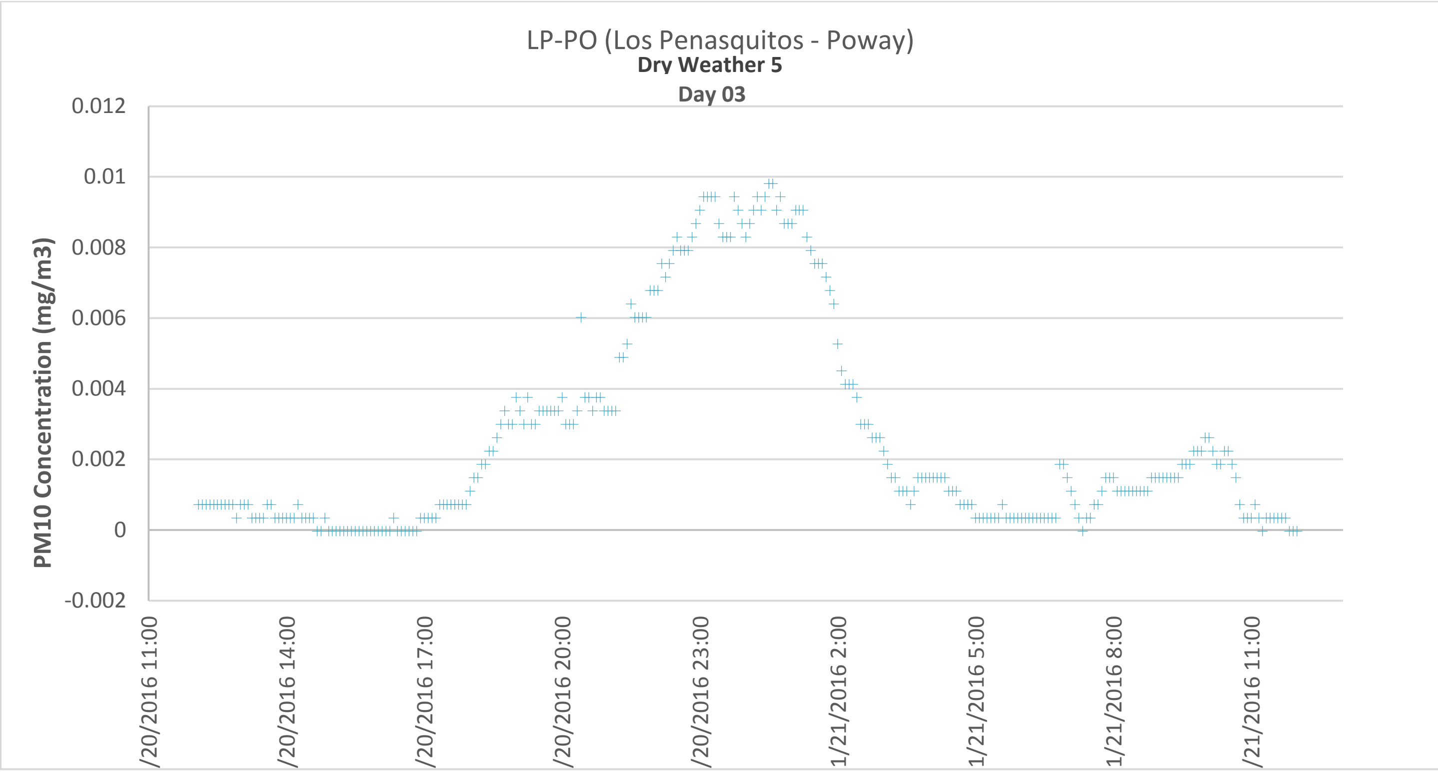


Figure 3-62
LP-PO PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 2



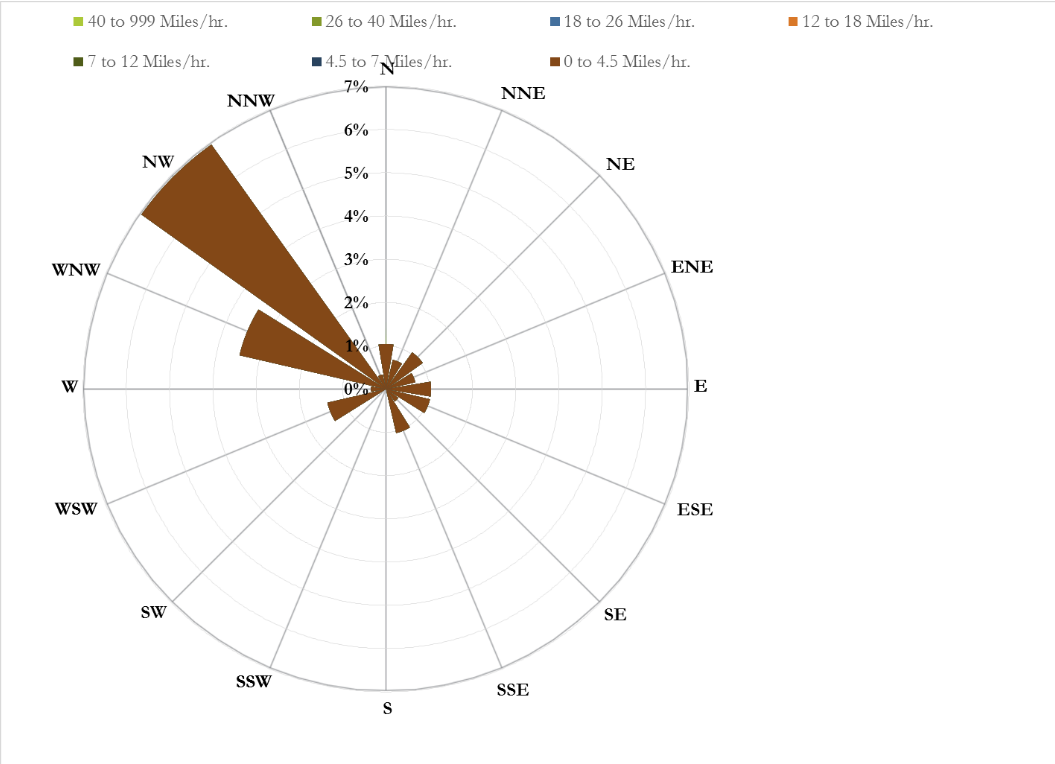


Figure 3-63.
LP-PO PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.2.11 LP-PR (Los Peñasquitos – Preserve)

LP-PR (Los Peñasquitos – Preserve):

LP-PR is a site monitored during the Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 763 measurements were determined to be valid (88%).
- Mean values for PM_{10} were 0.0039 mg/m^3.
- Mean standard deviation is $\pm$0.0029 mg/m^3

Day 1 (Saturday, 1/16/16 – Sunday, 1/17/16)

Day 4 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind direction were observed primarily from the W and WSW. Peak Optical readings occurred prior to sunrise.

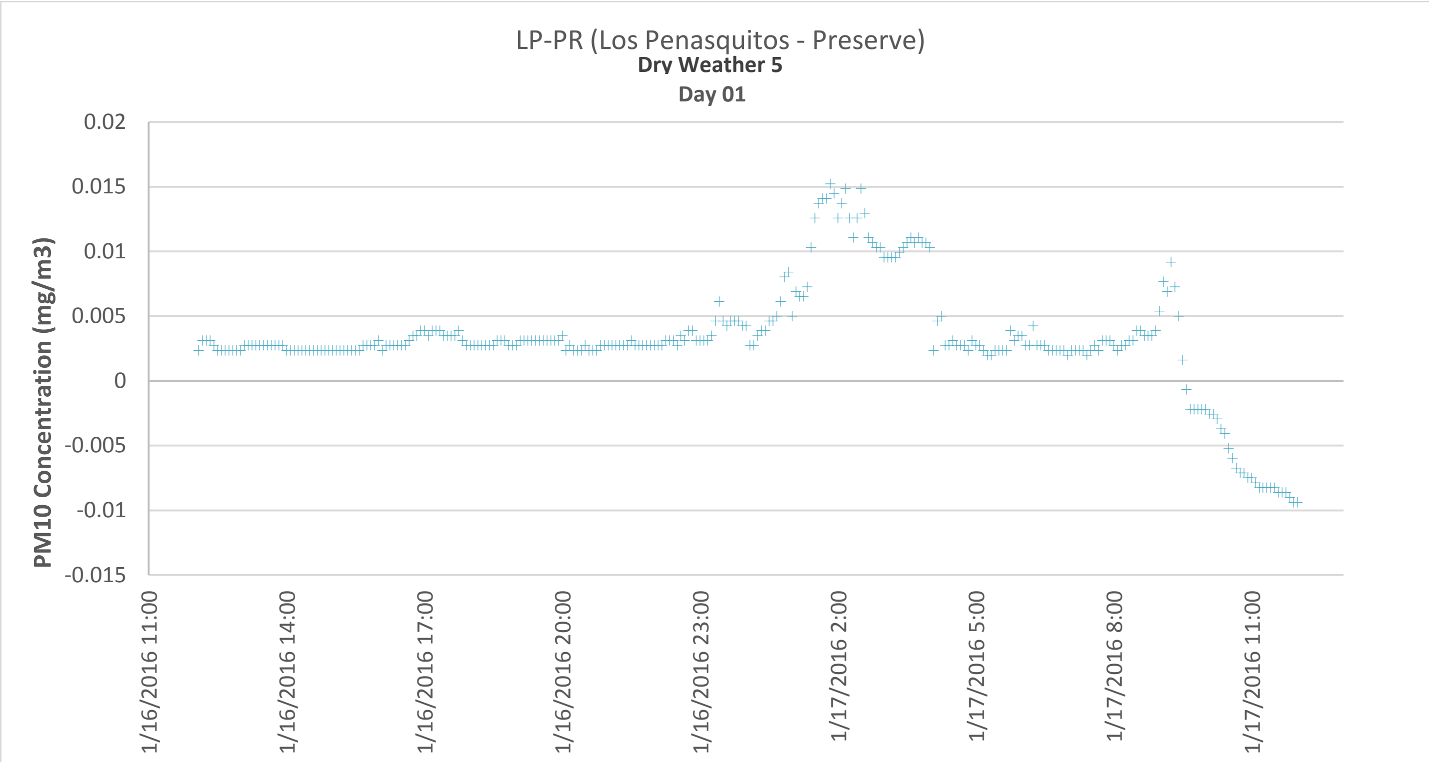
Day 2 (Monday, 1/18/16 – Tuesday, 1/19/16)

Day 5 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the NW, W, WSW, and SW. Peak Optical monitor readings were observed during the late morning.

Day 3 (Wednesday, 1/20/16 – Thursday, 1/21/16)

Day 6 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 5. Wind directions were observed primarily from the WSW, SW, NE, and ENE. Peak Optical monitor readings were observed before midnight. Higher Optical readings were observed before midnight and before to sunrise.

Graphical representations of this data are presented in Figure 3-64 through 3-66.



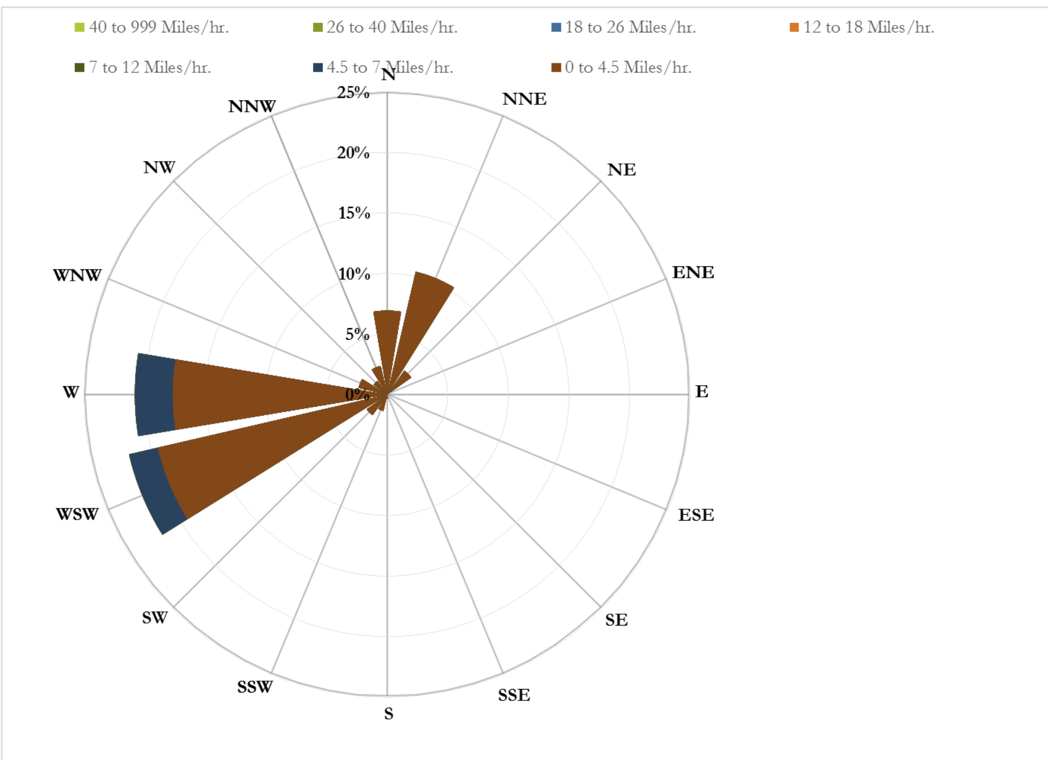
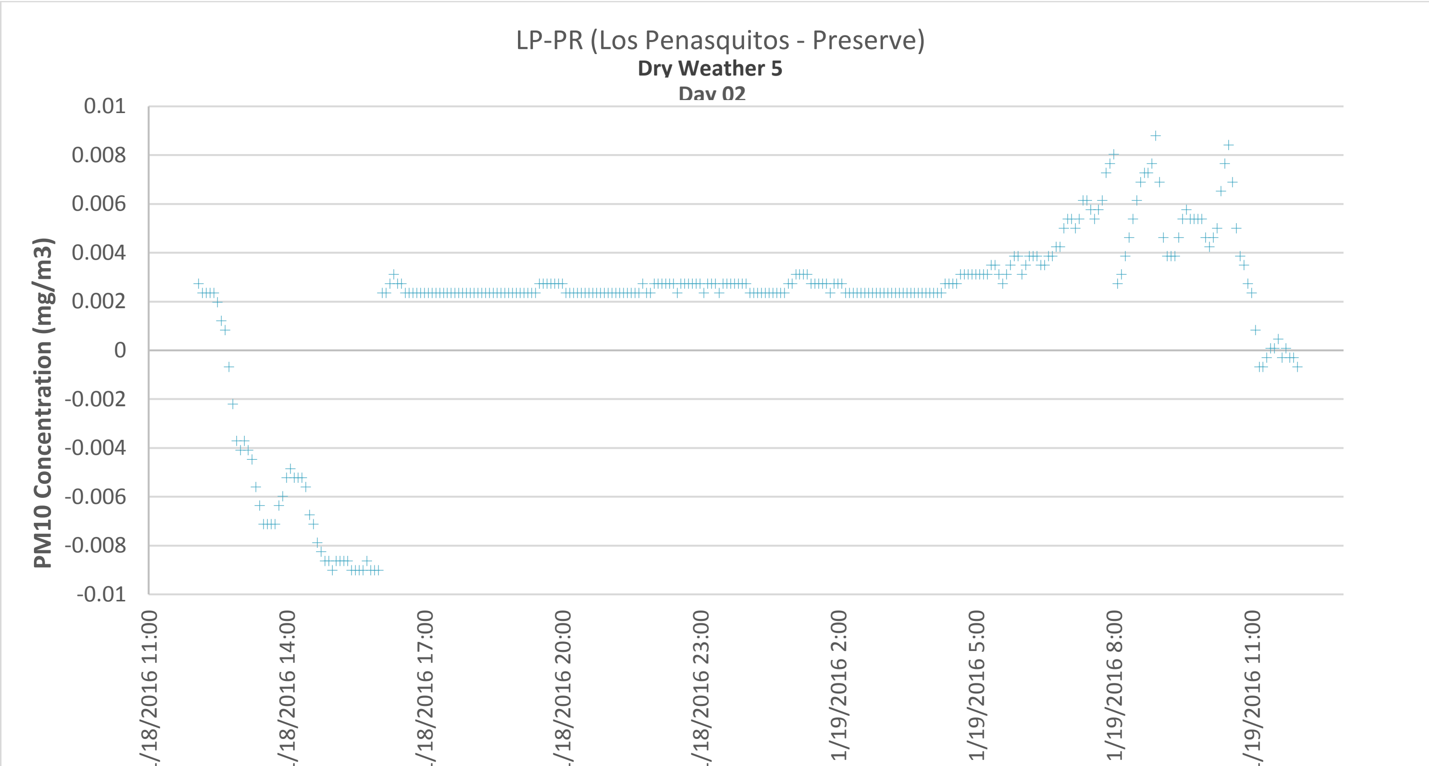


Figure 3-64.
LP-PR PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 1



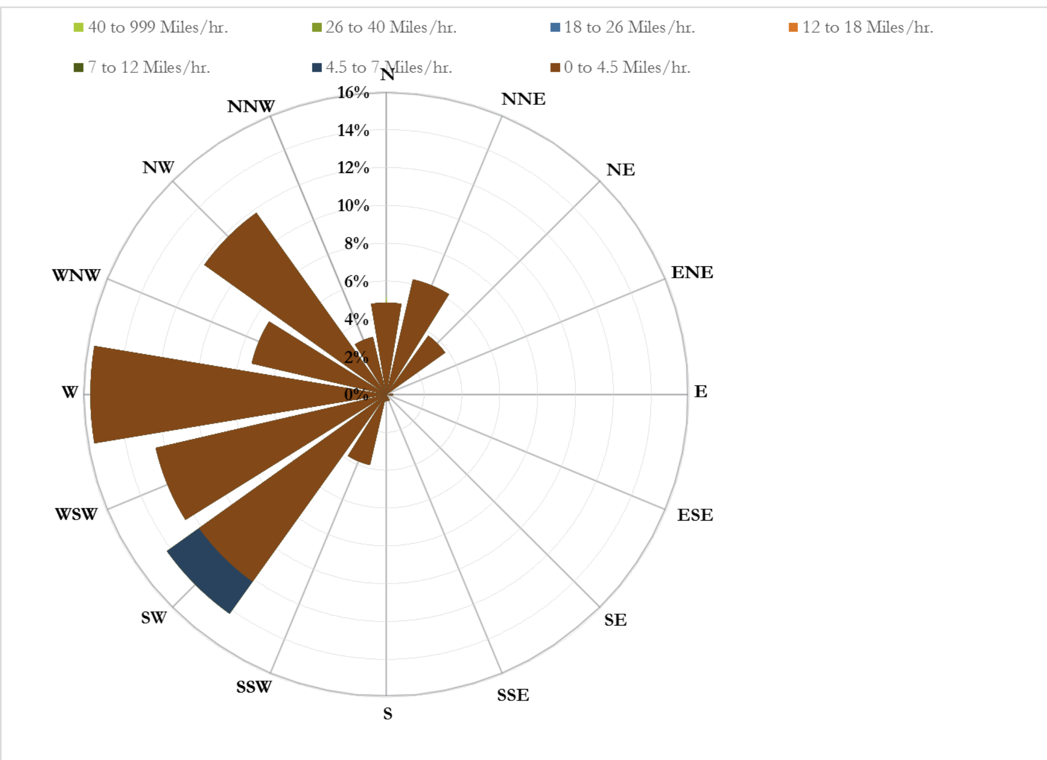
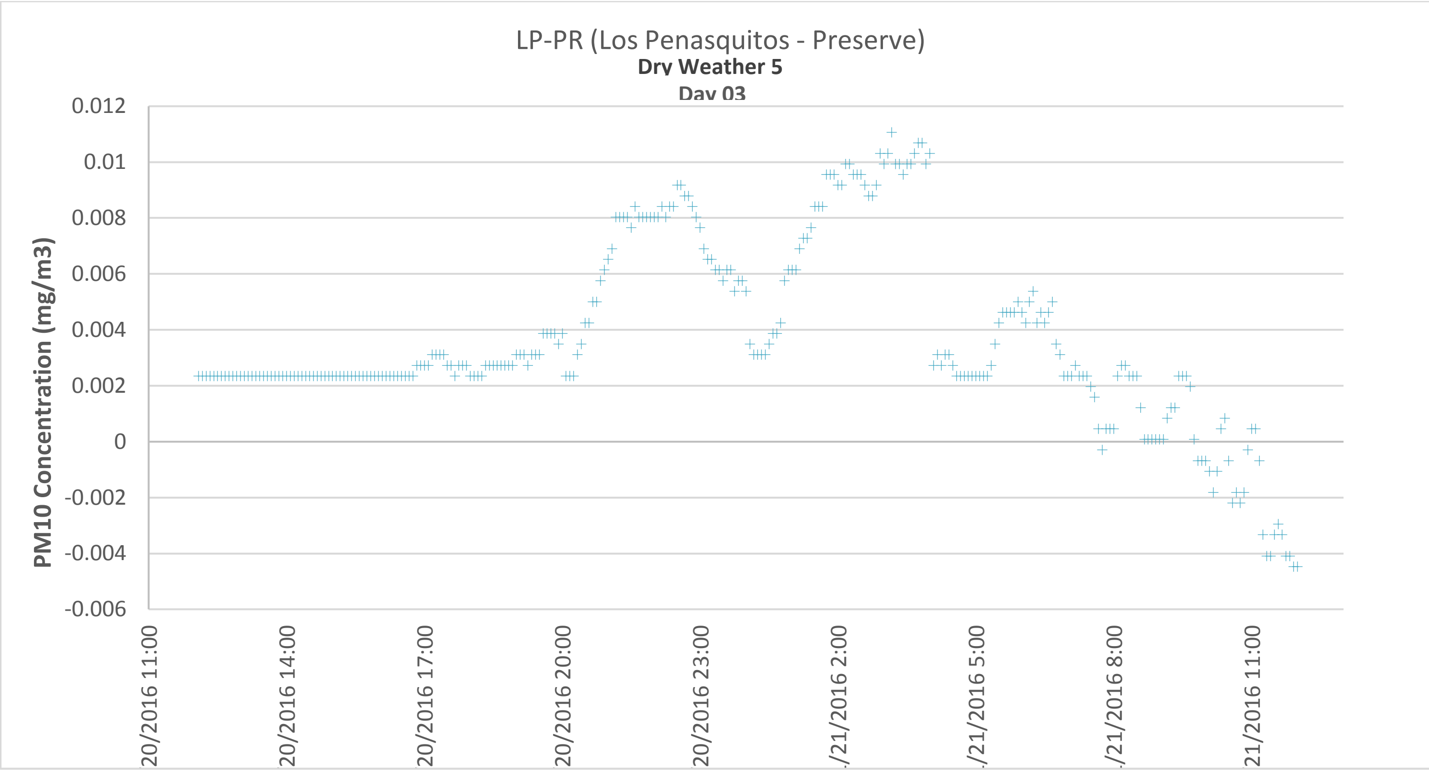


Figure 3-65.
LP-PR PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 2



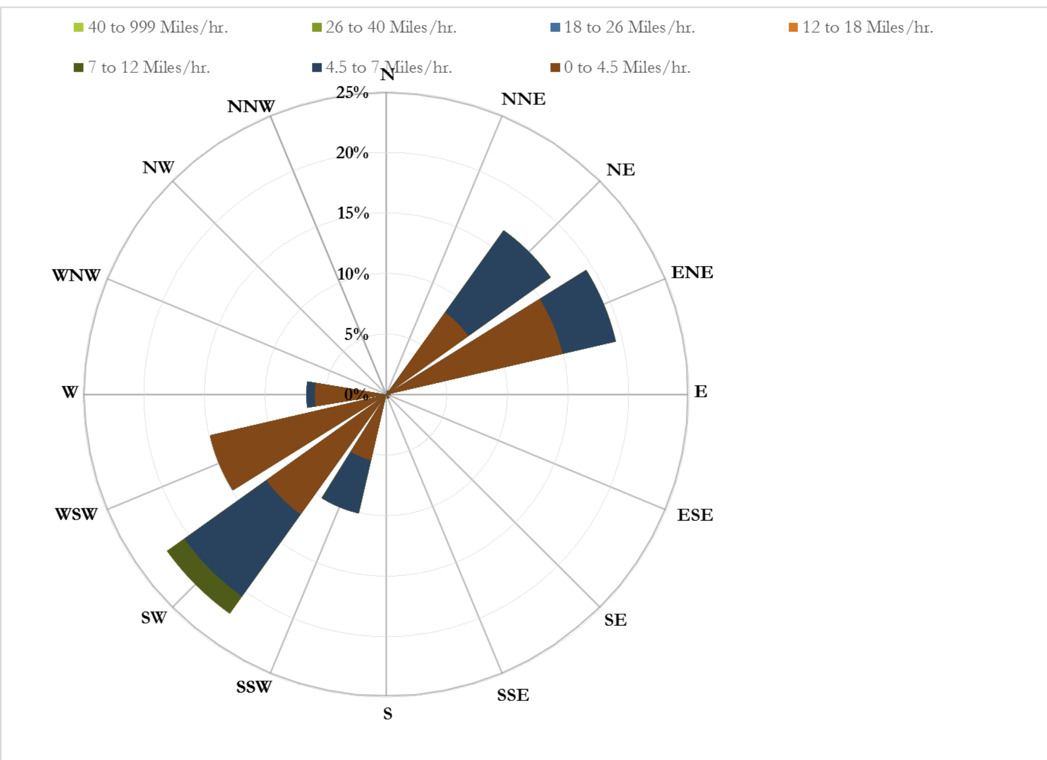


Figure 3-66.
LP-PR PM_{10} Concentrations and Wind Rose, Dry Weather 5 – Day 3

3.2.3 Dry Weather 6

3.2.3.1 CC-CC (Carroll Canyon)

CC-CC (Carroll Canyon):

CC-CC is a site monitored during the Phase I and Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 821 measurements were determined to be valid (95%).
- Mean values for PM_{10} were 0.0047 mg/m^3.
- Mean standard deviation is $\pm$0.0029 mg/m^3

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – CC-CC Optical readings were observed at lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed at midnight and during increased traffic conditions in the morning.

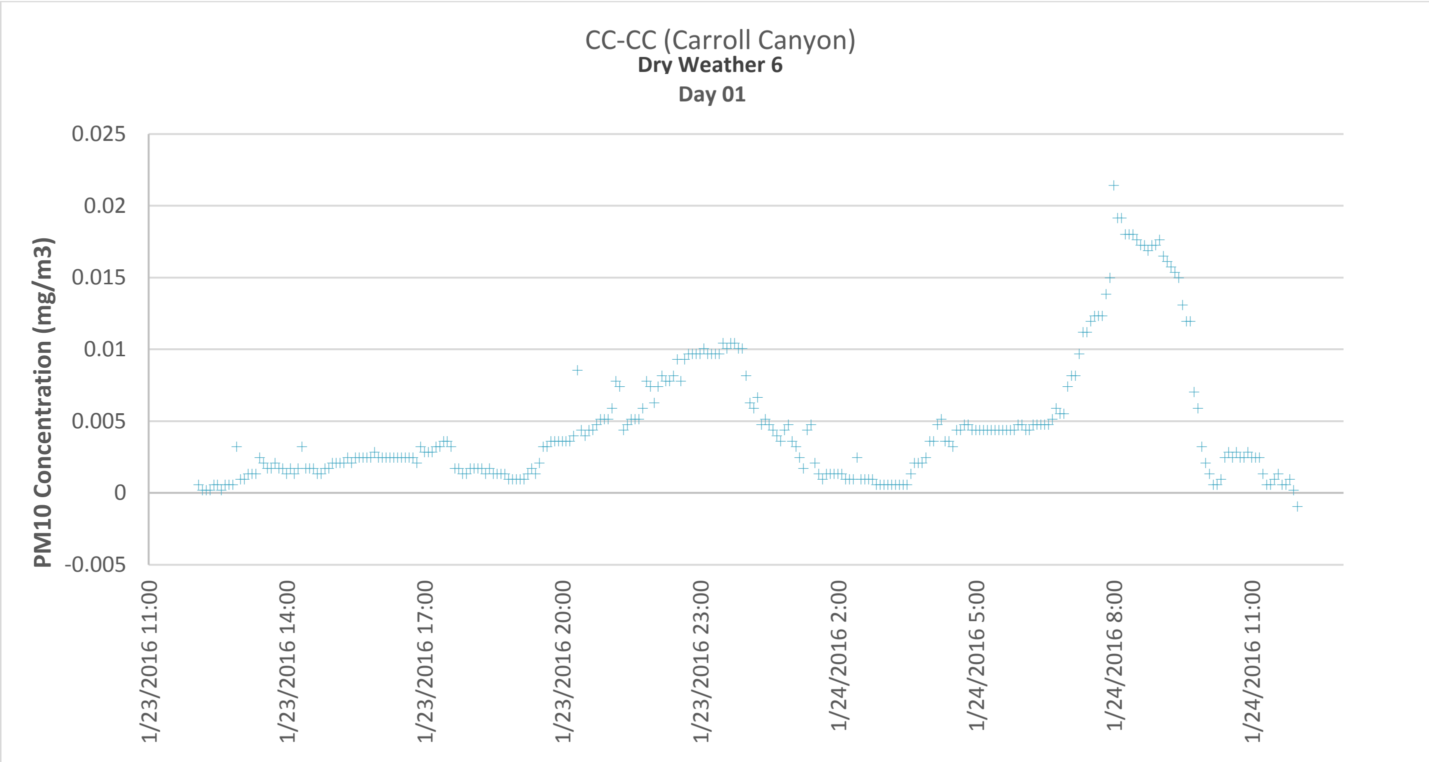
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – CC-CC Optical readings were observed at a higher mean value for this monitoring location during sampling event Dry Weather 6. Wind directions were observed primarily from the WNW. Peak Optical monitor readings were observed late evening through the night and during increased traffic conditions in the morning.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – CC-CC Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed at midnight and in the morning after sunrise.

Graphical representations of this data are presented in Figure 2-23.



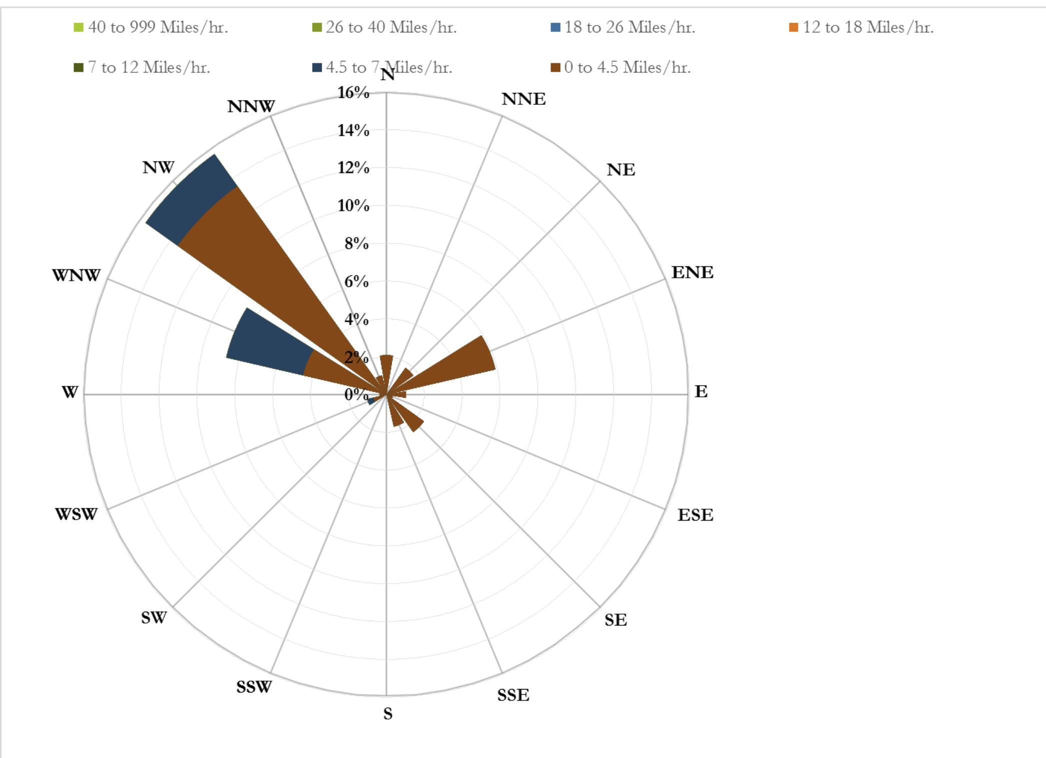
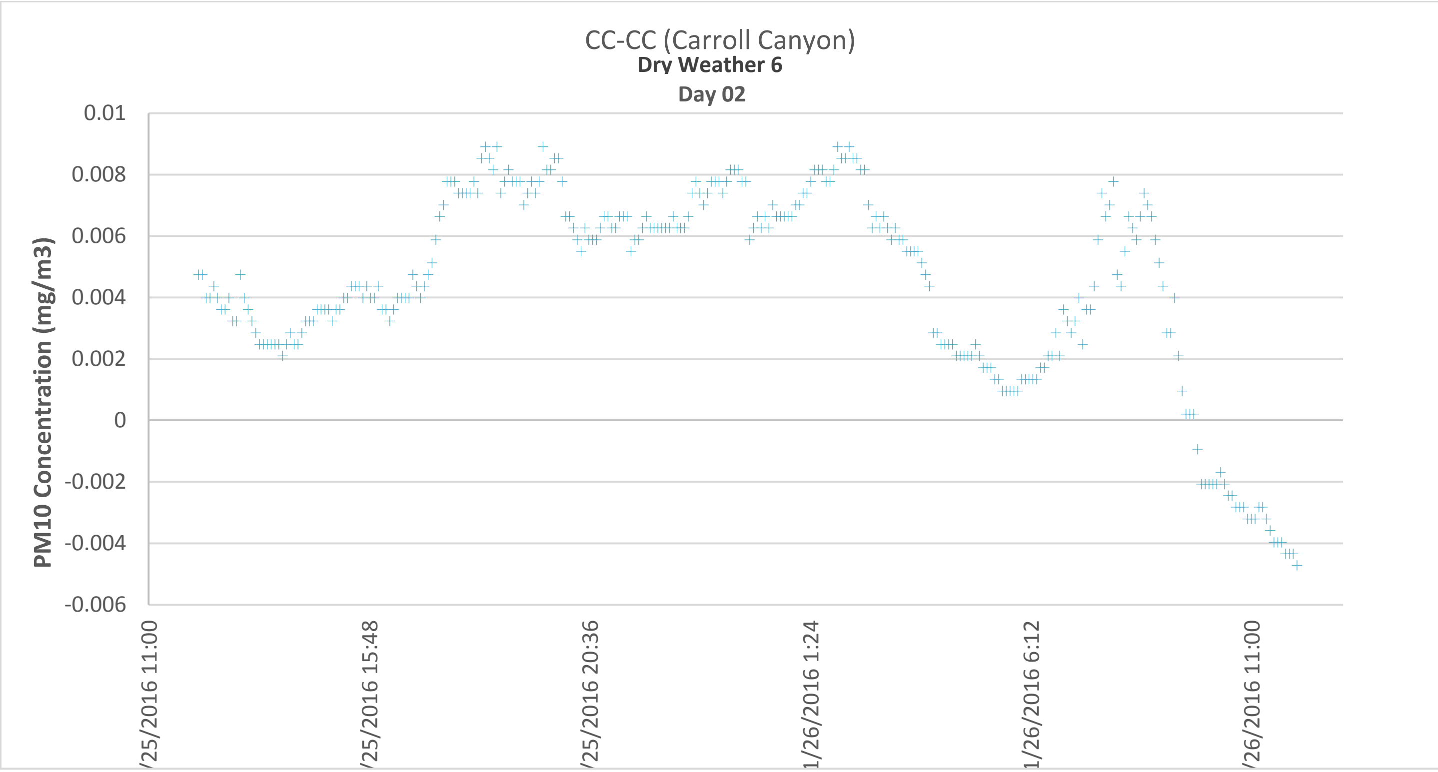


Figure 3-67.
CC-CC PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



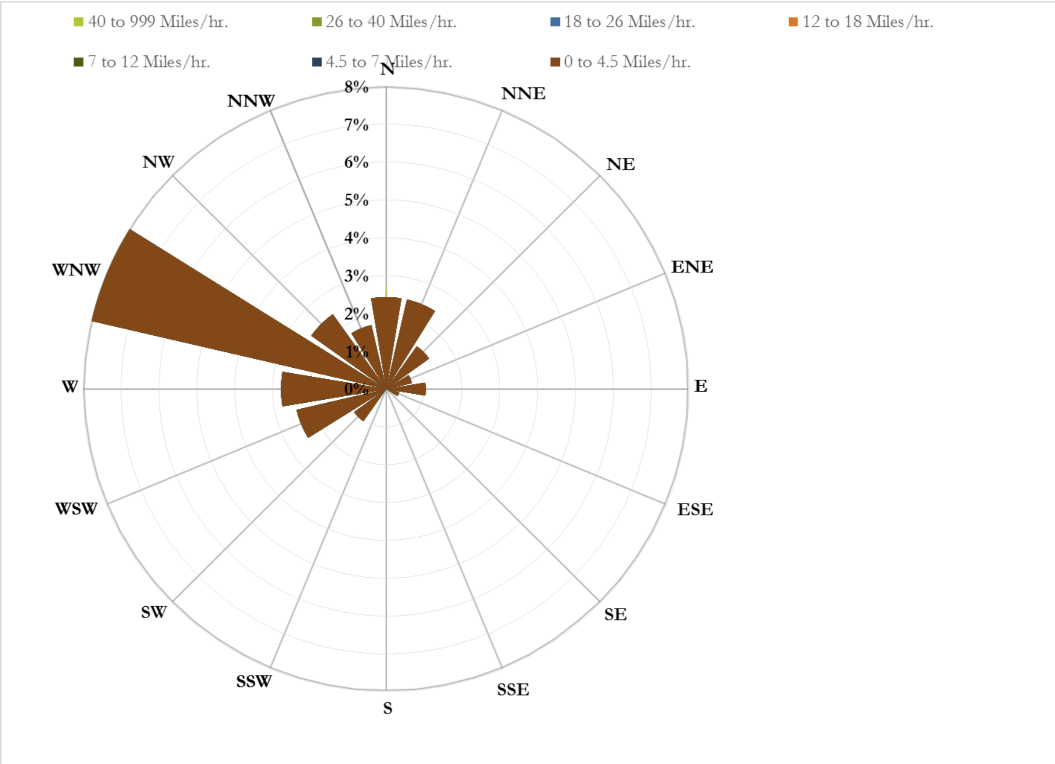
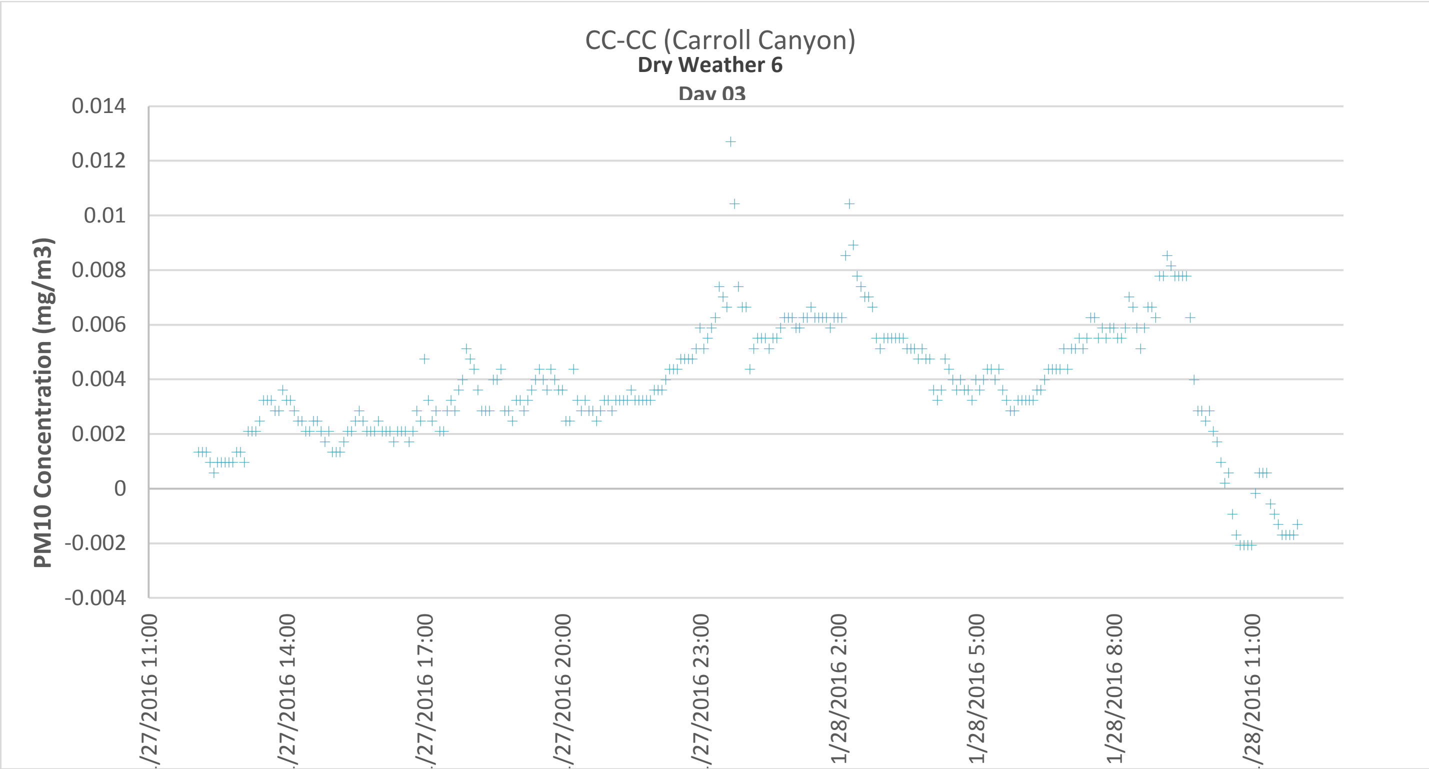


Figure 3-68.
CC-CC PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



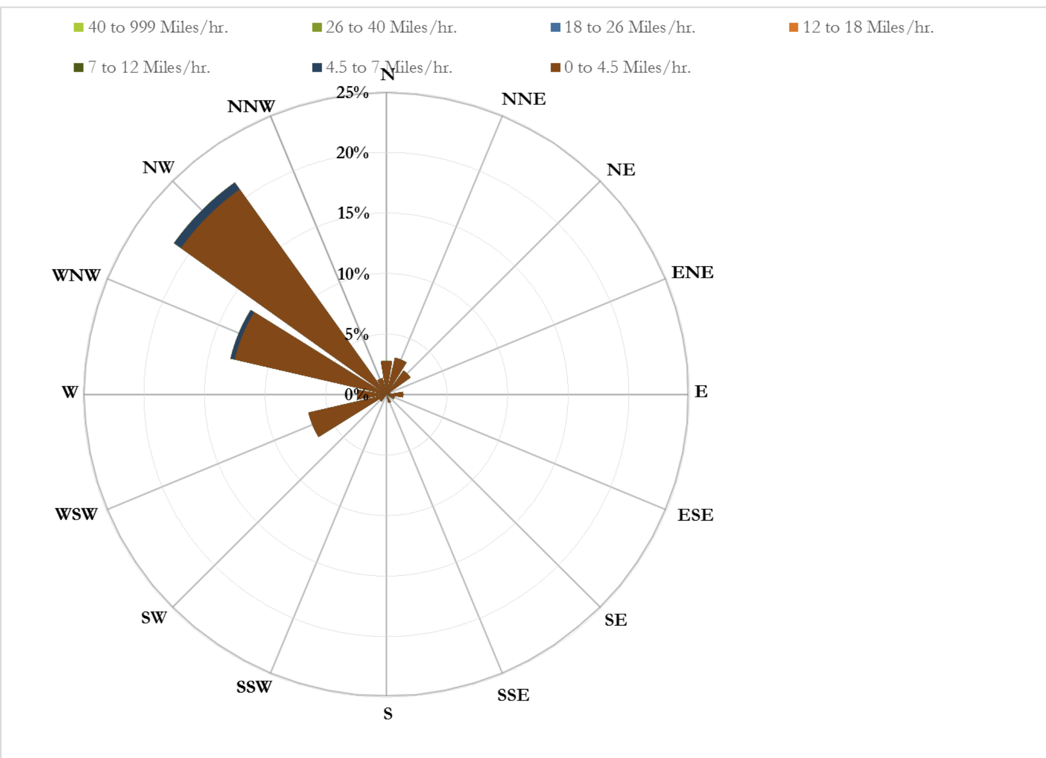


Figure 3-69.
CC-CC PM$_{10}$ Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.2 CC-DM (Reference – Del Mar)

CC-DM (Reference – Del Mar):

CC-DM is a site monitored during the Phase I and Phase II Watershed Special Study and contains an Optical monitor and an FRM sampler. This is the reference site for the aerial deposition portion of the Watershed Special Study, and was selected as a station away from anthropogenic influence during the prevalent weather patterns.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0081 mg/m^3.
- Mean standard deviation is $\pm$0.0048 mg/m^3

FRM Sampler (Laboratory) Results:

- Mean values for PM_{10} was 0.0402 mg/m^3.
- Mean RPD from the FRM results to the Optical monitor results was 129.32%

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – CC-DM Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the W, WSW, NNE and NE. Peak Optical monitor readings were observed during the evening and through the night.

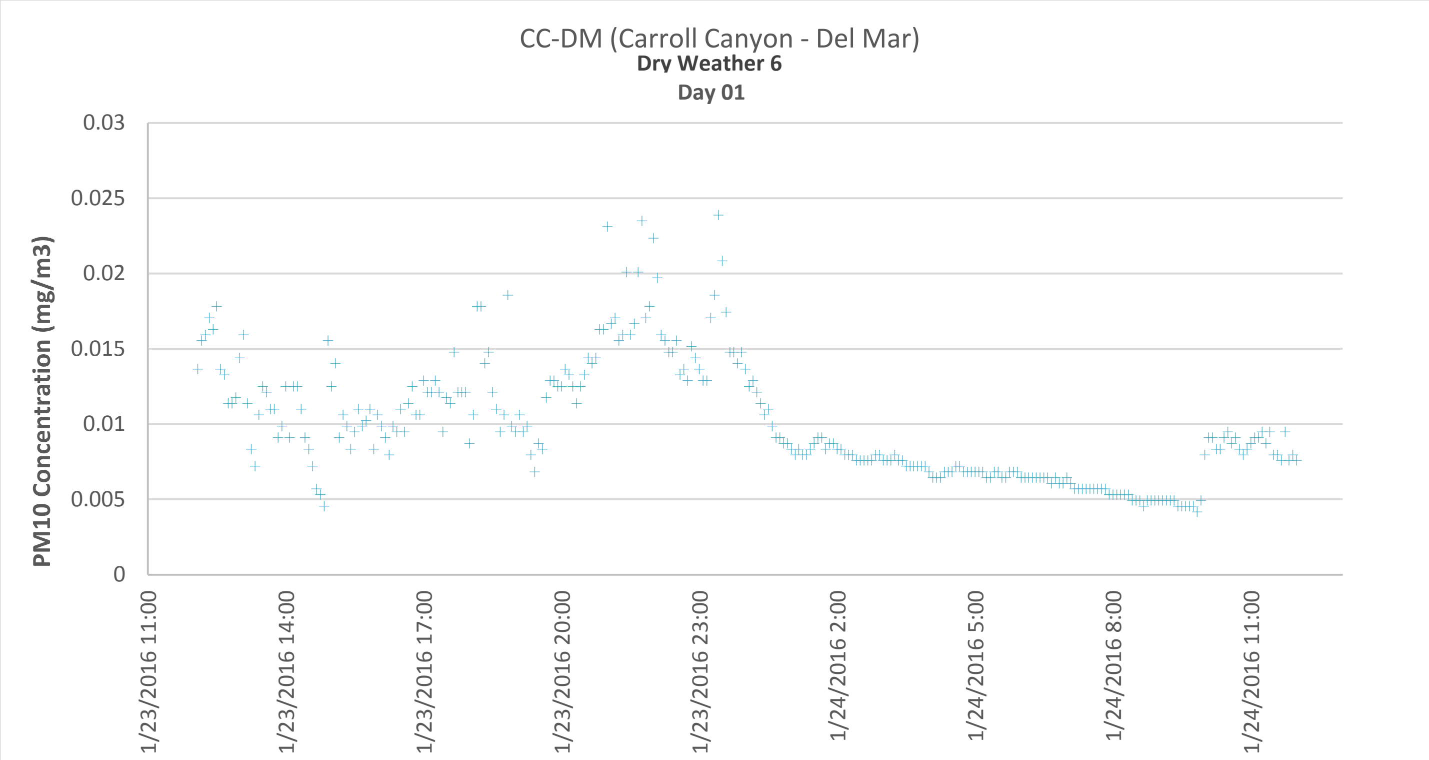
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – CC-DM Optical readings were observed at a higher mean value for this monitoring location for sampling event Dry Weather 6. Wind directions were observed primarily from the W. Optical monitor readings were observed higher during the evening to midnight and in the morning after sunrise.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – CC-DM Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the WNW, NW, and NNW. Optical monitor readings were observed consistently distributed with slightly higher readings during the late evening and morning after sunrise.

Graphical representations of this data are presented in Figures 3-70 through 3-72.



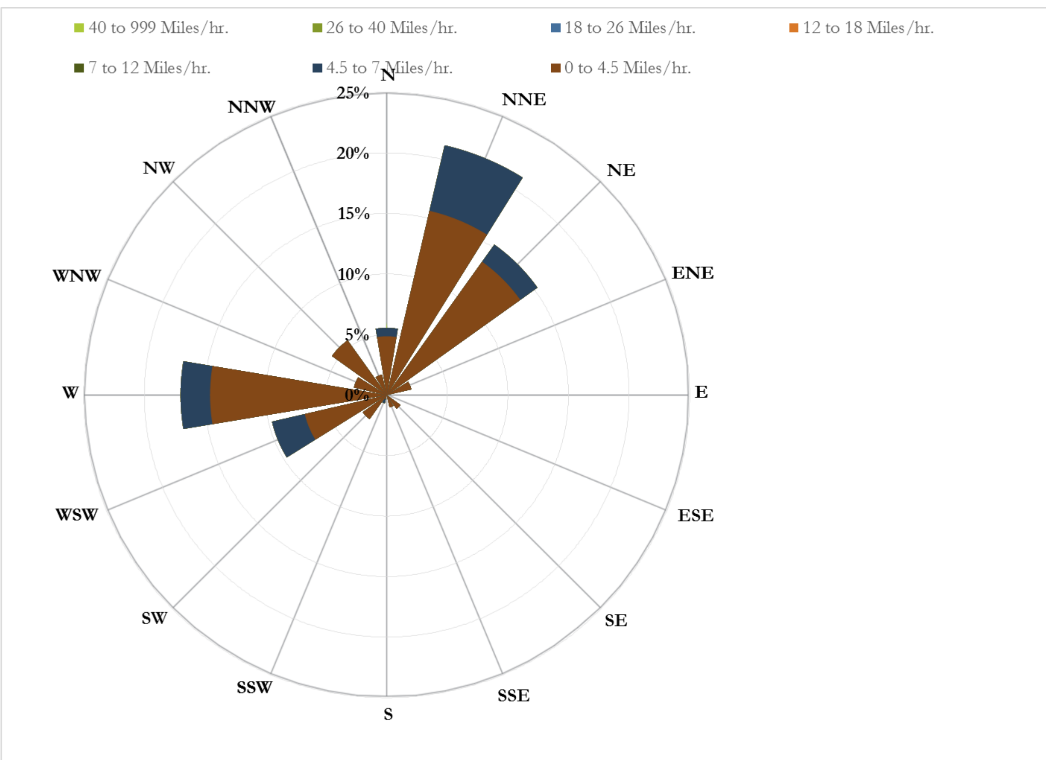
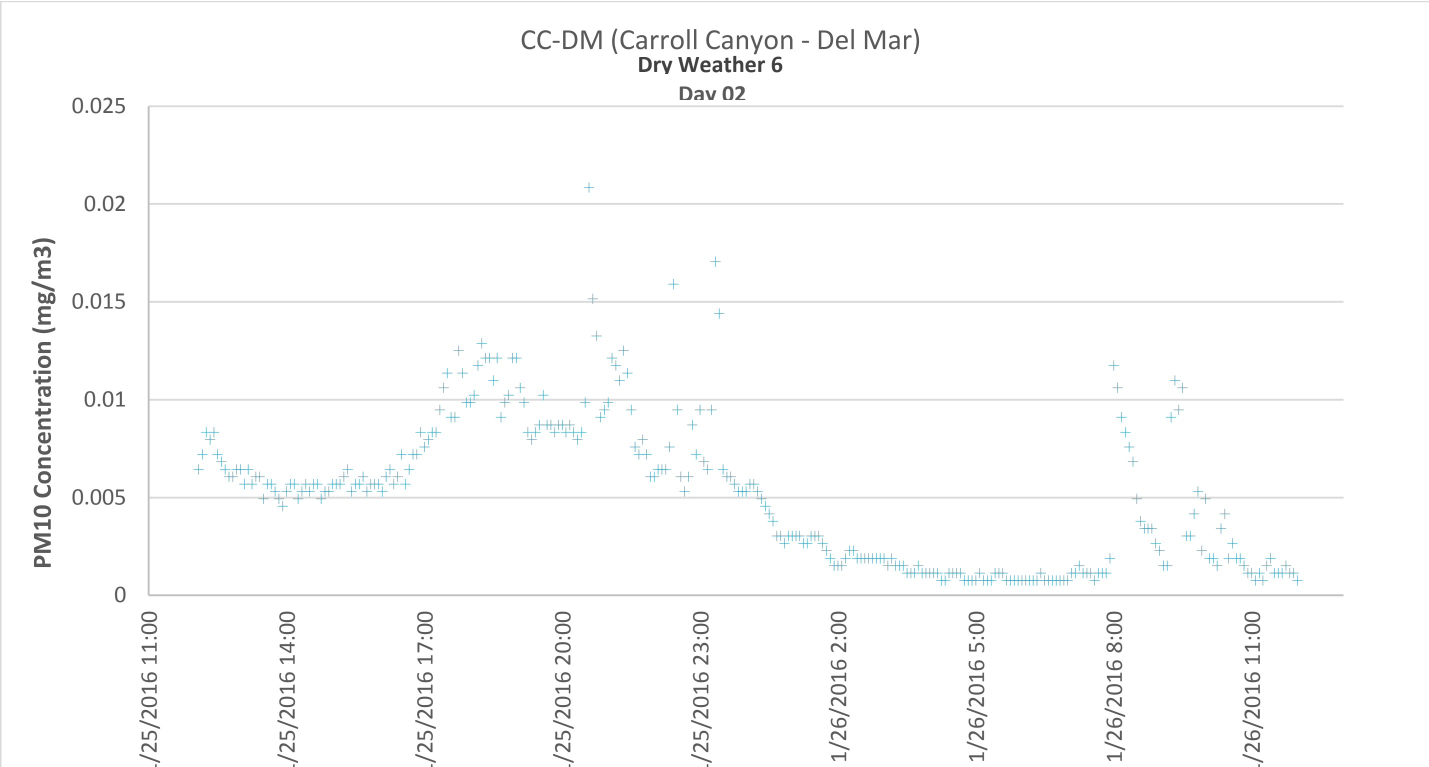


Figure 3-70.
CC-DM PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



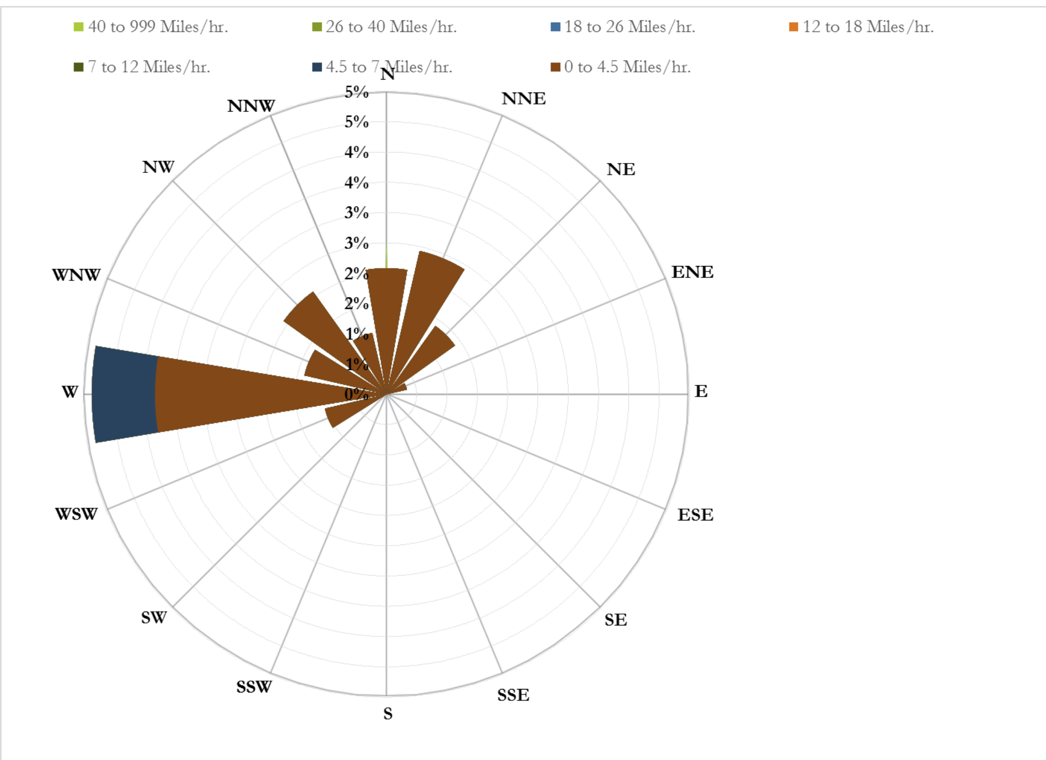
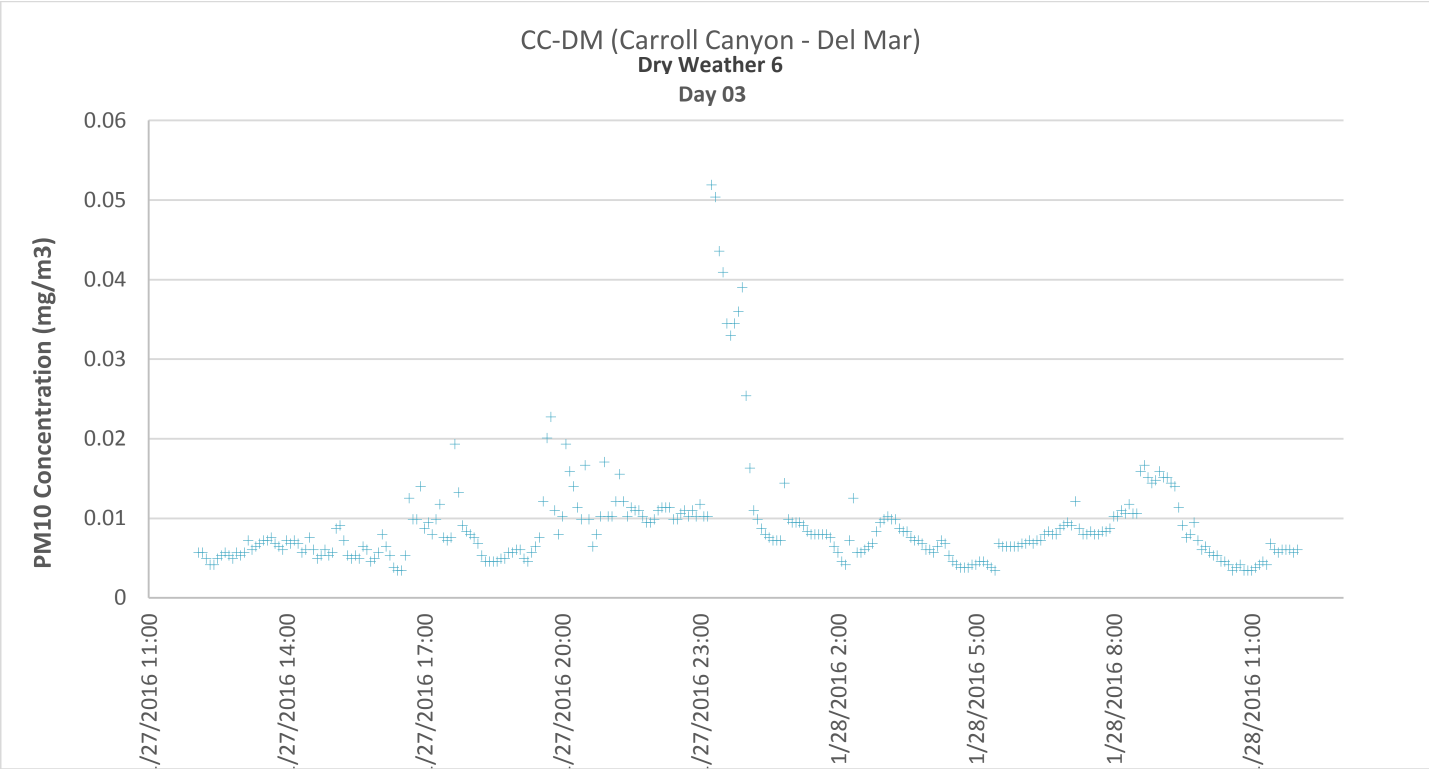


Figure 3-71.
CC-DM PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



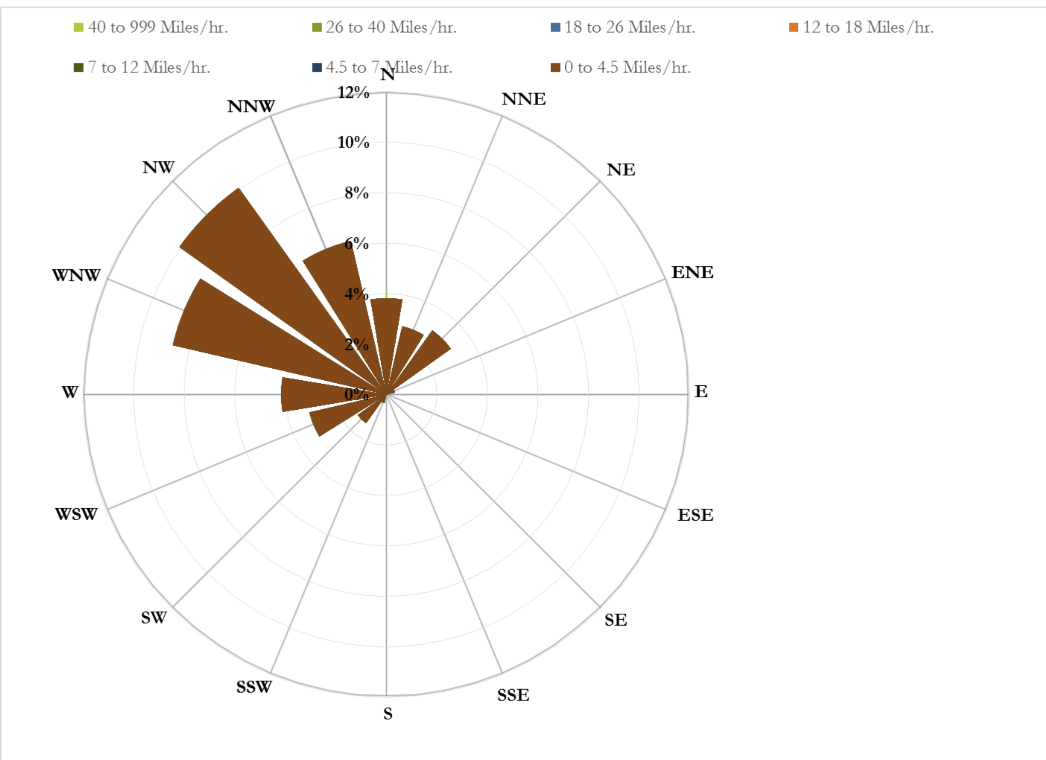


Figure 3-72.
CC-DM PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.3 CC-DW (Carroll Canyon – Downwind)

CC-DW (Carroll Canyon – Downwind):

CC-DW is a site monitored during the Phase I and Phase II Watershed Special Study and contains an Optical monitor and an FRM sampler.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 864 measurements were determined to be valid (100%).
- Mean values for PM_{10} were 0.0054 mg/m^3.
- Mean standard deviation is $\pm$0.0031 mg/m^3

FRM Sampler (Laboratory) Results:

- Mean value for PM_{10} was 0.0328 mg/m^3.
- Mean RPD from the FRM results to the Optical monitor results was 134.17%

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – CC-DW Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the WNW and NW. Peak Optical monitor readings were observed during evening and sundown, and during increased traffic conditions in the morning.

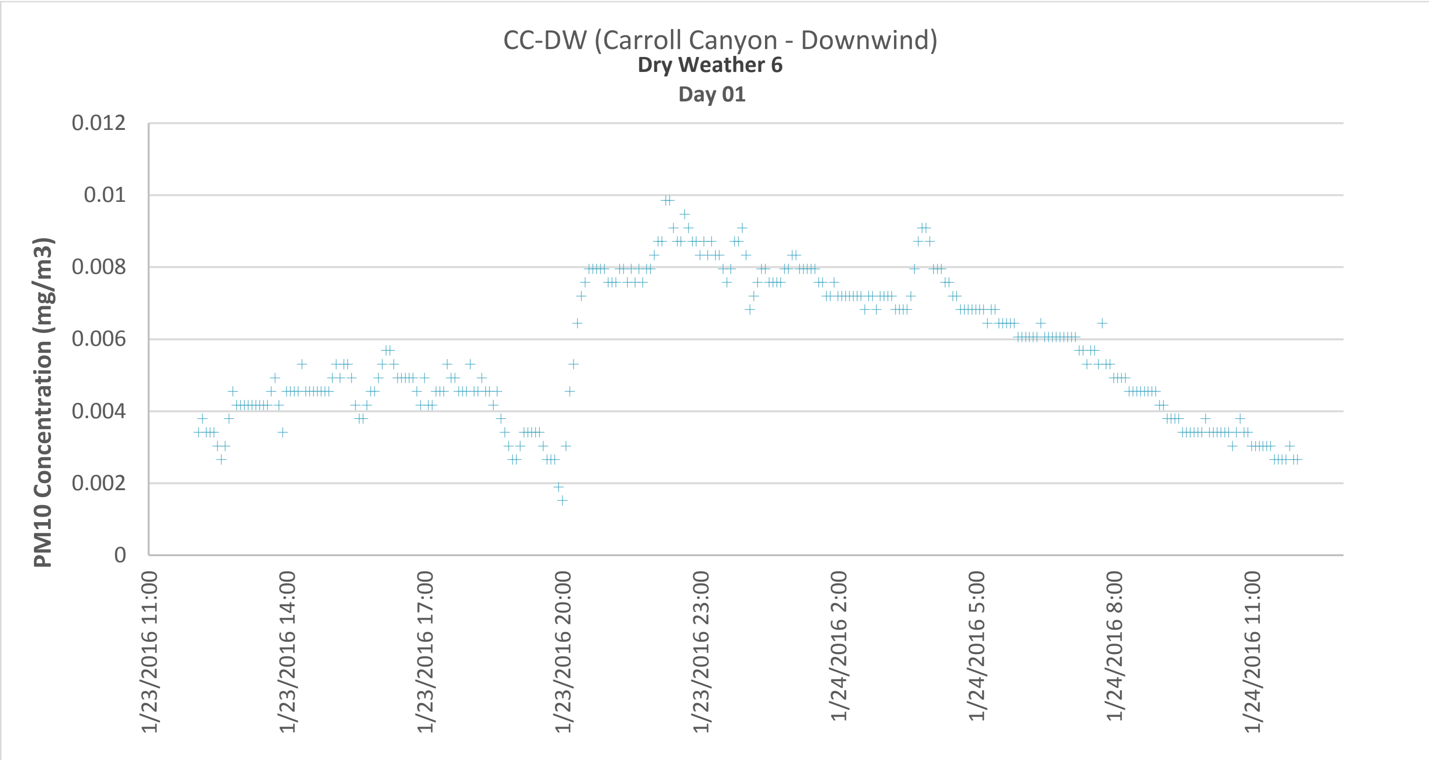
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – CC-DW Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed during the afternoon and at times of increased traffic conditions in the morning.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – CC-DW Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed during increased traffic conditions in the morning.

Graphical representations of this data is presented in Figures 3-73 through 3-75.



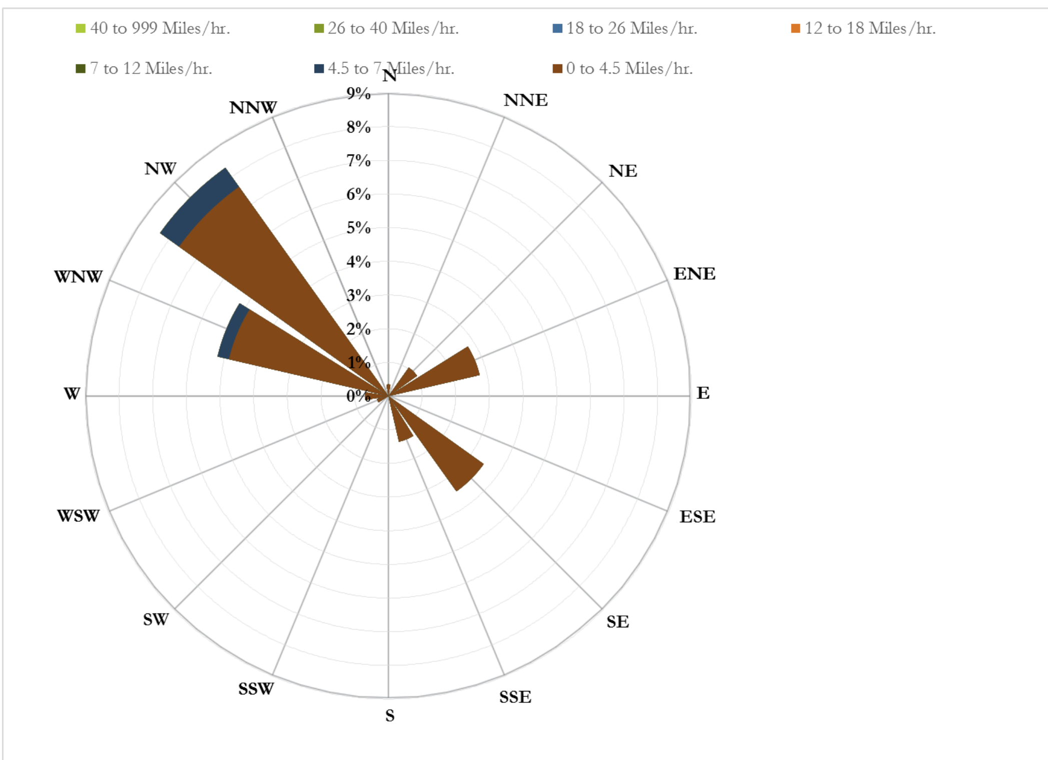
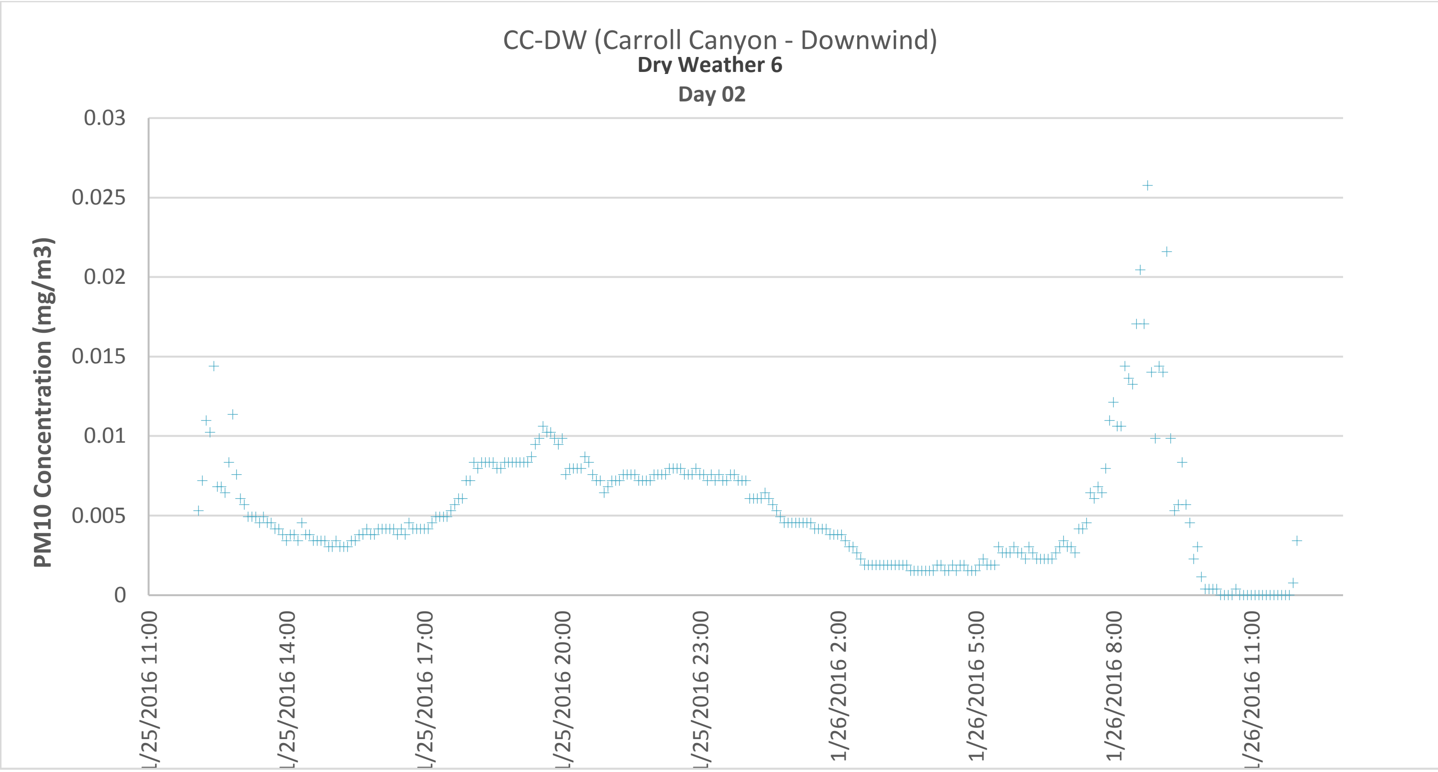


Figure 3-73.
CC-DW PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



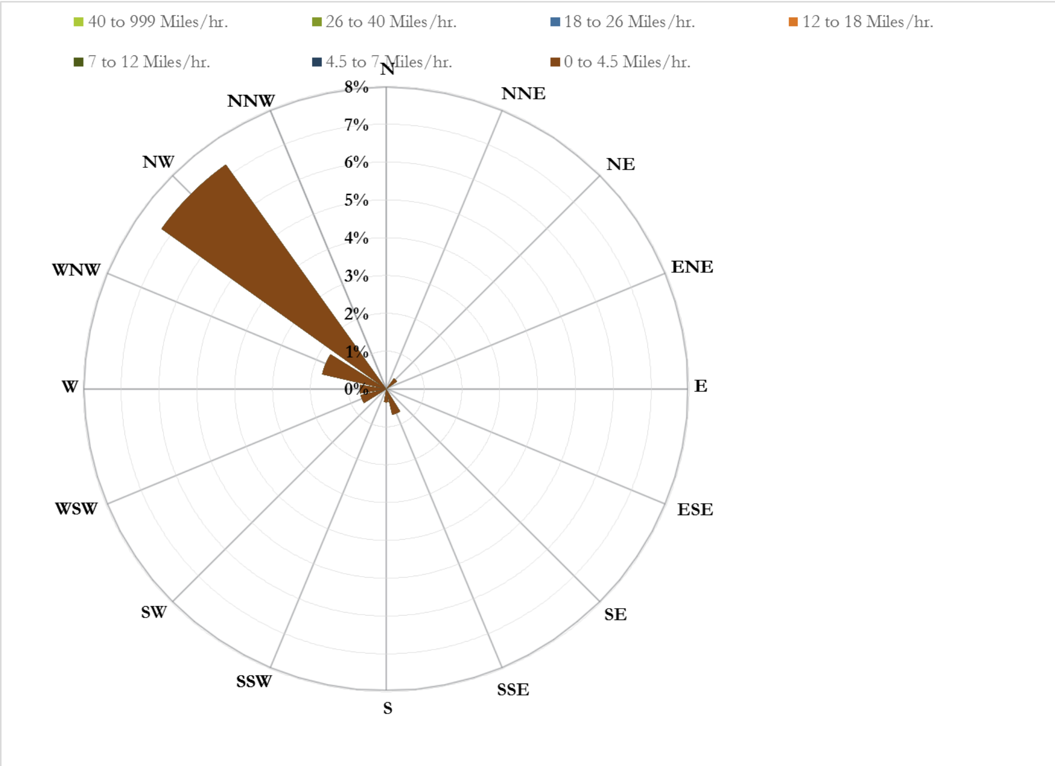
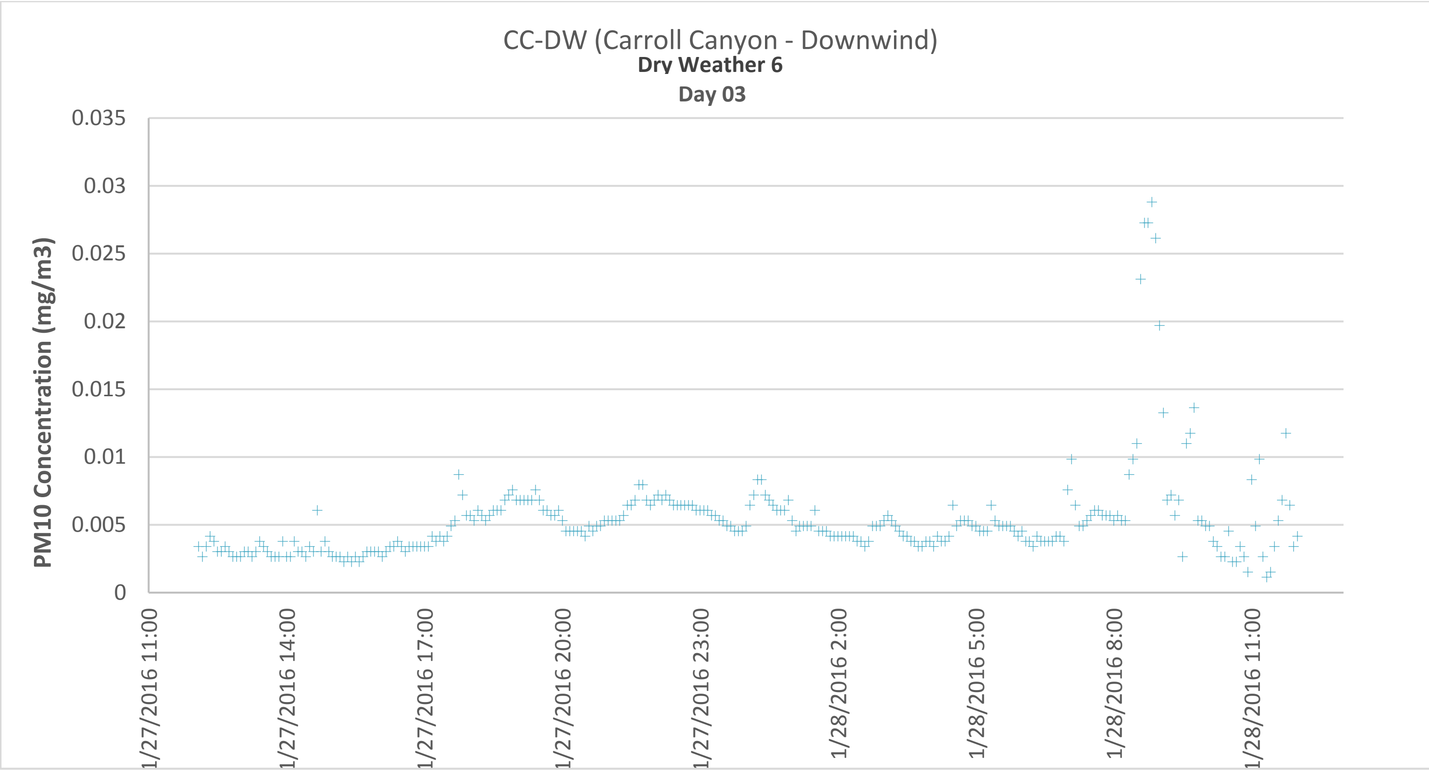


Figure 3-74.
CC-DW PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



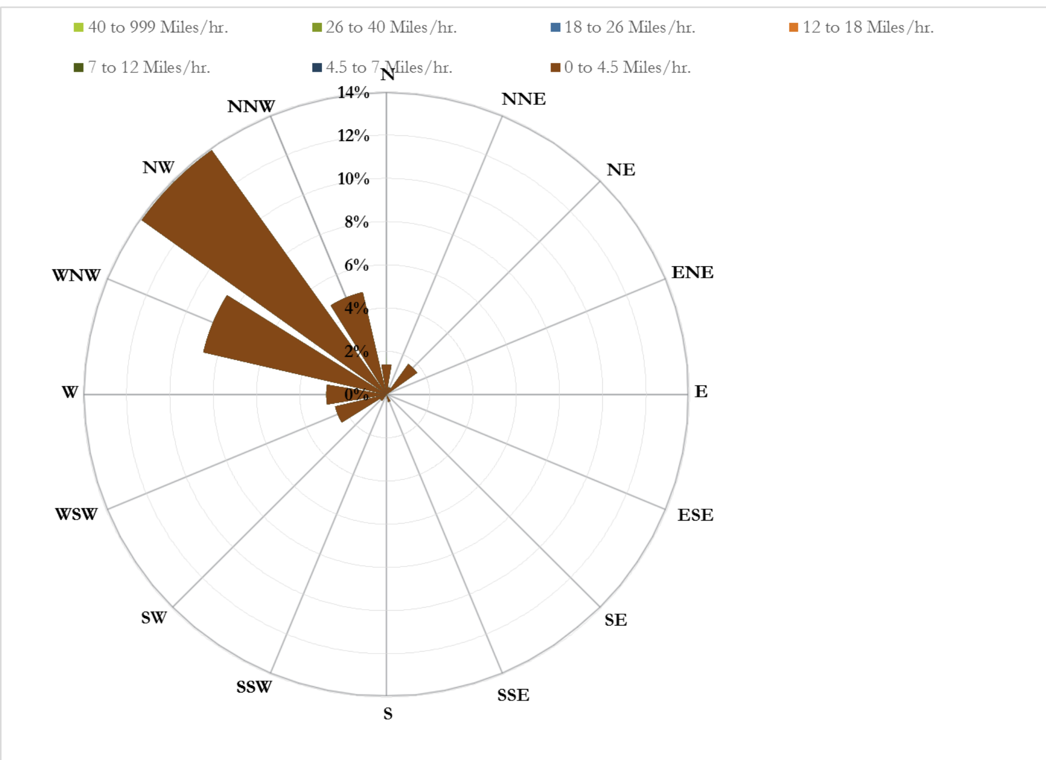


Figure 3-75.
CC-DW PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.4 CC-ER (Carroll Canyon – Eco Rentals)

CC-ER (Carroll Canyon – Eco Rental):

CC-ER is a site monitored during the Phase II Watershed Special Study that was added by the City of San Diego (i.e., not funded through the RA group) and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 845 measurements were determined to be valid (98%).
- Mean values for PM_{10} were 0.0041 mg/m^3.
- Mean standard deviation is $\pm$0.0026 mg/m^3

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – CC-ER Optical readings were lower than the mean value of the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Optical monitor readings were consistently distributed with slightly higher readings observed during the evening and sundown.

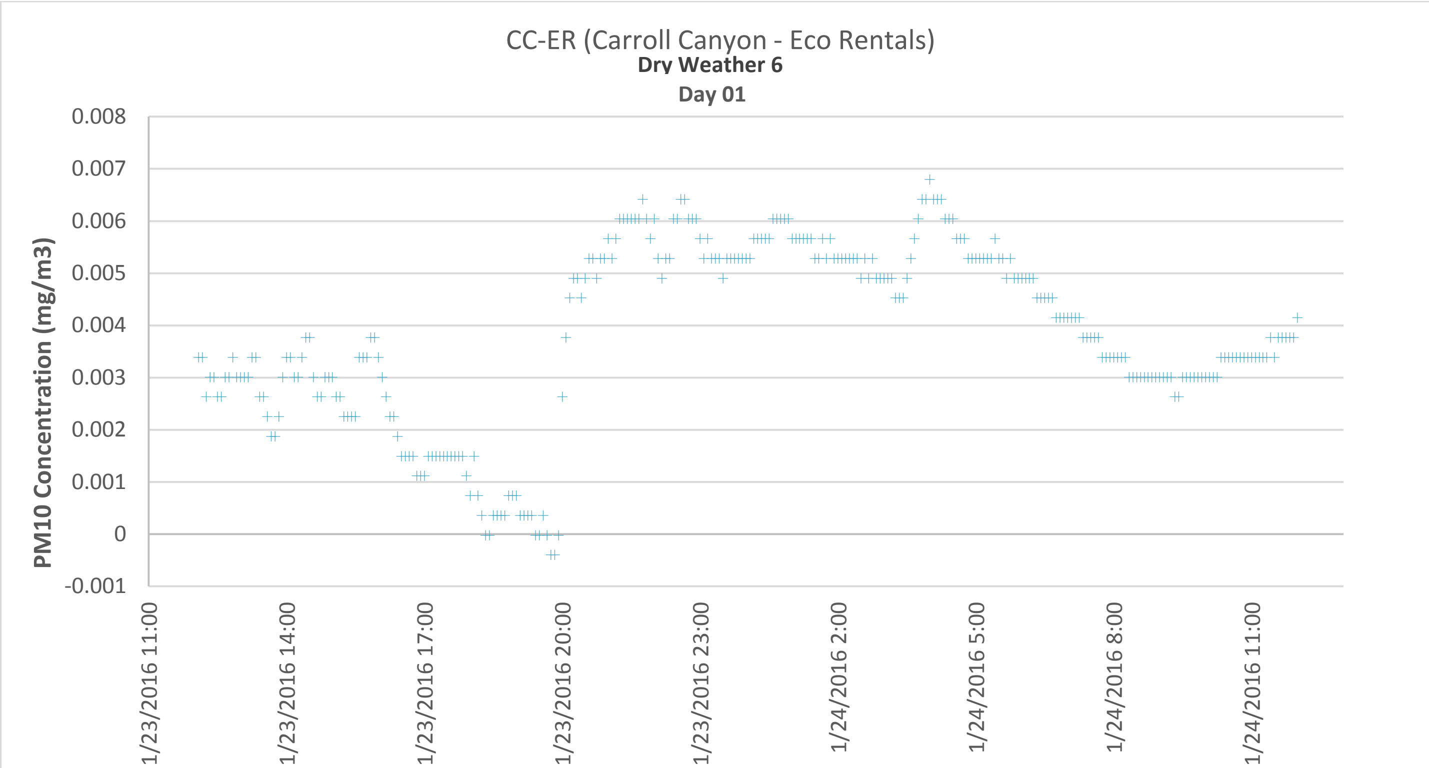
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – CC-ER Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the WNW. Optical monitor readings peaked during increased traffic conditions in the morning.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – CC-ER Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed during periods of increased traffic during the morning.

Graphical representations of this data is presented in Figures 3-76 through 3-78.



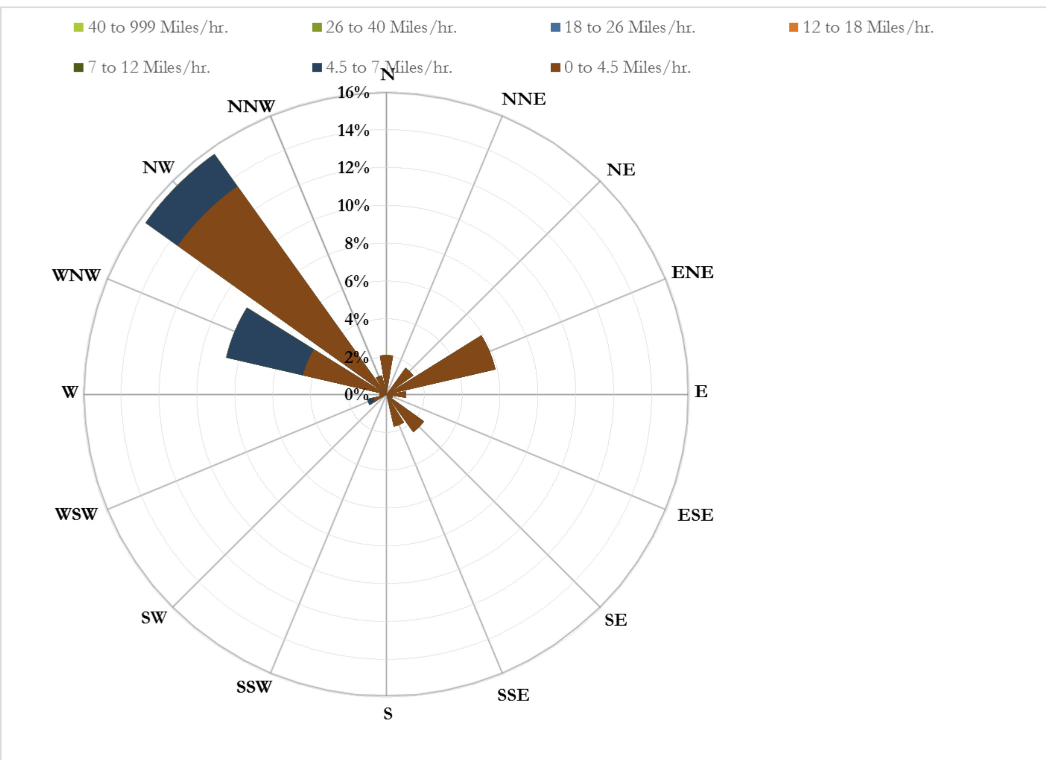
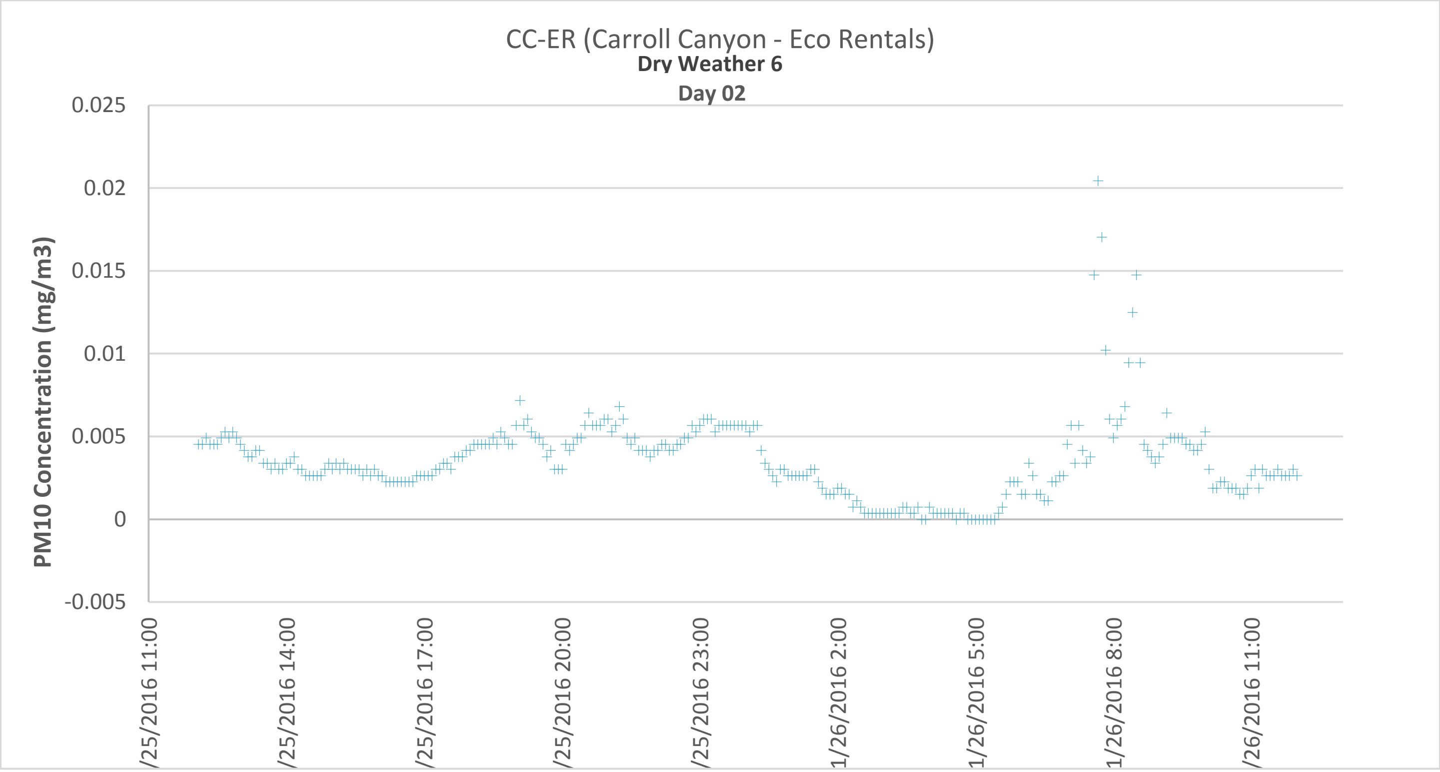


Figure 3-76.
CC-ER PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



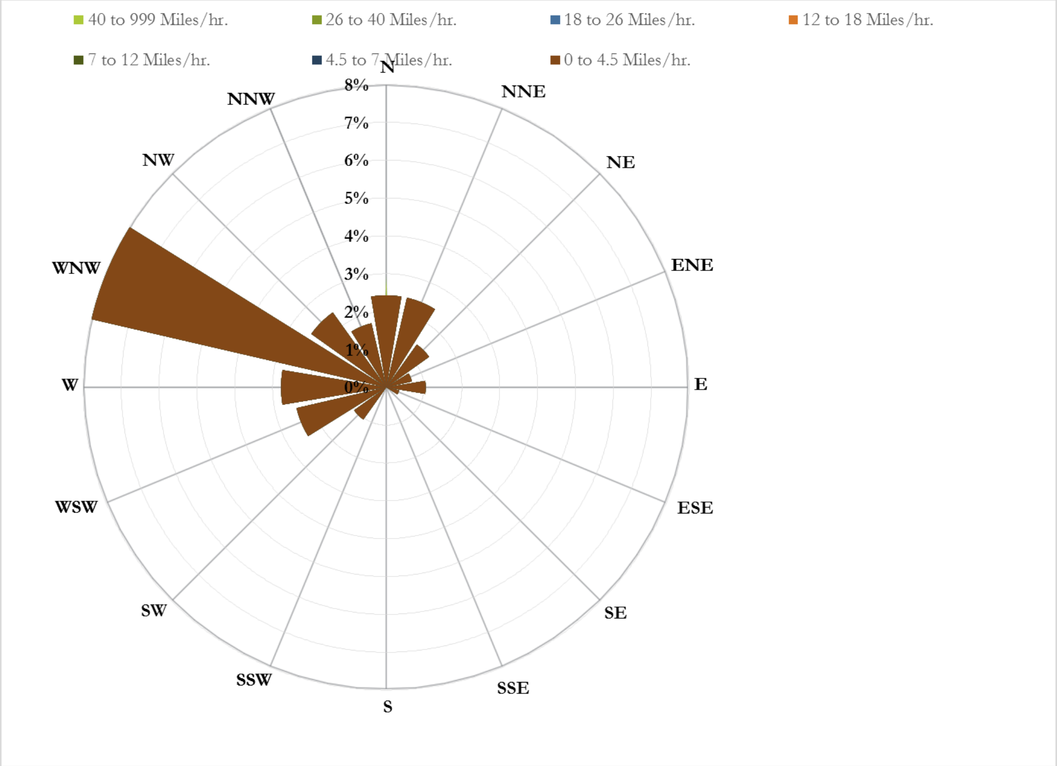
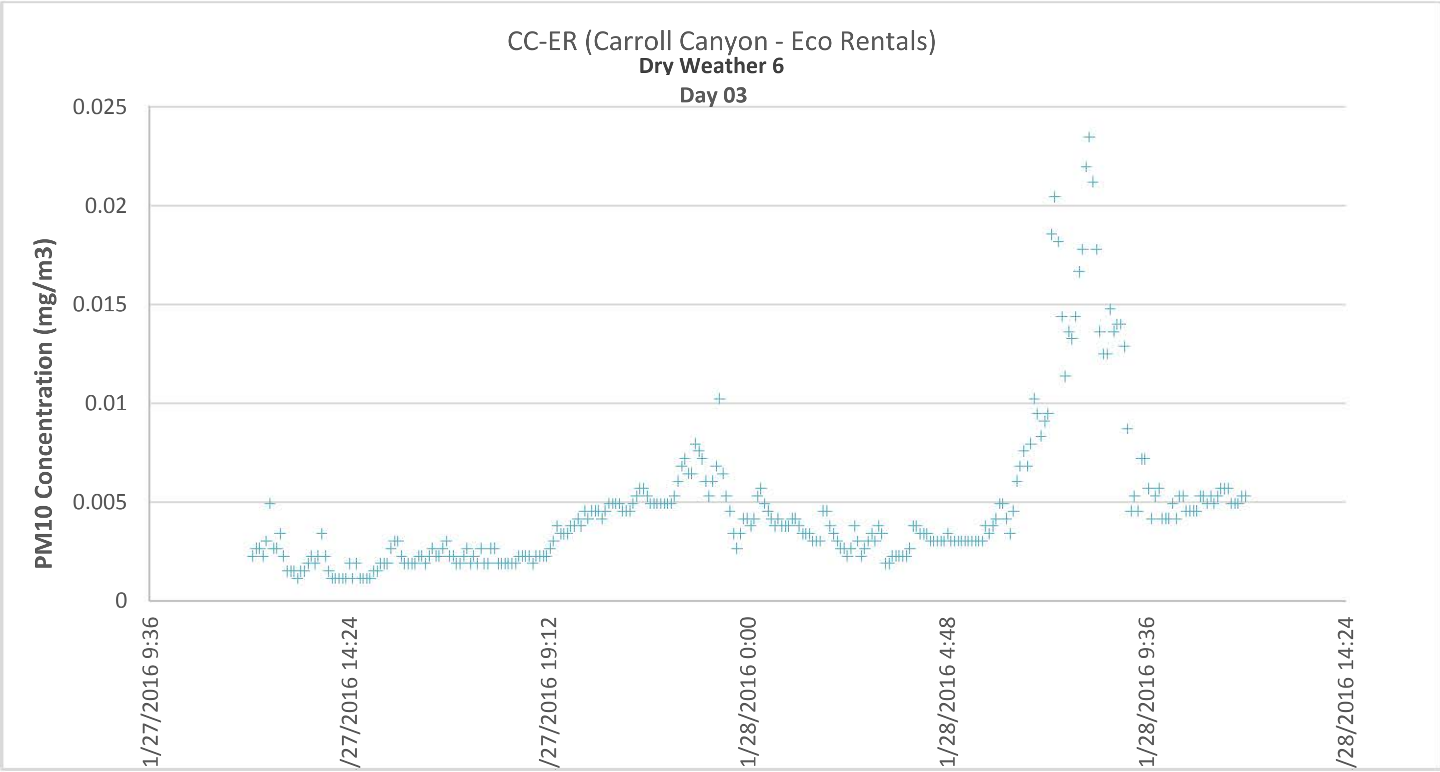


Figure 3-77.
CC-ER PM$_{10}$ Concentrations and Wind Rose, Dry Weather 6 – Day 2



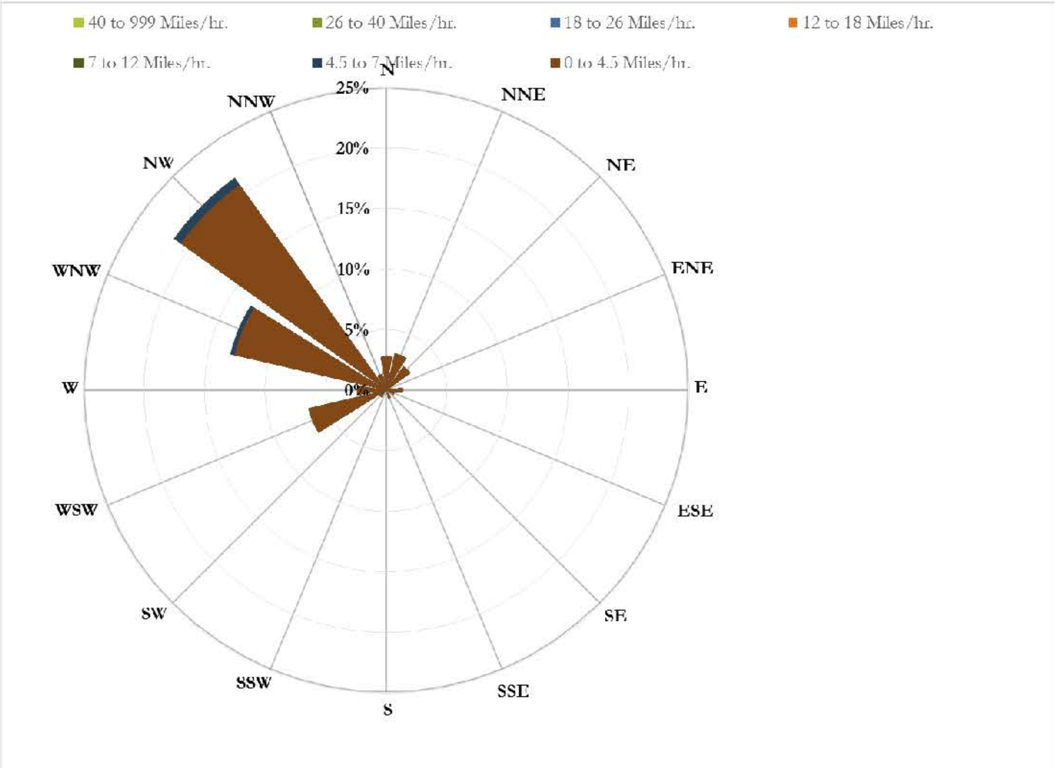


Figure 3-78.
CC-ER PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.5 CC-MP (Carroll Canyon – Maddox Park)

CC-MP (Carroll Canyon – Maddox Park):

CC-MP is a site monitored during the Phase II Watershed Special Study that was added by the City of San Diego (i.e., not funded through the RA group) and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 803 measurements were determined to be valid (93%).
- Mean values for PM_{10} were 0.0044 mg/m^3.
- Mean standard deviation is $\pm$0.0038 mg/m^3

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – CC-MP Mean Optical readings were observed at the mean value of the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed at noon and during times of increased traffic in the morning.

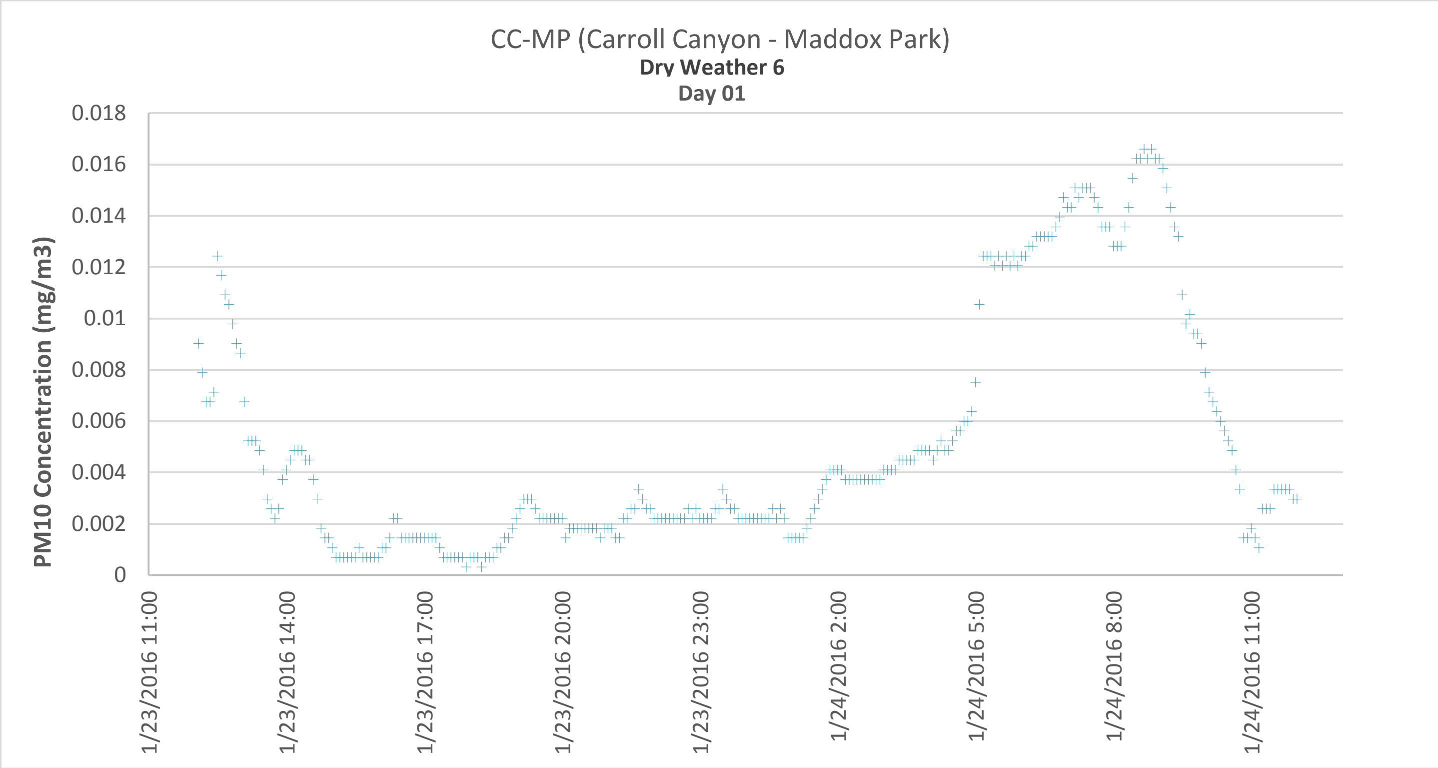
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – CC-MP Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed late evening to midnight.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – CC-MP Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were consistently distributed with a slightly higher readings before midnight.

Graphical representations of this data is presented in Figures3-79 through 3-81.



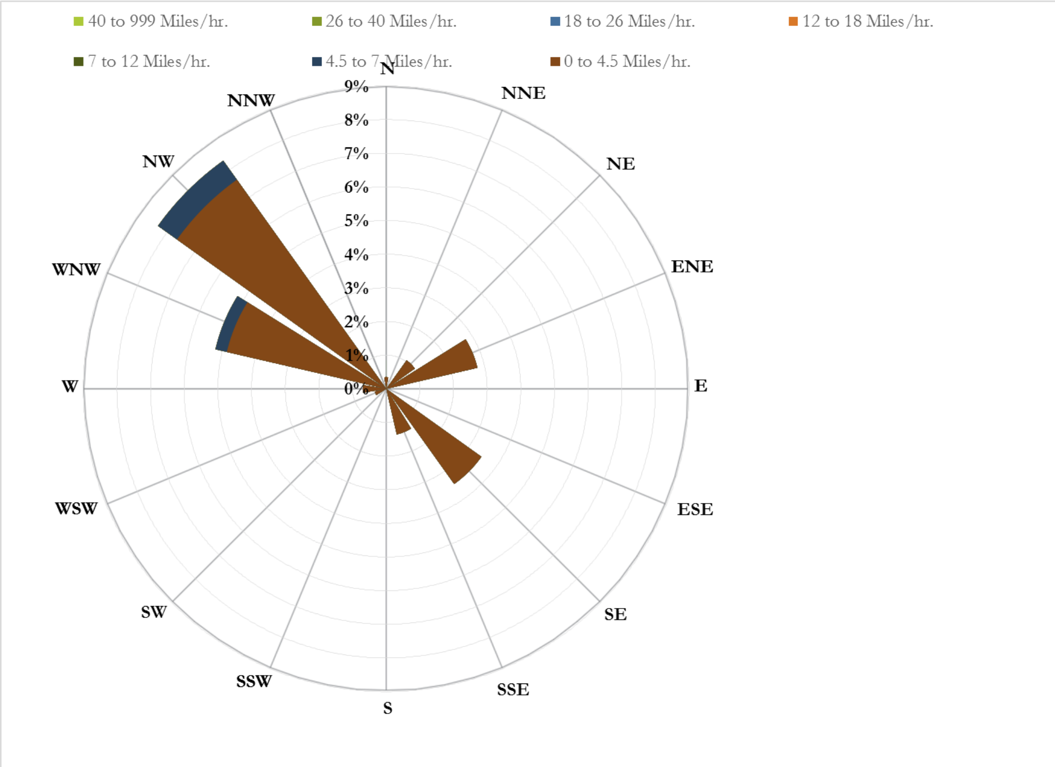
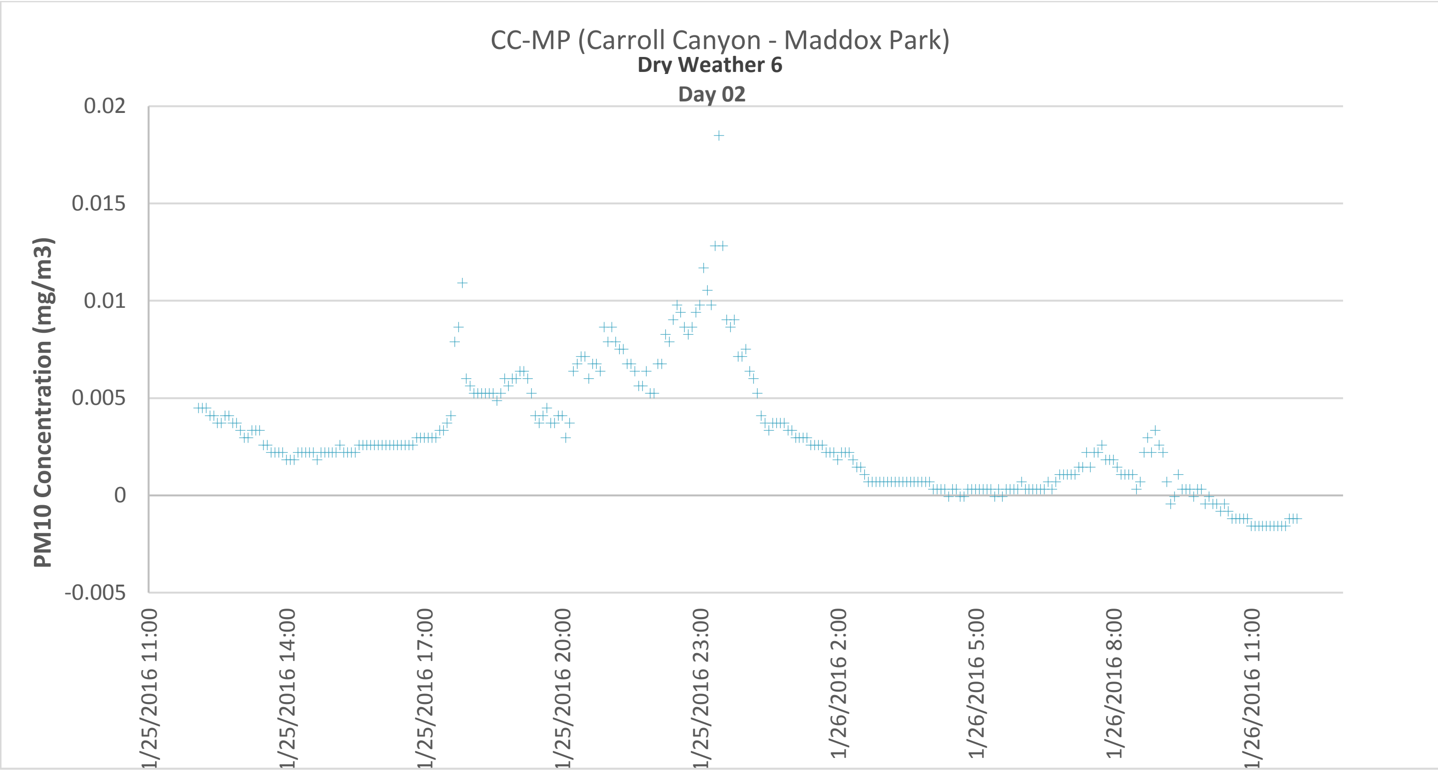


Figure 3-79.
CC-MP PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



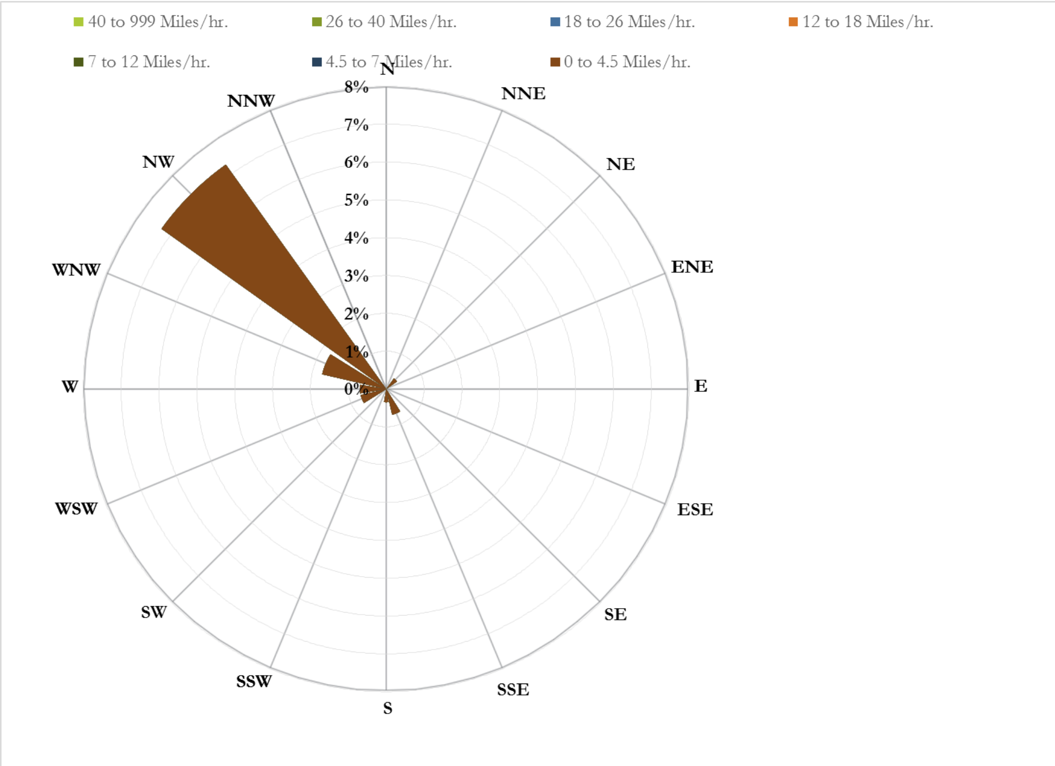
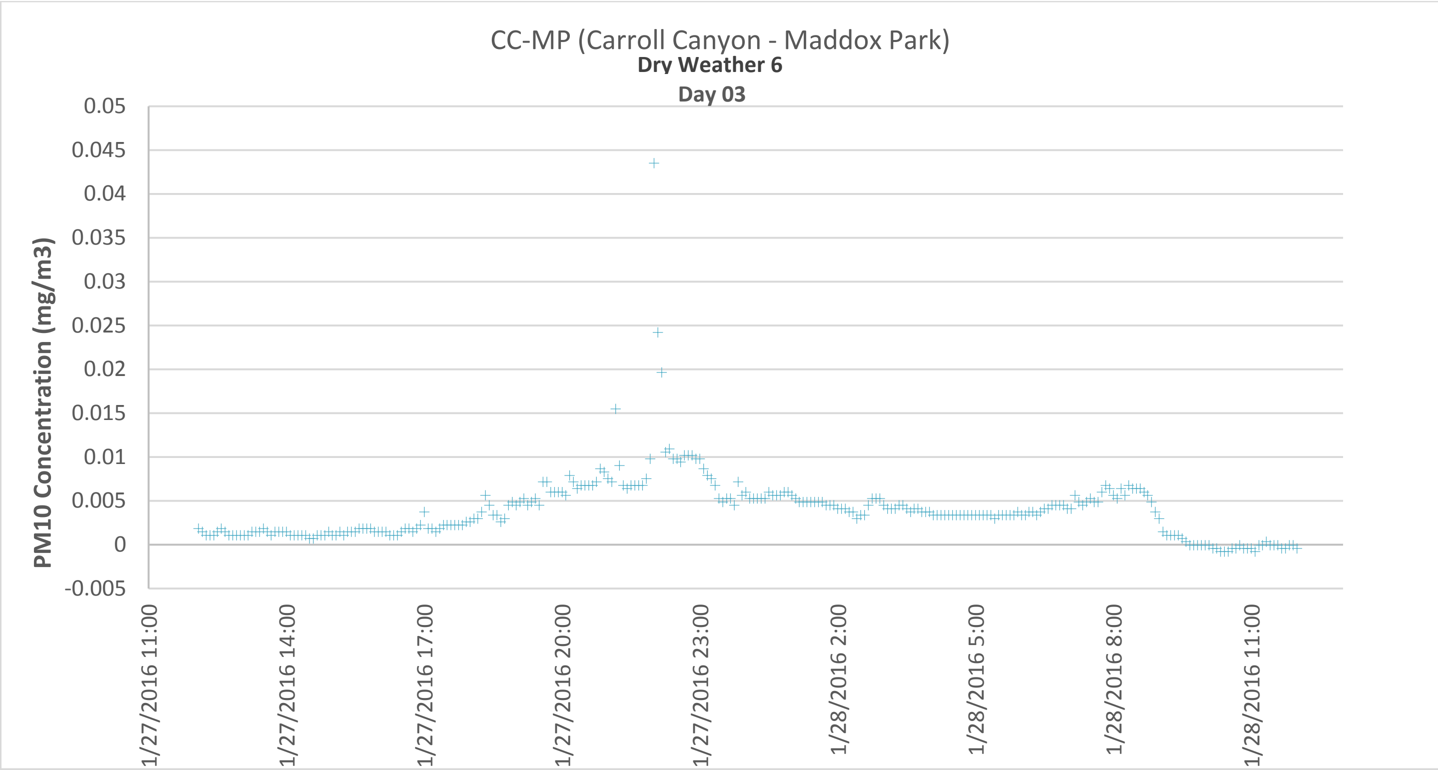


Figure 3-80.
CC-MP PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



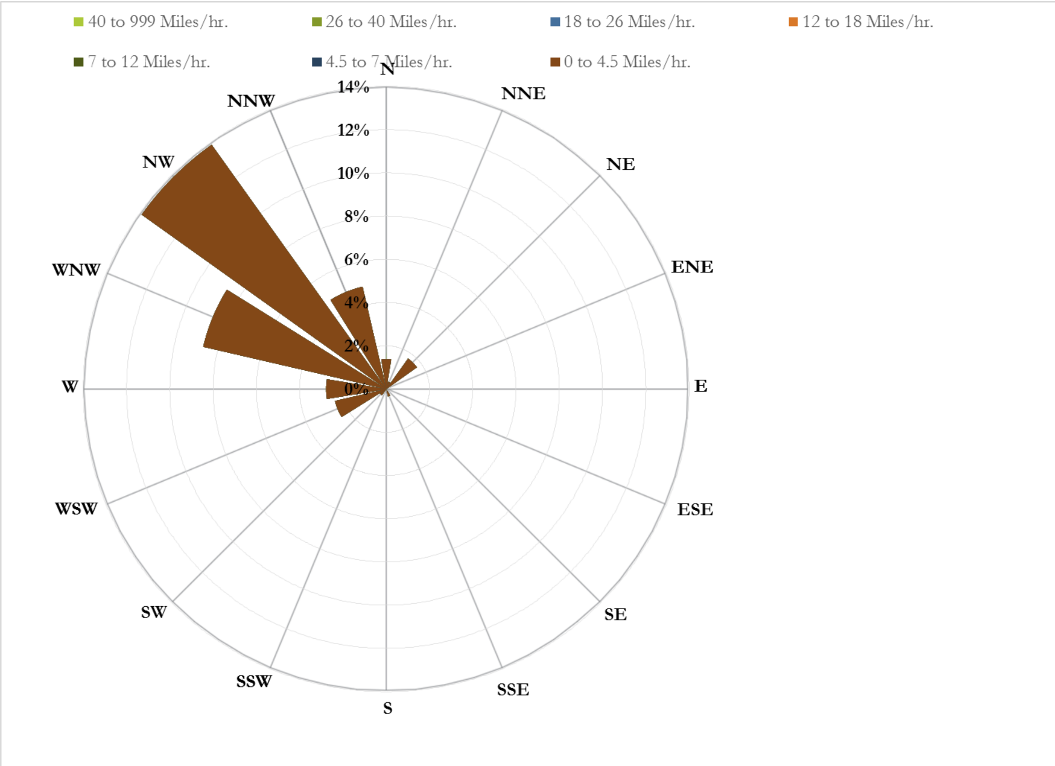


Figure 3-81.
CC-MP PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.6 CC-SF (Carroll Canyon – Camino Santa Fe)

CC-SF (Carroll Canyon – Camino Santa Fe):

CC-MP is a site monitored during the Phase II Watershed Special Study that was added by the City of San Diego (i.e., not funded through the RA group) and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 745 measurements were determined to be valid (86%).
- Mean values for PM_{10} were 0.0069 mg/m^3.
- Mean standard deviation is $\pm$0.0051 mg/m^3

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – CC-SF Optical readings were higher than the mean value of the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed late evening and sundown, at times of increased traffic during the morning.

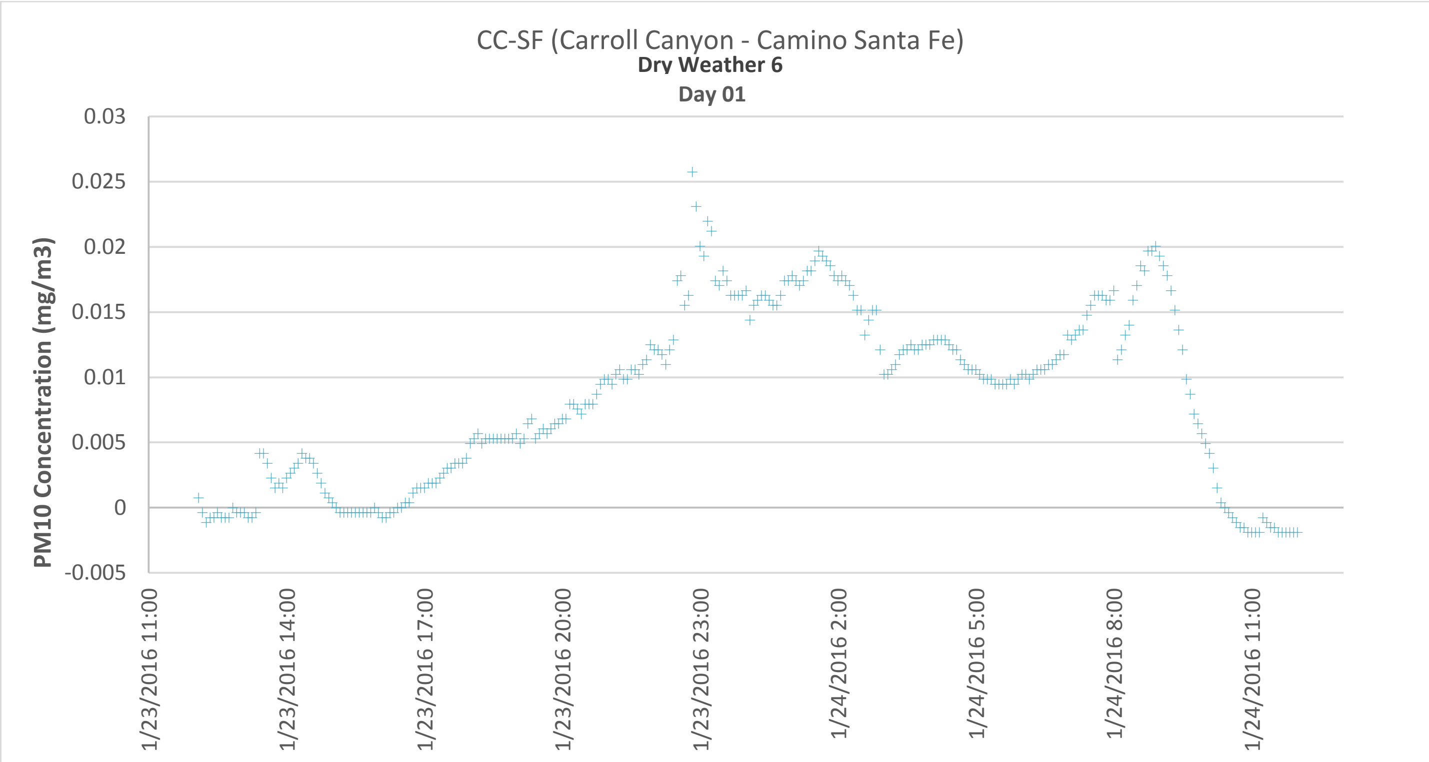
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – CC-SF Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed in the evening and at periods of increased traffic during the morning.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – CC-SF Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed during periods of increased traffic during the morning.

Graphical representations of this data is presented in Figures 3-82 through 3-84.



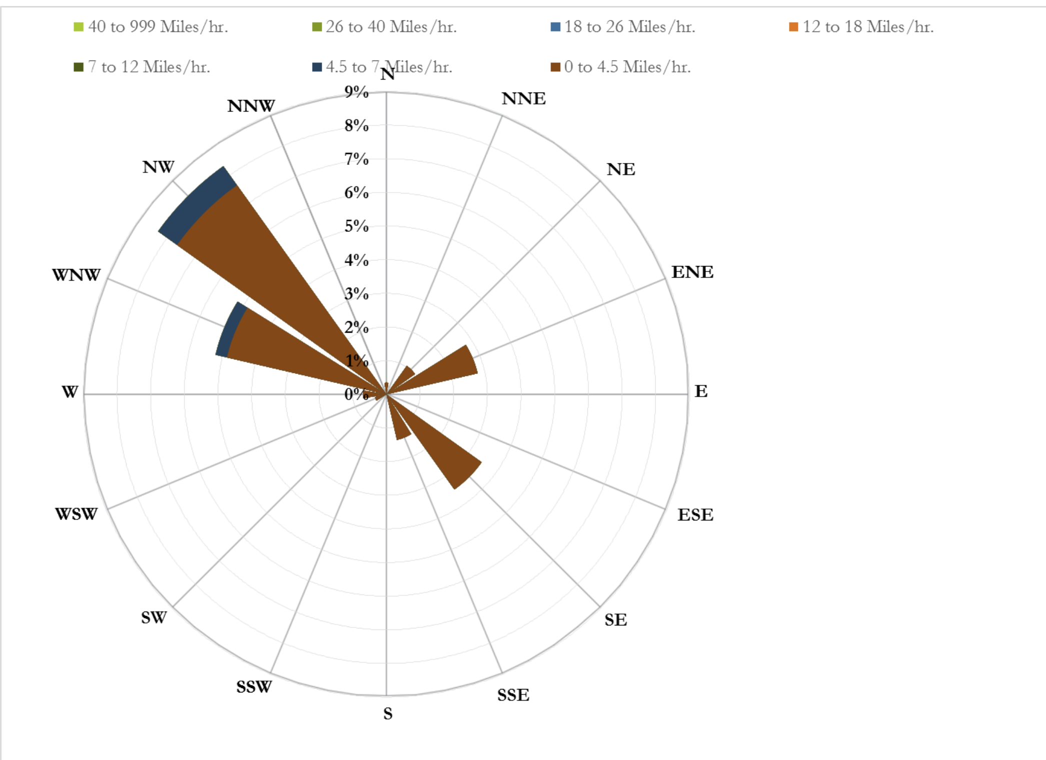
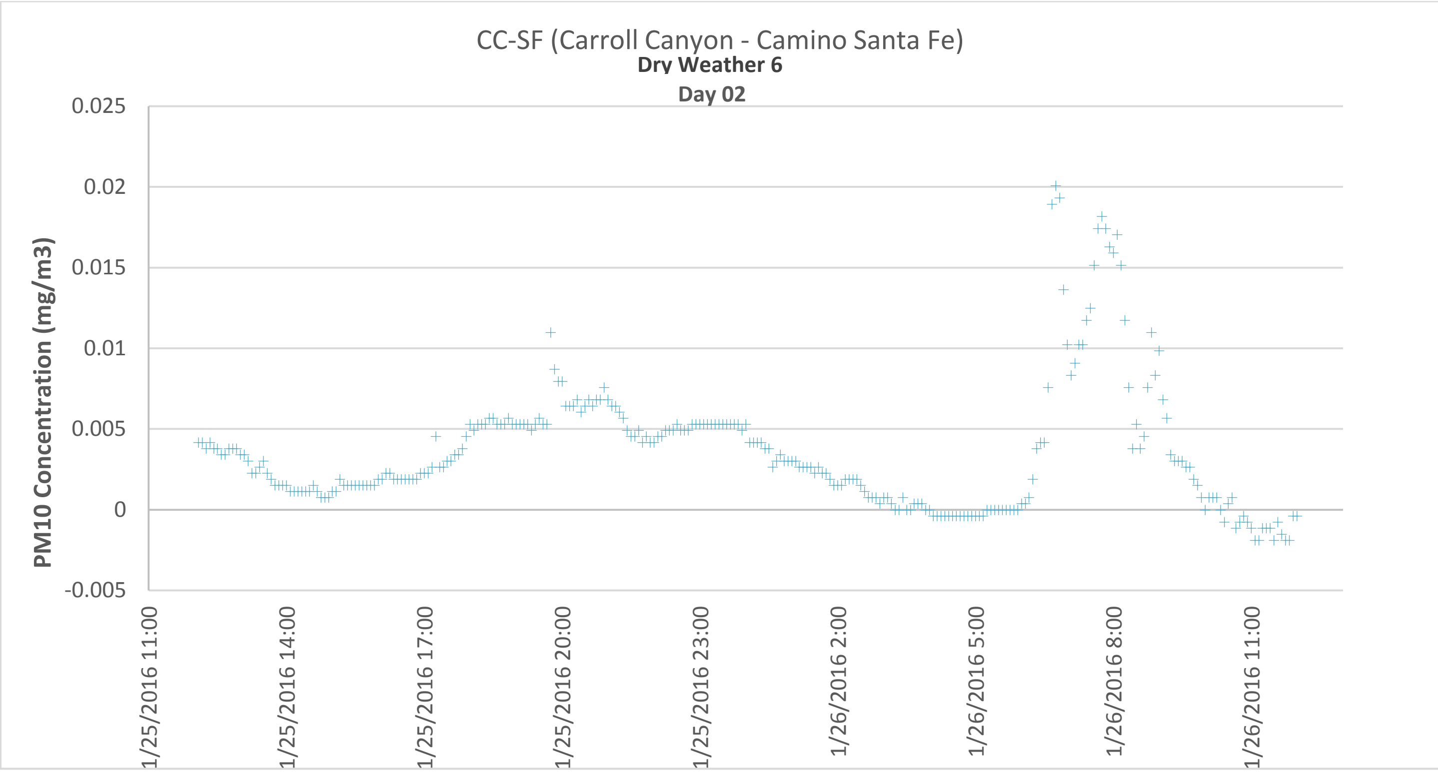


Figure 3-82.
CC-SF PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



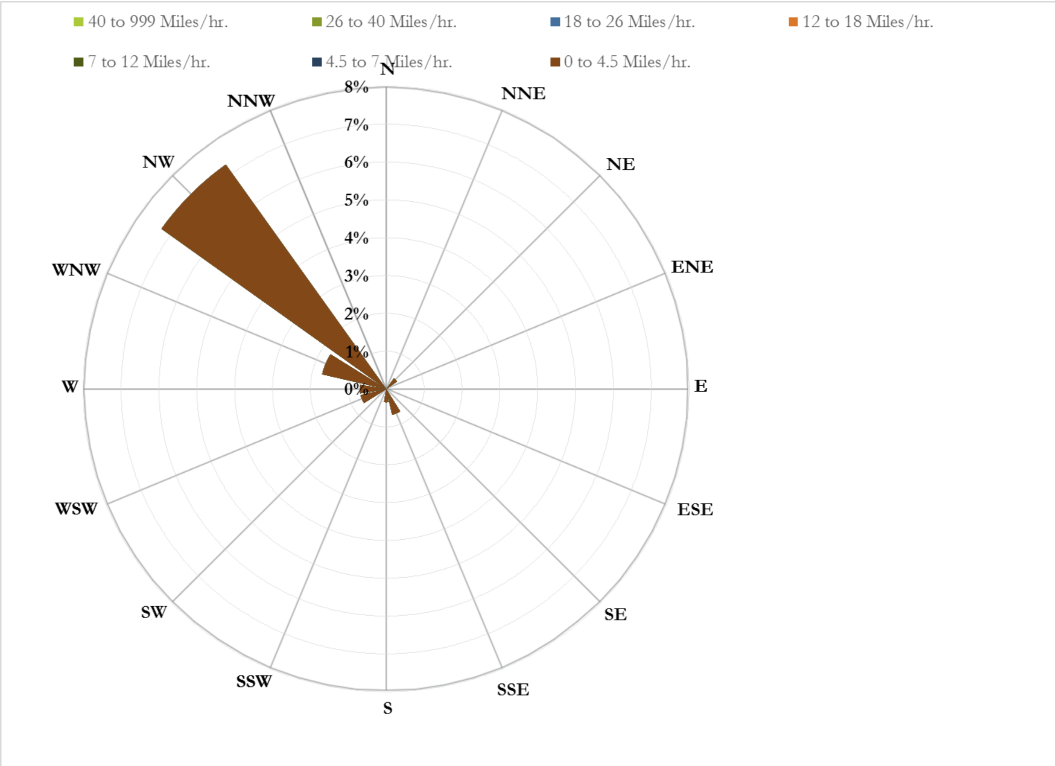
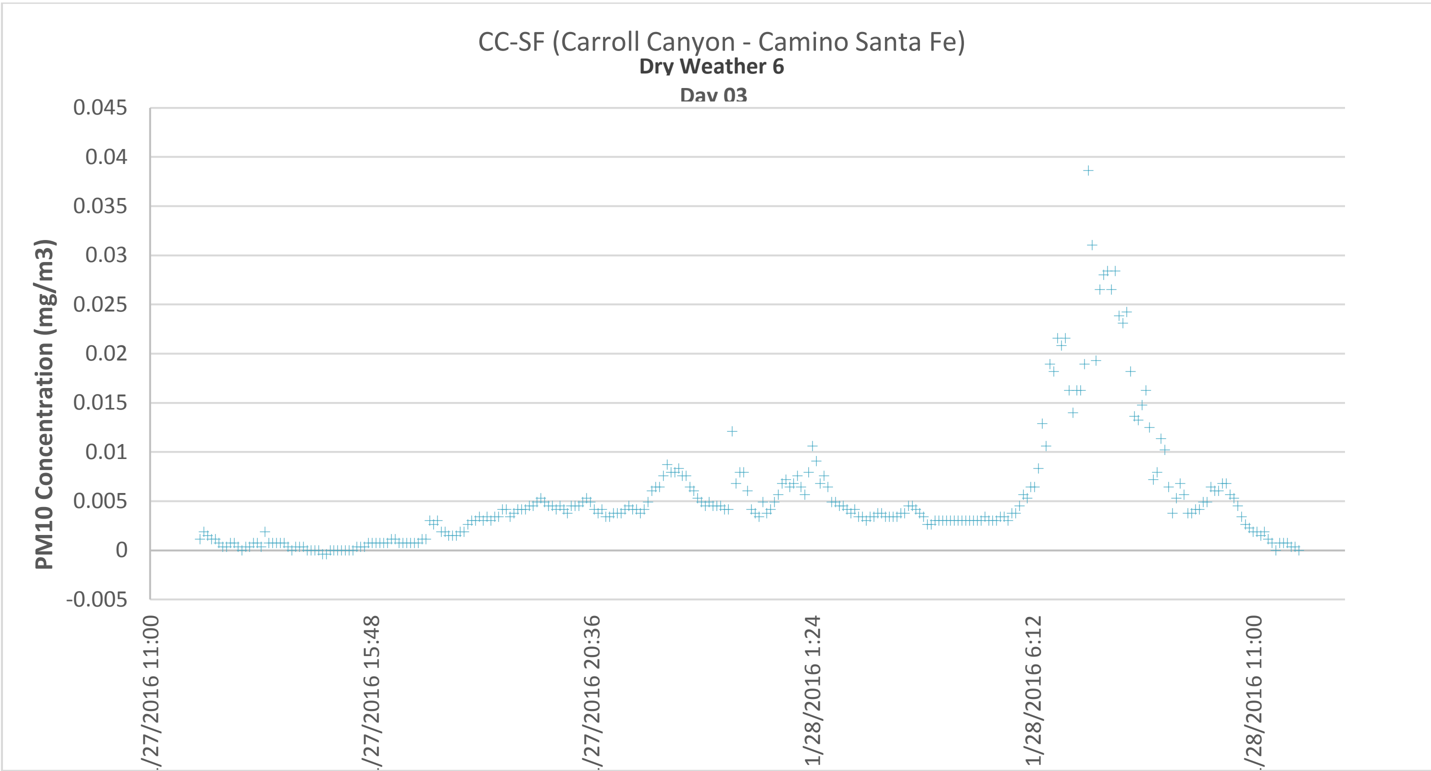


Figure 3-83.
CC-SF PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



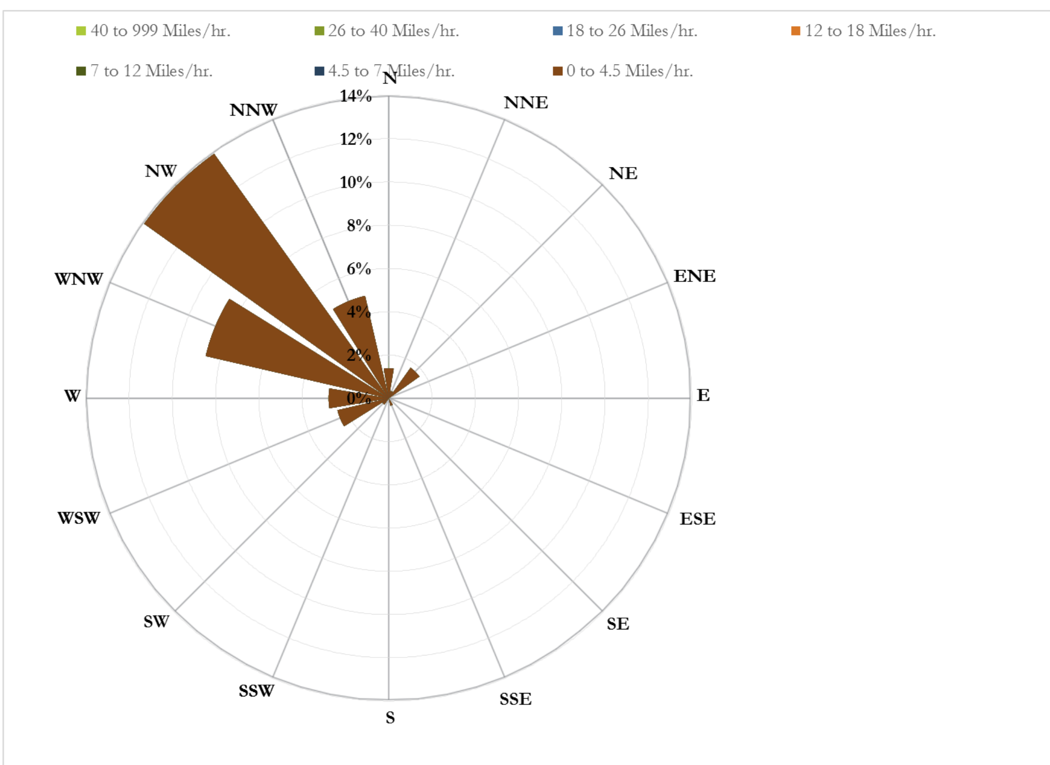


Figure 3-84.
CC-SF PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.7 CC-SR (Carroll Canyon – Scripps Ranch)

CC-SR (Carroll Canyon – Scripps Ranch):

CC-SR is a site monitored during the Phase I and 2 Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 845 measurements were determined to be valid (98%).
- Mean values for PM_{10} were 0.0030 mg/m^3.
- Mean standard deviation is $\pm$0.0014 mg/m^3

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – CC-SF Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed at noontime and during sundown.

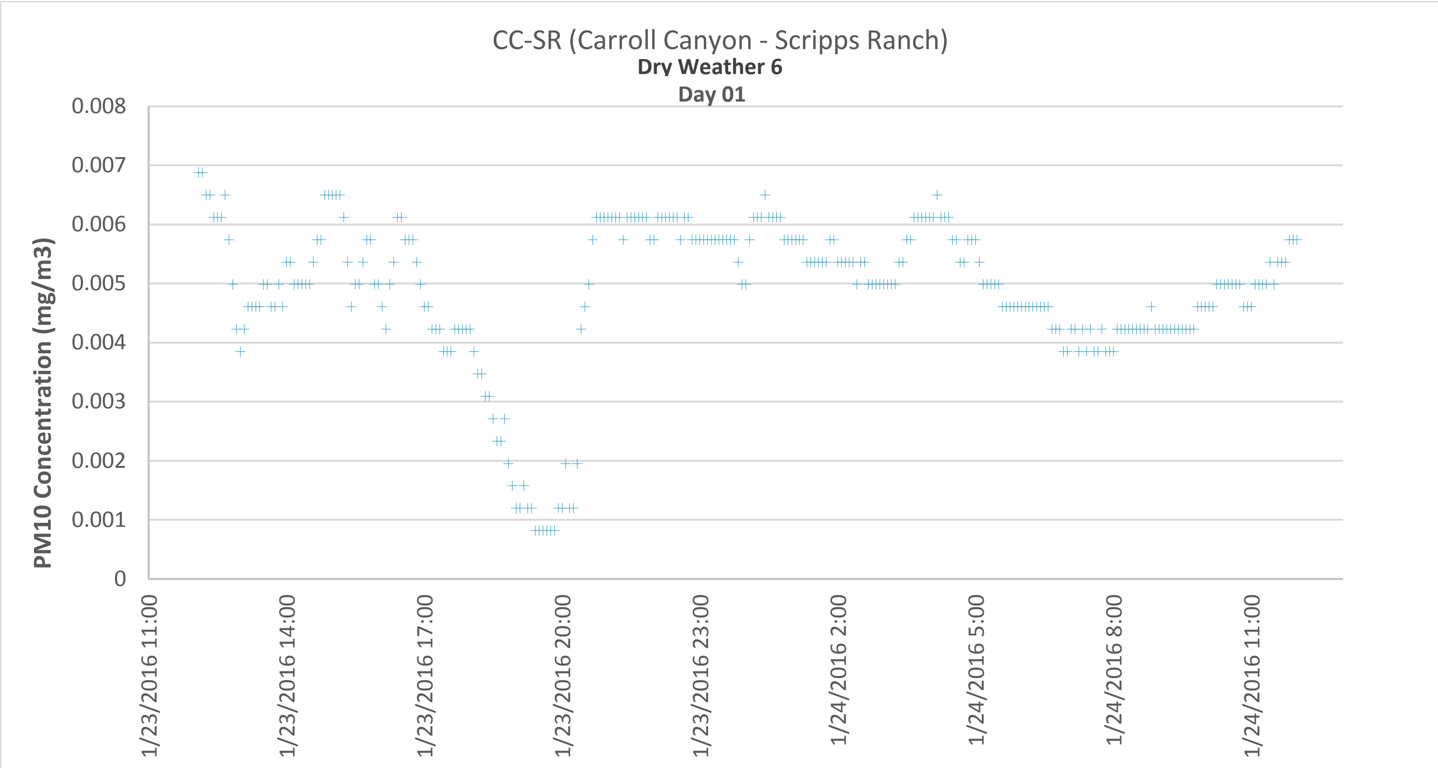
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – CC-SF Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW. Optical monitor readings peaked around noontime and during times of increased traffic conditions in the morning.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – CC-DM Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed during the afternoon and evening.

Graphical representations of this data is presented in Figure 2-29.



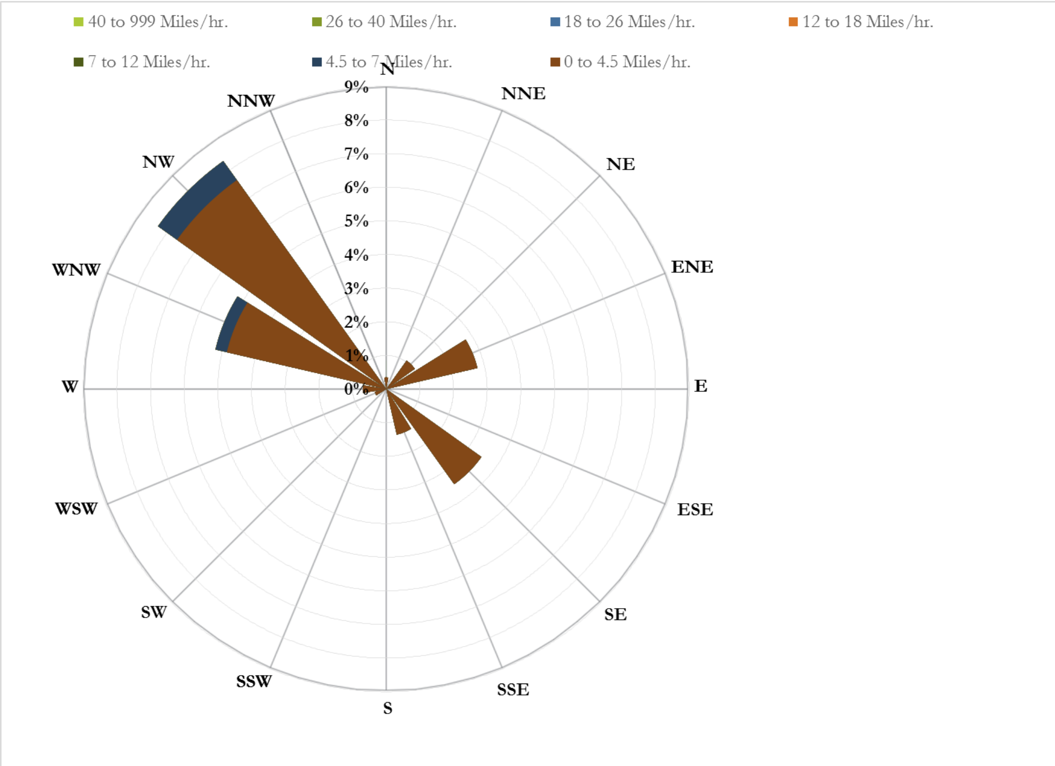
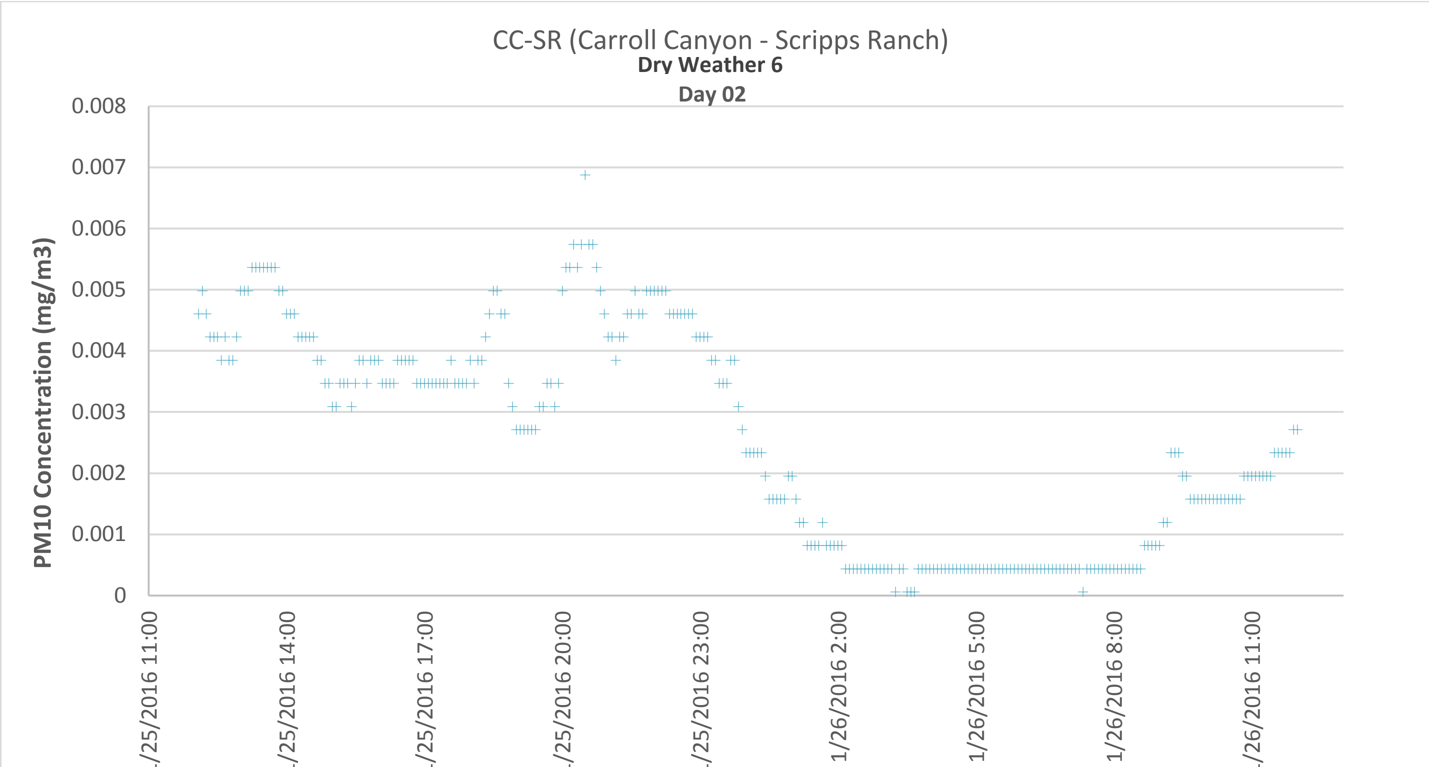


Figure 3-85.
CC-SR PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



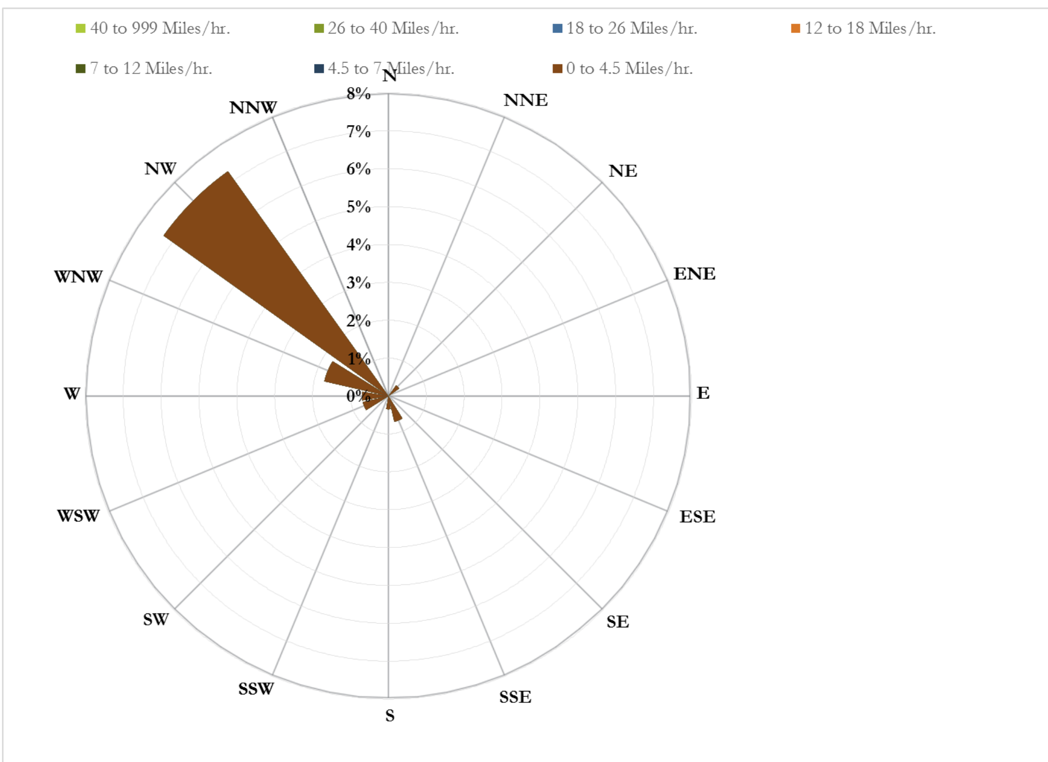
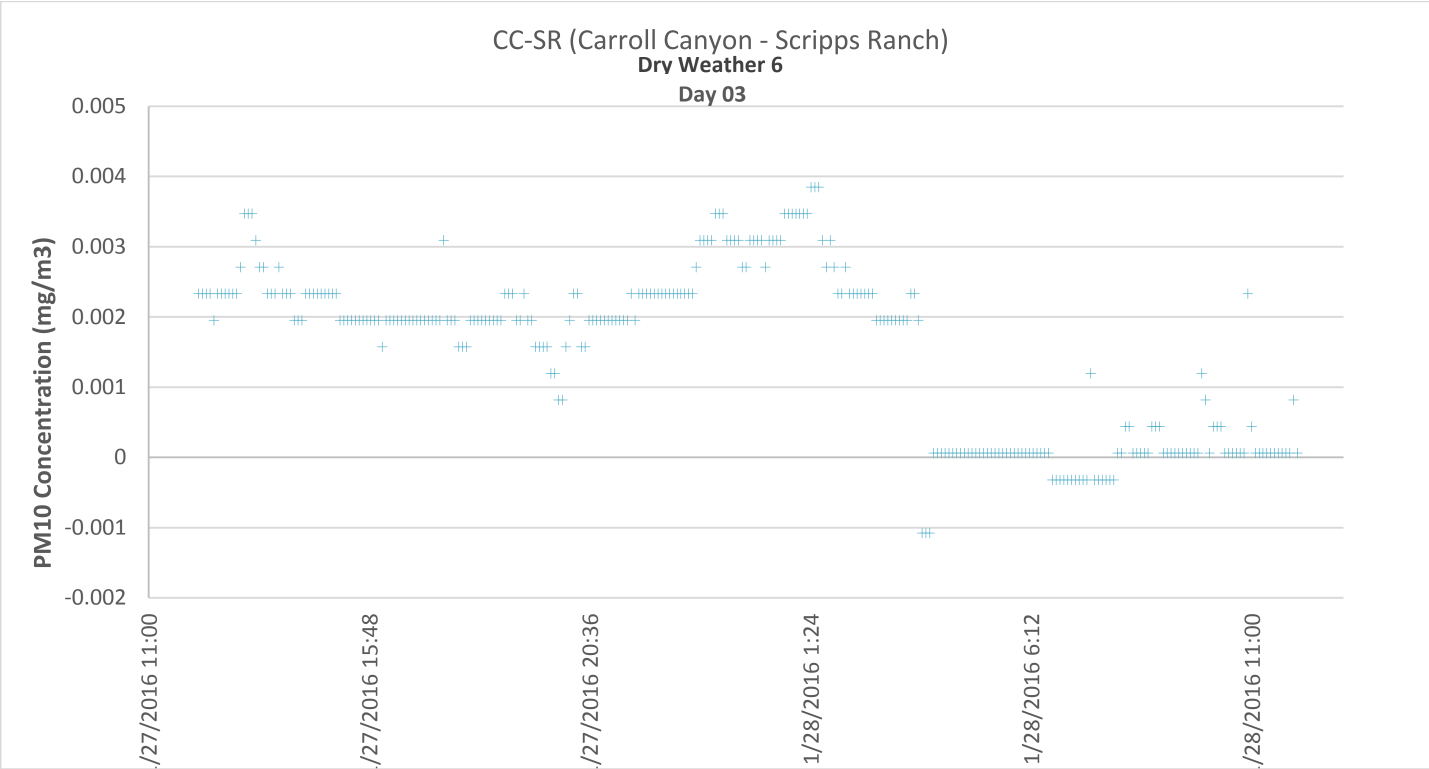


Figure 3-86.
CC-SR PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



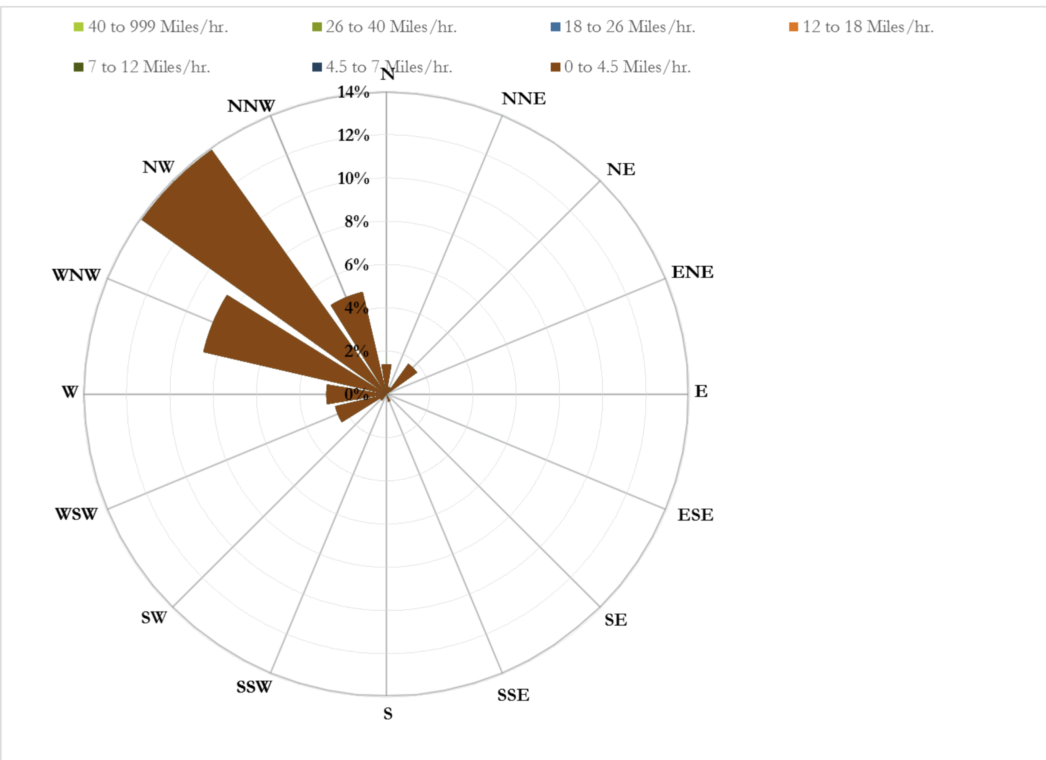


Figure 3-87.
CC-SR PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.8 CC-UP (Carroll Canyon – Upwind)

CC-UP (Carroll Canyon – Upwind):

CC-UP is a site monitored during the Phase I and 2 Watershed Special Study and contains an Optical monitor and an FRM sampler.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 853 measurements were determined to be valid (99%).
- Mean values for PM_{10} were 0.0050 mg/m^3.
- Mean standard deviation is $\pm$0.0024 mg/m^3

FRM Sampler (Laboratory) Results:

- Mean values for PM_{10} was 0.0152 mg/m^3.
- Mean RPD from the FRM results to the Optical monitor results was 91.48%

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – CC-UP Optical readings were lower than the mean value of the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed at midnight and during the morning after sunrise.

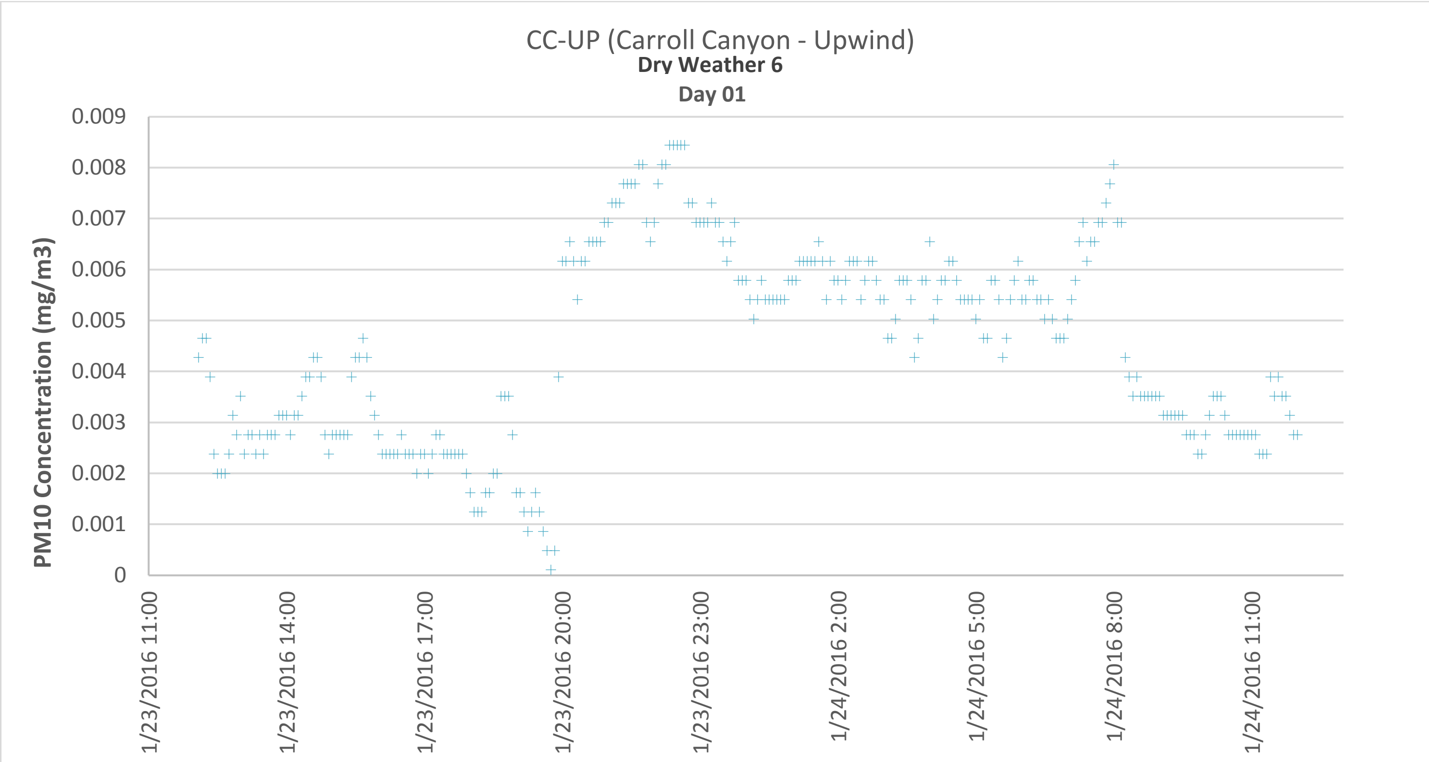
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – CC-UP Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the WNW. Peak Optical monitor readings were observed during periods of increased traffic in the afternoon and morning.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – CC-UP Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed during periods of increased traffic in the morning.

Graphical representations of this data is presented in Figures 3-88 through 3-90.



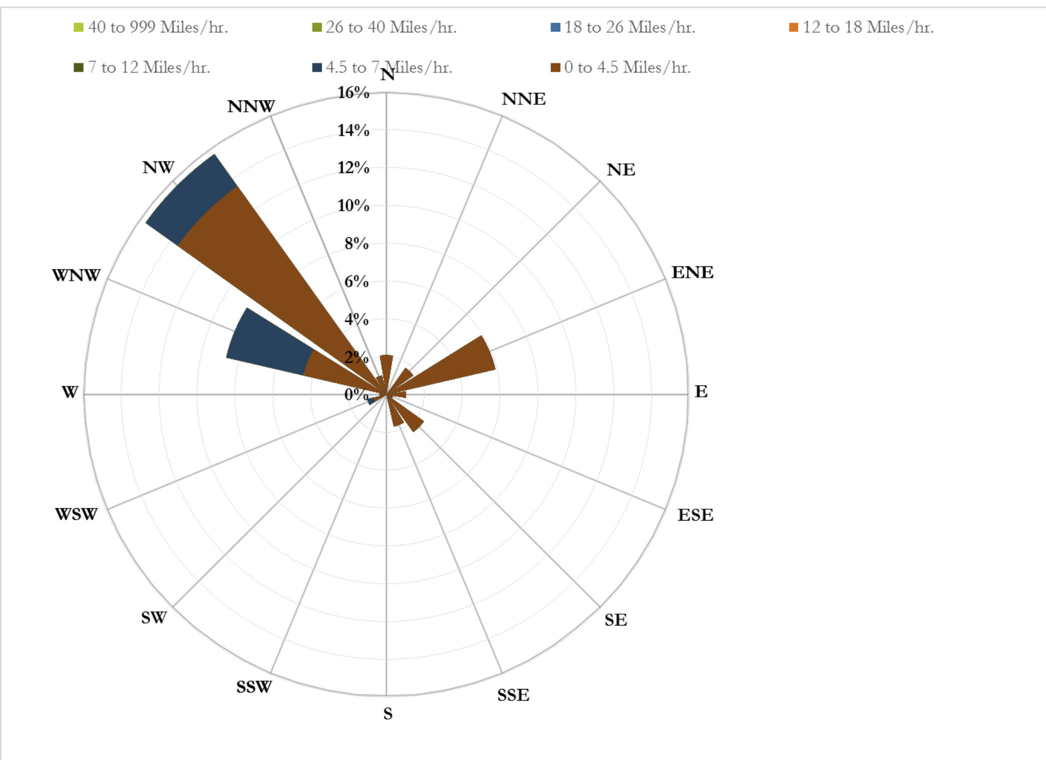
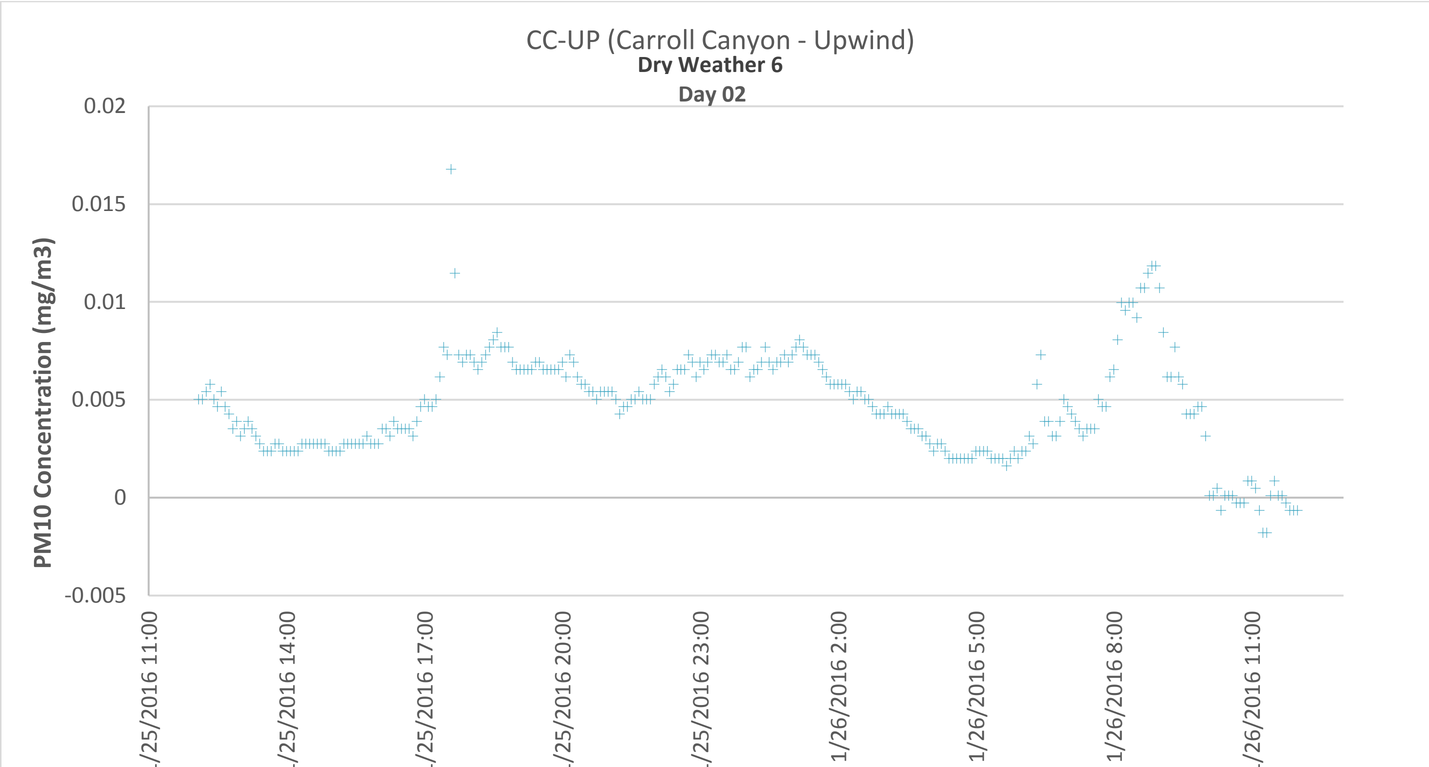


Figure 3-88.
CC-UP PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



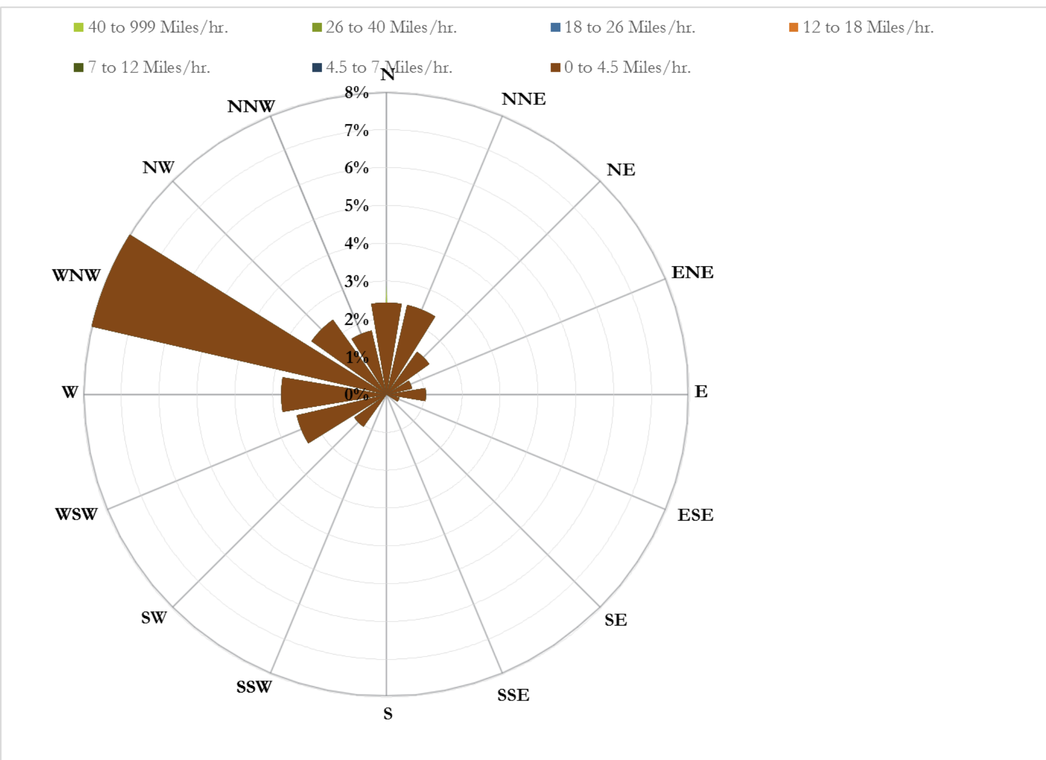
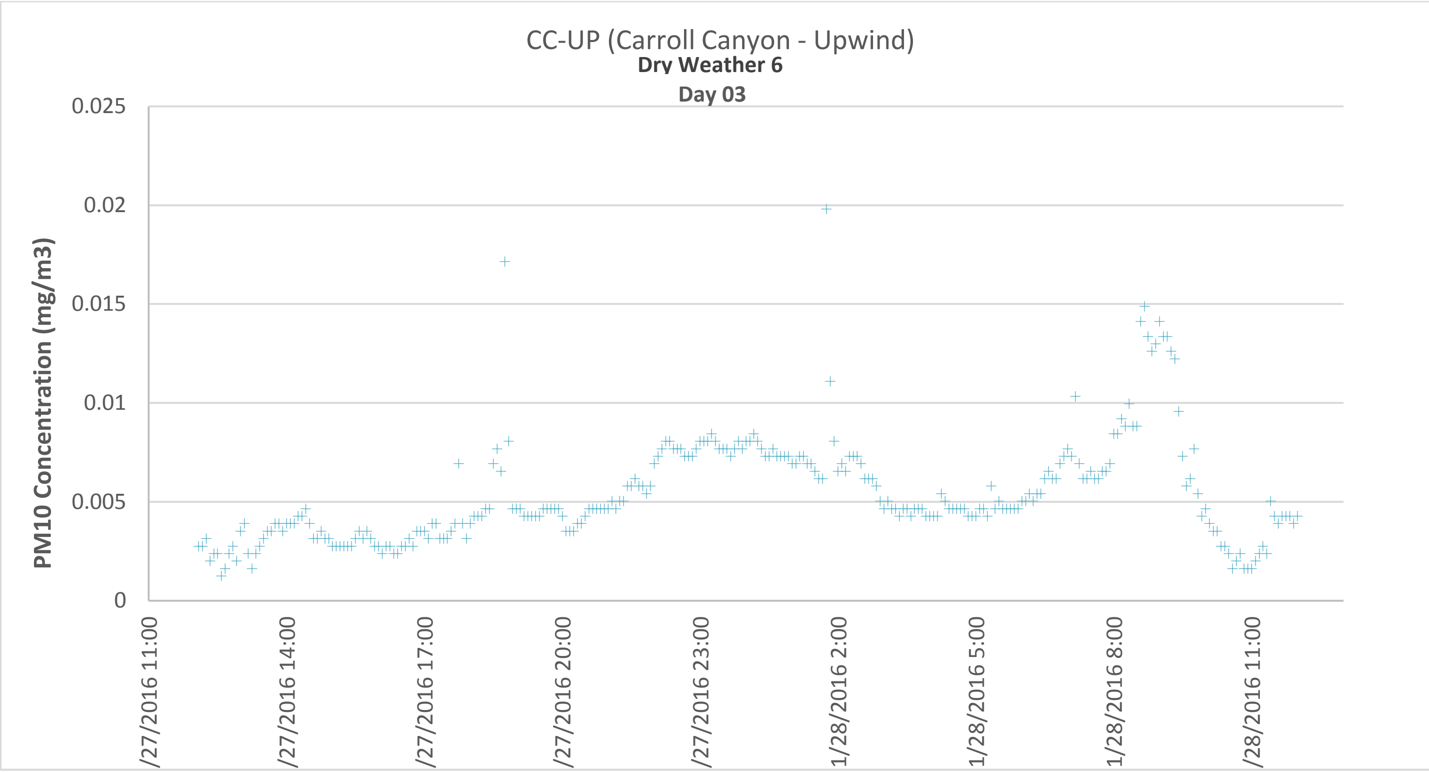


Figure 3-89.
CC-UP PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



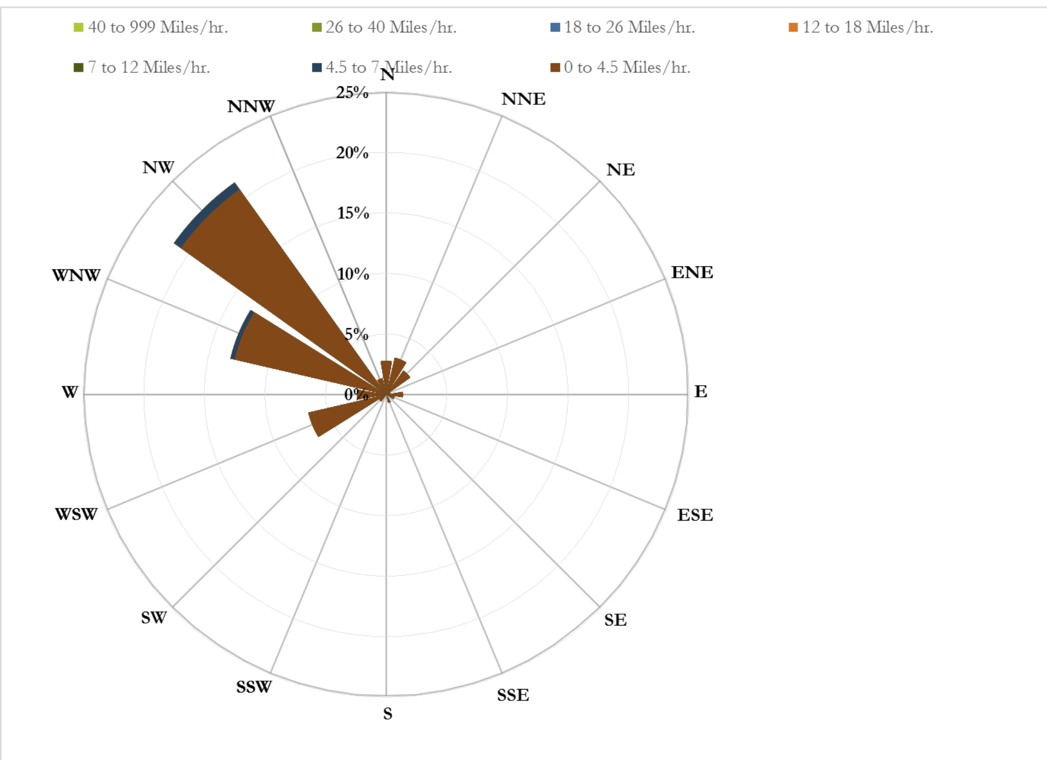


Figure 3-90.
CC-UP PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.9 CV-CD (Carmel Valley – Camino Del Sur)

CV-CD (Carmel Valley – Camino Del Sur):

CV-CD is a site monitored during the Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 778 measurements were determined to be valid (90%).
- Mean values for PM_{10} were 0.0054 mg/m^3.
- Mean standard deviation is $\pm$0.0036 mg/m^3

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – CV-CD Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind direction were observed primarily from the W, WSW, NNE, and NE. Peak Optical monitor readings were observed between after midnight and through the morning.

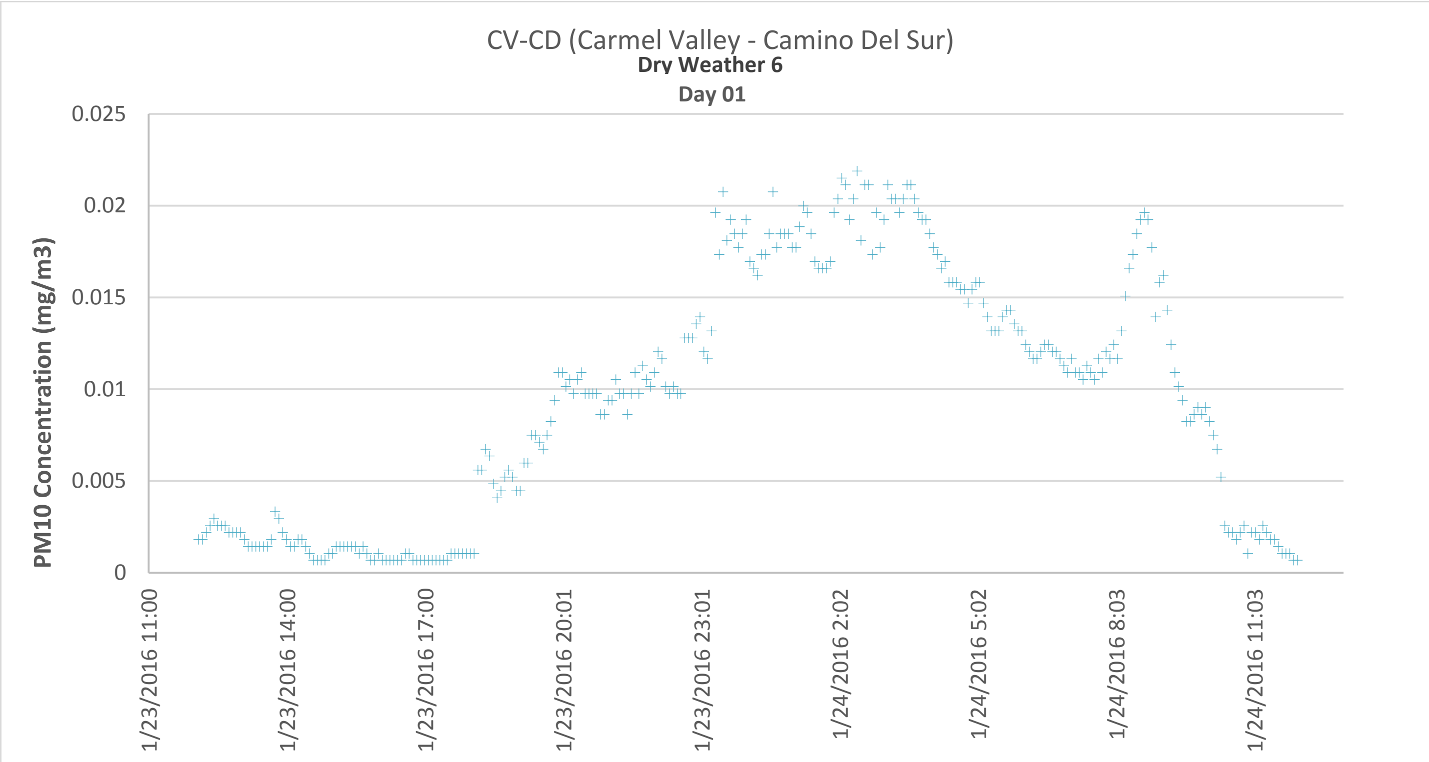
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – CV-CD Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the W. Peak Optical monitor readings were observed during sundown.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – CV-CD Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the WNW, NE, and NNWE. Peak Optical monitor readings were observed during sundown.

Graphical representations of this data are presented in Figures 3-91 through 3-93.



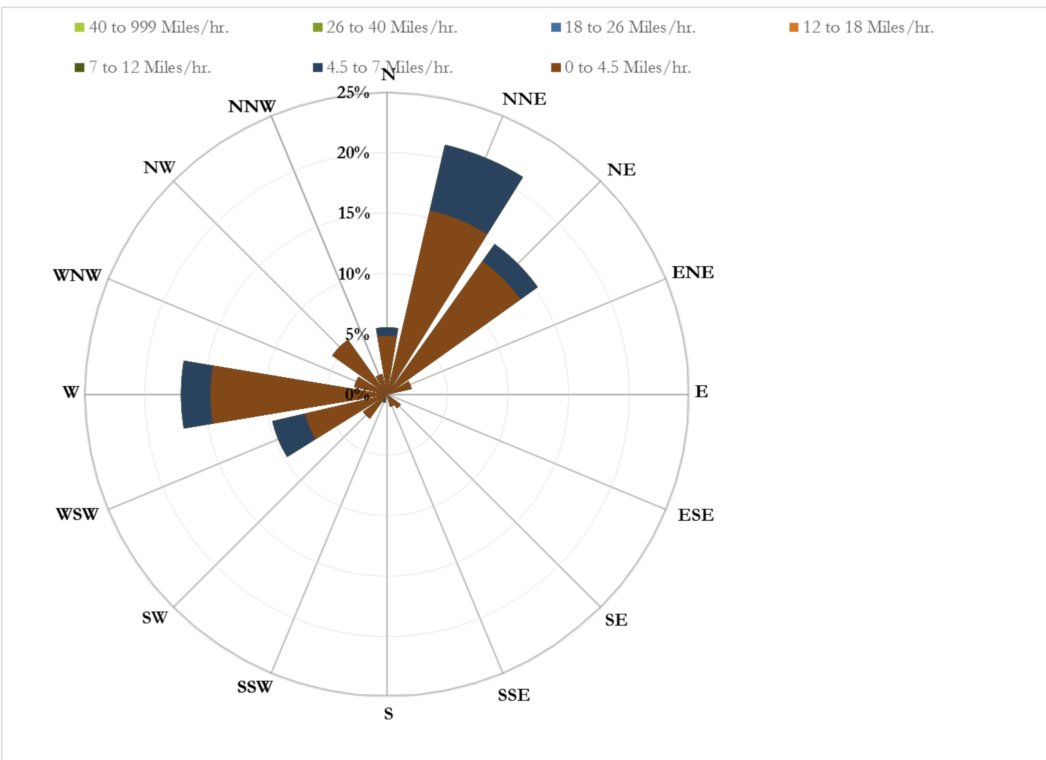
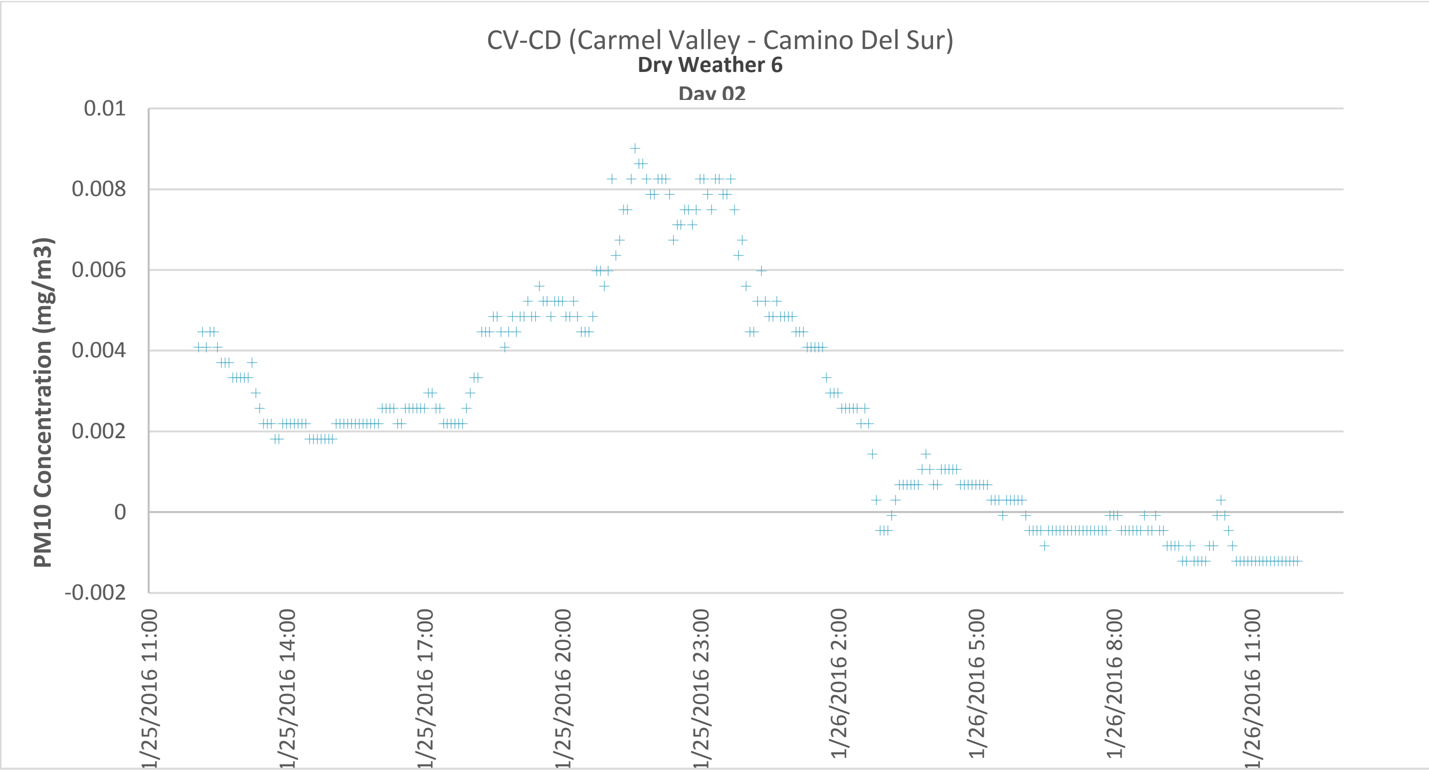


Figure 3-91.
CV-CD PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



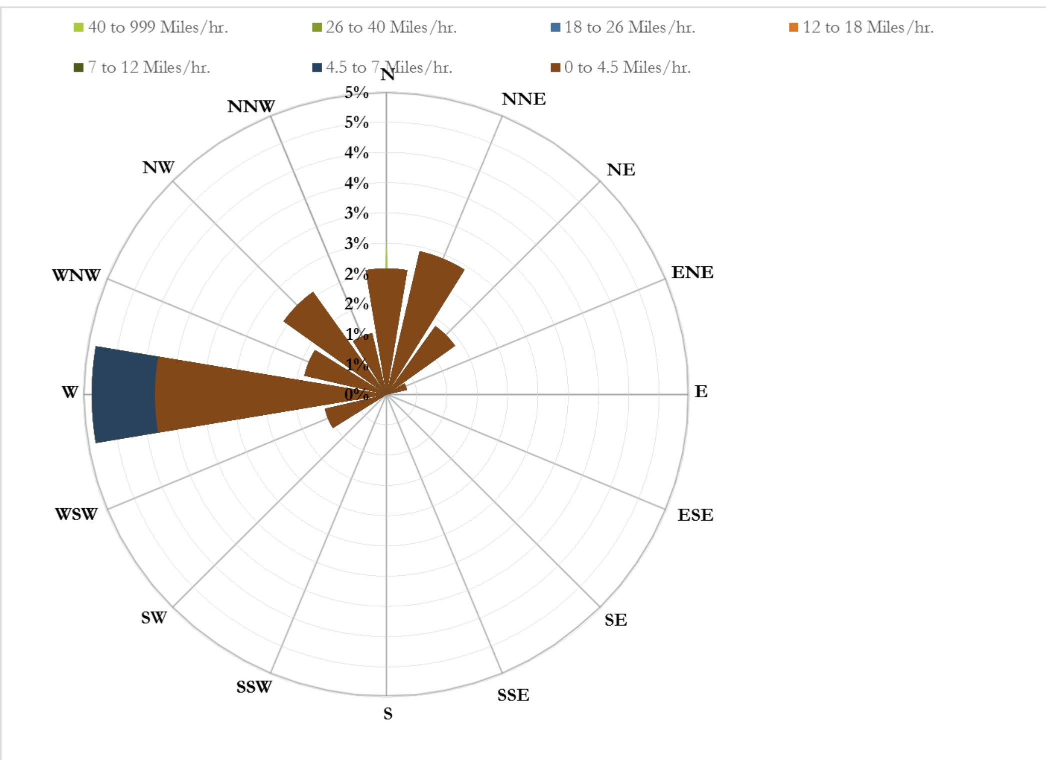
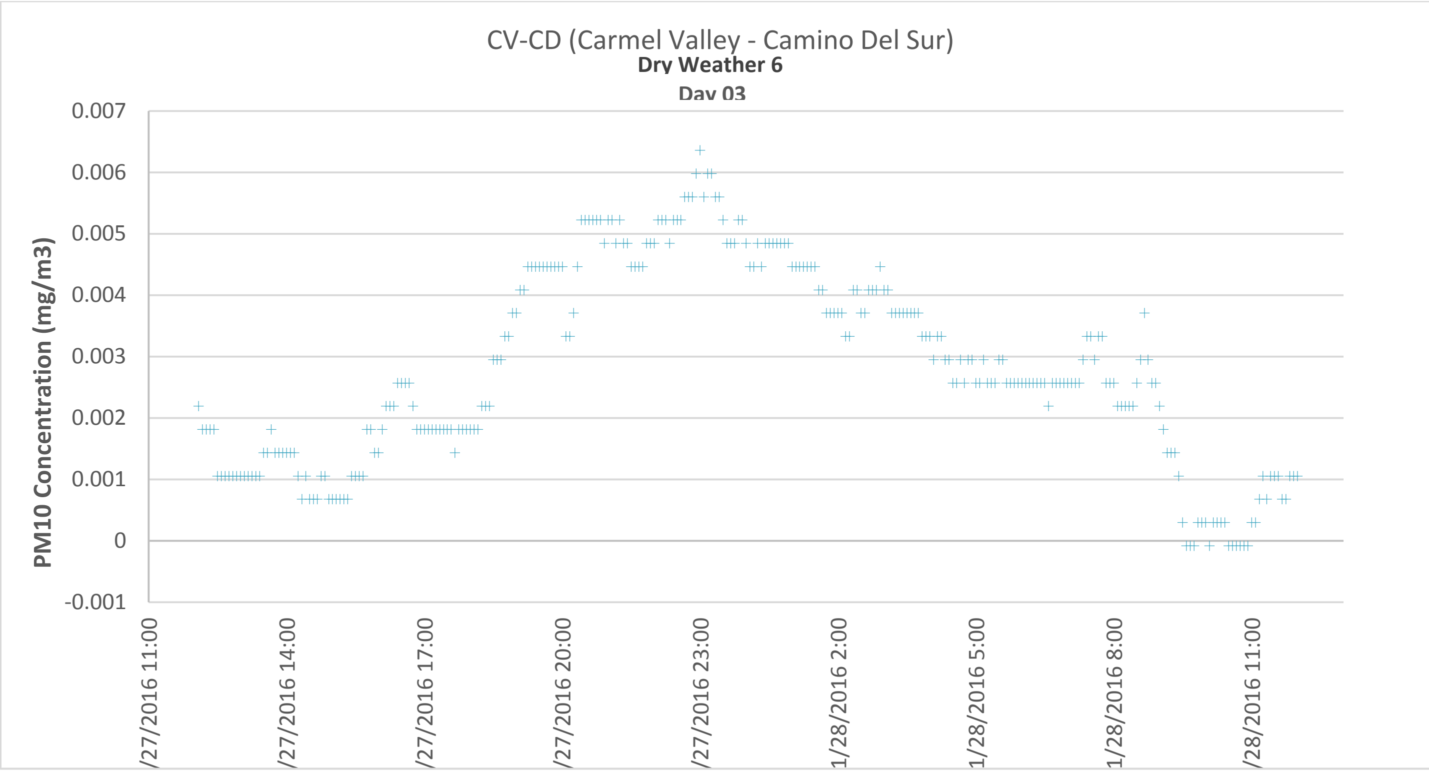


Figure 3-92.
CV-CD PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



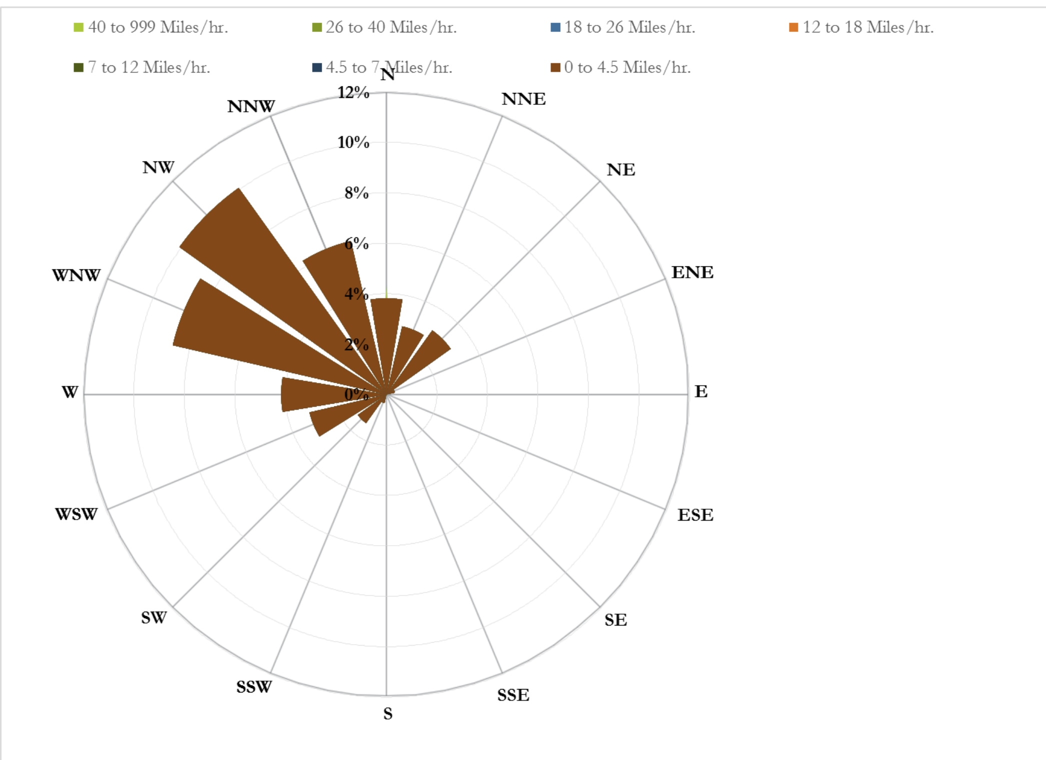


Figure 3-93.
CV-CD PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.10 LP-PO (Los Peñasquitos – Poway)

LP-PO (Los Peñasquitos – Poway):

CV-CD is a site monitored during the Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 824 measurements were determined to be valid (95%).
- Mean values for PM_{10} were 0.0051 mg/m^3.
- Mean standard deviation is $\pm$0.0036 mg/m^3

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 1 – LP-PO Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind direction were observed primarily from the NW. Peak Optical monitor readings were observed during the early afternoon and periods of increased traffic in the morning.

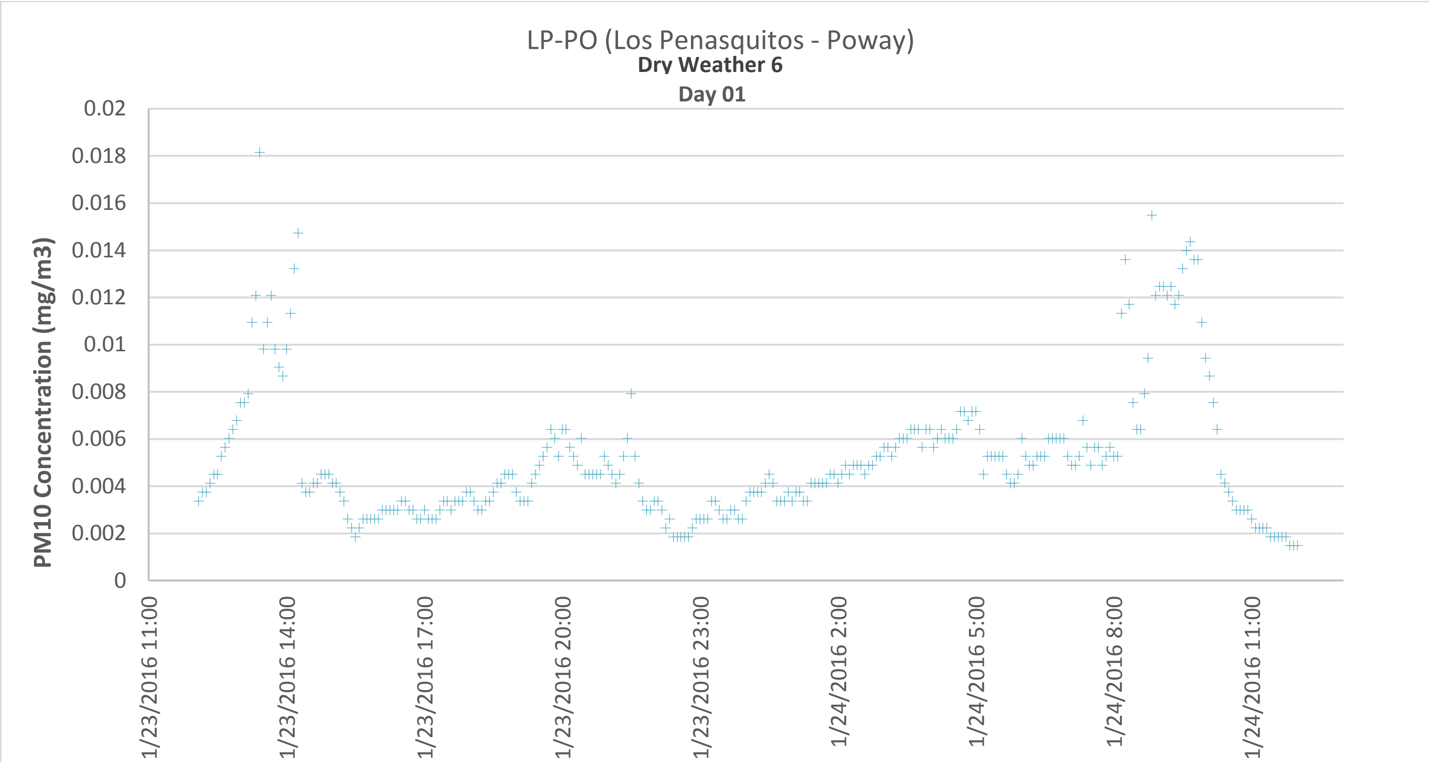
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 2 – LP-PO Optical readings were observed at a higher mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW. Peak Optical monitor readings were observed before midnight.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 3 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the NW and WNW. Peak Optical monitor readings were observed before midnight.

Graphical representations of this data are presented in Figures 3-94 through 3-96.



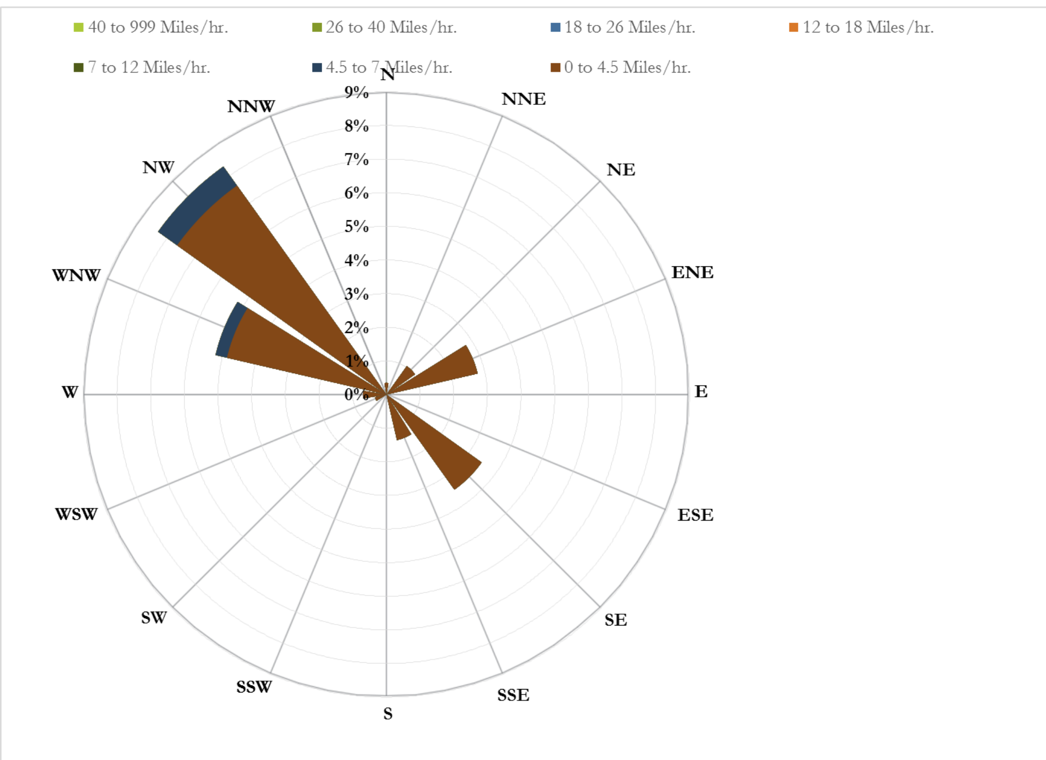
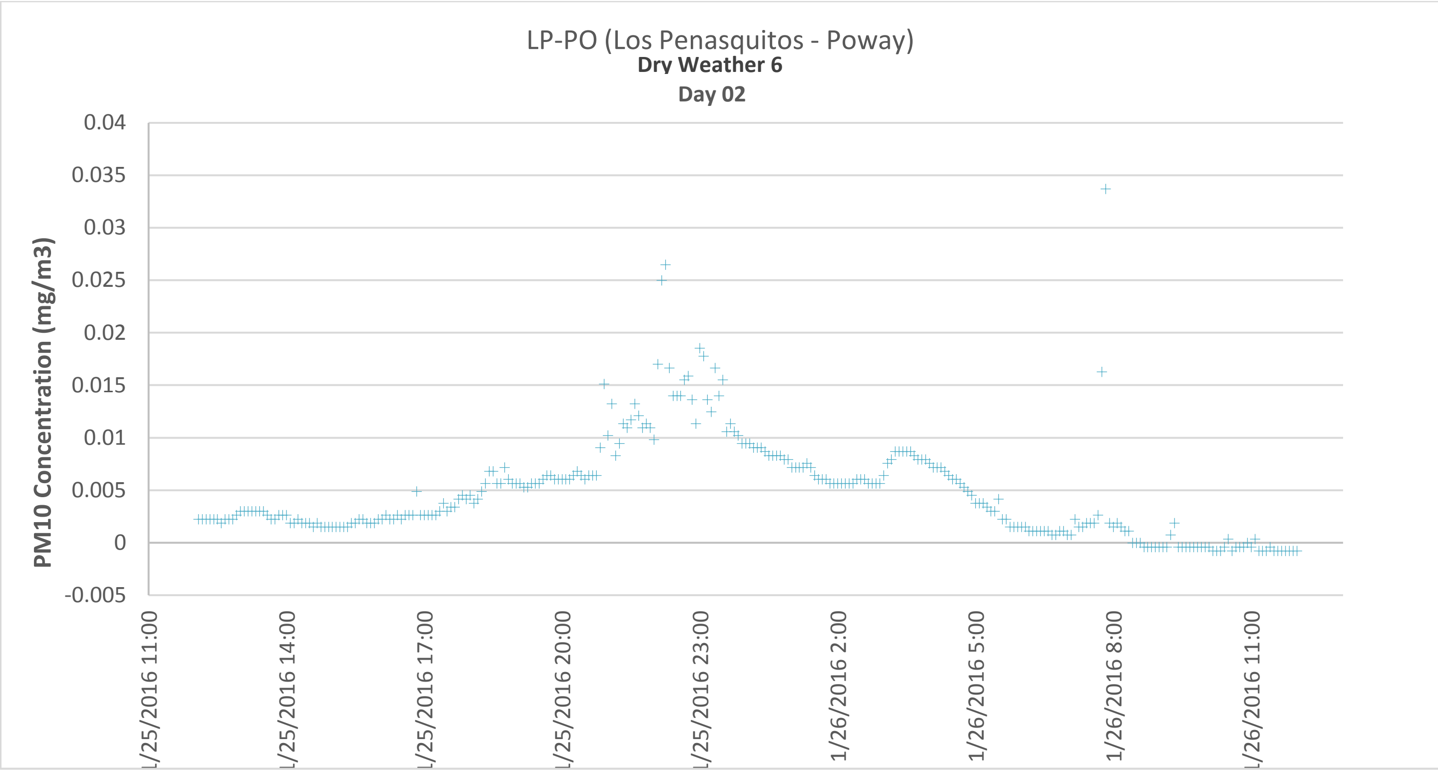


Figure 3-94.
LP-PO PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



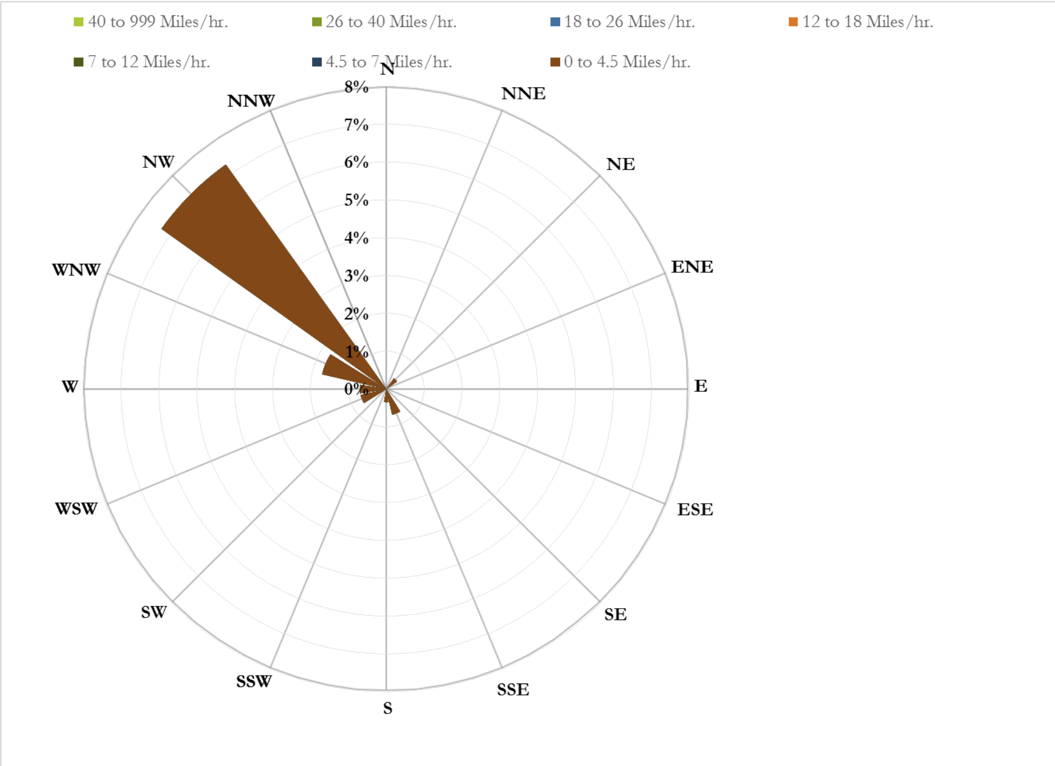
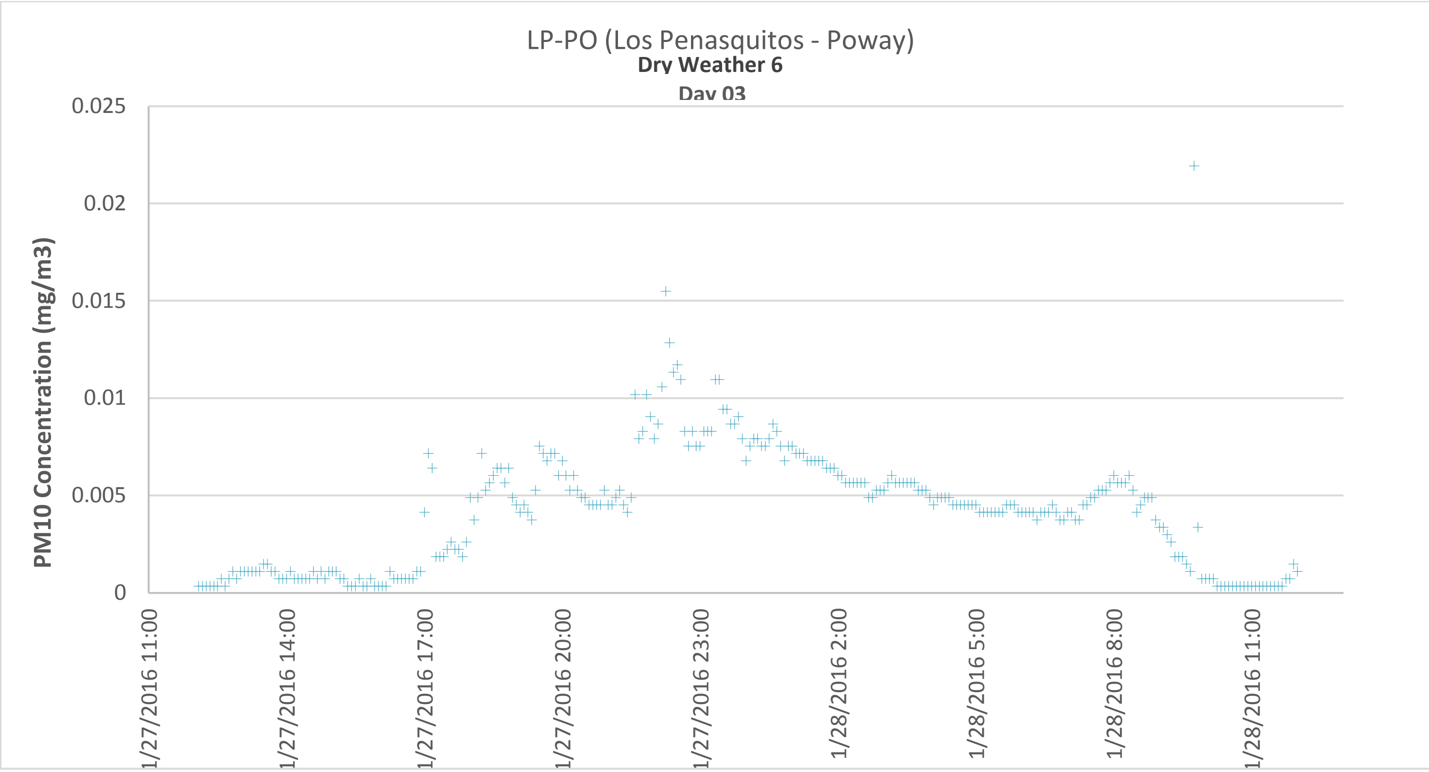


Figure 3-95.
LP-PO PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



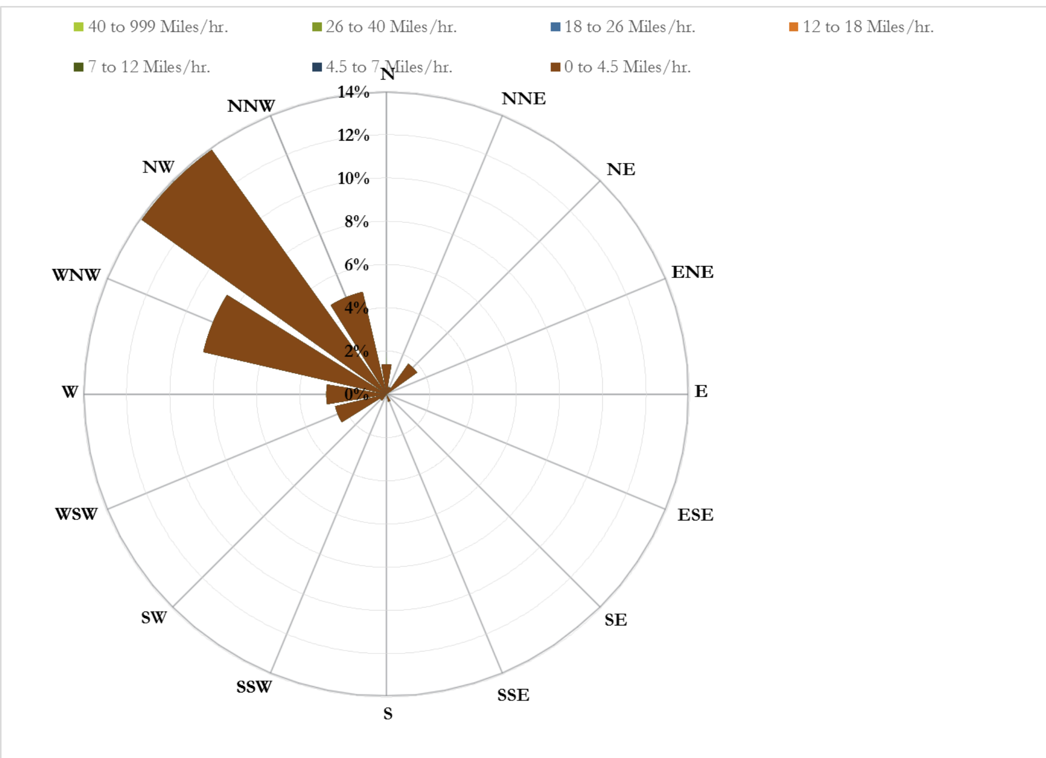


Figure 3-96.
LP-PO PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.2.3.11 LP-PR (Los Peñasquitos – Preserve)

LP-PR (Los Peñasquitos – Preserve):

LP-PR is a site monitored during the Phase II Watershed Special Study and contains an Optical monitor only.

Optical monitor (Continuous Concentration) Results:

- 864 measurements were obtained during the reporting period.
- 853 measurements were determined to be valid (99%).
- Mean values for PM_{10} were 0.0028 mg/m^3.
- Mean standard deviation is $\pm$0.0008 mg/m^3

Day 1 (Saturday, 1/23/16 – Sunday, 1/24/16)

Day 4 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind direction were observed primarily from the W, WSW, NE and NNE. Optical readings were distributed consistently with a slight rise observed after sunrise.

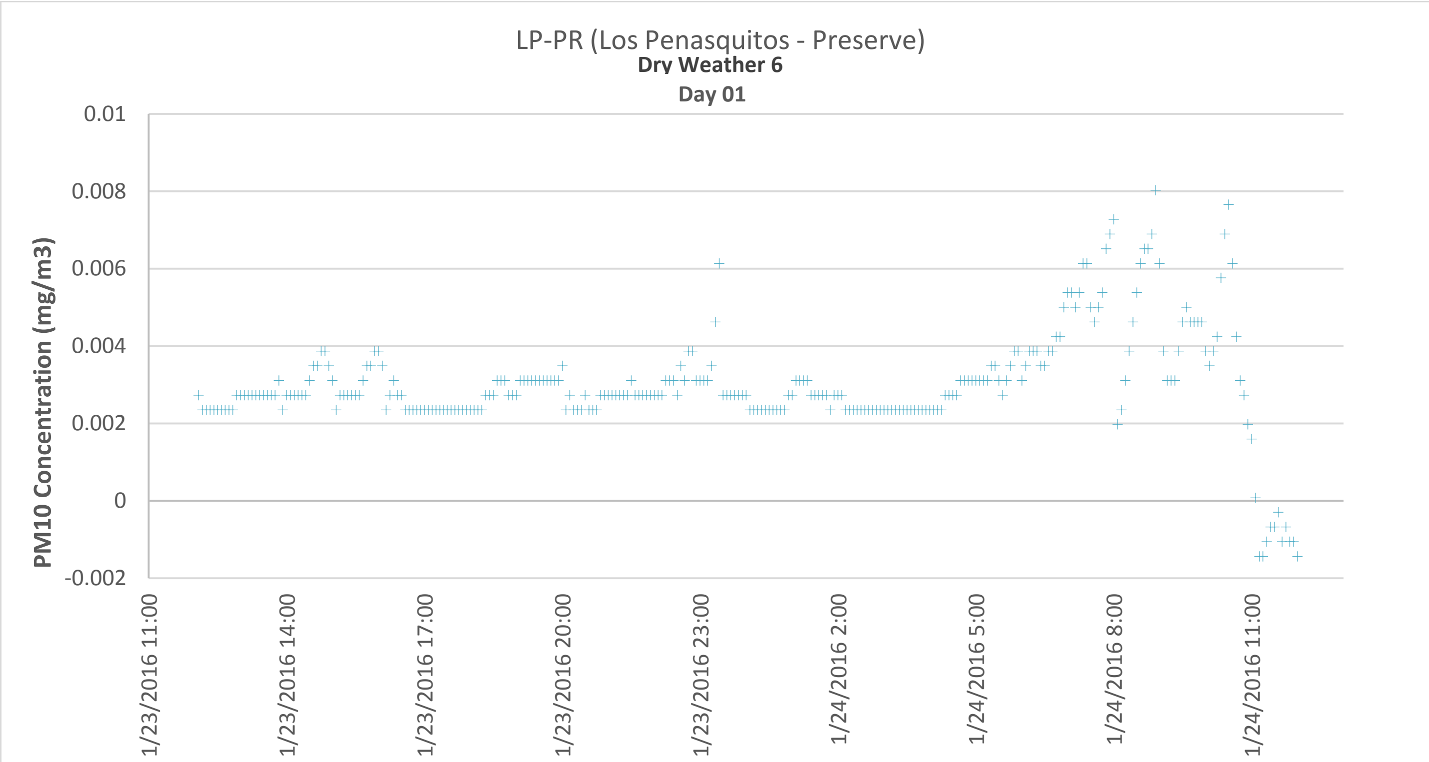
Day 2 (Monday, 1/25/16 Tuesday, 1/26/16)

Day 5 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the W. Optical readings were distributed consistently with a slight rise observed around midnight.

Day 3 (Wednesday, 1/27/16 – Thursday, 1/28/16)

Day 6 – LP-PO Optical readings were observed at a lower mean value than the overall mean for sampling event Dry Weather 6. Wind directions were observed primarily from the WNW, NW and NNW. Optical readings were distributed consistently with a slight rise observed around midnight.

Graphical representations of this data are presented in Figures 3-97 through 3-99.



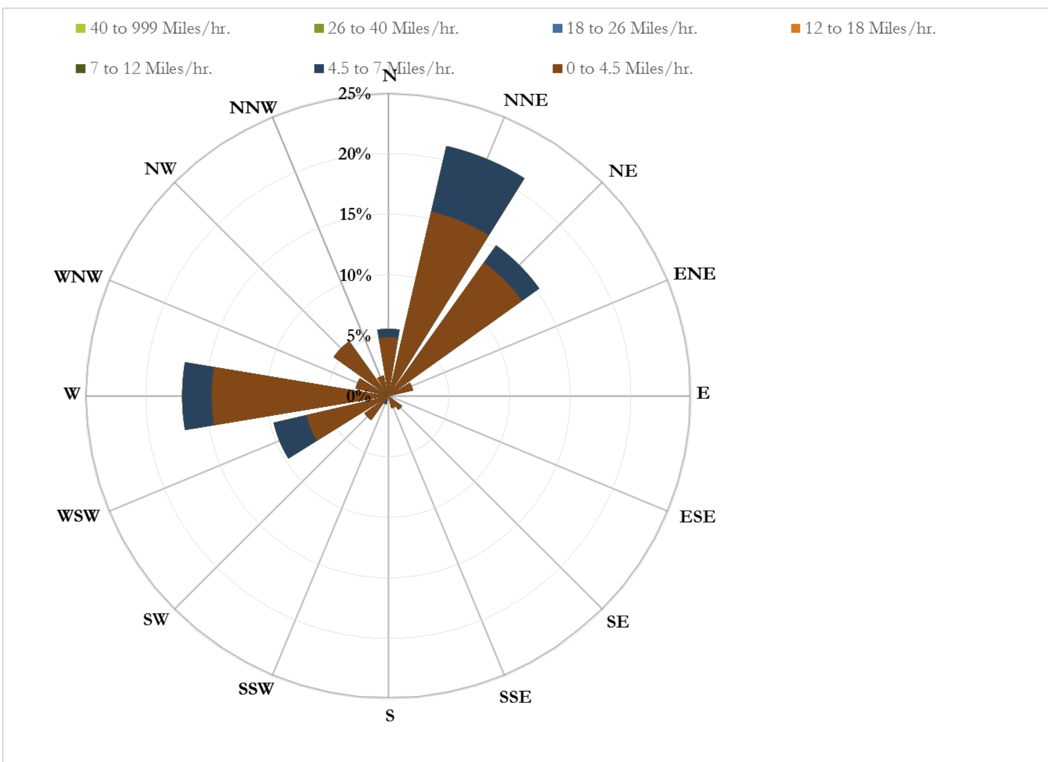
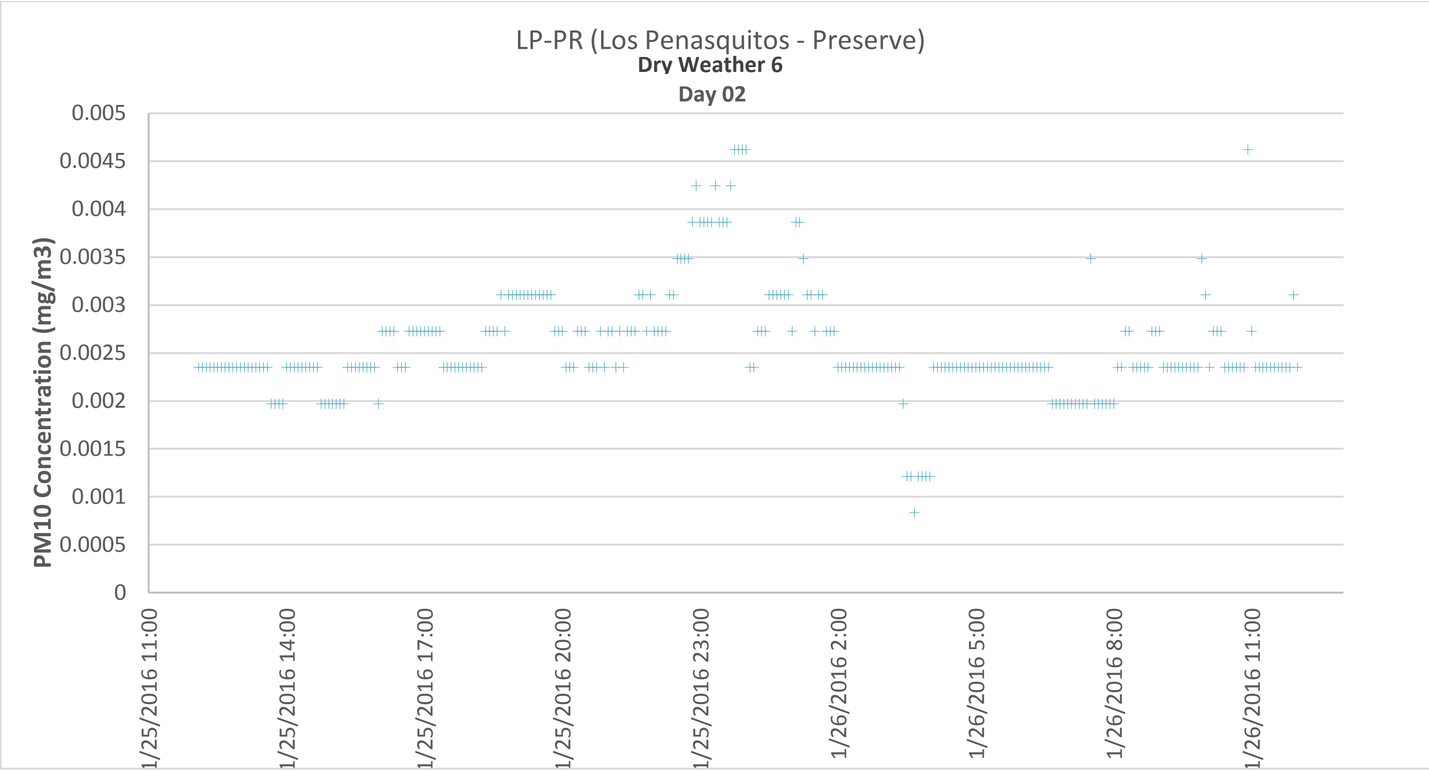


Figure 3-97.
LP-PR PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 1



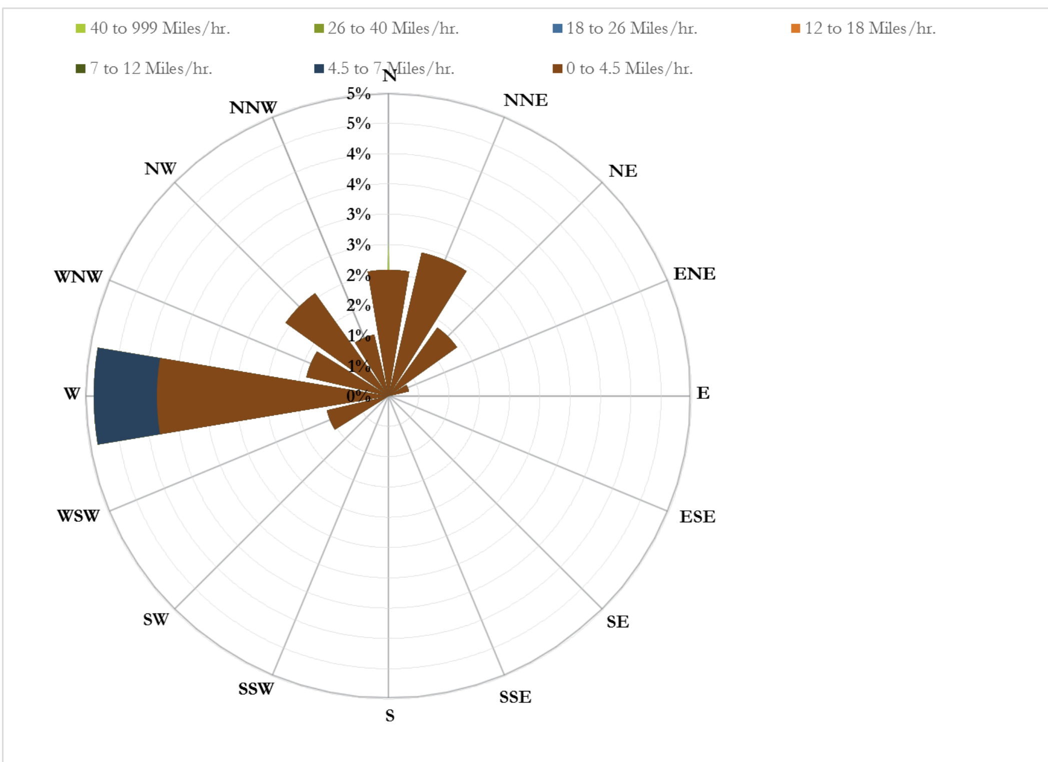
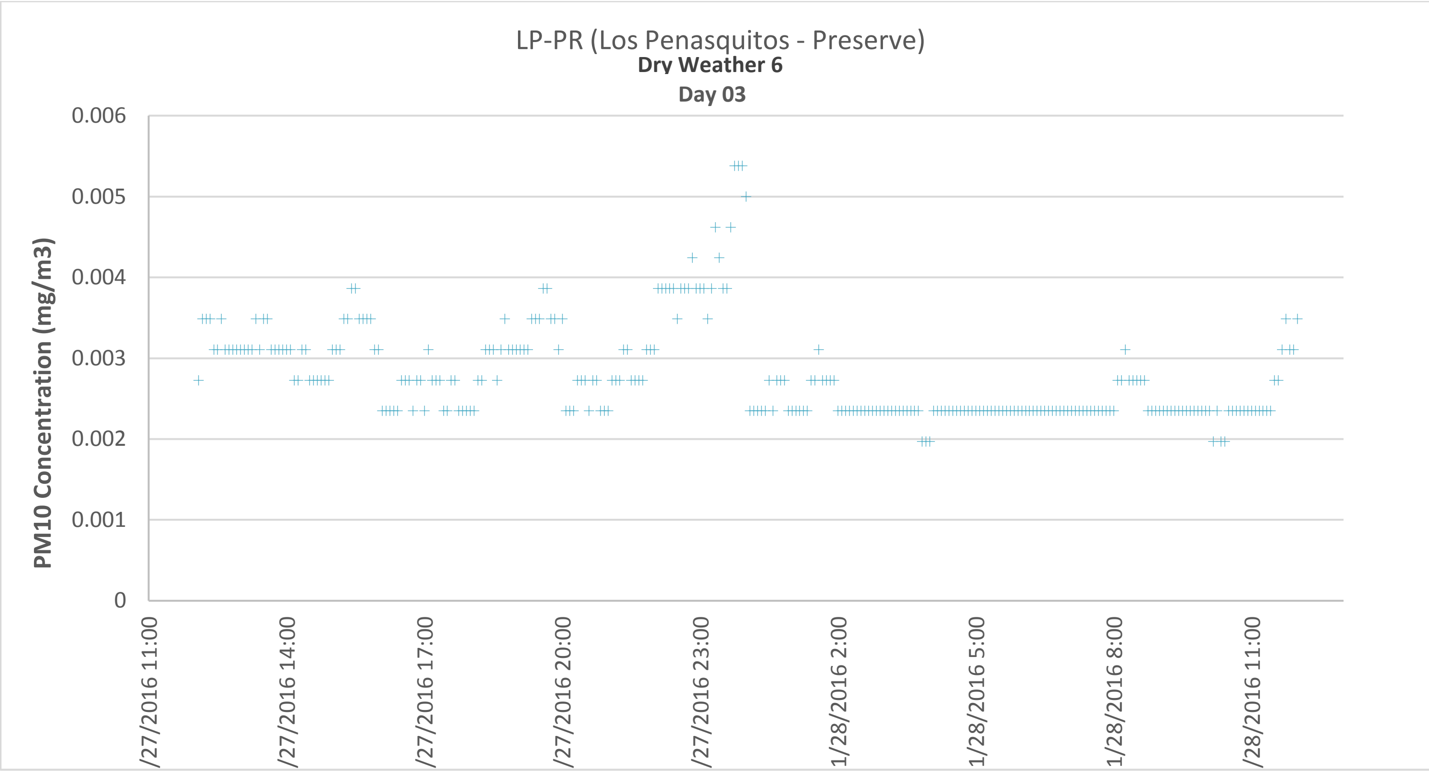


Figure 3-98.
LP-PR PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 2



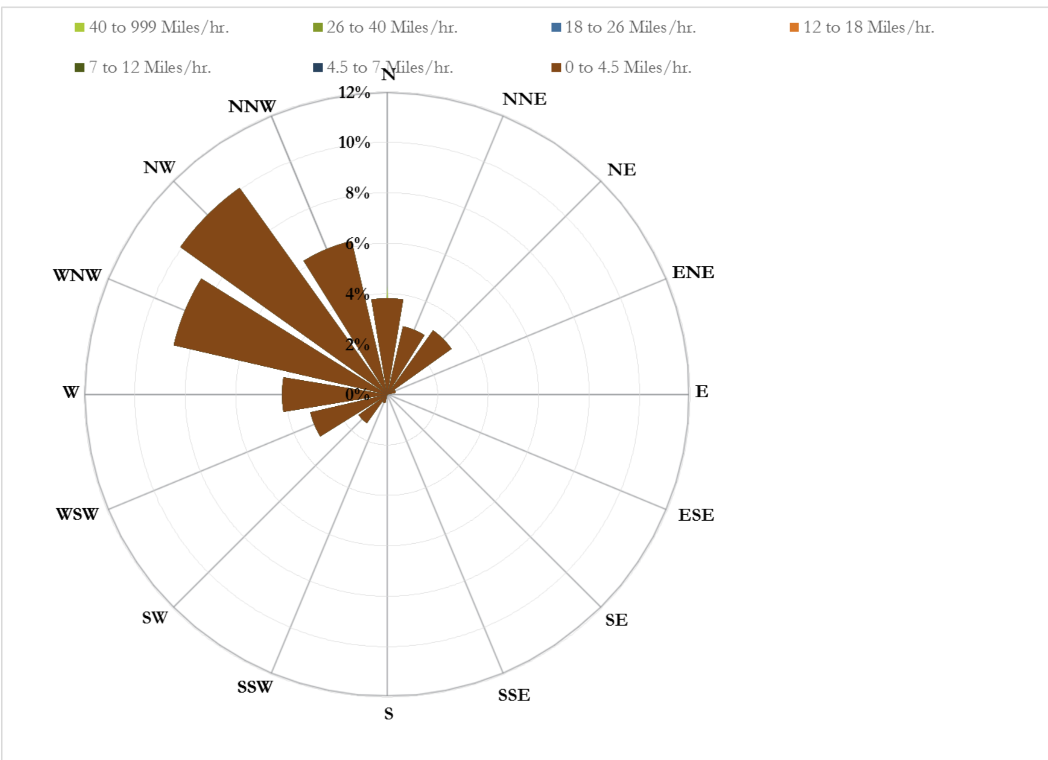


Figure 3-99.
LP-PR PM_{10} Concentrations and Wind Rose, Dry Weather 6 – Day 3

3.3 SAMPLING EQUIPMENT PROBLEMS AND MITIGATION

This section presents problems occurred during the monitoring effort and mitigation efforts performed to prevent future problems. To preserve the integrity of the data, the proper application, handling, calibration and use of the sampling equipment was adhered to at all times. This section describes the typical errors encountered and what solutions, as applicable, mitigated the errors.

Optical monitor

- Values were negative.

Mitigation Solution: The Optical monitor was zero-calibrated prior to every 24-hour monitoring period to curb zero drift. After zero-calibration, a short test was run to verify validity readings. If readings were still negative, additional zero-calibration and/or cleaning was performed. An additional auto-zero module was utilized to zero-calibrate the meter every four hours throughout the monitoring periods.

- A flow error was found.

Mitigation Solution: Before sampling, the filter fitting with the impactor plate and the tubing to the inlet port was checked to ensure that it was properly seated and sealed, and would not pinch or cause an obstruction of flow upon closure of the security case. Additionally, the battery leads to the meter from the power source were confirmed to be in good condition and making proper contact without slip in order to maintain the meter and pump operation.

FRM Sampler:

- Filter was mishandled or poorly protected.

Mitigation Solution: Proper gloves were worn to ensure that residual contaminants did not interact with the filter. All filters were handled as minimally as possible: either by sliding the filter from its pouch into the filter disk without any direct handling by the user, or by using decontaminated forceps. After sampling, filters were placed immediately in their original labeled pouch by the same methods and secured in a Ziplock™ bag surrounded by bubble wrap for transportation to the laboratory.

- Maximum Load Exceeded

Mitigation Solution: Prepare filter setup according to manufacturer's specifications. Make sure equipment is operable and the pump is functioning properly with test prior to execution.

- Program failure

Mitigation Solution: Double check programming and make sure battery power is sufficient for test run.

Table 3-6 describes the errors identified each monitoring location and the related weather events for this reporting period.

Table 3-6.
Sampling Equipment Errors

Site Name	Sampling Event	Day	Description
CC-DW (Carroll Canyon–Downwind)	Dry Weather 4*	Day 1	Maximum Loading Error – FRM Equipment Failure.
CC-DM (Reference–Del Mar)	Dry Weather 4*	Day 2	FRM program did not launch
CC-UP (Carroll Canyon–Upwind)	Dry Weather 4*	Day 3	Maximum Loading Error – FRM Equipment Failure.
CC-UP (Carroll Canyon–Downwind)	Dry Weather 4*	Day 3	Maximum Loading Error – FRM Equipment Failure.
CC-DM (Reference–Del Mar)	Dry Weather 4*	Day 3	Flow Error
CC-SF (Carroll Canyon – Camino Santa Fe)	Dry Weather 5	Day 1	>25% Values Negative
CC-SF (Carroll Canyon – Camino Santa Fe)	Dry Weather 5	Day 3	>25% Values Negative

*Dry Weather 4, Day 1 through 3 data was discarded and is not presented in this report due to multiple FRM equipment failures. This equipment was replaced for days 4 through 6.

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4.0 CONCLUSIONS

No Significant Effects. Based on the results of aerial deposition monitoring, the contribution of airborne particles to the sediment loads in the WMA subwatersheds is not significant. Optical values were generally low and negligible with marginal increases around anthropogenic disturbances, particularly in the Carroll Canyon subwatershed.

FRM and Optical Monitoring Results. For Optical monitor measurements only, higher values were observed at monitoring locations CC-DM, CC-DW, CC-ER, CC-MP, and CC-UP. All of these locations with the exception of CC-DM are located in Carroll Canyon. The highest mean Optical concentrations were observed at CC-DW and CC-DM, with mean values for total optical at 0.0090 and 0.0082 mg/m^3 respectively. High Optical monitor concentrations from the CC-DM (Del Mar) station could be the result of its proximity to the ocean, with the potential effect of higher relative humidity with low wind speeds (Zogou et al., 2012).

FRM values, when applicable, do not directly correlate with the optical values as, by example, CC-DW had the highest mean Optical value and the lowest mean FRM value through the entire study. In general, FRM mean values were similar and at very low detections based off individual monitoring locations.

Additional evaluations show that sampling event Dry Weather 5, conducted 1/18/2016 through 1/21/2016, had the highest Optical monitor values of all three sampling events. Continuing evaluation between the sampling methods, FRM values did not directly correlate with these readings as FRM values were observed at the lowest values for all three sampling events during this sampling event.

During sampling event Dry Weather 4, day 6, at CC-UP (Carroll Canyon – Upwind), FRM sampler results indicated a concentration of an order of magnitude higher than all other sampling period results at 0.2163 mg/m^3. Optical monitor measurements did not reflect any irregular concentration spikes.

FRM and Optical Monitor Comparisons. FRM samplers produce an air pollutant concentration in parts per million by volume after measuring total flow compensated by barometric pressure and temperature. Optical monitors produce instantaneous direct-read concentrations that can be averaged over time to produce 24-hour mean concentrations.

Gravimetric results from the FRM sampler were higher than the average Optical monitor concentrations, with RPDs ranging from 71.69 to 135.30 percent. On an event by event and site by site basis, RPDs were seem to be fairly consistent with each other. For all sampling events, the mean RPD was 108.44%. Sampling event Dry Weather 5 showed significantly lower FRM values than Dry Weather 4 and 6, yet had the highest standard deviation of all three sampling events.

Optical Direct-Read Concentration Trends. Typical Optical monitor data trends showed increased concentrations during hours with potentially high relative humidity (17:00 to 09:00), and with peaks consistent with increased vehicular traffic, especially during the morning commute

(06:00 to 10:00). More variability in the data trends was observed during events with increased average wind speeds relative to the typical base range of 0.0 – 4.5 miles per hour.

5.0 REFERENCES

40 Code of Federal Regulations (CFR) Part 50, *National Ambient Air Quality Standards for Particulate Matter.*

Amec Foster Wheeler. 2015. *Los Peñasquitos Watershed Management Area Sediment Load Special Study Final Monitoring Plan. June, 2015.*

Chung et.al. 2001. "Comparison of Real-Time Instruments Used To Monitor Airborne Particulate Matter*." Journal of the Air & Waste Management Association* 51:1, 109-120*.*

United Sates Environmental Protection Agency (USEPA). 2008. *Quality Assurance Handbook for Air Pollution Measurement Systems,* Volume II, Ambient Air Quality Monitoring Program. EPA-454/B-08-003.

Wallace, Lance et al. 2011. *Validation of Continuous Particle Monitors for Personal, Indoor and Outdoor Exposures.*

Zogou, O. et al. 2012. University of Thessaly. "Analysis of Data from Ambient PM_{10} Concentration Monitoring in Volos in the Period 2005–2010." *American Journal of Environmental Engineering 2012*, 2(4): 97-108.

Attachment H – CEDEN Certification Statements

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The files listed in Table H-1 were uploaded to CEDEN. Confirmation emails are included on the following pages.

Table H-1
Los Peñasquitos WMA CEDEN Files and Upload Dates

Monitoring Program	Copermittee	Results Type	File Name(s)	CEDEN Project Name Field Name "ProjectCode"	CEDEN Upload Date	Confirmation Email in Folder?
Wet Weather MS4 Outfall	Cities of Del Mar and San Diego	Chemistry Results	LPC_MS4_WW_2015_2016-CHEM2.xls	MS4_WW_OFM	1/27/2017	Yes
	City of Poway	Chemistry Results	LPC_MS4_WW_2015_2016-CHEM1.xls	MS4_WW_OFM	1/27/2017	Yes
	Cities of Del Mar, Poway, and San Diego	Bacteria Results	SanDieguito_LosPen_WW_2015-2016-BACT.xls	MS4_WW_OFM	1/27/2017	Yes
	Cities of Del Mar, Poway, and San Diego	Field Results	LPC_MS4_WW_2015_2016-Field.xls	MS4_WW_OFM	1/27/2017	Yes
Dry Weather MS4 Outfall	City of Del Mar	Chemistry Results	LP_DelMar_CEDEN_Chem_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
		Field Results	LP_DelMar_CEDEN_Field_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
	City of Poway	Chemistry Results	LP_Poway_CEDEN_Chem_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
		Field Results	LP_Poway_CEDEN_Field_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
	City of San Diego	Chemistry Results	Los Pen CEDEN CSD Chem DW Template.xls	MS4_DW_OFSM	1/25/2017	Yes
		Field Results	Los Pen CEDEN CSD Field DW Template.xls	MS4_DW_OFSM	1/25/2017	Yes
Bacteria TMDL	Cities of Del Mar, Poway, and San Diego	Chemistry Results	CEDEN EDD_2015-16_ChemResults_LosPen.xlsx	LosPen_BacteriaTMDL	1/9/2017	Yes
		Field Results	CEDEN EDD_2015-16_FieldResults_LosPen.xlsx	LosPen_BacteriaTMDL	1/9/2017	Yes
Sediment TMDL	Cities of Del Mar, Poway, and San Diego	Chemistry Results	LP_TMDLcompliance_2015-2016_Chem.xls	LP_Sediment_TMDL	1/26/2017	Yes
Sediment Special Study	Cities of Del Mar, Poway, and San Diego	Chemistry Results	LP_TMDLspecialstudy_2015-2016_Chem.xls	LP_Special_Study	1/26/2017	Yes

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Jeltema, Stephen

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Friday, January 27, 2017 3:38 PM
To: Jeltema, Stephen
Subject: Submittal confirmation for file LPC_MS4_WW_2015_2016-CHEM2.xls.

You have successfully submitted file LPC_MS4_WW_2015_2016-CHEM2.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Stephen Jeltema

Jeltema, Stephen

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Friday, January 27, 2017 3:37 PM
To: Jeltema, Stephen
Subject: Submittal confirmation for file LPC_MS4_WW_2015_2016-CHEM1.xls.

You have successfully submitted file LPC_MS4_WW_2015_2016-CHEM1.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Stephen Jeltema Amec Foster Wheeler
8585147756

Jeltema, Stephen

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Friday, January 27, 2017 3:42 PM
To: Jeltema, Stephen
Subject: Submittal confirmation for file SanDieguito_LosPen_WW_2015-2016-BACT.xls.

You have successfully submitted file SanDieguito_LosPen_WW_2015-2016-BACT.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Stephen Jeltema Amec Foster Wheeler
8585147756

Jeltema, Stephen

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Friday, January 27, 2017 3:39 PM
To: Jeltema, Stephen
Subject: Submittal confirmation for file LPC_MS4_WW_2015_2016-Field.xls.

You have successfully submitted file LPC_MS4_WW_2015_2016-Field.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Stephen Jeltema Amec Foster Wheeler
8585147756

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 12:22 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file LP_DelMar_CEDEN_Chem_Final.xls.

You have successfully submitted file LP_DelMar_CEDEN_Chem_Final.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 12:23 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file LP_DelMar_CEDEN_Field_Final.xls.

You have successfully submitted file LP_DelMar_CEDEN_Field_Final.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 12:52 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file LP_Poway_CEDEN_Chem_Final.xls.

You have successfully submitted file LP_Poway_CEDEN_Chem_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 12:57 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file LP_Poway_CEDEN_Field_Final.xls.

You have successfully submitted file LP_Poway_CEDEN_Field_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 12:11 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file Los Pen CEDEN CSD Chem DW Template.xls.

You have successfully submitted file Los Pen CEDEN CSD Chem DW Template.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 12:14 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file Los Pen CEDEN CSD Field DW Template.xls.

You have successfully submitted file Los Pen CEDEN CSD Field DW Template.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

Johnson, Claire (EI West US)

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Monday, January 09, 2017 2:37 PM
To: Ebentier, Darcy
Subject: Submittal confirmation for file CEDEN EDD_2015-16_ChemResults_LosPen.xlsx.

You have successfully submitted file CEDEN EDD_2015-16_ChemResults_LosPen.xlsx to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Darcy Ebentier darcy.ebentier@amecfw.com

Johnson, Claire (EI West US)

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Monday, January 09, 2017 2:38 PM
To: Ebentier, Darcy
Subject: Submittal confirmation for file CEDEN EDD_2015-16_FieldResults_LosPen.xlsx.

You have successfully submitted file CEDEN EDD_2015-16_FieldResults_LosPen.xlsx to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Darcy Ebentier darcy.ebentier@amecfw.com

Jeltema, Stephen

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Thursday, January 26, 2017 2:41 PM
To: Jeltema, Stephen
Subject: Submittal confirmation for file LP_TMDLcompliance_2015-2016_Chem.xls.

You have successfully submitted file LP_TMDLcompliance_2015-2016_Chem.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Stephen Jeltema Amec Foster Wheeler
8585147756

Jeltema, Stephen

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Thursday, January 26, 2017 2:42 PM
To: Jeltema, Stephen
Subject: Submittal confirmation for file LP_TMDLspecialStudy_2015-2016_Chem.xls.

You have successfully submitted file LP_TMDLspecialStudy_2015-2016_Chem.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Stephen Jeltema Amec Foster Wheeler
8585147756

Appendix D: Jurisdictional Runoff Management Program (JRMP) Annual Report Forms, Fiscal Analysis, Certifications, Updates to JRMPs, WQIP, and BMP Design Manuals (if applicable), and Jurisdictional Strategies

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Jurisdictional strategies are required as part of the Water Quality Improvement Plan (WQIP), under Provision B of the San Diego Regional Water Quality Control Board (Regional Board) National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region, Order Number R9-2013-0001 (MS4 Permit). The Responsible Agencies (RAs) identified water quality improvement strategies outlined in the WQIP and implemented those strategies in fiscal year (FY) 16, the first year of WQIP implementation, to address the highest priority water quality conditions (HPWQCs). The strategies were selected on the basis of their ability to effectively and efficiently eliminate non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the maximum extent practicable, and achieve the interim and final numeric goals identified in the Los Peñasquitos Watershed Management Area (WMA) WQIP.

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D.1 City of Del Mar

D.1.1 Annual Report Certifications

The City of Del Mar's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.1.2 Annual Report Form

Del Mar's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

City of Del Mar

STATEMENT OF CERTIFICATION

Los Peñasquitos Water Quality Improvement Plan 2015-2016 Annual Report

And

Legal Authority Establishment and Enforcement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (40 C.F.R. 122.22(d)).

Further, I certify under penalty of law that the City of Del Mar has taken necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in section E.1 of the San Diego Regional Water Quality Control Board Order No. R9-2013-0001 as amended by Order No. R9-2015-0100 (Municipal Permit). The Del Mar Municipal Code (DMMC), including the following provisions, provides the City with full legal authority as required by the Municipal Permit as well as authorizes judicial and administrative enforcement procedures to mandate compliance:

1. Stormwater Management and Discharge Control, DMMC Section 11.30
2. Clean Water Storm Drain Program – General, DMMC Section 11.32

Scott Huth
City Manager

1/13/2017
Date

1050 Camino Del Mar, Del Mar, California 92014-2698. Telephone: (858) 755-9313 Fax: (858) 755-2794
www.delmar.ca.us

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
CITY OF DEL MAR – ANNUAL REPORT FORM
FY 2015-2016

I. COPERMITTEE INFORMATION

Copermittee Name: City of Del Mar – Los Peñasquitos

Copermittee Primary Contact Name: Mikhail Ogawa

Copermittee Primary Contact Information:
Address: 1050 Camino Del Mar
City: Del Mar County: San Diego State: CA Zip: 92014
Telephone: (858) 755-9313 Fax: (858) 755-2794 Email: Mikhail@mogawaeng.com

II. LEGAL AUTHORITY

Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☒ ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES[1] NO	☒ ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☒ ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES[2] NO	☒ ☐

Number of non-storm water discharges reported by the public	3
Number of non-storm water discharges detected by Copermittee staff or contractors	2
Number of non-storm water discharges investigated by the Copermittee	5
Number of sources of non-storm water discharges identified	5
Number of non-storm water discharges eliminated	5
Number of sources of illicit discharges or connections identified	2
Number of illicit discharges or connections eliminated	2
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

V. DEVELOPMENT PLANNING PROGRAM

Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	☒ ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☒ ☐

Number of proposed development projects in review	11
Number of Priority Development Projects in review	0
Number of Priority Development Projects approved	0
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	0

Number of completed Priority Development Projects in inventory	1
Number of high priority Priority Development Project structural BMP inspections	11
Number of Priority Development Project structural BMP violations	0
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

Number of construction sites in inventory	10
Number of active construction sites in inventory	6
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	4
Number of construction site inspections	72
Number of construction site violations	4
Number of enforcement actions issued	4
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	1	1	0	12
Number of existing development inspections	11	11	0	132
Number of follow-up inspections	0	0	0	0
Number of violations	0	0	0	4
Number of enforcement actions issued	0	0	0	4
Number of escalated enforcement actions issued	0	0	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES ☒ NO[2] ☐

X. CERTIFICATION

I ☒ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Scott W. Huth

Signature

1/9/2017

Date

Scott Huth

Print Name

City Manager

Title

858-755-9313

Telephone Number

Citymanager@delmar.ca.us

Email

[1] The City of Del Mar was required to submit an updated JRMP with the WQIP and post it to the Regional Clearinghouse portal.

[2] The timeframe used for the Illicit Discharge Detection and Elimination component of this JRMP Annual Report matches the timeframe used in the WQIP Annual Report (10/1/15-9/30/16).

1. Fiscal Analysis

1.1 Jurisdictional Runoff Management Program Implementation

This section of the Jurisdictional Runoff Management Program (JRMP) Annual Report provides a fiscal analysis of the City's stormwater management programs. On May 8, 2013 the RWQCB adopted a revised Municipal Permit, Order No. R9-2013-0001, however, during this transitional period the City of Del Mar continued to develop its fiscal analysis according to Section G of the previous Municipal Permit, Order No. R9-2007-0001.

On January 29, 2009, the San Diego Municipal Copermittees adopted the "Standardized Fiscal Method and Format" which provides a model for the City of Del Mar and other Copermittees to perform the review and annual reporting as required in Order R9-2007-0001, Section G. This methodology and reporting format proved to be an effective model for reporting on City expenditures, and for consistency, the City of Del Mar will continue to use the format for this reporting period FY 2015-2016. The City, however, recognizes the additional elements required to be included in the fiscal analysis as specified in Order No. R9-2013-001 Section E.8, and has included those components in the year's report.

1.1.1 Clean Water Program Budget

The City of Del Mar's Clean Water Program is a multi-departmental program, funded as an enterprise fund in the City's Annual Budget. Enterprise funds account for operations that are financed and operated in a manner similar to private businesses, with the costs of providing the services recovered largely through user fees. Fund 55 ("The Clean Water Fund"), is one of three (3) enterprise funds in the City's budget, and was added to the City's budget in Fiscal Year 2004 to account for the mandated costs of the City's responsibilities in order to comply with the Municipal Permit. The budget for the City of Del Mar has the appropriate funds allocated to meet the requirements of Permit 2013-0001, including any development, implementation, and enforcement activities required.

The City of Del Mar Operating and Capital Improvement Budgets for Fiscal Years 2015-2016 and 2016-2017 were presented to the Del Mar City Council on June 1, 2015. The budget was formally adopted during the same meeting.

For the Fiscal Year 2015-2016 reporting period, the final amended budget for Fund 55 totaled $550,670. **Table 1-1** below provides a breakdown of program budget by major budget category for Fiscal Year 2015-2016.

Table 1-1: Budget Summary – Clean Water Fund 55

Fund Account		Adopted Budget Fiscal Year 2015-2016	Description/Comments
55-5530	Clean Water Planning	45,700	Active enforcement of clean water regulations including project plan review, permitting, construction monitoring and plan review of BMPs.
55-5536	Clean Water Code Enforcement	24,830	Active in-field enforcement of clean water regulations, including response to resident complaints.
55-5539	Clean Water Program Management	268,000	All clean water program management and reporting activities, fees to agencies, and interaction with regional and watershed Copermittee groups.
55-5840	Public Works (General)	212,140	Provides for administration and general support for all clean water programs for property and facilities, including supervision of maintenance staff.
Total Clean Water Program Budget – Fund 55		**$550,670**	–

1.1.2 Fiscal Analysis Methods

The City of Del Mar used the format and guidelines included in the Fiscal Analysis Method for reporting purposes; however, given the City's financial accounting methods, a few modifications were necessary. These adjustments are described below.

1.1.3 Fiscal Analysis Results

The City's Fiscal Year 2015-2016 jurisdictional, watershed, and regional projected expenditures for the implementation of the Municipal Permit requirements are summarized in **Table 1-2** below.

Table 1-2: Fiscal Year 2015-2016 Expenditure Summary by Program Component

Component Description	Fiscal Year 2015-2016 Projected Expenditures
Jurisdictional Component	
Administration	60,883
Development Planning	42,690
Construction	29,376
Municipal (Including Non-Emergency Fire Flows)	195,510
Industrial and Commercial	10,700
Residential, Education, and Public Participation	51,278
IDDE	37,066
Jurisdictional Total	**$427,503**
Watershed Component	
San Dieguito Watershed	47,975
Los Peñasquitos Watershed	37,275
Watershed Total	**$85,250**
Regional Component	
Total Copermittee Cost Share for Del Mar	37,918
Total Costs	**$550,670**

1.1.4 JRMP Expenditures

The City of Del Mar used the expenditure categories detailed in the Fiscal Analysis Method for jurisdictional reporting. However, due to the implementation overlap of some of the City's municipal permit components; it is difficult to separate out individual component costs. As a result, the expenditures for residential, education, and public participation are reported as one expenditure category. Additionally, since the City does not explicitly track expenditures by permit component for its budgeting purposes, in many cases estimated percentages were utilized to allocate expenditures into the appropriate municipal permit component categories.

A total of $550,670 was projected to be expended in Fiscal Year 2015-2016 for the implementation of JRMP activities. An overview of the expenditures reflected in JRMP activity component is described below.

Administration

Activities identified in this component represent labor and non-labor expenditures for materials, supplies, equipment, or tools that are not otherwise incorporated into other expenditure categories, general administrative functions (e.g., program planning, budgeting, staff supervision), and program assessment and reporting.

Development Planning

Activities identified in this component represent labor and non-labor expenditures related to issuance or oversight of permits or of plans (e.g., permit counter support, plan checks, permit or application processing), project planning and engineering (e.g. project design specifications, capital improvement projects).

Construction

Activities identified in this component represent labor and non-labor expenditures related to construction site inspections and enforcement.

Municipal

Activities identified in this component represent labor and non-labor expenditures related to maintenance inspections of streets, roads, catch basins and inlets, open channels, and the MS4, municipal facility inspections, street and parking lot sweeping, catch basins and inlets, open channels, and MS4 cleaning, and municipal BMP implementation. Since the City of Del Mar conducts all fire-fighting training outside of the City, and no non-emergency fire-fighting flows occurred during the reporting period, the City does not currently track expenditures relating to non-emergency fire-fighting flows. Any costs associated with preparing for these flows are included in the municipal component.

Industrial and Commercial

Activities identified in this component represent labor and non-labor expenditures related to evaluation and enforcement of program requirements at industrial and commercial sites or sources (e.g. routine inspections and complaint investigations).

Residential, Education, and Public Participation

Activities identified in these components represent labor and non-labor expenditures related to investigation and enforcement of residential areas or activities, staffing outreach events, development and production of outreach materials, and any expenditures associated with waste collection and recycling (e.g. household hazardous waste, used oil).

Illicit Discharge Detection and Elimination

Activities identified in this component represent labor and non-labor expenditures related to the identification and elimination of illicit discharges or connections, enforcing the City of Del Mar's storm water ordinance, and any expenditures related to monitoring programs (e.g. dry weather monitoring, coastal storm drain monitoring, special investigations, field or sampling equipment, materials and supplies).

1.1.5 Watershed Expenditures

The City of Del Mar used the expenditure categories (administration, watershed activities, cost share contribution, and other) detailed in the Fiscal Analysis Method for watershed reporting. The watershed expenditures included in this report only capture City of Del Mar expenditures and do not account for any expenditure disbursed by other Copermittees included in the watershed(s).

A total of $85,250 was projected to be expended in Fiscal Year 2015-2016 for the implementation of planned strategies for the San Dieguito and Los Peñasquitos Watersheds.

1.1.6 Regional Expenditures

The City of Del Mar utilized the expenditure categories (administration, cost share contribution, regional activities, and other) detailed in the Fiscal Analysis Method for regional reporting. The regional expenditures included in this report only capture City of Del Mar expenditures and do not account for any expenditure disbursed by other Copermittees in the region. A total of $37,918 was projected to be expended in Fiscal Year 2015-2016 for the implementation of regional activities and coordination.

1.1.7 Funding Sources

To ensure adequate funding for the Clean Water Program, the City uses a combination of user fees and general fund monies.

The City of Del Mar City Council created and adopted a user fee, called the Clean Water Fund Service Charge to offset the costs of the program. Initially, the rate was adopted to collect $100,000 of the estimated $300,000 for the program, with an escalator to achieve full cost recovery by 2009. Mid-way through the five-year schedule, on July 24, 2006, the California Supreme Court published a decision in the case of Bighorn-Desert View Water Agency v. Verjil (2006) 39 Cal. 4th 205, which held that consumption-based rates such as water and sewer rates are subject to the notice and hearing requirements of California Constitution, Article XIIID, Section 6 (commonly known as "Proposition 218"). Therefore, on January 22, 2007, and February 5, 2007, the Del Mar City Council held public hearings to receive written protests to comply with Proposition 218. No majority protest was received, and the Council ratified the previously approved five-year rate schedule, including the City's Clean Water Service Charge. However, the adopted rate increases did not account for the actual increases in the costs associated program requirements.

As an additional measure to obtain voter approval of the five-year rate schedule for the City's Clean Water Service Charge, the Council directed staff on April 2, 2007, to start the process to perform a mail ballot election procedure. During the process of researching the mail ballot election procedures and the current rates, it became apparent that the process would immediately need to be repeated to set the Fiscal Year 2010 rates and charges, since the current five-year rate schedule was due to expire in June of 2009. Due to the additional costs incurred in complying with the new requirements of the 2007 Permit, increases to the Clean Water Service Charge were proposed, including an annual rate escalator. All monies appropriated as part of the Clean Water Service Charge are directly identified for the Clean Water Program, and pursuant to law, may not be used by the City for any other purpose.

During the Fiscal Year 2009 reporting period, in compliance with Proposition 218, both the majority protest hearing and mail ballot process were conducted for the proposed increases. Both the ratification of the existing rate structure (required by Proposition 218), and the new rates, including the rate escalator, passed by more than 62%. As a result of the passage of the Clean Water Service Charge, the City will continue to have a secure funding source for the Clean Water Program, outside of general fund monies.

Based on current water allocations for the City of Del Mar, the projected revenues from the Clean Water Service Fee will be $482,700 (page 88 of city budget) for Fiscal Year 2015-2016.

D.1.3 City of Del Mar Strategies

City of Del Mar's strategies are detailed in Table D-1.

Table D-1
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
JRMP (E.2 – E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
DM-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to JRMP Section 5. As commercial/residential patrol inspections are conducted (see JRMP Section 7 – Existing Development), staff will both inspect and verify 100% of the structural BMPs within the City. These inspections occur a minimum of six times per year.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-2	Train staff on LID regulatory changes during annual stormwater training	Formal staff training implemented annually during stormwater training for staff	FY16	Continuous – Ongoing	Y	N	Y	-
DM-3	Maintain existing floor area ratio requirements to limit impervious surface areas.	Incorporate into planning phase of Land Development program implementation	FY16	Continuous – Ongoing	Y	N	Y	-
DM-4	Continue retention of native vegetation - New or redevelopment projects within the Lagoon Overlay Zone shall include the retention of the maximum amount of native vegetation on the site. Revegetation or landscaping of sites within the Lagoon Overlay Zone shall include the use of non-invasive, drought tolerant species native to the San Diego coastal region and which are compatible with adjacent wetland habitat species.	Retention of native vegetation is a requirement in the City's Municipal Code	FY16	Continuous – Ongoing	Y	N	Y	-
Priority Development Projects (PDPs)								
DM-5	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to JRMP Section 5	FY16	Continuous – Ongoing	Y	N	Y	-
DM-6	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP Section 5	FY15	Continuous – Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
E.4 Construction Management								
DM-7	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Refer to JRMP Section 6; Construction site inventory updated monthly and inspections of prioritized sites are conducted biweekly year round.	FY16	Continuous-Ongoing	Y	N	Y	-
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilitates and Areas								
DM-8	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP Section 7. . All industrial, commercial, residential, and municipal areas are inspected at least once every two months. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-8.1	Update minimum BMPs for commercial, industrial, and municipal existing development and enforce. Includes BMPs for water-using mobile businesses.	Refer to JRMP Appendix A and Attachment 1 of this WQIP for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC. .	FY16	Continuous-Ongoing; Updated as needed	Y	N	Y	-
DM-8.2	Provide BMP factsheet to water-using mobile businesses when business license is granted.	To ensure implementation of minimum BMPs for water -using mobile businesses, when a business license is granted for a water-using mobile business, a BMP factsheet is provided.	FY16	Continuous-Ongoing	Y	N	Y	
DM-8.3	Conduct property-based commercial, industrial, municipal, and residential inspections. Includes identification and addressing unmitigated incidents of power washing discharges.	Refer to JRMP Section 7. Inspections of commercial, industrial, municipal, and multifamily residential areas conducted a minimum of six times per year.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-8.4	Update municipal swimming pool discharge ordinance to ensure discharges from swimming pools meet permit requirements.	Municipal Code updated; Refer to JRMP Section 3	FY15	Continuous-Ongoing	Y	N	Y	-
DM-9	Implement pet waste program.	Implement education and prevention program. Pet waste bag dispensers and trash bins provided in public areas. Pet waste removal occurs as part of Dog Beach maintenance.	FY15	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
DM-10	Promote and encourage implementation of designated BMPs at residential areas.	Implement education and prevention program. Utilize over-irrigation door hangers for education and prevention	FY15	Continuous-Ongoing	Y	N	Y	-
DM-11	Promote and encourage implementation of designated BMPs in commercial areas.	Implement education and prevention program through patrol-based program and contact with commercial area owners, tenants etc.	FY15	Continuous-Ongoing	Y	N	Y	-
MS4 Infrastructure								
DM- 12	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	Refer to JRMP Section 7. The MS4 inventory is inspected by Public Works staff at least once per year. Based on the findings of the inspections, the City performs required cleanings and proper disposal of collected material. Removal of the collected trash and debris prevents the materials from being pushed through the system and into the receiving waters from runoff	FY16	Continuous-Ongoing	Y	N	Y	-
DM-12.1	Perform catch basin cleaning	Inspect and clean catch basins annually	FY16	Continuous-Ongoing	Y	N	Y	Approximately 101.5 cubic yards of material is removed as a result of catch basin cleaning in the City of Del Mar
DM-12.2	Repair and replace MS4 components as needed to provide source control from MS4 infrastructure.	In order to limit inflow of pollutants and reduce pollutant loads, the City will take proactive measures to improve, repair, and replace MS4 components.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-13	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers and identify sewer leaks and areas for sewer pipe replacement.	Refer to JRMP Section 4.7 and the City's Sanitary Sewer Management Plan. The City conducts a variety of activities to effectively operate, maintain, repair and replace sewer mains, manholes, and pump stations.	FY15	Continuous - Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Roads, Streets, and Parking Lots								
DM-14	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP Section 7. The City implements the street sweeping schedule as follows: • Twice per month ○ Primary roads ○ Business district ○ Collection and bike lanes ○ Medians ○ Parking facilities • Twice per year ○ Residential areas	FY16	Continuous-Ongoing	Y	N	Y	882.92 total miles of streets are swept in the City of Del Mar on an annual basis
DM-14.1	Enhanced street sweeping by use of regenerative air vacuum sweepers.	Enhanced sweeping implemented by using regenerative air vacuum sweepers. Residential areas are swept 2x per year; primary roads (Camino Del Mar) and business district are swept 2x per month. Collection and bike lanes and medians are swept 2x per month.	FY16	Continuous-Ongoing	Y	N	Y	882.92 total miles of streets are swept in the City of Del Mar on an annual basis
DM-14.2	Perform sweeping of medians on high-volume arterial roadways.	Primary roads and business district medians are swept 2x per month.	FY16	Continuous-Ongoing	Y	N	Y	882.92 total miles of streets are swept in the City of Del Mar on an annual basis
Pesticides, Herbicides, and Fertilizer BMP Program								
DM-15	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP Section 7. The City of Del Mar is committed to the application of Integrated Pest Management (IPM) procedures and the use of updated BMPs to prevent or reduce the use of pesticides, fertilizers, and subsequently their discharge into the MS4.	FY16	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Retrofit and Rehabilitation in Areas of Existing Development								
DM-16	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Refer to JRMP Section 8. The process for identifying retrofits will evaluate the following considerations: • Water Quality Improvement Plan (WQIP) Priority and Highest Priority Water Quality Conditions • Likely sources of pollutants generating pollutants related to WQIP conditions • Focus areas identified in WQIP • Vintage of geographic areas of the City – time period existing development was constructed • Public retrofit opportunities through Capital Improvement Program (CIP) projects • Areas of persistent discharges • Inspection/Illicit Discharge Detection and Elimination program findings • Identified areas of hydromodification or other stream impacts Using the considerations above, the City will identify areas where opportunities could provide water quality improvement benefits. Evaluation will include layering of the findings to determine where compounding factors overlap. The City will consider the locations where overlapping occurs and significance of the factors to prioritize areas suited for retrofits and rehabilitation projects. Once specific areas within the City have been identified and prioritized for retrofits and/or rehabilitation projects, the City will perform field verifications on an as-needed basis to substantiate the: • need for retrofits or rehabilitation projects • locations of potential retrofits or rehabilitation projects • appropriate type(s) of retrofit or rehabilitation project • appropriate responsible party to implement the retrofits or rehabilitation projects Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories.	FY18	Continuous-Ongoing	Y	N	Y	Project was slated to be implemented in FY18. However, project was implemented in FY16 and is ongoing

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
DM-17	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP Section 8. The process for identifying retrofits will evaluate the following considerations: • Water Quality Improvement Plan (WQIP) Priority and Highest Priority Water Quality Conditions • Likely sources of pollutants generating pollutants related to WQIP conditions • Focus areas identified in WQIP • Vintage of geographic areas of the City – time period existing development was constructed • Public retrofit opportunities through Capital Improvement Program (CIP) projects • Areas of persistent discharges • Inspection/Illicit Discharge Detection and Elimination program findings • Identified areas of hydromodification or other stream impacts Using the considerations above, the City will identify areas where opportunities could provide water quality improvement benefits. Evaluation will include layering of the findings to determine where compounding factors overlap. The City will consider the locations where overlapping occurs and significance of the factors to prioritize areas suited for retrofits and rehabilitation projects. Once specific areas within the City have been identified and prioritized for retrofits and/or rehabilitation projects, the City will perform field verifications on an as-needed basis to substantiate the: • need for retrofits or rehabilitation projects • locations of potential retrofits or rehabilitation projects • appropriate type(s) of retrofit or rehabilitation project • appropriate responsible party to implement the retrofits or rehabilitation projects	FY18	Continuous-Ongoing	Y	N	Y	Project was slated to be implemented in FY18. However, project was implemented in FY16 and is ongoing

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
DM-18	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP Section 3.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
E.7 Public Education and Participation (B.3.b.(1)(a)(iii))								
DM-19	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Section 10 and 11.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
DM-19.1	Continue outreach to property managers responsible for HOAs and Maintenance Districts.	As part of the patrol-based program for the residential existing development inventory, provide frequent education and contact to HOAs and maintenance districts targeting outdoor activities and trash areas.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
DM-19.2	Continue education and outreach to reduce over-irrigation through patrol program.	Once per year outside of business hours, patrol jurisdiction for incidents of over-irrigation and leave door-hangers identifying problem areas and appropriate corrective actions.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-19.3	Conduct trash cleanups through community-based organizations involving target audiences.	In partnership with I Love a Clean San Diego, host a site in Del Mar during two beach clean-ups per year.	FY16	Continuous-Ongoing	N	N	Y	1st clean up to take place 9/17/16
DM-19.4	Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions	Update City Clean Water Program website with WQIP and JRMP information and highlight what the community can do for water quality.	FY16	Continuous-Ongoing	Y	N	Y	Currently being updated
DM-19.5	Collaborate with regional education and outreach efforts	Participate in Regional Think Blue campaign and collaborate with other regional efforts to provide consistent message or efficiency in training for targeted audiences.	FY16	Continuous-Ongoing	Y	N	Y	Participated in various outreach events

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

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E.6 Enforcement Response Plan								
DM-20	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP Section 9.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
Non-JRMP Strategies (Optional Strategies, B.3.b.(1)(b))								
Nonstructural Strategies								
DM-21	Promote and collaborate with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	Collaborate with MWD and promote their SoCal Water$mart rebates and products such as weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and turf removal. Collaborate with San Diego County Water Authority (SDCWA) and promote their Water Smart irrigation system checkups and turf replacement incentives.	FY16	Continuous – Ongoing	Y	N	Y	Information regarding rebate opportunities are listed on the City's webpage
DM-22	Continue program to address and capture trash and debris.	Properly maintain trash guards	FY15	Continuous - Ongoing	Y	N	Y	-
DM-23	Continue participating in source reduction initiatives	Continue participating in source reduction initiatives. Continue implementation of cigarette ban on beaches, parks and in commercial areas	FY15	Continuous - Ongoing	Y	N	Y	-
DM-24	Proactively monitor for erosion and complete minor repair and slope stabilization as needed.	Post-storm monitoring is conducted to identify slope and bluff erosion in priority areas. As-needed, repairs and slope stabilization are completed	FY15	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
DM-25	Protect areas that are functioning naturally	As feasible opportunities arise, the City will protect areas that are functioning naturally. This may include avoiding hardscape development and degradation in unpaved open space areas and creating permanent open space protections to undeveloped city-owned land. This strategy will be triggered on a case by case basis. The following resources, funds, and steps are needed to implement this strategy 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants if necessary (2 -18 months) 3) Obtain City Council approval	Must be Triggered	Continuous-Ongoing	NA	NA	NA	Not triggered
DM-26	Reference watershed study ~~Conduct special studies~~	San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for "natural sources" to establish the concentrations or loads from streams in a minimally disturbed or "reference" condition. Refer to Section 5.1 of the Water Quality Improvement Plan for further details. Will occur region-wide. Funding and resources were previously secured.	FY15	One Time	Y	N	Y	Language revised for accuracy

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

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DM-27	Los Peñasquitos Watershed Special Study ~~Reference watershed study~~	~~Assess sources of bacteria in the watersheds using the San Diego Bacteria Source Identification and Prioritization Process developed in 2012 as part of the MS4 Permit Report of Waste Discharge process. Focus is on the beach/lagoon area of the San Dieguito River WMA, with inputs from the upper watershed also considered where relevant and necessary to identify sources of bacteria to the beach/lagoon. Refer to Section 5.1 for further details.~~ The Los Peñasquitos Watershed Special Study will assess sediment loads in the watersheds upstream of the Draft Sediment TMDL compliance monitoring locations. Includes the analysis of sediment water column loads, stream bedload, and air monitoring. Implemented in a phased approach. Monitoring will occur first in the Carroll canyon subwatershed. The Los Peñasquitos Creek and Carmel Valley Creek subwatersheds will be monitored in subsequent phases. Refer to Section 5.1 of the Water Quality Improvement Plan for further details. Funding and resources have been secured for FY 2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY15	One Time	Y	N	Y	Language revised to correct an error. San Dieguito Watershed information was removed and replaced with Los Peñasquitos information. The City of Del Mar is determining additional jurisdictional monitoring to analyze sediment contributions. Updates will be included in the next WQIP Annual Report.
DM-28	Visually inspect all major and minor MS4 outfalls	All major and minor MS4 outfalls are inspected a minimum of six times per year to assist in the identification of any illegal discharges, persistently flowing outfalls or any other issues that may be identified.	FY15	Continuous – Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

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Structural Strategies								
Green Infrastructure								
DM-29	0.001 acre BMP has been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 0.06 acre with a total storage volume of 0.002 acre-foot	City will assess opportunities and implement as applicable This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants (2-18 months) 3) Obtain City Council approval 4) Initiate preliminary engineering, design and develop construction plans and cost estimates (6 months-2 Years) 5) Bid and Award process for construction phase (6 months) 6) Construct project (4 months-1 yr; project construction costs are TBD and are based on size of the project). 7) Operation and maintenance will be in perpetuity.	Must be Triggered	Continuous-Ongoing	NA	NA	NA	Not triggered

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

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Green Streets								
DM-30[1]	0.06 acres of green streets (0.03 acres of permeable pavement and 0.03 acres of bioretention) have been identified as potential opportunities for green street projects to treat a drainage area of 2.59 acres.	City will assess opportunities and implement as applicable This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants (2-18 months) 3) Obtain City Council approval 4) Initiate preliminary engineering, design and develop construction plans and cost estimates (6 months-2 Years) 5) Bid and Award process for construction phase (6 months) 6) Construct project (4 months-1 yr; project construction costs are TBD and are based on size of the project). 7) Operation and maintenance will be in perpetuity.	Must be Triggered	Continuous-Ongoing	NA	NA	NA	Not triggered

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

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Multiuse Treatment Area								
Other Opportunities								
DM-31[1]	Implement 0.18 acres with a total storage volume of 0.35 ac-ft. of multiuse treatment area projects on public/private parcels and/or through public-private partnerships.	City will assess opportunities and implement as applicable This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants (2-18 months) 3) Obtain City Council approval 4) Initiate preliminary engineering, design and develop construction plans and cost estimates (6 months-2 Years) 5) Bid and Award process for construction phase (6 months) 6) Construct project (4 months-1 yr; project construction costs are TBD and are based on size of the project). 7) Operation and maintenance will be in perpetuity.	Must be Triggered	Continuous-Ongoing	NA	NA	NA	Not triggered

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

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Water Quality Improvement BMPs								
Dry Weather Flow Separation and Treatment Projects								
DM-32	If interim load reduction goals are not met, dry weather flow separation and treatment projects will be considered.	Construction of dry weather flow separation and treatment projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants (2 -18 months) 3) Obtain City Council approval 4) Initiate preliminary engineering, design and develop construction plans and cost estimates (6 months -2 Years) 5) Bid and Award process for construction phase (6 months) 6) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 7) Operation and maintenance will be in perpetuity.	Must be Triggered	Continuous-Ongoing	NA	NA	NA	Not triggered

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

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WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-1	Watershed Collaboration for Los Peñasquitos Lagoon Restoration	Collaborate with stakeholders to promote the restoration of salt marsh areas and overall improvements in estuarine and other beneficial uses within the Los Peñasquitos Lagoon. Benefits of this strategy include more efficient targeting and prioritization of lagoon restoration activities, increased cost-effectiveness of selected BMP strategies in the watershed, and development of partnerships across the MS4 jurisdictions and other TMDL responsible parties. These efforts will be coordinated with the Lagoon Enhancement Program currently being updated by the Los Peñasquitos Lagoon Foundation and will require that (1) funding to address MS4 discharges and dry weather input of freshwater is identified and secured, (2) staff resources are identified and secured, (3) partners are identified and formal memoranda of understanding (MOUs) are developed and executed, (4) permits required by regulatory agencies are secured, and (5) consensus and community support are achieved. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. Implementation is in perpetuity as long as funding is available.	FY16	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

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WMA-2	Los Peñasquitos Wetland Restoration Project	Collaborate with Copermittees on the region-wide North Coast Corridor (NCC) Program, led by Caltrans and SANDAG. The program is intended to improve coastal transportation (including Interstate 5 and the coastal rail and transit system) while protecting and restoring coastal habitats throughout the corridor. The 27-mile-long project stretches across the cities of Oceanside, Carlsbad, Encinitas, Solana Beach, Del Mar, and San Diego and provides improvements for six coastal lagoons, including Los Peñasquitos Lagoon. The NCC Program is implementing construction in phases from 2010 through 2040. The program is a $6.5-billion investment in the region that will be paid for through a combination of federal, state, and local funds. The NCC program is part of TransNet, the voter-approved, half-cent sales tax initiative that helps fund transportation projects in the region.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
WMA-3	Collaborative Approach to Irrigation Reduction	Responsible Agencies are collaborating with water agencies to encourage implementation of water conservation efforts. Water conservation that attempts to reduce irrigation and minimize storm water runoff can also improve water quality of receiving waterbodies. MWD's SoCal Water$mart Program supports conservation efforts by offering incentives in the form of rebates for rain barrels, rotating sprinkler nozzles, weather-based irrigation controllers, soil moisture sensor systems, and turf replacement. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council or appropriate legislative body (i.e. Board).	Prior to FY16	Continuous-Ongoing	Y	N	Y	Information regarding rebate opportunities are listed on the City's webpage

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	**Implemented as planned in current FY (FY16)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(ii)	**Modification for FY17 (If modified or canceled, provide rationale)** MS4 Permit Section: F.3.b.(3)(d)(iv))	**Plan to implement into next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-4	Offsite Alternative Compliance Option (WMAA)	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015, jurisdictions can formally implement an optional Alternative Compliance Program by December 2015 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
WMA-5	Collaboration with the Regional Board	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit, 2) enforcement of other non-MS4 dischargers, and 3) Bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for Los Peñasquitos WMA

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WMA-6	Refinement of Water Quality Regulations	The Responsible Agencies will collaborate with the Regional Board to refine the accuracy of regulations to ensure that Non-MS4 dischargers are regulated appropriately. The goal of this exercise is to begin a dialog with the Regional Board that may lead to the following outcomes: 1) Removal of Non-MS4 discharges and the associated BMPs needed to treat those discharges from the Responsible Agencies' burden, 2) amendment of current TMDLs and the MS4 Permit to correctly assign responsibilities for Non-MS4 discharges to the appropriate entities, and 3) strengthening of Non-MS4 NPDES permits that are directly tied to the requirements of existing and future TMDLs. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Resources to implement this strategy include staff time and are currently secured.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-

1. Strategy has been identified as potential based on results of a model that may not be reflective of the small drainage area that leads from Del Mar to the lagoon. The strategy is presented until further analysis (including monitoring data) can confirm or revise the needs and strategies.

D.1.4 Modifications to the BMP Design Manual

No modifications to the BMP Design Manual have been made since the WQIP was approved in fall 2015. The current Del Mar BMP Design Manual is posted on the Del Mar's website, and the link to this page is listed on Project Clean Water.

D.1.5 Modifications to the Jurisdictional Runoff Management Plan

No modifications to the Del Mar's JRMP have been made since the WQIP was approved in fall 2015. The current Del Mar JRMP is posted on the Del Mar's website, and the link to this page is listed on Project Clean Water.

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D.2 City of Poway

D.2.1 Annual Report Certifications

The City of Poway's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.2.2 Annual Report Form

Poway's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

STATEMENT OF CERTIFICATION

Los Peñasquitos Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report and JRMP Certificate of Adequate Legal Authority

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

I also certify that the City of Poway has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 9th day of January, 2017, at the City of Poway.

Robert J. Manis
Director
Development Services Department

1/9/17
Date

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015/2016

I. COPERMITTEE INFORMATION			
Copermittee Name: City of Poway (Los Peñasquitos Watershed)			
Copermittee Primary Contact Name: Steven Strapac			
Copermittee Primary Contact Information:			
Address: 13325 Civic Center Drive			
City: Poway, CA	County: San Diego	State: CA	Zip: 92064
Telephone: (858) 668-4653	Fax:	Email: sstrapac@poway.org	

II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES ☒ NO ☐	
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES ☒ NO ☐	

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE	
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES ☐ NO ☒
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES ☐ NO ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM	
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Number of non-storm water discharges reported by the public	13
Number of non-storm water discharges detected by Copermittee staff or contractors	50
Number of non-storm water discharges investigated by the Copermittee	63
Number of sources of non-storm water discharges identified	53
Number of non-storm water discharges eliminated	25
Number of sources of illicit discharges or connections identified	49
Number of illicit discharges or connections eliminated	25
Number of enforcement actions issued	47
Number of escalated enforcement actions issued	0

V. DEVELOPMENT PLANNING PROGRAM	
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES ☐ NO ☒
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES ☐ NO ☐
Number of proposed development projects in review	40
Number of Priority Development Projects in review	12
Number of Priority Development Projects approved	3
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	0
Number of completed Priority Development Projects in inventory	57
Number of high priority Priority Development Project structural BMP inspections	15
Number of Priority Development Project structural BMP violations	0
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Number of construction sites in inventory	62
Number of active construction sites in inventory	62
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	25
Number of construction site inspections	121
Number of construction site violations	19
Number of enforcement actions issued	19
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	53	423	187	38
Number of existing development inspections	26	107	19	38
Number of follow-up inspections	0	39	2	0
Number of violations	0	39	2	13
Number of enforcement actions issued	0	39	2	11
Number of escalated enforcement actions issued	0	4	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Steven E Strapac
Signature

10/17/16
Date

STEVEN E. STRAPAC
Print Name

SENIOR CIVIL ENGINEER
Title

858.668.4653
Telephone Number

SSTRAPAC@POWAY.ORG
Email

FISCAL ANALYSIS

Fiscal information for 2015/2016 is reported in the tables on the following page. The tables are based largely on the standard templates used by the Copermittees in previous fiscal years, but with a distinction between labor costs and other expenses (materials, contracts, etc.) as requested in the Municipal Permit (San Diego Regional Water Quality Control Board, Order No. R9-2013-0001 as amended by Order No. R9-2015-001 and Order No. R9-2015-0100).

Regional programs include Copermittee shared costs for education and other regional expenses, as well as City staff time to participate in regional meetings. Watershed costs include meeting participation, monitoring, and the City's portion of watershed cost shares.

The City anticipates using the same funding sources as shown in Table 2 for 2015/2016 program funding needs. Developer fees are contingent on the number of development projects in the City, and the fees are only used for reviews and similar services provided for those development projects.

Table 1: 2015/2016 Expenditure Summary

Jurisdictional Components	Labor	Expenses	Total
Administration and Permit Fee	$192,655	$24,220	$216,875
Development Planning	$12,120	$0	$12,120
Construction	$22,372	$0	$22,372
Municipal	$703,942	$355,244	$1,059,186
Industrial and Commercial	$27,325	$31,760	$59,085
Residential	$14,375	$176,075	$190,450
IDDE	$0	$48,500	$48,500
Education	$0	$1,000	$1,000
Public Participation	$0	$0	$0
Jurisdictional Total	**$972,789**	**$636,799**	**$1,609,588**
Watershed Programs			
Los Peñasquitos	$14,256	$145,360	$159,616
San Dieguito	$14,256	$27,301	$41,557
Watershed Programs Total	**$28,512**	**$172,660**	**$201,172**
Regional Programs	**$12,217**	**$20,500**	**$32,717**
Total Costs	**$1,013,517**	**$829,960**	**$1,843,477**

Table 2: 2015/2016 Funding Source Summary

Funding by Source	Amount
General Fund	$1,674,987
Storm Water Fee	$0
Developer Deposits and Fees	$21,000
Registration and Inspection Fees	$4,752
Grant Funds	$13,903
Other	$175,075
Total Funding	**$1,889,717**

D.2.3 City of Poway Strategies

City of Poway's strategies are detailed in Table D-2.

Table D-2
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
JRMP (E.2 – E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
PW-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to JRMP. All high priority projects are inspected annually prior to the rainy season. 20% of all projects are inspected annually.	FY16	Continuous- Ongoing	Y	None	Y	None
Priority Development Projects (PDPs)								
PW-2	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to JRMP. For structural BMPs, all high priority projects will be inspected prior to the start of the rainy season. Any projects that do not provide sufficient documentation to verify that appropriate maintenance work has been performed through the annual maintenance verification program will also be inspected before the end of the fiscal year.	FY16	Continuous- Ongoing	Y	None	Y	None
PW-3	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP.	FY16	Continuous- As needed	Y	None	Y	None
PW-3.1	Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover.	Implemented through the Minor Development Review process and the plan check process.	FY16	Continuous- As needed	Y	None	Y	None
PW-4	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects). Refer to Section 4.2.5. and Appendix P for further details.	Refer to JRMP.	FY16	Continuous- As needed	Y	None	Y	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
E.4 Construction Management								
PW-5	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Refer to JRMP; Perform daily inspections during construction. During the wet season, high priority construction sites are inspected every two weeks, medium priority are inspected monthly, and low priority sites are inspected as needed. During the dry season, all construction sites are inspected as needed.	FY16	Continuous-Ongoing	Y	None	Y	None
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
PW-6	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP; Commercial/industrial/municipal are inspected annually, with municipal receiving more frequent inspections by staff.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-6.1	Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	Annually review policies and procedures.	Prior to FY16	Continuous- As needed (Annually)	Y	None	Y	None
PW-6.2	Track stationary and mobile businesses through communication with Business Licensing Division.	Maintain through the City's Commercial/Industrial program.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-7	Promote and encourage implementation of designated BMPs in commercial areas.	Collaborate with MWD and promote their SoCal Water$mart rebates and products such as weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and turf removal.	FY16	Continuous-Ongoing	Y	None	Y	The City also partnered with the San Diego County Water Authority to promote their artificial turf rebate program.

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
PW-8	Implement program to investigate illegal grading on private property.	Program to investigate reports of illegal grading. Maintain records of reported illegal gradings and immediately investigate. If activity violates grading or stormwater regulation, issued a "Stop Work" notice and must obtain grading permit and correct stormwater violations. Reports are tracked in "Trackit" software as a code violation and bi-monthly meetings to discuss the status of reports. Grading cases are subject to a strict timeline of action, and enforcement is upped until either compliance, or a Notice of Violation is filed against the property. If it is a stormwater issue, the City's on-call stormwater contractor corrects the issue and City liens the property for payment.	FY16	Continuous-Ongoing	Y	None	Y	None
MS4 Infrastructure								
PW-9	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	Refer to JRMP.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-9.1	Perform catch basin cleaning.	Inspect and clean catch basins annually.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-9.2	Clean open-channels to reduce pollutant loads and invasive plants and animals.	Inspect and clean open channels annually.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-10	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers and identify sewer leaks and areas for sewer pipe replacement.	Program implemented through sewer maintenance and inspection program.	FY16	Continuous-Ongoing	Y	None	Y	None
Roads, Street, and Parking Lots								
PW-11	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP; the City of Poway is divided into 8 zones for road operation and maintenance activities; rotational cycle: one zone inspected each year	FY16	Continuous-Ongoing	Y	None	Y	None
PW-11.1	Implement street sweeping.	Refer to JRMP; all areas swept twice per month.	FY16	Continuous-Ongoing	Y	None	Y	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
PW-11.2	Continue maintenance on access roads and trails by proactively monitoring for erosion and completing minor repair and slope stabilization.	Actively identify and repair eroding slopes that may be contributing to sediment loading. Prepare an inventory and assessment of eroding areas and their risk to surface waters. Follow assessment with a schedule for ongoing inspection and stabilization (potentially based on a number or percentage of sites annually). Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-12	Enhance street sweeping through route optimization.	In Los Peñasquitos River WMA, implement route optimization from results of efficiency studies.	FY18	Continuous-Ongoing	Y	None	Y	None
Pesticide, Herbicides, and Fertilizer BMP Program								
PW-13	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP.	FY16	Continuous-Ongoing	Y	None	Y	None
Retrofit and Rehabilitation in Areas of Existing Development								
PW-14	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	The Offsite Alternative Compliance Program will include methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to high priority water quality conditions, potential pollutant load removal effectiveness, and feasibility of implementation. The development of such program is contingent on the completion of a current water quality equivalency study and development of a crediting system across multiple Responsible Agencies. Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories.	FY18	Continuous-Ongoing	Y	None	Y	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
PW-15	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	The Offsite Alternative Compliance Program will include methods for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas. Rehabilitation project selection will be based upon a variety of factors including existing stream or habitat degradation, potential future cumulative stream or habitat impacts, and feasibility of implementation. The development of such program is contingent on the completion of a current water quality equivalency study and development of a crediting system across multiple Responsible Agencies.	FY18	Continuous-Ongoing	Y	None	Y	None
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
PW-16	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP. The City must visually inspect at least 80% of their outfalls two times per year during dry weather conditions.	FY16	Continuous-Ongoing	Y	None	Y	None
E.7 Public Education and Participation (B.3.b.(1)(a)(iii))								
PW-17	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-17.1	Target school-based education and outreach.	Through "I Love a Clean San Diego," give school presentations to fourth-graders eight times per year.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-17.2	Conduct education through community-based organizations.	Through "I Love a Clean San Diego," staff street fair booths twice per year. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Y	None	Y	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
PW-17.3	Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions.	Review City storm water website, identify and implement required updates to reflect WQIP and JRMP revisions.	Prior to FY16	Continuous- As needed	Y	None	Y	None
PW-17.4	Collaborate with regional education and outreach efforts.	Participate in Regional Think Blue campaign and collaborate with other regional efforts to provide consistent message or efficiency in training for targeted audiences.	FY16	Continuous- Ongoing	Y	None	Y	None
E.6 Enforcement Response Plan								
PW-18	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP.	FY16	Continuous- Ongoing	Y	None	Y	None
Non-JRMP Strategies (Optional Strategies, B.3.b.(1)(b))								
Nonstructural Strategies								
PW-19	Require implementation of low impact development BMPs with all new construction.	The City requires LID at all sites, with an emphasis on an effective combination of both erosion control BMPs and sediment control BMPs to reduce discharges of sediment. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous- Ongoing	Y	None	Y	None
PW-20	Promote MWD and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	Collaborate with MWD to promote their SoCal Water$mart rebates and products such as weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and turf removal. Collaborate with San Diego County Water Authority (SDCWA) to promote their Water Smart irrigation system checkups and turf replacement incentives. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous- Ongoing	Y	None	Y	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
PW-21	Proactively repair and replace corrugated metal pipe (CMP) MS4 components to provide source control from MS4 infrastructure.	Implement CMP replacement program with an emphasis on pipes in open canyons.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-22	Target human behavior in parks and other public areas including trash reduction or other high impact behavior to habitat, wildlife, and water quality.	Implement trash reduction programs by increasing the number of trash and recycling bins during high-traffic public events and in public parks. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-23	Los Peñasquitos Watershed Special Study	Los Peñasquitos WMA special study will assess sediment loads in the watersheds upstream of the Draft Sediment TMDL compliance monitoring locations. Includes the analysis of sediment water column loads, stream bedload, and air monitoring. Implemented in a phased approach. Monitoring will occur first in the Carroll Canyon subwatershed. The Los Peñasquitos Creek and Carmel Valley Creek subwatersheds will be monitored in subsequent phases. Refer to Section 5.1 of the Water Quality Improvement Plan for further details. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-24	Participate in Reference Watershed Study.	The San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for “natural sources” to establish the concentrations or loads from streams in a minimally disturbed or “reference” condition. Refer to Section 5.1 of the Water Quality Improvement Plan for further details. Will occur region-wide. Funding and resources were previously secured.	Prior to FY16	One Time, With Continuous O&M	Y	None	N	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
PW-25	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas, creating permanent open space protections on undeveloped city-owned land, and acquiring privately-owned undeveloped open areas.	As opportunities arise, where feasible, avoid hardscape development and degradation in unpaved open space areas, create permanent open space protections to undeveloped city-owned land, and acquire privately owned undeveloped parcels of land. This strategy may be implemented if there is interest in participation by the public or private entity with current control of the land. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) identification of partners, if needed (public, private, non-profit), 2) identification of costs and potential sources of funding, 3) final agreement by public or private entity with current control of the land, 4) final agreement by all other participating partners including acceptance by intended land- or asset-owning City department, and 5) funding in place. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The time frame for implementation will vary by project. Implementation is in perpetuity as long as funding is available.	Triggered	Continuous as funding allows	Not triggered in FY16	None	If triggered	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Structural Strategies								
Green Infrastructure								
PW-26	0.26 ac have been identified as potential opportunities for green infrastructure implementation on public parcels.	In the Los Peñasquitos Creek Subwatershed, construction, operation, and maintenance of 0.26 ac of bioretention and permeable pavement. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months-1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function will be approval by City Council as part of the City's annual budget.	FY22	Continuous-Ongoing	N	None	N	Planned implementation in FY22

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

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Green Streets								
PW-27	32.42 acres of permeable pavement and 32.47 acres of bioretention have been identified as potential opportunities for green street projects.	In the Los Peñasquitos Creek Subwatershed, construction, operation and maintenance of 32.42 acres of permeable pavement and 32.47 acres of bioretention for green streets. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months-1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function will be approval by City Council as part of the City's annual budget.	FY22	Continuous-Ongoing	N	None	N	Planned implementation in FY22
Multiuse Treatment Areas								
Infiltration and Detention Basins								
PW-28	Community Detention Basin	Community Detention Basin is already in place. Funding and resources have been secured. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Y	None	Y	None
PW-29	Gate Detention Basin	Gate Detention Basin is already in place. Funding and resources have been secured. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Y	None	Y	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

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PW-30	Kirkham Detention Basin	Kirkham Detention Basin is already in place. Funding and resources have been secured. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Y	None	Y	None
PW-31	Stotler Detention Basin	Stotler Detention Basin is already in place. Funding and resources have been secured. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Y	None	Y	None
PW-32	Stowe Detention Basin	Stowe Detention Basin is already in place. Funding and resources have been secured. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Y	None	Y	None
PW-33	If interim load reduction goals are not met and additional multiuse treatment areas are required, a constructed wetland system can be implemented in the open space adjacent to Carriage Road.	Construction, operation, and maintenance of a 1.7 ac Constructed Wetland System would treat approximately 9,567 acres of drainage area (APN 3175012400). The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function will be approval by City Council as part of the City's annual budget.	FY22	Continuous-Ongoing	N	None	N	Planned implementation in FY22

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
PW-34	If interim load reduction goals are not met and additional multiuse treatment areas are required, a dry extended detention basin can be implemented in Hilleary Park.	Construction, operation and maintenance of a 1.6 ac Dry Extended Detention Basin would treat approximately 138 acres of drainage area (APN 3171020700). The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function will be approval by City Council as part of the City's annual budget.	FY22	Continuous-Ongoing	N	None	N	Planned implementation in FY22

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
Additional Watershed Opportunities								
PW-35	Through adaptive management and additional analysis in the future, the City will identify and implement one or more of the following opportunities to meet numeric goals: 1) participate in restorative efforts for the Los Peñasquitos Lagoon with stakeholders, 2) MS4 outfall repair and relocation, 3) slope stabilization, 4) stream restoration, 5) implementation of sediment detention basins upstream of Los Peñasquitos Lagoon or 6) new strategies not yet identified.	Through adaptive management and additional analysis in the future, the City will identify and implement one or more of the following opportunities to meet numeric goals: 1) participate in restorative efforts for the Los Peñasquitos Lagoon with stakeholders, 2) MS4 outfall repair and relocation, 3) slope stabilization, 4) stream restoration, 5) implementation of sediment detention basins upstream of Los Peñasquitos Lagoon or 6) new strategies not yet identified. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	FY26	Continuous-Ongoing	N	None	N	Planned implementation in FY26
Stream, Channel, and Habitat Rehabilitation Projects								
PW-36	Rattlesnake Creek Project (stabilization of ephemeral tributary segment to Rattlesnake Creek)	This project involves the stabilization of a section of an ephemeral tributary to Rattlesnake Creek, which is located west of Midland Road, between Kentfield Drive and Norwalk Street. The project will involve grading in order to widen the channel bottom and contour the banks. It will include installation of rip rap, turf reinforcement matting, concrete pillow blocks, and a headwall, landscape removal and replacement, temporary BMPs, a temporary diversion system, and temporary irrigation. Funding and resources have been secured. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	One Time, With Continuous O&M	Y	None	Y	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-1	Collaborative Approach to Irrigation Reduction	Responsible Agencies are collaborating with water agencies to encourage implementation of water conservation efforts. Water conservation that attempts to reduce irrigation and minimize storm water runoff can also improve water quality of receiving waterbodies. MWD's SoCal Water$mart Program supports conservation efforts by offering incentives in the form of rebates for rain barrels, rotating sprinkler nozzles, weather-based irrigation controllers, soil moisture sensor systems, and turf replacement. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous - Ongoing	Y	None	Y	The City also partnered with the San Diego County Water Authority to promote their artificial turf rebate program.
WMA-2	Offsite Alternative Compliance Option (WMAA)	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015, jurisdictions can formally implement an optional Alternative Compliance Program by December 2015 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).	Prior to FY16	Continuous - Ongoing	Y	None	Y	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-3	Collaboration with the Regional Board	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit, 2) enforcement of other non-MS4 dischargers, and 3) Bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous - Ongoing	Y	None	Y	None
WMA-4	Refinement of Water Quality Regulations	The Responsible Agencies will collaborate with the Regional Board to refine the accuracy of regulations to ensure that Non-MS4 dischargers are regulated appropriately. The goal of this exercise is to begin a dialog with the Regional Board that may lead to the following outcomes: 1) Removal of Non-MS4 discharges and the associated BMPs needed to treat those discharges from the Responsible Agencies' burden, 2) amendment of current TMDLs and the MS4 Permit to correctly assign responsibilities for Non-MS4 discharges to the appropriate entities, and 3) strengthening of Non-MS4 NPDES permits that are directly tied to the requirements of existing and future TMDLs. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Resources to implement this strategy include staff time and are currently secured.	Prior to FY16	Continuous - Ongoing	Y	None	Y	None

Table D-2 (continued)
City of Poway Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-5	Watershed Collaboration for Los Peñasquitos Lagoon Restoration	Collaborate with stakeholders to promote the restoration of salt marsh areas and overall improvements in estuarine and other beneficial uses within the Los Peñasquitos Lagoon. Benefits of this strategy include more efficient targeting and prioritization of lagoon restoration activities, increased cost-effectiveness of selected BMP strategies in the watershed, and development of partnerships across the MS4 jurisdictions and other TMDL responsible parties. These efforts will be coordinated with the Lagoon Enhancement Program currently being updated by the Los Peñasquitos Lagoon Foundation and will require that (1) funding to address MS4 discharges and dry weather input of freshwater is identified and secured, (2) staff resources are identified and secured, (3) partners are identified and formal memoranda of understanding (MOUs) are developed and executed, (4) permits required by regulatory agencies are secured, and (5) consensus and community support are achieved. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. Implementation is in perpetuity as long as funding is available.	FY16	Continuous as funding allows	Y	None	Y	None

D.2.4 Modifications to the BMP Design Manual

No modifications to the BMP Design Manual have been made since the WQIP was approved in fall 2015. The current Poway's BMP Design Manual is posted on the Poway's website, and the link to this page is listed on Project Clean Water.

D.2.5 Modifications to the Jurisdictional Runoff Management Plan

No modifications to the Poway's JRMP have been made since the WQIP was approved in fall 2015. The current Poway JRMP is posted on the Poway's website, and the link to this page is listed on Project Clean Water.

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D.3 City of San Diego

The City of San Diego is proposing the following administrative changes to the Los Peñasquitos Water Quality Improvement Plan. The proposed administrative changes include clarifications, corrections to errors and typos, and other minor edits that only apply to the City of San Diego.

WQIP Section		Administrative Changes
1	Section 4.4 Alternative BMP Implementation Scenario for Refinement of Water Quality Regulations	Included the following text: "Cost comparison between the Primary and Alternative Scenario presented in this section are a snapshot in time and are based on the best information available at the time they were prepared. As program implementation progresses, updates to estimated funding needs are likely to change. For the most recent estimate of funding needs, refer to the WAMP available at the Storm Water Division website, www.sandiego.gov/stormwater/plansreports."
2	Appendix I – Jurisdictional Strategies and Schedules; Section I.4.2 Funding Needs for the City of San Diego	Included the following text: "Funding needs presented in this section are a snapshot in time and are based on the best information available at the time they were prepared. As program implementation progresses, updates to estimated funding needs are likely to change. For the most recent estimate of funding needs, refer to the WAMP available at the Storm Water Division website, www.sandiego.gov/stormwater/plansreports."
3	Appendix I – Jurisdictional Strategies and Schedules; Table I-5 City of San Diego Jurisdictional Strategies	Refined the text (shown as track changes in red text in Appendix D) to provide greater clarity and/or to correct errors and typos.
4	Appendix I – Jurisdictional Strategies and Schedules; Table I-5 City of San Diego Jurisdictional Strategies	Changed strategy identification numbering system (See Appendix D).
5	Appendix I – Jurisdictional Strategies and Schedules; Table I-5 City of San Diego Jurisdictional Strategies	Structural Strategies, Priority Development Project (PDP) BMPs: All PDP BMPs have been combined into a single strategy for ease of viewing. A table with an updated list of PDP BMPs is included in the WQIP Annual Report (See Appendix D).

6	Appendix I – Jurisdictional Strategies and Schedules; Table I-5 City of San Diego Jurisdictional Strategies	Structural Strategies, Multi Use Treatment Areas (MUTAs): Planned MUTAs that are not yet built have been combined into a single strategy for ease of viewing. The total sum of drainage area treated (level of commitment) has not changed. A table with all structural strategies (MUTAs, Green Infrastructure, Green Streets, etc.) is included in the WQIP Annual Report (See Appendix D).

D.3.1 Annual Report Certifications

The City of San Diego's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.3.2 Annual Report Form

City of San Diego's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

THE CITY OF SAN DIEGO

STATEMENT OF CERTIFICATION

Los Penasquitos Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Drew Kleis
Deputy Director
Transportation & Storm Water Department

1/12/17
Date

Transportation & Storm Water Department
9370 Chesapeake Drive, Suite 100, MS 1900 • San Diego, CA 92123
Hotline (619) 235-1000 Fax (858) 541-4350

CITY OF SAN DIEGO

SCOTT CHADWICK
CHIEF OPERATING OFFICER

January 27, 2017

Mr. David W. Gibson, Executive Officer
Regional Water Quality Control Board
San Diego Region
2375 Northside Drive, Suite 100
San Diego, CA 92108

Subject: Certification of Adequate Legal Authority

Dear Mr. Gibson:

Pursuant to San Diego Regional Water Quality Control Board Order No. R9-2013-0001, as amended by Order No. R9-2015-0100 (Municipal Permit or Permit), Provision E.1.b, the City of San Diego, as a Copermittee in the above referenced permit, submits this certification of adequate legal authority with the first Water Quality Improvement Plan Annual Report. The City has adequate legal authority to implement and enforce each requirement contained in 40 C.F.R. section 122.26(d)(2)(i)(A)-(F), and the Municipal Permit (including Provision E.1.a(1)-(10)). The San Diego Municipal Code, including the following provisions, provides the City with adequate legal authority as required by the Municipal Permit:

1. Storm Water Management and Discharge Control, sections 43.0301 through 43.0312. These provisions are being amended, although the current version also complies with the requirements of the Municipal Permit.
2. General Construction Permit Authority and Procedures, sections 129.0101 through 129.0120.
3. Grading Regulations, sections 142.0101 through 142.0150.
4. Storm Water Runoff Control and Drainage Regulations, sections 142.0201 through 142.0230.

The City looks forward to working with you and the Regional Board on storm water management matters. If you have any questions, please contact Senior Planner Jim Harry at (858) 541-4353 or email JHarry@sandiego.gov.

Sincerely,

Scott Chadwick
Chief Operating Officer

AK/jph

cc: Mara Elliott, City Attorney, Office of the City Attorney
Stephen Puetz, Chief of Staff, Office of the Mayor
Stacey LoMedico, Assistant Chief Operating Officer
Mike Hansen, Deputy Chief of Staff and Chief of Policy, Office of the Mayor
Paz Gomez, Deputy Chief Operating Officer, Infrastructure/Public Works
Alejandra Gavaldon, Director of Federal Government Affairs & Water Policy, Office of the Mayor
Kris McFadden, Director, Transportation & Storm Water Department
Drew Kleis, Deputy Director, Transportation & Storm Water Department
Davin Widgerow, Deputy City Attorney, Office of the City Attorney
Clem Brown, Program Manager, Transportation & Storm Water Department
Ruth Kolb, Program Manager, Transportation & Storm Water Department
Jim Harry, Senior Planner, Transportation & Storm Water Department

I. COPERMITTEE INFORMATION			
Copermittee Name: **City of San Diego (Los Peñasquitos WMA)**			
Copermittee Primary Contact Name: **Drew Kleis, Deputy Director, Storm Water Division, Transportation & Storm Water Department**			
Copermittee Primary Contact Information:			
Address: **9370 Chesapeake Drive, Suite 100**			
City: **San Diego**	County: **San Diego**	State: **CA**	Zip: **92123**
Telephone: **858-541-4320**	Fax: **858-541-4350**	Email: **Akleis@sandiego.gov**	

II. LEGAL AUTHORITY	
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	**YES** ☒ **NO** ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE	
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	**YES**[1] ☒ **NO** ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	**YES** ☒ **NO** ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM[2]	
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
Number of non-storm water discharges reported by the public	**353**
Number of non-storm water discharges detected by Copermittee staff or contractors	**172**
Number of non-storm water discharges investigated by the Copermittee	**518**
Number of sources of non-storm water discharges identified	**442**
Number of non-storm water discharges eliminated	**434**
Number of sources of illicit discharges or connections identified	**437**
Number of illicit discharges or connections eliminated	**429**[3]
Number of enforcement actions issued	**436**[3]
Number of escalated enforcement actions issued	**197**
V. DEVELOPMENT PLANNING PROGRAM[2]	
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	**YES** ☒ **NO** ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	**YES**[4] ☒ **NO** ☐
Number of proposed development projects in review	**241**[5]
Number of Priority Development Projects in review	**32**[6]
Number of Priority Development Projects approved	**110**[7]
Number of approved Priority Development Projects exempt from any BMP requirements	**0**
Number of approved Priority Development Projects allowed alternative compliance	**0**
Number of Priority Development Projects granted occupancy	**63**[8]
Number of completed Priority Development Projects in inventory	**178**[9]
Number of high priority Priority Development Project structural BMP inspections	**9**
Number of Priority Development Project structural BMP violations	**8**[10]
Number of enforcement actions issued	**15**[11]
Number of escalated enforcement actions issued	**3**

VI. CONSTRUCTION MANAGEMENT PROGRAM[2]

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES[1,12] ☒ NO ☐

Number of construction sites in inventory	4,300
Number of active construction sites in inventory	47
Number of inactive construction sites in inventory	112
Number of construction sites closed/completed during reporting period	169
Number of construction site inspections	27,037
Number of construction site violations	270
Number of enforcement actions issued	164
Number of escalated enforcement actions issued	91

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM[2]

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	123	8,282 (includes mobile)	915	27[13]
Number of existing development inspections	117	1,533	140	4[13]
Number of follow-up inspections	0	263	13	0
Number of violations	18	388	37	375[13]
Number of enforcement actions issued	22	490	48	285[13]
Number of escalated enforcement actions issued	2	148	8	134

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES[14] ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Andrew Kleis
Signature

1/12/17
Date

Drew Kleis
Print Name

Deputy Director
Title

(858) 541-4320
Telephone Number

Akleis@sandiego.gov
Email

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[1] The City of San Diego approved an update to the Jurisdictional Runoff Management Plan (JRMP) in FY 16. The update of the JRMP was done in compliance with Order No. R9-2013-0001.
[2] See the JRMP Annual Report FY 2016 Attachment 1 for a citywide summary of this data.
[3] The number of enforcement actions issued does not equal the number of identified illicit discharges or connections because some discharge complaints in the last quarter of FY 2016 were still under investigation at the end of FY 2016.
[4] The Storm Water Standards Manual (Part 1: BMP Design Manual, and Part 2: Construction BMP Standards) was updated in January 2016.
[5] The number of ongoing Standard and Priority Development Projects in review as of 6/30/16. The Development Services Department processes other types of permits, in addition to those included in the JRMP Annual Report, that are not subject to the requirements of the municipal permit.
[6] The number of ongoing Priority Development Projects in review as of 6/30/16. Only a portion of the projects that the Development Services Department processes qualify as a priority development project.
[7] The number of Priority Development Projects approved in FY 2016.
[8] This number includes the City's Priority Development Projects that received final inspection in FY 2016 as well as certain Priority Development buildings and grading projects that did not require a Certificate of Occupancy, that were completed in FY 2016.
[9] Represents the total number of completed Priority Development Projects in the City's inventory as of the end of FY 2016. These projects include projects entered into the inventory as complete in previous years.
[10] The number of Priority Development Project structural BMP violations included Notices of Violation, Notices of Deficient Maintenance, and Administrative Citations issued to public and private entities within the City's jurisdiction in this watershed.
[11] The number of enforcement actions included Notices of Violation and Notices of Deficient Maintenance issued to public and private entities within the City's jurisdiction in this watershed. The City has achieved compliance at 146 of the 150 sites identified in the San Diego RWQCB's Notice of Violation (Order Number R9-2014-0034). The San Diego RWQCB granted the City an extension to achieve compliance at the remaining four sites by May 26, 2017.
During the process of achieving compliance for the aforementioned 150 identified sites, the City has discovered an additional 74 sites which initially appear to be out of compliance due to varying degrees of circumstances. Each of these potential violations consist of post-construction BMP issues. Continuing the same process as outlined in our quarterly reports to the RWQCB, the City is currently researching each case. After initial research to verify non-compliance or not, we will follow our established procedures to have each site be in conformance to the MS4 permit under which it was permitted.
[12] Responses in this report are based on the City's internal data. Potential program deficiencies were identified by the Board in FY 2016, however, the City has taken steps to correct issues identified by the Board as detailed in the JRMP Annual Report FY 2016 Appendix. The City has implemented several improvements that address the Regional Board's concerns. These improvements ranged from procedural changes to creating multi-language brochures for contractors. Several operating and internal procedures have been refined to improve enforcement actions, add clarity to how sites are inspected, and to better define the staff's roles and expectations.
[13] Existing facilities for residential uses are characterized as Residential Management Areas (RMA), which could include hundreds of residences. When all of the residences in an RMA are inspected by City staff that is only counted as one inspection. However, all individual issues noted at each residence during an RMA inspection is counted as a separate violation and/or enforcement action.
[14] See the JRMP Annual Report FY 2016 Appendix for the FY 2016 Fiscal Analysis.

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The City of
SAN DIEGO
Development Services Department
Engineering Division

January 12, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Development Services Department Engineering Division Contributions

Please accept this letter as certification of the City of San Diego Development Services Department Engineering Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Edric Doringo, Program Manager at 619-446-5098 or email edoringo@sandiego.gov.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Development Services Department, Engineering Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

Gregory Hopkins

Gregory Hopkins
Deputy Director, Development Services Department

GH/cmm

Enclosure:
cc: Robert Vacchi, Director, Development Services Department
Drew Kleis, Deputy Director, Transportation and Storm Water Department

The City of
SAN DIEGO

Development Services Department
Inspection Services Division

January 24, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Development Services Department Inspection Services Division Contributions

Please accept this letter as certification of the City of San Diego Development Services Department Inspection Services Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Senior Inspector Sam Lindsey or Project Manager Xavier Del Valle at (858) 492-5070.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Development Services Department, Inspection Services Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

William Barrañón
Inspection Services Manager

The City of
SAN DIEGO

Public Works Department
Construction Management and Field Services Division

November 3, 2016

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Public Works Department, Construction Management and Field Services Division Contributions

Please accept this letter as certification of the City of San Diego Public Works Department Construction Management and Field Services Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Julie Ballesteros, Senior Civil Engineer, at (858) 573-5012.

I certify under penalty of law that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Public Works Department Field Engineering Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, to the best of my knowledge and belief, is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Myrna M. Dayton, PE, QSP, QSD, DCE
Deputy Director

9485 Aero Drive, Mail Station 18
San Diego, CA 92123
engineering@sandiego.gov

T (858) 627-3200
sandiego.gov

THE CITY OF SAN DIEGO

January 30, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Public Works Department, Project Implementation Division Contributions

Please accept this letter as certification of the City of San Diego Public Works Department, Project Implementation Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Catherine Dungca, Senior Civil Engineer, at (619) 533-3778.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Public Works Department, Project Implementation Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

Marnell Gibson
Assistant Director
Public Works Department

APPENDIX

1 OPERATIONAL ADAPTIVE MANAGEMENT

In Fiscal Year (FY) 2016 the City of San Diego (City) completed technical and non-technical monitoring, special studies, pilot studies, and various other efforts related to its Storm Water Program. The City gained valuable information that led to effective adaptation of procedures and operations, which ultimately led to more effective implementation of its Storm Water Program and the Jurisdictional Runoff Management Plan (JRMP). The following are operational adaptive management improvements that the City made during FY 2016:

- **Get it Done Application**
  In late FY 2016, the City released the Get it Done Application (App), which provides a modern, efficient method for members of the public to report issues to the City. One of the App's features allows illicit discharges to be reported by taking a photo with a phone that includes Global Positioning System (GPS) coordinates, and uploading it to the App. According to a recent City survey, 83 percent of respondents stated that they did not want to call the City government to report a problem. The new Get It Done App eliminates the need to call the City for various problems, by allowing residents to report issues online, which was the preferred method of 50 percent of survey respondents. The App also allows residents to report problems using their name or anonymously.

- **Phase V Street Sweeping Pilot**
  The City completed the fifth and final pilot study of the Targeted Aggressive Street Sweeping Pilot Program in FY 2016, which tested the effectiveness of posting limited-hour "no parking" signs on traditionally non-posted street sweeping routes. After two years of data collection on two subject routes, the study confirmed the hypothesis that a significant amount of additional debris (48% and 58% over baseline on the subject routes) can be removed from posting no parking signs on traditionally non-posted roadways. Based on this finding, the City will consider posting additional routes if supported by the community.

- **Enhanced Catch Basin Cleaning Optimization**
  Enhanced catch basin cleaning is a strategy to address pollutant removal from the Municipal Separate Storm Sewer System (MS4) in three of the City's six watersheds. While most catch basins are inspected once per year, this strategy involves inspecting catch basins within the specified watersheds between two and four times per year. The optimization study assigned priorities to individual basins and watersheds based on eight years of historic debris removal. This optimization focused efforts by reducing the number of inspections performed per year, while increasing total debris removal from those inspections. This enhancement will allow the City to target high priority drains to maximize pollutant removal while maintaining cost efficiencies. In FY 2016, approximately 2,500 additional catch basin inspections and cleanings (if necessary) were completed in the Chollas Creek area of the San Diego Bay Watershed.

- **Flood Control Pump Stations**
  To help minimize the risk of flooding in flood-prone areas during storm events, the City utilizes a number of pump stations to increase the flow of water through the conveyance network. Considering the pump stations are connected to the electric network, they only

function when power is running. In FY 2016, a 2,400 volt automatic transfer switch and generator were installed at a critical pump station that are capable of pumping 130,000 gallons of water per minute. This significantly decreases the risk of flooding in the related drainage area because the pump station will continue to operate during a storm event. The City also replaced or refurbished 11 other critical pump stations. Additionally, the City modernized operations at 14 pump stations by installing a telemetry system that remotely alerts staff of failures, allowing for a more immediate response.

- **Storm Drain Inspections**
  To help prioritize replacement of corrugated metal piping in the City's conveyance network, the City used closed-circuit televising at 62 locations in FY 2016 to assess pipe conditions. The City assessed the condition of 28,000 linear feet of corrugated metal piping in FY 2016.

- **Property-Based Inspections**
  In FY 2016, the City further committed to implementing property-based inspections to increase the business inspection program's efficiency and effectiveness. A previously conducted pilot study on inspection practices found property-based inspections more effective at identifying and resolving water quality issues (e.g., improper trash disposal practices and irrigation runoff, etc.) associated with commercial and industrial businesses. The inspections are focused on areas and activities associated with businesses that would not otherwise be inspected for storm water compliance. The inspections greatly increase the number of businesses subjected to storm water inspections while focusing on the pollution generating areas and activities without unduly increasing the inspection load of City inspectors. In FY 2016, the City performed 835 property-based inspections that accounted for over 4,700 business inspections.

- **Tiger Team**
  The Tiger Team was established in FY 2016 to identify, locate and eliminate sources of human specific bacteria sources in the MS4. The Transportation & Storm Water Department (TSW) leads this effort in partnership with the Public Utilities Department. After a specific portion of the MS4 with elevated human specific bacteria was identified, the Tiger Team performed escalated enforcement activities through TSW Code Enforcement, MS4 sampling, MS4 sanitary sewer line televising, and MS4 and sanitary sewer cleaning. Over several months during the reporting year, one problem area within the City was investigated extensively and a source of human specific bacteria in the MS4 was identified and abated.

- **Increased Non-Stormwater Discharge Investigations**
  The City received 215 more complaints of non-stormwater discharges in FY 2016. Approximately 81% of the complaints citywide were resolved. A majority of the investigations that were resolved involved irrigation runoff. Cases were unresolved either because the source could not be identified or the source was groundwater.

  The identification and elimination of irrigation efforts in FY 2016 involved the following:
  1) Special irrigation patrols were conducted on a monthly basis. All violating properties were issued notices of violation and/or a citation.
  2) TSW code compliance partnered with the Public Utilities Department. If a complaint of irrigation with runoff was received, a storm water code compliance officer would issue a notice of violation. If the property had multiple complaints,

that property would become part of an irrigation patrol and could result in a citation.

- **Waterways Maintenance Plan**
  The City began development of the Waterways Maintenance Plan in FY 2016, which will replace the Master Storm Water System Maintenance Program, which expires in 2018. The goals of the Plan are to create an overall holistic storm water management strategy with standard mitigation measures and streamlined maintenance approvals. Objectives of the Plan include flood risk reduction, infrastructure sustainability and resource protection and restoration. In addition to technical scoring criteria, the Plan also includes a unique public input metric so that public concerns are given a tangible value. Planning efforts will continue in FY 2017, with implementation beginning in FY 2019.

- **Off-Site Alternative Compliance Program**
  In FY 2016, the City implemented phase I of the Alternative Compliance Program. This gives development projects that would require on-site structural Best Management Practices (BMPs) to comply with pollutant control and hydromodification management the option to propose off-site alternative compliance projects. The development of phase II also began in FY 2016 and includes establishing an in-lieu fee structure and credit system as an alternative to installing on-site stormwater BMPs.

- **Watershed Master Planning**
  To provide the high-resolution data needed to drive systematic and cost-effective implementation of green infrastructure (GI) projects, the City has developed a comprehensive and dynamic Watershed Master Plan (WMP) in the Chollas Creek Watershed that quantifies progress towards water quality goals and incorporates synergies with other municipal programs. The WMP has the capability to dynamically assess the cost-based water quality benefits of specific GI projects against one another and incorporates a robust prioritization logic that realizes the complex nature of implementing retrofit GI facilities within a highly urbanized environment. Ultimately, the output of this project gives the City a project-by-project roadmap that is prioritized to implement high-impact and high-efficiency BMPs first, leaving less desirable projects for later implementation.

- **Bacteria Regrowth Study**
  The bacteria regrowth study currently being completed by the City includes monitoring to characterize the magnitude and extent of potential *Enterococcus* loading due to regrowth within the City's storm drain system. This study will quantify the amount of bacteria in receiving water samples that are harmless to humans and would potentially be used to refine bacteria water quality standards of the Bacteria TMDL as a part of the re-opener process.

- **Los Peñasquitos Lagoon Restoration Project**
  Modeling was completed in FY 2016 to confirm the preferred alternative for the Los Peñasquitos Lagoon Restoration project. The City was identified as the "lead" for the project. The upcoming tasks in FY 2017 include completing the concept design and starting the public outreach process. In coordination with Copermittees, Caltrans and SANDAG completed the environmental and construction phases for various rail and transit, highway, and environmental protection projects.

2 STORMWATER PROGRAM ACCOMPLISHMENTS/NOTABLE UPDATES

The City continued to implement the key elements of the JRMP. The following are stormwater accomplishments and notable updates that occurred during the FY 2016 reporting period.

- **Water Quality Improvement Plans**

  In FY 2016, the San Diego Regional Water Quality Control Board (Regional Board) accepted the six Water Quality Improvement Plans (WQIPs) that included City jurisdiction. The goal of the WQIPs is to protect, preserve, enhance, and restore the water quality of receiving water bodies. These WQIPs identify the adaptive planning and management process necessary to address the highest priority water quality conditions within a watershed. The WQIPs also identify strategies to achieve improvements in the quality of discharges from the Responsible Agencies' storm drain systems. The City is the lead on the WQIP for the San Dieguito, Los Penasquitos, and Mission Bay watersheds. The City is also a participating agency in the San Diego River, San Diego Bay, and Tijuana River watersheds.

- **JRMP Refinements**

  In FY 2016, the City identified refinements to the JRMP. These refinements were incorporated into the JRMP and will be completed in mid FY 2017. Refinements included minor changes to text to update the discussions of WQIP strategies, updates to the fiscal analysis, updates to the minimum BMPs to address pesticide applications, and updated references to the Storm Water Standards Manual that was adopted in FY 2016. The updated JRMP can be viewed at https://www.sandiego.gov/stormwater/plansreports/jrmp.

- **General Plan and Community Plan Amendments**

  Southeastern San Diego and Encanto Neighborhoods Community Plan Updates:

  The recently adopted Southeastern San Diego and Encanto Neighborhoods Community Plans incorporate language, policies and recommendations concerning the reduction of urban runoff and storm water quality. Stormwater quality plays a significant role in both of these communities since Chollas Creek is a significant feature within both plan areas lead directly to the San Diego Bay. A primary recommendation in both community plans is the restoration and enhancement of the creek, consistent with the Chollas Creek Enhancement Program, which includes the reduction of pollutants that enter the storm water system from nearby uses (see respective Conservation Elements). Specific stormwater language and policies have been adopted for the newly updated Southeastern San Diego and Encanto Neighborhoods Community Plans (adopted October 2015 by City Council).

The following policies have been adopted and will be used to implement BMPs for new development projects in Encanto as an example:

- PLU-53:
    - Facilitate urban gardening as a strategy for creating local healthy food systems and fighting chronic obesity related illnesses, contributing to stormwater retention, and fostering community interaction;
    - Figure 3-4 in the Southeastern San Diego and Encanto Neighborhoods Community Plan illustrates stormwater treatment for streets;
    - Images on page 4-15 in the Southeastern San Diego Encanto Neighborhoods Community Plan illustrate stormwater treatment images;

- P-UD-88: Utilize permeable paving, bioswales, green alleys and/or other stormwater design features that will manage rain water and irrigation runoff while supporting the heavy load vehicles that would service the loading docks and refuse containers;

- Upgrade infrastructure for water and sewer facilities and institute a program to clean the storm drain system prior to the rainy season.

- Install infrastructure that includes components to capture, minimize, and/or prevent pollutants in urban runoff from reaching San Diego Bay and Chollas Creek. (See also Urban Runoff Management in the Conservation and Sustainability Element.)

- P-RE-20: Require that all stormwater and urban runoff drainage be filtered or treated before entering into open space lands.

Draft North Park Community Plan: The draft North Park Community Plan, scheduled to be adopted by City Council in October 2016, also contains specific Stormwater and BMP language in the Conservation Element of the Community Plan as well as in the appendices. The draft North Park Community Plan incorporates language, policies and recommendations concerning the reduction of urban runoff and storm water quality specifically in relation to tree planting as well as "Green Streets". Specific policies include:

- PF-1.15 Implement water improvements programs so there are systematic improvements and gradual replacement of water and wastewater facilities throughout the community. Also see General Plan PF-F.6 PF-G.2, PFH. 3, and PF-I.1.
    - Implement Green Infrastructure strategies to address storm water runoff throughout North Park.

- SE-3.17 Encourage property owners to design or retrofit landscaped or impervious areas to better capture stormwater runoff.

Draft Uptown and Golden Hill Community Plans: Public review drafts of the community plans for Uptown and Golden Hill plan updates were made available for public review in June 2016. The Conservation Elements of the draft community plans address conservation of the natural resources in each community, including open space, natural habitats, canyon sewer maintenance, and management of water resources and

urban runoff. The Public Facilities, Services and Safety Elements also address water, sewer and stormwater infrastructure. The discussion and policies related to these topics are intended to guide sustainable development practices that will minimize ecological footprints within each community and preserve natural features and resources. The Draft Programmatic Environmental Impact Reports were released in the summer of 2016. Adoption of the community plans are anticipated at the end of 2016.

San Ysidro Community Plan Update: A comprehensive community plan update started in San Ysidro in June of 2010 and aims to reflect the current conditions, improve mobility, include the pedestrian environment, and address quality of life issues. A Community Plan Update Stakeholders Advisory Committee (Advisory Committee) was established as part of the plan update effort and consists of diverse representation from the residents, property owners, various business interests, local community organizations, and not-for-profit groups, and participating public agencies within the plan update boundary. The San Ysidro Community Planning Group, which provides City decision-makers with input and recommendations regarding land use plans and development proposals within the San Ysidro plan boundary, makes up the majority of the Advisory Committee members. The Plan update effort is informed by technical studies and the City's 2008 General Plan which promotes current storm water, urban runoff, and water conservation policies. A discussion draft of the plan was released in June 2014 and a public review draft was released in April 2015 and 2016. The plan includes a Conservation Element as well as a Public Facilities Services and Safety Element, and contains specific policies related to reducing storm water runoff in the San Ysidro Community planning area. The plan is anticipated to be adopted in fall 2016.

- **Notices of Violation**

Treatment Control BMPs Notice of Violation: The City has achieved compliance at 146 of the 150 sites identified in the Regional Board's Notice of Violation (Order Number R9-2014-0034). The Regional Board granted the City an extension to achieve compliance at the remaining four sites by May 26, 2017.

During the process of achieving compliance for the aforementioned 150 identified sites, the City has discovered an additional 74 sites which initially appear to be out of compliance due to varying degrees of circumstances. Each of these potential violations consist of post-construction BMP issues. The City is continuing the same process outlined in its quarterly reports to the Regional Board, and is researching each case. After initial research to verify non-compliance or not, the City will follow its established procedures to achieve compliance at each site as required by the MS4 permit that it was permitted.

Administrative Civil Liability Complaint: The Regional Board conducted an audit of the City's construction management program during the 2014-2015 rainy season, and issued an Administrative Civil Liability Complaint in July 2016 for several alleged violations involving the City's construction oversight and enforcement practices. The City has worked diligently to address their initial concerns, and will continue to evaluate and implement strategies to ensure long-term success.

Since 2011, there has been a steady increase in the number of construction projects citywide. This surge in activity required the City to respond in a manner that would

enable the staff to keep up with the demand and allow the managers to effectively oversee the growth.

Several substantial improvements have been made, ranging from updating our standard procedures and increasing our outreach efforts to improving the City's escalating enforcement practices and issuing Administrative Citations and Administrative Civil Penalties to repeat offenders. In addition, the City established bi-weekly coordination meetings with the Storm Water teams from Public Works, Development Services and TSW to more effectively share up-to-date project information, discuss various strategies, collaborate on solutions, and coordinate enforcement on a more routine basis so that escalated enforcement is effective.

Another significant improvement involves the development of a unified storm water enforcement database. This will ensure collaboration between Resident Engineers (RE) and storm water inspectors while in the field so they will know the full inspection and enforcement history prior to entering a site. This resource is expected to be available in FY 2017.

Updating the Storm Water Standards Manual is another milestone improvement that was completed during FY 2016. The additional clarity that's now provided in the Construction BMP Standards section (Part 2) gives the responsible party increased guidance to help prevent construction activities from adversely impacting water quality downstream.

The frequency of the citywide storm water training has increased and proven to be a key factor in equipping and empowering our staff to properly address various field challenges and confidently communicate concerns and violations to the responsible parties. Some of the trainings included mandatory annual storm water training for the REs, Inspectors and Code Enforcement Officers, as well as training for our operations staff from the Public Utilities Department and TSW Streets Division.

3 FISCAL ANALYSIS

3.1 GENERAL BUDGET INFORMATION

The Storm Water Division is responsible for reporting annually on the jurisdictional, watershed and regional fiscal analyses to the Regional Board in accordance with the regional Fiscal Analysis Method developed by the Copermittees in response to Regional Board Order No. R9-2007-0001 (2007 Permit). During the reporting period, the Storm Water Division collected and analyzed financial information from 23 City departments/divisions through its “Annual Report Form” questionnaire, as well as from within the Storm Water Division. A summary of the findings is included below.

FY 2016 fell within the transitional period, as defined under Regional Board Order No. R9-2013-0001, as amended by Order No. R9-2015-0001 (Municipal Permit). During the transitional period, most of the jurisdictional portions of the City’s program continue to follow the requirements of the 2007 Permit, while the JRMP and WQIPs were being developed in response to the current Municipal Permit. The WQIPs were approved by the Regional Board at the end of FY 2016. The expenditures described for FY 2015 therefore reflect costs to comply with the transitional period stormwater requirements in effect during FY 2015, which are a combination of 2007 Permit and current Municipal Permit standards. Since the WQIPs were approved during FY 2016, partial implementation began, but full implementation will commence in FY 2017.

It is expected that the City will begin full implementation of current Municipal Permit requirements during FY 2017. The City will implement the revised JRMP, which updates the City’s jurisdictional stormwater program to follow the current Municipal Permit requirements rather than the 2007 Permit requirements. The City’s fiscal analysis reporting structure in turn will change, reporting expenditures, and funding sources in the following three main categories: JRMP (jurisdictional), WQIP (watershed), and flood risk management. That structure is consistent with the framework described in the City’s Watershed Asset Management Plan (WAMP), the WQIPs to which the City is a party, and the JRMP. FY 2015 is the last year in which JRMP and flood risk management will be lumped together under the heading of “Jurisdictional Component” rather than reported separately.

3.2 FISCAL ANALYSIS METHODS

While the City used the format and guidelines included in the Fiscal Analysis Method for reporting purposes, a few modifications were necessary to address how the City tracks accounts internally. Modifications to the expenditure categories are described in the relevant sections below. In many cases, estimated percentages were used to allocate expenditures into the appropriate municipal permit component categories, including watershed and regional.

3.2.1 Fiscal Analysis Results

3.2.1.1 Expenditures

The City’s FY 2016 Transitional JRMP Regional Program total expenditures ($75,934,083) for implementing the Municipal Permit requirements are summarized in Table 1.

Table 1: FY 2016 Jurisdictional, Watershed, and Regional Expenditures Summary

Jurisdictional Component	
Administration	$11,179,605
Development Planning (including public and private projects)	$1,897,784
Construction (including public and private projects)	$632,646
Municipal (including Non-emergency Fire Fighting expenditures)	$30,146,109
Storm Water Division Capital Improvements Program (CIP)	$7,929,308
Industrial and Commercial	$2,001,544
Residential, Education, and Public Participation	$2,159,991
Illicit Discharge Detection and Elimination (IDDE)	$11,339,120
Jurisdictional Total	**$67,286,108**
Watershed Component[1]	
San Dieguito Watershed	$1,105,348
Los Peñasquitos Watershed	$2,061,071
Mission Bay Watershed	$1,242,769
San Diego River Watershed	$680,843
San Diego Bay Watershed	$2,165,456
Tijuana River Watershed	$686,584
Watershed Total	**$7,942,071**
Regional Component	
Total Copermittee Cost Share for the City of San Diego	$342,001
Additional Regional Costs for education efforts, monitoring, document reviews, regional meeting attendance, and special projects	$363,903
Regional Total	**$705,904**
Total Costs	**$75,934,083**

[1] Watershed Component costs do not include Capital Improvements Program (CIP) costs. CIP costs are only included in the Jurisdictional Component's Storm Water Division Capital Improvements Program Category.

Transitional JRMP Expenditures

The City's FY 2016 Citywide expenditures for implementing the jurisdictional Municipal Permit requirements are depicted in Figure 1. Expenditures were provided as actual costs in most cases, and when the actual costs could not be determined, estimates of actual costs were provided. The Storm Water Division used the expenditure categories detailed in the Fiscal Analysis Method for jurisdictional reporting. However, because of implementation overlap with the City's education, public participation, and residential Municipal Permit components, it is difficult to separate out individual component costs. Therefore, the expenditures for residential, education, and public participation are reported as one expenditure category.

A total of $67,286,108 was expended in FY 2016 to implement JRMP activities citywide. This amount includes costs paid by sewer and water rate payers (which are used for sewer and water-related services) and costs reimbursed by project applicants. An overview of the expenditures reflected in this component is described below.

Administration ($11,179,605)

Activities identified in this section represent personnel and non-personnel expenses for administration and contracts, grant management, citywide management, staff training, reporting, and assessment of the Municipal Permit.

Development Planning ($1,897,784)

Activities identified in this section represent personnel and non-personnel expenses for plan check reviews, incorporating BMPs into project designs, BMP Design Manual development, and General Plan updates. This category includes expenses for private and public projects.

Construction ($632,646)

Activities identified in this section represent personnel and non-personnel expenses for plan check review services, field inspections related to grading permits, public improvements, and building activities. This category includes expenses for private and public projects.

Municipal ($30,146,109)

Activities identified in this section represent personnel and non-personnel expenses for street sweeping, storm drain and channel maintenance, BMP implementation, and municipal facility and activity inspections. Additionally, this section includes the expenditures for Fire Department activities not related to emergency firefighting, such as facility inspections, stormwater BMPs, etc.

Capital Improvement Program ($7,929,308)

Activities identified in this section represent personnel and non-personnel expenses for implementation of new construction and planned improvements to existing facilities for storm water management. Projects may include, but are not limited to, the construction, purchase, or major renovation of buildings, utility systems, and other facilities to achieve storm water requirements. In addition, they may also include land acquisitions and roadway projects to install storm water facilities.

Industrial and Commercial ($2,001,544)

Activities identified in this section represent personnel and non-personnel expenses for inspection of industrial and commercial facilities. This also includes personnel and non-personnel expenses for the stormwater components of Food Establishment Wastewater Discharge Program (FEWD) and Industrial Wastewater Control Program (IWCP) inspections.

Residential, Education, and Public Participation ($2,159,991)

Activities identified in this section represent personnel and non-personnel expenses for educational materials, outreach efforts and events, public service announcements (PSAs), household hazardous waste (HHW) and used oil outreach, and community events.

Illicit Discharge Detection and Elimination ($11,339,120)

Activities identified in this section represent personnel and non-personnel expenses for identification and elimination of illicit discharges, enforcing the City's stormwater ordinance and implementation of the administrative civil penalties and citation process, and the urban runoff monitoring program.

Watershed Expenditures

The City's watershed expenditures during FY 2016 for the implementation of the watershed Municipal Permit requirements were provided as actual costs and when the actual costs could not be determined, estimates of actual costs were provided. The Storm Water Division used the expenditure categories (administration, watershed activities, cost share contribution, and other) detailed in the Fiscal Analysis Method for watershed reporting. The watershed expenditures included in this report only capture City expenditures and do not account for any expenditure disbursed by other Copermittees within the watershed(s).

In total, $7,942,071 was expended in FY 2016 for the implementation of citywide watershed activities. This amount includes costs for the implementation of applicable TMDLs along with special studies.

Regional Expenditures

The City's FY 2016 regional expenditures ($705,904) for the implementation of the regional Municipal Permit requirements are primarily the City's share of regional Copermittee stormwater program costs. Additional costs include estimated staff time to attend regional meetings and other related administration costs. The Storm Water Division used the expenditure categories (administration, cost share contribution, regional activities, and other) detailed in the Fiscal Analysis Method for regional reporting. The regional expenditures included in this report only capture City expenditures, and do not account for any expenditure disbursed by other Copermittees in the region.

3.2.1.2 ***Grant Funding for Special Studies***

In addition to resources identified for Municipal Permit requirements, the City actively seeks grants, and other funding sources, for special studies and Capital Improvement Projects. For the most part, funding for these projects may be limited to the projects specified and the City may restrict funding reallocation to other projects. Therefore, these resources are currently not incorporated in calculations for total Municipal Permit requirements expenditures detailed in Section 2.2.1.4 above. Table 2 lists projects that were initiated and/or in progress during FY 2016. It is important to note that the projects span multiple years and the amounts listed below are not just representative of FY 2016.

Table 2: Funding for Special Projects

Funding Source	Project	Amount	Matching Fund Amount	Total Amount[2]
San Diego County Water Authority (SDCWA)	Memorial Park Infiltration Basin Construction	$255,651.00	$295,904.00	$551,555.00
State Water Resources Control Board (SWRCB)	43rd & Logan Monitoring & Assessment	$689,300.00	$85,362.00	$774,662.00
SDCWA	Bannock Avenue Infiltration Construction	$630,500.00	$893,300.00	$1,523,800.00
SWRCB	Southcrest Park Infiltration Project	$1,880,070.00	$777,970.00	$2,658,040.00
Total Grant Funding		**$3.5 million**	**$2.0 million**	**$5.5 million**

2 Amounts span multiple years and not just FY 2016

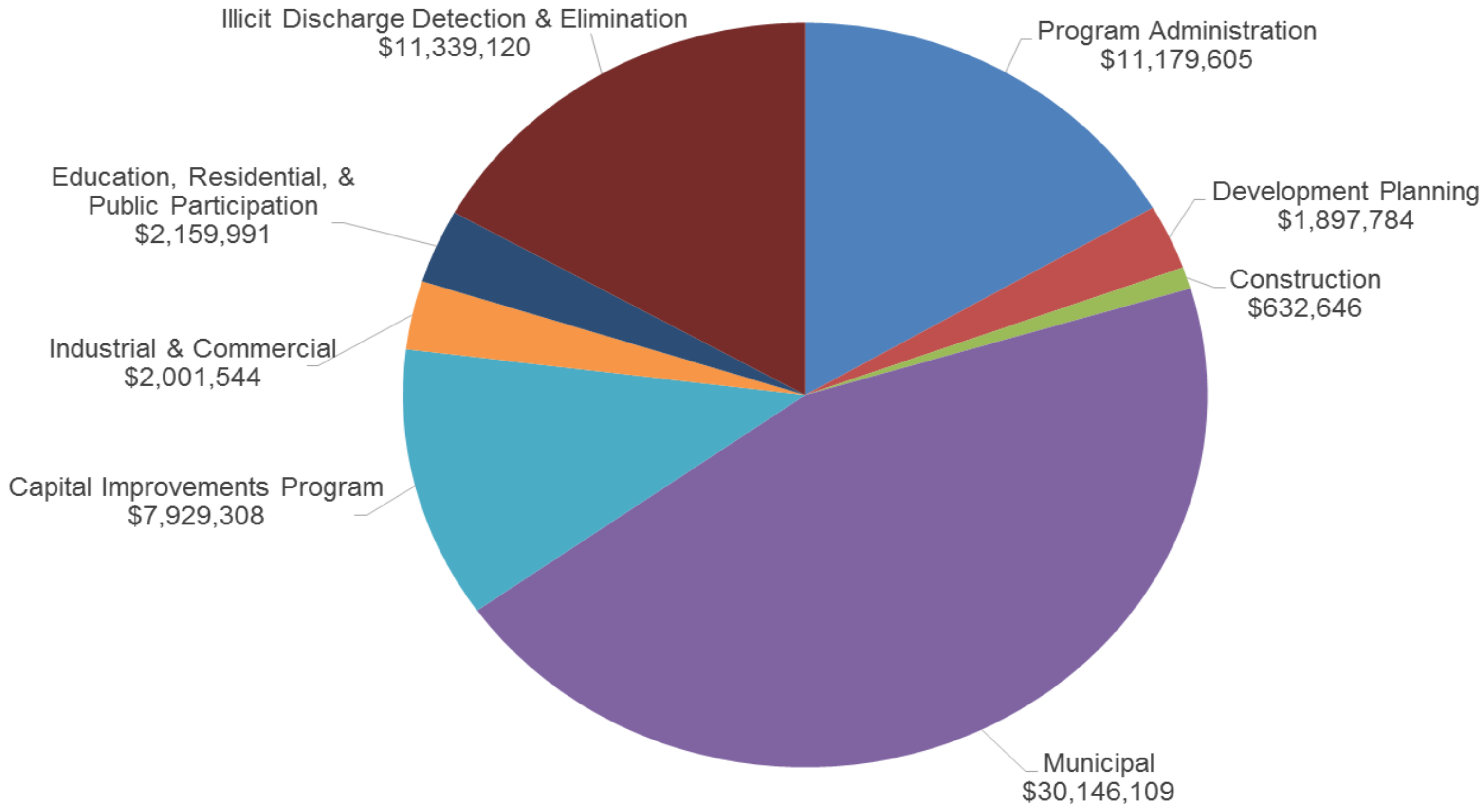

Figure 1: FY 2016 Citywide JRMP Expenditures by Permit Area

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3.2.2 Funding Sources

Citywide implementation of Municipal Permit requirements is funded through four main types of governmental funds: the General Fund, Special Revenue Funds, Enterprise Funds, and Internal Service Funds.

3.2.2.1.1 General Fund

The General Fund is the main fund for the City and is supported by major revenue sources, including property tax, sales tax, transient occupancy tax, and franchise fees. Departments funded by the General Fund provide core community services.

3.2.2.1.2 Special Revenue Funds

Special Revenue Funds account for revenues received for specifically identified purposes. Some of the larger funds that fall under this category include TransNet, Gas Tax, and Special Promotion programs.

3.2.2.1.3 Enterprise Funds

Enterprise Funds are initiated for specific purposes and funded through fees for services. This funding type is designated for the operations, management, maintenance, and development of the department providing the service. For implementation of citywide JRMP activities, activities are funded through the following enterprise funds:

- Airports Fund
- Development Services Enterprise Fund
- Golf Course Enterprise Fund
- Recycling Fund
- Refuse Disposal Fund
- Sewer Revenue Funds
- Water Utility Fund

3.2.2.1.4 Internal Service Funds

Internal Service Funds are comprised of fees for services provided by one City department to another City department or division. For implementation of citywide JRMP activities, activities are funded through the following internal service funds:

- Engineering and Capital Projects Fund
- Equipment Division Funds

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City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 1: Summary of Watershed Specific Data from the IDDE Program

JRMP Annual Report Form – Section IV. Illicit Discharge Detection and Elimination Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of non-storm water discharges reported by the public	119	353	541	368	634	47	**2,062**
Number of non-storm water discharges detected by Copermittee staff or contractors	60	172	317	314	393	50	**1,306**
Number of non-storm water discharges investigated by the Copermittee	171	518	845	683	1,021	97	**3,335**
Number of sources of non-storm water discharges identified	143	442	736	559	828	94	**2,802**
Number of non-storm water discharges eliminated	141	434	697	553	819	92	**2,736**
Number of sources of illicit discharges or connections identified	142	437	715	551	805	94	**2,744**
Number of illicit discharges or connections eliminated	140	429	676	545	796	92	**2,678**
Number of enforcement actions issued	141	436	709	553	819	93	**2,751**
Number of escalated enforcement actions issued	69	197	351	349	445	61	**1,472**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 2: Summary of Watershed Specific Data from the Development Planning Program

JRMP Annual Report Form – Section V. Development Planning Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/ La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of proposed development projects in review	70	241	332	233	561	60	**1,497**
Number of Priority Development Projects in review	5	32	15	21	38	8	**119**
Number of Priority Development Projects approved	88	110	76	61	138	27	**500**
Number of approved Priority Development Projects exempt from any BMP requirements	0	0	0	0	0	0	**0**
Number of approved Priority Development Projects allowed alternative compliance	0	0	0	0	0	0	**0**
Number of Priority Development Projects granted occupancy	75	63	7	30	40	9	**224**
Number of completed Priority Development Projects in inventory	118	178	141	113	213	89	**852**
Number of high priority Priority Development Project structural BMP inspections	1	9	0	1	1	5	**17**
Number of Priority development project structural violations	1	8	0	1	1	5	**16**
Number of enforcement actions issued	1	15	0	3	4	12	**35**
Number of escalated enforcement actions issued	0	3	0	1	1	1	**6**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 3: Summary of Watershed Specific Data from the Construction Managment Program

JRMP Annual Report Form – Section VI. Construction Management Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/ La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of construction sites in inventory	1,364	4,300	2,091	1,830	3,870	448	**13,903**
Number of active construction sites in inventory	26	47	37	38	51	8	**207**
Number of inactive construction sites in inventory	12	112	216	188	425	36	**989**
Number of construction sites closed/completed during reporting period	23	169	276	258	518	44	**1,288**
Number of construction site inspections	10,074	27,037	9,404	8,875	18,737	2,801	**76,928**
Number of construction site violations	169	270	195	78	211	154	**1,077**
Number of enforcement actions issued	114	164	183	51	187	150	**849**
Number of escalated enforcement actions issued	65	91	16	25	32	6	**235**

City of San Diego FY 2015 JRMP Annual Report

Attachment 1

Table 4: Summary of Watershed Specific Data from the Existing Development Managment Program

JRMP Annual Report Form – Section VII. Existing Development Management Program	San Dieguito Watershed				Los Peñasquitos Watershed				Mission Bay/La Jolla Watershed				San Diego River Watershed				San Diego Bay Watershed				Tijuana River Watershed				Total Citywide			
	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES
Number of facilities or areas in inventory	23	1,542	81	12	123	8,282	915	27	218	8,911	464	32	121	10,175	513	33	197	14,085	690	70	20	2,075	369	6	702	45,070	3,032	180
Number of existing development inspections	22	308	6	1	117	1,533	140	4	159	4,801	186	5	114	2,573	99	5	195	3,197	102	5	19	233	41	2	626	12,645	574	22
Number of follow-up inspections	0	14	0	0	0	263	13	0	0	166	4	3	0	193	5	4	0	270	44	4	0	31	7	0	0	937	73	11
Number of violations	3	49	0	109	18	388	37	375	34	413	6	424	10	420	11	481	23	511	34	709	1	60	19	69	89	1,841	107	1,819
Number of enforcement actions issued	4	58	0	107	22	490	48	285	46	462	9	407	16	514	13	365	41	623	44	543	1	65	21	62	130	2,212	135	1,790
Number of escalated enforcement actions issued	0	23	0	50	2	148	8	134	0	205	3	182	0	172	0	236	6	217	11	291	0	26	13	36	8	791	35	884

MUN Municipal
COM Commercial
IND Industrial
RES Residential

D.3.3 City of San Diego Strategies

City of San Diego's strategies are detailed in Tables D-3 through D-6.

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Table D-3
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

~~Strikeouts~~ and red text are text edits that have been made up to the current date since the WQIP September 2015 submittal.

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Jurisdictional Strategies								
Note: Strategy IDs with an asterisk indicate those strategies that are considered "jurisdictional" in the MS4 Permit, but are considered enhancements to the JRMP to target highest priority water quality conditions.								
JRMP (E.2-E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
CSD-JRMP-01	Establish guidelines and standards for all development projects; provide technical support related to implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area or implement easements to protect water quality, where applicable and feasible le. Includes internal coordination and collaboration between City departments (DSD, PWD, and Engineering) to improve success and long-term benefits of BMPs.	Refer to JRMP Section 4. ~~All high priority projects will be inspected annually prior to the rainy season. 20 percent of all projects will be inspected annually. Maintenance inspections include examination of all structural BMPs at a project to verify that each structural BMP is working, being maintained properly, and is in compliance with all applicable City ordinances and permits.~~ May include providing technical support and consultation for other City departments that review project submittals for compliance with Storm Water Standards Manual requirements. May also include review of City projects for compliance with Storm Water Standards Manual requirements.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY16 Notes: Revised Storm Water Standards Manual went into effect on February 16, 2016. FY17 Notes: The Storm Water Standards will be revised to include Critical Coarse Sediment Yield Area mitigation measures that were developed through a TAC process, along with other minor clarifications.
CSD-JRMP-02	Develop Design Standards for Public LID BMPs.	Improve quality of design to ensure efficiency and reliability in public designs.	FY14-FY15	Continuous-As needed	Yes	No Change	Yes	FY16 Notes: Draft Green Infrastructure standard drawings and specifications are currently in the review process. FY17 Notes: Plan to develop more standard drawings and specifications for other green infrastructure components.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-03	Outreach to impacted ~~industry~~ commercial, industrial, municipal, and residential development regarding minimum BMP requirement updates.	~~Affects commercial, industrial, and residential development.~~ May include onsite education at the time of inspections, city staff training, and mailers to business owners and prospective business owners.	FY15	Continuous-As needed	Yes	Revised to clarify strategy	Yes	FY16 Notes: Sent out monthly business Tax License renewal mass mailings, which included information about storm water BMPs. Violation location information from the Residential Patrol Program is used to target outreach.
CSD-JRMP-04*	Train staff on LID regulatory changes and LID practices.	Formal training is required for all staff involved in development plan review to increase knowledge of LID BMPs. Goal of training associated with LID practices and regulations is to promote LID implementation and to avoid adverse conditions such as trees planted within swales, or planned drainage patterns which obstruct or inhibit LID performance.	FY16	Continuous-As needed	Yes	No Change	Yes	FY16 Notes: Presented at a PWD training to discuss the revised Storm Water Standards Manual. Provided a plan to check training for plan reviewers at DSD and PWD staff in May 2016.
CSD-JRMP-05*	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities to support compliance with the MS4 Permit and TMDLs in a reasonable manner. Ensure consistency with the City of San Diego's BMP Design Manual. Update the Storm Water Standards Manual accordingly.	Municipal codes and ordinances will be brought to City Council for consideration to encourage LID implementation (e.g., runoff detention and filtration using natural filters and storm water retention for reuse). LID storm water management will be encouraged in proposed codes and ordinances associated with development and redevelopment projects, which are brought to City Council for consideration.	FY15	Continuous-As needed	Yes	No Change	No	None
CSD-JRMP-06	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	Technical education and outreach to the development community includes outreach on design standards, City design manuals, and the WMAA.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Presented the revised draft Storm Water Standards at two public workshops in September 2016.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
Priority Development Projects (PDPs)								
CSD-JRMP-07	For PDPs, administer a program and provide technical support to other City departments to ensure implementation of on-site structural BMPs to control pollutants and manage hydromodification by developing City wide storm water development standards and design guidelines.	Administer a program in coordination with other City departments to promote and confirm a thorough understanding of requirements for implementing structural BMPs that control pollutants and manage hydromodification. Includes requirements to confirm proper design and construction through processes controlled by other City departments. Please see Attachment 1 for details on PDP related BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City enhanced the Storm Water Quality Management Plan (SWQMP) template that was developed as a Copermittee effort for developers to use.
CSD-JRMP-08	Institute a program to verify and enforce maintenance and performance of treatment control BMPs.	Refer to JRMP Section 4.5. The Storm Water Division is responsible for annually verifying that all structural BMPs within its inventory are being properly maintained. The Storm Water Division performs verification through an Annual Maintenance Verification mailing and a direct maintenance inspection program. Parties responsible for maintenance of structural BMPs are required to complete and sign the Annual Maintenance Verification, certifying that the structural BMPs are being properly maintained. Direct maintenance inspections will be performed at all projects for which an Annual Maintenance Verification Form was not completed. All high priority projects will be inspected annually prior to the rainy season. 20 percent of all projects will be inspected annually. Inspect additional BMPs as needed. Medium and low priority projects will not require inspection if they have completed their Annual Maintenance Verification form, unless they are part of the 20 percent of projects that are annually inspected.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY17 Notes: For porous pavement BMPs, staff plan to use an infiltrometer to measure BMP effectiveness.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-09	Update ~~BMP Design Manual procedures~~ Storm Water Standards Manual to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP Section 4. Storm Water Standards Manual will be updated in accordance with the Permit and made available on the City's website.	FY15	Continuous every 5 years/ permit cycle	Yes	Revised to clarify strategy	Yes	FY17 Notes: The Storm Water Standards will be revised to include Critical Coarse Sediment Yield Area mitigation measures that were developed through a TAC process, along with other minor clarifications.
CSD-JRMP-10*	Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	Amend BMP Design Manual and zoning standards/requirements which address reduction of pollutants for common areas of trash build-up (e.g. restaurants, supermarkets, "big box" retail stores with food, pet stores). Most effective method for source control of bacteria and trash is to employ four-sized trash enclosures with a cover over trash areas.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on trash enclosures (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-11*	Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, groomers, and pet care stores.	Amend BMP Design Manual and zoning requirements (including retrofits) to provide supplemental standards for animal facilities (including animal shelters, dog daycares, veterinary clinics, groomers, pet car stores, and breeding, boarding, and training facilities). Supplemental standards may include requiring covered trash enclosures, identification of landscaped relief areas on site plans, ensuring drainage connections and treatment swales for areas that will not drain to the sanitary sewer, as well as inspection of grading, drainage, and landscaping for outdoor exercise areas.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on animal facilities (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-12*	Amend BMP Design Manual for nurseries and garden centers.	Amend BMP Design Manual to provide supplemental standards for plant nurseries and garden centers. Standards will focus on reducing irrigation runoff, and loading of sediment, pesticides, and nutrients. Measures may include: covered outdoor storage, green waste management BMPs, improved irrigation efficiency to reduce dry-weather runoff, and containment of runoff from impervious areas where plants and materials are stored.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on nurseries (See Part 1, Appendix E of the Storm Water Standards).

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-13*	Amend BMP Design Manual for auto-related uses.	Amend BMP Design Manual to provide supplemental standards for automotive-related uses to reduce loading of metals, oils, grease, and trash. Measures may include: four-sized covered trash enclosures, and careful review of auto-related usage areas (e.g. garage bays at repair shops) for grading, drainage, and drain connections to sanitary sewer systems.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on auto-related facilities (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-14*	~~Develop and administer an alternative compliance program for on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects). Refer to Section 4.2.5.~~ Offsite Alternative Compliance Option	Refer to JRMP Section 4.2.3.1. WMAA and Water Quality Equivalency Study completed in FY15. Phase I, applicant implemented projects, is anticipated to be in effect by the end of FY16 contingent on Regional Board's approval of the WQIPs. Phase II, the expansion of the program to include other alternative compliance options, is expected to begin in FY16.	FY15	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY16 Notes: Phase 1 of the Alternative Compliance Program (ACP) went into effect on 2/16/16. Development on Phase 2 of the ACP, including public involvement via Technical Advisory Committee (TAC) meetings, began during FY16. FY17 Notes: Continue developing Phase 2 of ACP. Topics to discuss include: environmental permitting, long-term facility maintenance, legal agreements and credit tracking, maintenance and permitting rules, and credit tracking and legal rules. Public involvement via TAC meetings will continue.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
E.4 Construction Management								
CSD-JRMP-15	Administer a program to oversee implementation of temporary BMPs that control sediment and other pollutants during the construction phase of projects. Includes requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other City departments.	Refer to JRMP Section 5. Inspections performed by the City or City staff provide verification that each site is in conformance with the Construction Storm Water BMP Performance Standards in the Storm Water Standards Manual. Inspections are tracked to ensure that they meet the minimum inspection frequencies. High priority active and inactive sites are inspected bi-weekly during the rainy season. Medium priority sites are inspected monthly during the rainy season. Low priority sites are inspected as-needed during the rainy season. All sites are inspected as-needed during the dry season. Please see Attachment 1 for details on construction BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
CSD-JRMP-17	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP Sections 6, 7, and 8. All industrial and commercial areas are inspected once within ~~the Permit term (~~five years~~)~~. At a minimum, 20 percent of industrial and commercial areas receive onsite inspections every year. Municipal facilities are inspected twice annually, once prior to the rainy season, and once during the rainy season. Residential management areas (RMAs) within the City are to be inspected once within five years ~~the Permit term~~, at a minimum. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	<u>FY16 Notes:</u> The City began patrols of residential management areas in FY16. See the City's JRMP Annual Report form, also included in Appendix D, for numbers of inspections, violations, and enforcement actions for all types of existing development.
CSD-JRMP-18	Update minimum BMPs for existing residential, commercial, and industrial development. Specific updates to BMPs include required street sweeping, catch basin cleaning, and maintenance of private roads and parking lots in targeted areas.	Refer to JRMP Appendix IX. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY15	Continuous every 5 years/ permit cycle	Yes	No Change	Completed	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-JRMP-19	Outreach to property managers and trash haulers to elevate the emphasis of power washing as a pollutant source.	Emphasis will be placed on non-compliant washing as an enforceable violation. Will occur city-wide in residential, commercial, and industrial areas.	FY15	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: City staff utilized a new fact sheet consistent with updated permit conditions to inform non-compliant power-washing operators of BMP requirements. The fact sheet was also provided to the San Diego Downtown Partnership as part of the Division's education and outreach effort for downtown businesses. FY17 Notes: The City anticipates distributing a comprehensive BMP guidebook to businesses and business district leaders in areas with regular power-washing activities.
CSD-JRMP-20	Implement property based inspections.	Property-based inspections increase awareness and responsibility for individual properties to tackle issues associated with trash, landscapes, and parking areas. Expanding beyond the business-level inspections will achieve different and more effective opportunities for education, outreach, inspection, and enforcement to encourage water conservation strategies. Inspection frequency dependent on type of facility. See CSD-9 for inspection frequency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Inventoried properties have been mapped in GIS. The City's inspection data management system has also been set up to track and map the properties inspected each fiscal year and over the Permit cycle.
CSD-JRMP-21	Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	Verify and bring to City Council for consideration an update (as needed) for the City's Municipal Code (43.0301) to meet new permit requirements for swimming pool discharges.	FY15	Continuous-As needed	Yes	No Change	Completed	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-JRMP-22*	Promote and encourage implementation of designated BMPs for residential and non-residential areas.	Landscape-based rebates are a "gateway" for adoption of other beneficial practices and are one of the nonstructural methods which address impacts from single-family residential areas (City of San Diego 2011 program development background study). Residential incentives can include: education and training ~~(neighborhood watershed field days)~~, and aggressive subsidies or rebates for grass replacement and rainwater harvesting. Existing programs will be expanded overall, and ~~also have targeted expansion within specific subwatershed, particularly with highest water quality priority conditions. W~~will occur city-wide in residential, commercial, and industrial areas.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	None
MS4 Infrastructure								
CSD-JRMP-23	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels as allowed by resource agencies, detention basins, pump stations, etc.) for water quality improvement and for flood control risk management.	Refer to JRMP Section 7. Storm drain inlets are inspected ~~at least once per year~~ generally annually, and cleaned when accumulated materials are present. Other MS4 and related structures are inspected as needed.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY16 Notes: 7,087 storm drain inspections were completed in the WMA, and 386.5 tons of sediment, trash, and debris were removed during storm drain cleaning. In addition to routine maintenance of the MS4, across its entire jurisdiction the City repaired or replaced 12 pump stations and modernized another 14 pump stations, televised 28,000 linear feet of pipe in 62 locations, and began the development of the Waterways Maintenance Plan and Channel Maintenance Prioritization Plan. Removed 0.35 tons of trash from routine open channel trash cleaning.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-JRMP-24*	Enhanced catch basin cleaning to increase pollutant removal (up to 4 times per year) in the rainy season.	To increase pollutant load removal, catch basins will be cleaned up to four times per year in the rainy season. The City of San Diego's pilot study found that major pollutants may vary from neighborhood to neighborhood (yard waste versus trash and sediment). Implementation may be adapted based on catch basin record keeping and cleaning optimization. Increase in frequency will be phased over 4 Fiscal Years.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Additional staff was hired to begin phased program ramp up, FY17 Notes: Begin performing enhanced catch basin cleaning.
~~CSD-JRMP-26~~	~~Increased frequency of catch basin inspection and as-needed cleaning.~~	~~For every segment of channel that is cleared, the City will conduct an inspection and as-needed cleaning of every catch basin within 100 feet of the cleared segment of channel. Additional inspection and as-needed cleaning will occur every three months for one year after the segment of channel is cleared.~~	~~FY13~~	~~Completed within schedule in 5 years (ends FY18)~~	NA	Incorporated into CSD-JRMP-27	NA	NA
CSD-JRMP-27	Implement additional BMPs in coordination with Master Maintenance Plan Enhancements.	For each channel segment, City will either 1) implement landscape retrofits on one residential property, 2) increase street sweeping frequency by prioritizing high traffic commercial routes adjacent to maintained channel, 3) construct and maintain a stormwater management BMP (e.g. biofiltration system, permeable pavement, vegetated swale, restored wetlands), or 4) increase frequency of catch basin inspection and as-needed cleaning for one year after maintenance.	FY13	Completed within schedule in 5 years (ends FY18)	NA	Strategies CSD-JRMP-26 and CSD-JRMP-36 were combined into one strategy, CSD-JRMP-27, to streamline recordkeeping	Yes	FY16 Notes: Not applicable, channel maintenance did not occur in the Los Peñasquitos WMA during FY16. FY17 Notes: If channel maintenance activities occur in this watershed during FY17, this mitigation approach may be used in FY17.
CSD-JRMP-28	Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	In order to limit inflow of pollutants and reduce pollutant loads, proactive measures will be taken to improve, repair, and replace MS4 components. The City of San Diego will start a multi-year program of repairing and replacing storm drain pipes to reduce sediment loading to the MS4. Development of an assessment management program and bond issues will be addressed. Exploration of daylighting pipes will take place where feasible and appropriate.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-JRMP-29	Replacement of hard assets.	Includes needed replacement of storm drains and structures.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-JRMP-30	Coordinate with other City departments (PUD) to implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	Refer to JRMP Section 7.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The Tiger Team was established in FY16 as a joint effort between TSW & PUD to identify and eliminate exfiltration sources from the sanitary sewer system to the MS4. Since the team was created, it has successfully eliminated one major source. FY17 Notes: For FY17, the team is focusing on two sites within the City and are identifying more.
CSD-JRMP-31*	Identify sewer leaks and areas for sewer pipe replacement prioritization.	Risk assessment to include identifying targeted areas (age, location, proximity to MS4), coming up with methodology, pilot, desktop exercise/analysis.	FY16	Continuous-As needed	Yes	No Change	Yes	None
Roads, Streets, and Parking Lots								
CSD-JRMP-32	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP Section 7.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Approximately 21,030 curb miles of roads, streets and highways were swept in the WMA.
CSD-JRMP-33	Outreach to street sweeping enhancement-targeted areas.	Division staff will conduct a thorough education and outreach effort beginning months in advance of the expansion of sweeping routes. Staff will work with the affected Council offices, community stakeholders, non-governmental organizations and community groups to build community awareness and acceptance of the enhanced sweeping program.	FY16	Continuous-As needed	Yes	No Change	Yes	FY16 Notes: Developed targeted communication materials for lead commercial property managers that covered various topics, including enhanced street sweeping.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-JRMP-34*	Enhance street sweeping through equipment replacement (replace mechanical sweepers with regenerative air sweepers) and route optimization (sweep all routes twice per month) in targeted areas.	Following outreach and posting, street sweeping efforts will be increased in target areas (those with sediment or metals as a highest priority water quality conditions). Replacement of street sweeping equipment with high-efficiency regenerative air and vacuum-assisted sweepers over time is expected to further increase load reductions (even if current routes and frequencies remain unchanged).	FY17	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: City purchased five vacuum sweepers. Existing routes in the Los Peñasquitos Watershed were identified and recommended to be swept. Also began sweeping various routes on an individual basis to assess sweeper function. FY17 Notes: The City plans to develop a route optimization process in Los Peñasquitos.
CSD-JRMP-35*	Initiate sweeping of medians on high-volume arterial roadways.	Medians of roadways are also a potential source of pollutants. Consider implementing or increasing sweeping of medians. Consider mechanical and hand sweeping techniques.	FY17	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Median sweeping began in FY16. A total of 4,315 median miles were swept in FY16 City-wide.
~~CSD-JRMP-36~~	~~Implement additional street sweeping (Settlement Agreement).~~	~~City shall increase street sweeping frequency by prioritizing high traffic commercial routes adjacent to maintained channel with vacuum-assisted sweeper for every 400 linear feet of vegetation that is removed (except for removal of invasive species, e.g., Arundo) within a drainage area. Sweeping shall be conducted in median areas that are not subject to regular sweeping routes, and shall occur at a frequency of at least once per quarter for one calendar year after maintenance. Funding and resources were secured for FY2013. Funding for future fiscal years is contingent on annual budget approval by City Council.~~	~~FY13~~	~~Completed within schedule in 5 years (ends FY18)~~	~~NA~~	~~Incorporated into CSD-JRMP-27~~	~~NA~~	~~NA~~
Pesticides, Herbicides, and Fertilizer BMP Program								
CSD-JRMP-37	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education.~~ permits, and certifications.~~	Refer to JRMP Sections 7, 8, and 9.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Retrofit and Rehabilitation in Areas of Existing Development								
CSD-JRMP-38	Development of a strategy and identification of candidate areas of existing development necessary for implementing retrofit projects and facilitate the implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program will include methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to high priority water quality conditions, potential pollutant load removal effectiveness, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards. Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None
CSD-JRMP-39	Development of a strategy and identification of candidate areas necessary to implement stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program ~~(Section 4.2.5.4 and Appendix P)~~ will include methods for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas. Rehabilitation project selection will be based upon a variety of factors including existing stream or habitat degradation, potential future cumulative stream or habitat impacts, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy	NA, Not scheduled to be implemented in FY17	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
CSD-JRMP-40	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP Section 3. ~~The City must visually inspect at least 500 identified and prioritized major MS4 outfalls at least annually during dry weather conditions.~~ Inspections of major MS4 outfalls conducted in response to public reports and staff or contractor reports and notifications may count toward the required visual inspections of MS4 outfall discharge monitoring stations. Please see Attachment 1 for details on how the IDDE Program will address sources causing or contributing to the HPWQC.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY16 Notes: 518 cases were investigated, including 353 reported by the public; 429 illicit discharges or illicit connections were eliminated; and 436 enforcement actions and 197 escalated enforcement actions were issued in the WMA. City-wide, the number of discharges investigated has almost tripled since FY14 (1,186 in FY14 to 3,335 in FY16). The increase is believed to be mainly due to increased reports of irrigation runoff discharges from the public and from PUD.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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E.7 Public Education and Participation (B.3.b(1)(a)(iii))								
CSD-JRMP-42	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Section 9.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City continued its extensive education and outreach effort across each of the six watershed areas in the City. This included regular attendance at community events in order to share education materials and the continuing sponsorship of community clean-up and pollution prevention education events with the City's Non-Governmental Organization partners, including I Love A Clean San Diego and San Diego Coastkeeper.
CSD-JRMP-43	Continue implementation of a Pet Waste Program.	Pet Waste Program includes outreach on "Scoop the poop", installation of posts for dispensers, distribution of lawn signs, and attendance at dog-related community activities.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Printed and distributed more pet waste signage. FY17 Notes: New bag dispensers will be installed and there will be outreach at community events. More signage will be installed.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-JRMP-44	Promote and encourage implementation of designated BMPs in commercial and industrial areas.	Provide education and outreach on BMPs for commercial businesses and industrial facilities. Will occur city-wide in non-residential areas.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City continued its mandated commercial and industrial facility inspection effort sharing industry specific education materials with business and property owners when BMP deficiencies were discovered. FY17 Notes: The City will continue its inspection and education effort while also introducing alternative compliance strategies for new developments and sharing the updated Storm Water Standards Manual with target audiences.
CSD-JRMP-45*	Expand outreach to homeowners' association (HOA) common lands and HOA incentives.	Approaches to consider include: offering incentives to HOAs and maintenance districts to adopt water-conserving/efficiency and stormwater-reduction changes to their landscapes, irrigation, and maintenance; conducting workshops with property managers; providing supplemental standards, inspection, or enforcement for HOA-managed properties.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Finalized updated code compliance fact sheets applicable to common lands activities. Coordinated water conservation pollution prevention incentive programming with PUD.
CSD-JRMP-46*	Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	Approaches to engage HOAs and property managers include: conducting workshops with property managers, providing supplemental standards, inspections or enforcement around HOA properties, and offering incentives to HOAs and maintenance districts to adopt changes to landscapes, irrigation, or maintenance which promote water conservation or storm water reduction. Property managers are also a target for enhanced outreach.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-JRMP-47	Develop a targeted education and outreach program for homeowners with orchards or other agricultural land uses on their property.	Educate residents on practices of small-scale or on-site composting to protect local water quality. May include targeted education of owners of chickens to address bacteria. Outreach can be coordinated through the San Diego County Agriculture, Weights, and Measures division.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-JRMP-48	Enhance school and recreation-based education and outreach.	Develop curriculum and establish distribution in public schools. Includes education on water conservation.	FY15	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City worked with its NGO partners to expand the number of children reached through school-aged education programs. The Division updated curriculum materials for Project Swell in conjunction with San Diego Coastkeeper and provided printed education materials to leaders with the Ocean Discovery Institute in hope of establishing new partnerships with that organization. FY17 Notes: The Division will be expanding the Blue Brigade Middle and High School program sponsored with I Love A Clean San Diego. The Division will also distribute written education materials through the newly completed Ocean Discovery Institute headquarters.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-JRMP-49	Develop education and outreach to reduce irrigation runoff.	Example approaches to reduce or eliminate irrigation runoff may include: education and outreach, prohibition, enhanced enforcement of existing prohibitions, and pilot projects such as the City of Del Mar's pilot door hanger project.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The Division used communication materials designed to address potential threats from El Nino rains as a new vehicle for educating the public about the need to eliminate irrigation runoff. FY17 Notes: The Division is working with partner agencies and other City operations to develop new education and outreach efforts targeting urban runoff.
CSD-JRMP-50*	Develop and distribute regional training materials for water-using mobile businesses.	Consider development of supplemental standards for mobile businesses including: covered trash enclosures, careful review of washing areas (grading, drainage, landscaping, sanitary sewer system connectivity), and appropriate signage (either through zoning for retrofits or "best fix" approaches, or through BMP Design Manual standards). Businesses may include carpet cleaners, tile installers, plumbers, etc.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY16 Notes: The Division updated its suite of fact sheets related to mobile business activities to bring them up-to-date with current permit requirements.

Table D-3 (continued)
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CSD-JRMP-51*	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	Use effectiveness surveys to enhance existing education and outreach programs while proactively keeping up with and incorporating changing regulatory requirements.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The Division annually conducts thousands of event-based surveys gathering information about public understanding of pollution prevention and about the City's storm water management efforts. The survey effort continued in FY16 and allowed the Division to update its education materials and strategies based on current findings about public awareness. FY17 Notes: The Division will contract with a new public opinion research firm to perform a statistically valid assessment of general public awareness. The finding from that effort will be combined with the discoveries of the ongoing event survey effort to drive future outreach priorities.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-JRMP-52	Continue to promote and encourage implementation of Integrated Pest Management (IPM) for residents and businesses.	The City will continue to provide education on IPM techniques during presentations and on the City's Think Blue website.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The Division focused its outreach and education efforts regarding IPM in the Peñasquitos Watershed given vector control concerns associated with limited water flow through the lagoon mouth. City forces addressed the water flow issues and used their time in the area as a means of education the surrounding community about vector control and pest management strategies consistent storm water controls. FY17 Notes: The Division will continue to expand its new partnership with the San Diego Native Plant Society and work with that group to develop new strategies promoting IPM.

Table D-3 (continued)
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CSD-JRMP-53*	Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	Websites will be updated to provide a user-friendly format and clarity for stormwater violations, conditions which citizens can and should report, and how to make such reports. Examples of reports for common incidents will be developed and posted which may vary locally and regionally. Photographs of allowable practices as well as illegal practices should be shown for utmost clarity. Displaying hotline numbers prominently on the website and near the photographs of illegal practices will ensure that those seeking to report will be able to do so easily. Also ensure hotline number and website are searchable and can be retrieved by simple internet searches.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City completely revamped its website improving public access and availability of web-based resources including the storm water management and pollution prevention materials developed and posted by the Division. The Division also brought forward the environmental response documents associated with its channel maintenance efforts. These documents include descriptions of water quality protections undertaken by the City allowing the public to view our agency's watershed protection strategies. FY17 Notes: The Division will review and renew the entire portfolio of education materials available for public downloading from the City's website.

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E.6 Enforcement Response Plan								
CSD-JRMP-54	Continue to implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Storm Water Code Enforcement Unit's Standard Operating Procedures (SOPs) - Enforcement Response Plan.	Refer to JRMP Appendix XIII.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-JRMP-55*	~~Increase~~ Focused enforcement of irrigation runoff.	~~Increased~~ Focused enforcement policies against irrigation runoff will be established in tandem with the education and outreach programs on how these actions lead to pollutant loading. By shifting to property-based inspections irrigation runoff can be handled as enforceable violations once the public is well-informed.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY16 Notes: Performed irrigation patrols and Residential Management Area Patrols throughout FY16. Also receive referrals from Water Conservation at PUD for over irrigation cases that have runoff entering the curb and gutter.
CSD-JRMP-56*	~~Increase~~ Focused enforcement of water-using mobile businesses.	In addition to education, pollution associated with mobile business sources can be handled through policy, code development, inspections of business practices, and enforcement.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY16 Notes: Performed early morning patrols to find mobile sources and over-irrigation to the MS4.
CSD-JRMP-57*	~~Increase~~ Focused enforcement of all minimum BMPs for existing residential, commercial, and industrial development.	~~Increased~~ Focused enforcement of existing development minimum BMPs.	FY16	Continuous-As needed	Yes	Revised to clarify strategy	Yes	None
CSD-JRMP-58*	~~Increase~~ Focused enforcement associated with property-based inspections.	Shifting inspections from businesses-specific to property-based will increase effectiveness and sense of responsibility and ownership. Education and outreach must be followed up with inspection and enforcement of regulations to encourage proper landscape and water conservation strategies.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	None

Table D-3 (continued)
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CSD-JRMP-59*	~~Increase~~ Focused enforcement of sweeping and maintenance of private roads and parking lots in targeted areas.	Refer to Minimum BMPs in JRMP (Appendix IX).	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	None
CSD-JRMP-60*	~~Increase~~ Focused identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	Eroding and unstable slope areas on private property (excluding construction sites) will be identified as potential sediment loading sources and subject to enforcement. In the short term, this will target enhanced inspection and enforcement programs to ensure inspectors address erosion and slope instability for the purpose of education.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY16 Notes: City staff completed patrols of construction sites that included sediment discharges. They also began the Residential Patrol Program, which notes and addresses sediment discharges in residential areas.
Non-JRMP Strategies (Optional Strategies, B.3.b(1)(b))								
Nonstructural Strategies								
CSD-NS-01	Conduct a special study on outfall repair/relocation.	Implement fourth phase of a special study which will identify priority locations for outfall repair/relocation and sediment load reductions. Funding and resources have been secured for FY2016.	FY16	One time	Yes	No Change	Yes	FY16 Notes: Completed tech memo "Sediment Load Reduction Quantification through Outfall Repair and Relocation for the Los Peñasquitos WMA. Refer to Section 5.3 in Appendix C for more information.
CSD-NS-02	Investigation and research of emerging BMP technology.	Annually the Construction & Development Standards Group identifies new tasks to conduct literature review, communication with researchers outside of the City, physical testing and experimentation of new or emerging technologies, and other research with the goal of updating tools available for reducing pollutant loads from development and redevelopment sites. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-As needed	Yes	No Change	Yes	FY16 Notes: Continued monitoring and assessment of the biofiltration basin and curbside filtration units at 43rd and Logan.

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CSD-NS-03	Approve and implement a green infrastructure policy.	The City will begin developing a policy in FY16 that will increase the green infrastructure requirements for City CIP projects. This policy will be coordinated with ongoing efforts to update City design manuals and LID design standards for public LID BMPs. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous- As needed	Yes	No Change	Yes	None
CSD-NS-04	Create a manual that outlines right-of-way design standards.	Create a manual that includes flood control performance standards, permanent BMP elements design standards, design standards for green streets and other BMPs, and maintenance access. Provides drainage and streets design standards. Opportunity to merge various existing manuals and provide consistency. Funding and resources were secured for FY2015.	FY15	Completed within schedule	Yes	No Change	Yes	FY17 Notes: Will be published in FY17.
CSD-NS-05	Create a fund that allows habitat acquisition, protection enhancement, and restoration in conjunction with other cooperating entities including community groups, academic institutions, state county, and federal agencies, etc.	This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired or restored lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. It is anticipated that a minimum of 1 FTE will be needed to implement the program. Once initiated, the time frame for planning to initial implementation is expected to be 3 years. Implementation is in perpetuity as long as funding is retained.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

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CSD-NS-06	Residential and Commercial BMP: Rain Barrel	The existing PUD rebate program will continue for residential properties and expand for commercial properties for water collection, conservation, and reuse with rain barrels. Will occur city-wide in residential areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates for rain barrels were issued to capture 772,740 gallons of rainwater City-wide.
CSD-NS-07	Residential and Commercial BMP: Grass Replacement	The existing PUD grass replacement cash rebate program will continue and expand for residential and commercial properties. Program encourages a reduction in water use through the conversion of non-artificial grass to water wise plant material, while maintaining a high level of living landscape to benefit the environment. Program does not allow for conversion to artificial turf. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates were issued to convert 203,599 sq. ft. of turf in the WMA.
CSD-NS-08	Residential and Commercial BMP: Downspout Disconnect	Disconnecting downspouts provide alternate runoff pathways from rooftops, sidewalks, driveways, and roads. Disconnecting downspouts from residential areas to pervious land can allow for depression storage and infiltration. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Completed downspout redirect guidelines in collaboration with PUD.

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CSD-NS-09	Residential and Commercial BMP: Microirrigation	The existing PUD micro-irrigation rebate program will continue and increase for residential and commercial properties. Application of microirrigation aims to improve the efficiency of landscape irrigation through the precise application of water. Will occur city-wide in residential areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates were issued for installing microirrigation for 29,531 sq. ft. of landscaping in the WMA.
CSD-NS-10	Provide Onsite Water Conservation Surveys.	Provide free onsite water conservation surveys to commercial and residential customers to reduce overirrigation and to encourage water conservation. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-NS-11	Enhance and expand trash cleanups through community-based organizations involving target audiences.	Increase effectiveness and reach of trash/beach cleanups and community based efforts by engaging community groups to self-define and carry-out trash clean-ups. Longstanding partnerships and sponsorships with I Love A Clean San Diego and others are recommended to be continued and enhanced. To effectively target stream clean-up efforts, focus on partnerships with community organizations which provide strong engagement with target audiences and communities. Cleanups target trash, however a reduction in trash also reduces other pollutants such as bacteria and nutrients that can attach to food waste wrappers and yard waste. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY 16 Notes: The City partnered with I Love a Clean San Diego on five clean-ups, which resulted in the removal of 5,468 pounds of trash and debris in the WMA.

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CSD-NS-16	Conduct a Comprehensive Benefits Analysis to identify benefits other than water quality that are applicable to each of the specific WQIP strategies.	The analysis identifies which other benefits apply to each strategy, and documents the assumptions making those linkages. The delineation of other benefits to strategies includes a general description of each benefit, and a listing of the assumptions that were made to link those benefits to strategies. In addition, the other benefits are characterized with respect to who is directly affected: the city, local residents, local businesses, or visitors. This analysis may be used as part of the adaptive management process to modify future strategies. Funding and resources were secured for FY2015.	FY15	Completed within schedule	Yes	No Change	No	None
CSD-NS-17	Address and clean up trash from transient encampments with collaboration from the Environmental Services Department, which consults with the Homeless Outreach Team.	Coordinate with the Environmental Services Department, in conjunction with the Homeless Outreach Team, to respond to transient encampment trash complaints. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	None
CSD-NS-18	Continue participating in source reduction initiatives.	Source reduction initiatives are ultimately the most effective measure to remove pollutants from surface waters, where feasible. Bans or progressive phase-outs that may be considered include: leaf blowers, plastic bags, architectural copper (generally a legacy issue), as well as prohibiting or more aggressively regulating vehicle washing. Additional source reduction initiatives to consider include pesticide sales at hardware stores and irrigation supply stores. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City began development of plastic bag ban ordinance. FY17 Notes: Pursuit of City-specific plastic bag ban ordinance will depend on whether Statewide plastic bag ban ballot initiative passes.

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City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-19	Coordinate with Fleet Services to replace City-owned vehicle brake pads with copper-free brake pads as they become commercially available.	Consider legislative mandate and cooperative implementation of copper-free brake pads on city-owned vehicle to reduce pollutant deposition. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None
CSD-NS-22	~~Proactively~~ Coordinate with appropriate City Departments that monitor for erosion, and complete minor repair and slope stabilization on municipal property.	~~Actively~~ Coordinate with Streets Division and other appropriate City Departments that identify and repair eroding slopes that may be contributing to sediment loading. Prepare an inventory and assessment of eroding areas and their risk to surface waters. Follow assessment with a schedule for ongoing inspection and stabilization (potentially based on a number or percentage of sites annually). Consider Caltrans program as a template. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	None
CSD-NS-23	Conduct special studies.	Special studies will be conducted to gather data to identify pollutant sources, appropriate targets, or other information. Includes collaboration with universities. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-25	Los Peñasquitos Watershed Special Study	Los Peñasquitos WMA special study will assess sediment loads in the watersheds upstream of the Draft Sediment TMDL compliance monitoring locations. Includes the analysis of sediment water column loads, stream bedload, and air monitoring. Implemented in a phased approach. Monitoring will occur first in the Carroll Canyon subwatershed. The Los Peñasquitos Creek and Carmel Valley Creek subwatersheds will be monitored in subsequent phases. Refer to Section 5.1 for further details. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	One time	Yes	No Change	Completed	FY16 Notes: Completed the Los Peñasquitos Lagoon TMDL Upper Watershed Sediment Load Study. See Section 5.1 in Appendix C for more information.
CSD-NS-26	Participate in Reference Watershed Study.	The San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for “natural sources” to establish the concentrations or loads from streams in a minimally disturbed or “reference” condition. Refer to Section 5.1 for further details. Will occur region-wide. Funding and resources were previously secured.	Prior to FY16	Completed within schedule	Yes	No Change	Completed	FY16 Notes: See Section 5.2 in Appendix C for more information.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-27	Participate in Reference Beach Study.	The San Diego Regional Reference Beach Study (currently being conducted by the Southern California Coastal Water Research Project) will develop numeric targets that account for "natural sources" to establish the concentrations or loads from the beach in a minimally disturbed or "reference" condition. The purpose of this monitoring program is to advise the public of potential health risks that could occur with water contact recreation at local beaches. DEH will post a health advisory notice or close a beach when FIB results are above REC-1 water quality standards. Will occur region-wide in the Los Peñasquitos, San Dieguito River, Mission Bay, and San Diego River WMAs. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	One time	Yes	Revised to clarify strategy	Completed	FY16 Notes: See Section 5.1 in Appendix C for more information.
CSD-NS-31	Using adaptive management, delist the beach segment from the TMDL and Attachment E of the MS4 Permit.	Using the adaptive management process outlined in Section 6, remove 303(d) delisted beach segments from the Bacteria TMDL and Attachment E of the MS4 Permit. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Working with the Regional Board on re-evaluating the bacteria TMDL.
CSD-NS-32	Conduct a Storm Water Fee Study~~Cost of Service Study~~.	Conduct a Storm Water Fee Study~~Cost of Service Study~~ that will examine the full cost of flood control and storm water strategies needed to comply with storm water regulations for the City of San Diego. The City of San Diego's Watershed Asset Management Plan will be used as the basis for the study. Funding and resources have been secured for FY2016.	FY16	Completed within schedule	Yes	No Change	Yes	FY16 Notes: Significant progress was made on the fee study; it will be finalized and posted on the City website in FY17. FY17 Notes: Study results to be posted in FY17.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-33	Conduct Sustainable Return on Investment (SROI) analysis to estimate strategies' co-benefits and impacts to the public and the private sector on a common scale.	SROI is an economics-based framework for evaluating quantitative and qualitative performance metrics and monetizing them, if possible, along a triple bottom line (i.e. financial, societal, and environmental). This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated one-time cost to implement is $115,000. Once initiated, the analysis is expected to be complete in 1 year.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	**Implemented as planned in current FY (FY16)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(ii)	**Proposed Modifications** — **Modification for FY17 (If modified or canceled, provide rationale)** MS4 Permit Section: F.3.b.(3)(d)(iv))	**Proposed Modifications** — **Plan to implement next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-34	Collaborate with the County, if a County-led regional social services effort is established, to provide sanitation and trash management for individuals experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	Support a non-profit or consortium to provide sanitation services associated with hygiene as well as trash management for persons experiencing homelessness. Rented or purchased shower/sanitary trailers providing mobile showers may be organized at specifically scheduled locations and times. This provision has been proposed as a method for preventing surface water usage for sanitation and bathing, as well as opportunity for outreach and referral by social service agencies. The trash management services will include providing trash bags, trash collection areas, and shower/sanitary facilities at centers which provide daytime shelter to their clients, or on a mobile-basis for known transit camps. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy includes an initial first year planning cost of $30,000 and implementation is expected to cost $10,000 annually thereafter. Once initiated, development of the program is expected in 1 year. Implementation is in perpetuity as long as funding is available.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	**Implemented as planned in current FY (FY16)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: **Modification for FY17 (If modified or canceled, provide rationale)** MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: **Plan to implement next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-37	Participate in an assessment to determine if implementation of an urban tree canopy (UTC) program would benefit water quality and other City goals, where feasible.	Perform a feasibility study to determine if implementing an UTC program would be beneficial to the City's goals. UTC intercepts rainfall through increased coverage of leaves, branches, and stems and reduces runoff from the storm drainage system. Benefits associated with enhancing an UTC include reducing heat island effects and air pollution in addition to aesthetics and community benefits. Where feasible, native trees will be utilized to prevent invasive trees from migrating to open spaces and to conserve water. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, implementation and assessment is expected in 2 years.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-38	Conduct a feasibility study to test Permeable Friction Course (PFC), a porous asphalt that overlays impermeable asphalt.	Perform an assessment to determine the feasibility of implementing PFC on City streets. PFC, an overlay of porous asphalt, is an innovative roadway material that improves driving conditions in wet weather and water quality. Placed in a layer 25-50mm thick on top of regular impermeable pavement, PFC allows rainfall to drain within the porous layer rather than on top of the pavement. PFC has also been shown to reduce concentrations of pollutants commonly observed in highway runoff. PFC incorporates stormwater treatment into the roadway surface and does not require additional right-of-way. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy is $50,000. Once initiated, implementation and assessment is expected in 2 years.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-39	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas, creating permanent open space protections on undeveloped city-owned land, and accepting privately-owned undeveloped open areas.	This strategy may be implemented if there is interest in participation by the public or private entity with current control of the land. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) identification of partners, if needed (public, private, non-profit), 2) identification of costs and potential sources of funding, 3) final agreement by public or private entity with current control of the land, 4) final agreement by all other participating partners including acceptance by intended land- or asset-owning City department, and 5) funding in place. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The time frame for implementation will vary by project. Implementation is in perpetuity as long as funding is available.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None
CSD-NS-44	Participate in a watershed council or group if one is established.	This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) partners have been identified and formal MOUs have been developed and 2) consensus and community support has been achieved. Resources necessary to implement this strategy include a coordinator or project manager. Projected funding needs may be met through award of a grant, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, development of the program is expected in 2 years. Implementation would be in perpetuity as long as funding is retained.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-47	Coordinate with Development Services Department to ~~P~~prohibit introduction of invasive plants in new development and redevelopment projects.	Coordinate with the City's Development Services Department to continue to prohibit introduction of invasive species such as *Arundo donax* and *Cortaderia selloana* for new development or redevelopment projects as specified in the City's municipal code for landscape. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	None
CSD-NS-48	Collaborate with watershed stakeholders to plan and implement projects that will further Los Peñasquitos Lagoon restoration efforts and reduce flooding in the lower watershed.	Efforts may include 1) dredging of tidal channels and inlet area to restore and maintain tidal circulation and facilitate draw down times of floodwater in the lagoon and 2) modeling and/or studies to analyze sediment transport and flood control options. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs are developed and executed, 4) permits required by regulatory agencies are secured, and 5) consensus and community support is achieved. Resources necessary to implement this strategy include a coordinator or project manager. Projected funding needs may be met through award of a grant, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, development of the program is expected in 3 years. Implementation would be in perpetuity as long as funding is retained.	Must be triggered	Continuous as funding allows	Yes	No Change	Yes	FY16 Notes: Modeling was completed in FY16 to confirm the preferred alternative for the Los Peñasquitos Lagoon Restoration project. The City of San Diego was identified as the "lead" for the project. FY17 Notes: Continue development of the concept design and starting the public outreach process. Will also coordinate with State Parks on *Arundo* removal maintenance in areas of City Right of Way in the Lagoon.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-NS-49	Los Peñasquitos Wetland Restoration Project	Collaborate with Copermittees on the region-wide North Coast Corridor (NCC) Program, led by Caltrans and SANDAG. The program is intended to improve coastal transportation (including Interstate 5 and the coastal rail and transit system) while protecting and restoring coastal habitats throughout the corridor. The 27-mile-long project stretches across the cities of Oceanside, Carlsbad, Encinitas, Solana Beach, Del Mar, and San Diego and provides improvements for six coastal lagoons, including Los Peñasquitos Lagoon. The NCC Program is implementing construction in phases from 2010 through 2040. The program is a $6.5-billion investment in the region that will be paid for through a combination of federal, state, and local funds. The NCC program is part of TransNet, the voter-approved, half-cent sales tax initiative that helps fund transportation projects in the region. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	City-specific version of WMA strategy	Yes	FY16 Notes: Coordination with Copermittees, Caltrans and SANDAG completed environmental and construction phases for various rail & transit, highway, and environmental protection projects.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-NS-51	Collaboration with the Regional Board.	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit, 2) enforcement of the Ag Waiver, 3) enforcement of other non-MS4 dischargers, and 4) Bacteria TMDL updates, as appropriate for each WMA. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	City-specific version of WMA strategy	Yes	FY16 Notes: Provided written comments to the Regional Board, State Water Board, and US Environmental Protection Agency (EPA) regarding proposed rules and regulations.
CSD-NS-53	Refinement of Water Quality Regulations	Collaborate with other Responsible Agencies and the Regional Board to refine the accuracy of regulations to ensure that Non-MS4 dischargers are regulated appropriately. The goal of this exercise is to begin a dialog with the Regional Board that may lead to the following outcomes: 1) Removal of Non-MS4 discharges and the associated BMPs needed to treat those discharges from the Responsible Agencies' burden, 2) amendment of current TMDLs and the MS4 Permit to correctly assign responsibilities for Non-MS4 discharges to the appropriate entities, and 3) strengthening of Non-MS4 NPDES permits that are directly tied to the requirements of existing and future TMDLs. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Resources to implement this strategy include staff time and are currently secured.	Prior to FY16	Continuous-Ongoing	Yes	City-specific version of WMA strategy	Yes	FY16 Notes: City coordinated with the Regional Board to discuss addressing non-MS4 contributions in TMDL and other water quality regulations.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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Structural Strategies								
Green Infrastructure								
CSD-GI-03	0.96 acre of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 37.86 acres (total drainage area of 274 ac) with a total storage volume of 1.69 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Carmel Valley Creek Subwatershed, staggered construction, operation, and maintenance of 0.96 acres of bioretention to treat an impervious drainage area of 37.86 acres (total drainage area of 274 ac) with a total storage volume of 1.69 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY22	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table D-4.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-GI-04	17.18 acres of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 582.71 acres (total drainage area of 1520 ac) with a total storage volume of 27.21 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Carroll Canyon Creek Subwatershed, staggered construction, operation, and maintenance of 17.18 acres of bioretention to treat an impervious drainage area of 582.71 acres (total drainage area of 1520 ac) with a total storage volume of 27.21 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY26	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table D-4.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

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CSD-GI-05	2.40 acres of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 145.75 acres (total drainage area of 328 ac) with a total storage volume of 6.86 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Los Peñasquitos Creek Subwatershed, staggered construction, operation, and maintenance of 2.40 acres of bioretention to treat an impervious drainage area of 145.75 acres (total drainage area of 328 ac) with a total storage volume of 6.86 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY26	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table D-4.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-GI-06	1.33 acres of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 48.97 acres (total drainage area of 466 ac) with a total storage volume of 2.14 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Los Peñasquitos Lagoon Subwatershed, staggered construction, operation, and maintenance of 1.33 acres of bioretention to treat an impervious drainage area of 48.97 acres (total drainage area of 466 ac) with a total storage volume of 2.14 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY28	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table D-4.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Green Streets								
CSD-GS-05	53.20 acres of green streets (26.6 acres of bioretention and 26.6 acres of pervious pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 1,746.8 acres with a total storage volume of 72.54 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Carmel Valley Creek Subwatershed, staggered construction, operation and maintenance of 53.20 acres of green streets (26.60 acres of bioretention and 26.60 acres of pervious pavement) to treat a total drainage area of 1,746.8 acres with a total storage volume of 72.54 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY26	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table D-4.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-GS-06	55.92 acres of green streets (27.96 acres of bioretention and 27.96 acres of pervious pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 2,345.5 acres with a total storage volume of 86.16 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Carroll Canyon Creek Subwatershed, staggered construction, operation and maintenance of 55.92 acres of green streets (27.96 acres of bioretention and 27.96 acres of pervious pavement) to treat a total drainage area of 2,345.5 acres with a total storage volume of 86.16 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY26	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table D-4.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-GS-07	121.42 acres of green streets (60.71 acres of bioretention and 60.71 acres of pervious pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 4,128.6 acres with a total storage volume of 186.11 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Los Peñasquitos Creek Subwatershed, staggered construction, operation and maintenance of 121.42 acres of green streets (60.71 acres of bioretention and 60.71 acres of pervious pavement) to treat a total drainage area of 4,128.6 acres with a total storage volume of 186.11 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY24	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table D-4.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-GS-08	9.06 acres of green streets (4.53 acres of bioretention and 4.53 acres of pervious pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 12.37 acres.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Los Peñasquitos Lagoon Subwatershed, staggered construction, operation and maintenance of 9.06 acres of green streets (4.53 acres of bioretention and 4.53 acres of pervious pavement) to treat a total drainage area of 12.37 acres. An updated inventory of green streets projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY26	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table D-4.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	**Plan to implement next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	
Multiuse Treatment Areas								
Infiltration and Detention Basins								
CSD-MUTA-03	Multiuse Treatment Area BMPs in Los Peñasquitos WMA.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. Modeled MUTA BMPs with footprints of 7.3 acres (ac) in FY21 (total drainage area of 871 ac), 4.7 ac in FY22 (total drainage area of 9,372 ac), 3.0 ac in FY23 (total drainage area of 280 ac), 3.6 ac in FY24 (total drainage area of 559 ac), 5.0 ac in FY25 (total drainage area of 449 ac), and 0.3 ac in FY26 (total drainage area of 49.4 ac). These can be wetland, infiltration, retention and/or detentions systems. An updated inventory of MUTA projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY21, FY22, FY23, FY24, FY25, FY26	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Multiple similar strategies were compiled into this new strategy listing to simplify recordkeeping and reporting, total drainage area treated remains the same	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table D-4.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-MUTA-04	Ashley Falls	In the Los Peñasquitos Creek Subwatershed, a ~~10.16~~ 0.35 acre retention basin (large scale storm storage) designed to capture a drainage area of 29.7 acres. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY19	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Correction to implementation approach description	NA, Not scheduled to be implemented in FY17	Please see Table D-4 for an updated list of completed and planned structural projects.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-MUTA-05	Los Peñasquitos Lagoon Sediment Basin	In the Los Peñasquitos Creek Subwatershed, construction of a custom-designed basin to maximize sediment interception from Los Peñasquitos Creek, while minimizing effects on surrounding habitat and protecting nearby developments from flooding and preserving view corridors of nearby residents (Los Peñasquitos Lagoon Sediment Basin Monitoring & Maintenance Plan). Total footprint for this basin is ~~10.16~~ 1.5 acres designed to treat a drainage area of ~~36,375~~ 77 acres (Total drainage area (Ac) treated was corrected. Additional analysis will be completed to confirm if additional acres of drainage area are required. Findings will be presented in a future WQIP Annual Report). Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	Correction to implementation approach description	Yes	Please see Table D-4 for an updated list of completed and planned structural projects.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-MUTA-13	If interim load reduction goals are not met and additional multiuse treatment areas are required, an infiltration basin(s) may be considered on publicly owned open spaces in canyon areas on a case-by-case basis when no other opportunities for load reductions exist.	Construction, operation, and maintenance of infiltration basin(s) in canyon areas. 8 potential canyon sites, owned by City of San Diego, have been identified in Los Peñasquitos WMA that provide up to 60 acres of available space (out of 174 acres of total parcel acreage). This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Stream, Channel and Habitat Rehabilitation Projects (B.3.b.(1)(b)(iii))								
CSD-MUTA-16	El Cuervo del Norte Wetlands	In the Los Peñasquitos Creek Subwatershed, the El Cuervo Norte wetlands were built upon 23.3 acres upstream of the long-term MLS monitoring station. Flows from Los Peñasquitos Creek are diverted into the wetlands, creating the potential for solids to settle out and thus reduce the TSS measured at the MLS. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-MUTA-17	El Cuervo del Sur Wetlands	In the Los Peñasquitos Creek Subwatershed, on a total of 2.3 acres, the primary mitigation strategy in this plan involves the minor grading (one to three feet) of the Site to create three riparian plant zones. Maintenance activities planned during the maintenance and monitoring program revolve around the establishment of the plantings to a self-sufficient state. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Mitigation project is 66% complete. FY17 Notes: Continue with project construction.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-MUTA-20	If interim load reduction goals are not met and additional stream, channel, and habitat rehabilitation projects are required, implement as needed.	This strategy may be triggered as 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, 4) permits required by regulatory agencies are secured, and 5) recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
Water Quality Improvement BMPs								
Priority Development Projects (PDPs)								
CSD-PDP-01	Priority Development Project BMPs in Los Peñasquitos WMA.	Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. Funding and resources have been secured for PDPs implemented prior to FY16. Funding for PDP BMPs constructed in future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	Multiple similar strategies were compiled into this new strategy listing to simplify recordkeeping and reporting	Yes	See Table D-5 for a current list of PDP BMPs.
Proprietary BMPs								
CSD-WQBMP-01	Rehco Rd.	In the Carroll Canyon Creek Subwatershed, an HSU unit is used to treat onsite runoff on the north end of Rehco Road. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Dry Weather Flow Separation and Treatment Projects								
CSD-WQBMP-09	If interim load reduction goals are not met and additional dry weather flow separation and treatment projects are required, implement as needed.	Construction of dry weather flow separation and treatment projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	**Implemented as planned in current FY (FY16)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: **Modification for FY17 (If modified or canceled, provide rationale)** MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: **Plan to implement next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Trash Segregation								
CSD-WQBMP-10	If interim load reduction goals are not met and additional trash segregation projects are required, implement as needed.	Construction of trash segregation (Trash Guards, etc.) projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in high loading areas city-wide. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
Additional Opportunities								
CSD-AddOp-01	Participate in restorative efforts for the Los Peñasquitos Lagoon in collaboration with TMDL Responsible Parties and other stakeholders.	Collaborate with TMDL Responsible Parties and other stakeholders to promote and support the restoration of the Los Peñasquitos Lagoon. Efforts will be coordinated with the Lagoon Enhancement Program currently being updated by the Los Peñasquitos Lagoon Foundation. This effort will require that 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners are identified and formal MOUs are developed and executed, 4) permits required by regulatory agencies are secured, and 5) consensus and community support are achieved. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	FY20	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None
CSD-AddOp-02	Through adaptive management and additional analysis in the future, the City will identify and implement one or more of the following opportunities to meet numeric goals: 1) MS4 outfall repair and relocation, 2) slope stabilization, 3) stream restoration, 4) implementation of sediment detention basins upstream of Los Peñasquitos Lagoon or 5) new strategies not yet identified.	Through adaptive management and additional analysis in the future, the City will identify and implement one or more of the following opportunities to meet numeric goals: 1) MS4 outfall repair and relocation, 2) slope stabilization, 3) stream restoration, 4) implementation of sediment detention basins upstream of Los Peñasquitos Lagoon or 5) new strategies not yet identified. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	FY28	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-1	Watershed Collaboration for Los Peñasquitos Lagoon Restoration	Collaborate with stakeholders to promote the restoration of salt marsh areas and overall improvements in estuarine and other beneficial uses within the Los Peñasquitos Lagoon. Benefits of this strategy include more efficient targeting and prioritization of lagoon restoration activities, increased cost-effectiveness of selected BMP strategies in the watershed, and development of partnerships across the MS4 jurisdictions and other TMDL responsible parties. These efforts will be coordinated with the Lagoon Enhancement Program currently being updated by the Los Peñasquitos Lagoon Foundation and will require that (1) funding to address MS4 discharges and dry weather input of freshwater is identified and secured, (2) staff resources are identified and secured, (3) partners are identified and formal memoranda of understanding (MOUs) are developed and executed, (4) permits required by regulatory agencies are secured, and (5) consensus and community support are achieved. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. Implementation is in perpetuity as long as funding is available.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Modeling was completed in FY 2016 to confirm the preferred alternative for the Los Peñasquitos Lagoon Restoration project. The City of San Diego was identified as the "lead" for the project. FY17 Notes: Next steps for FY 2017 include completing the concept design and starting the public outreach process.

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-2	Los Peñasquitos Wetland Restoration Project	Collaborate with Copermittees on the region-wide North Coast Corridor (NCC) Program, led by Caltrans and SANDAG. The program is intended to improve coastal transportation (including Interstate 5 and the coastal rail and transit system) while protecting and restoring coastal habitats throughout the corridor. The 27-mile-long project stretches across the cities of Oceanside, Carlsbad, Encinitas, Solana Beach, Del Mar, and San Diego and provides improvements for six coastal lagoons, including Los Peñasquitos Lagoon. The NCC Program is implementing construction in phases from 2010 through 2040. The program is a $6.5-billion investment in the region that will be paid for through a combination of federal, state, and local funds. The NCC program is part of TransNet, the voter-approved, half-cent sales tax initiative that helps fund transportation projects in the region.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: In coordination with Copermittees, Caltrans and SANDAG completed environmental and construction phases for various rail & transit, highway, and environmental protection projects.
WMA-4	Collaborative Approach to Irrigation Reduction	Responsible Agencies are collaborating with water agencies to encourage implementation of water conservation efforts. Water conservation that attempts to reduce irrigation and minimize storm water runoff can also improve water quality of receiving waterbodies. MWD's SoCal Water$mart Program supports conservation efforts by offering incentives in the form of rebates for rain barrels, rotating sprinkler nozzles, weather-based irrigation controllers, soil moisture sensor systems, and turf replacement. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council or appropriate legislative body (i.e. the Board).	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-6	Offsite Alternative Compliance Option ~~(WMAA)~~	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, ~~anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015,~~ which was submitted and approved in FY 2016. Following this approval, jurisdictions can formally implement an optional Alternative Compliance Program by ~~December 2015~~ February 2016 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy	Yes	FY16 Notes: Phase 1 of the Alternative Compliance Program (ACP) went into effect on 2/16/16. FY17 Notes: Proposed Water Quality Equivalency (WQE) guideline development for stream restoration.
WMA-8	Collaboration with the Regional Board.	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit, 2) enforcement of other non-MS4 dischargers, and 3) Bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Working with Regional Board to include non-Phase I MS4s in general permits, waivers, and Waste Discharge Requirements (WDRs).

Table D-3 (continued)
City of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	**Implemented as planned in current FY (FY16)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: **Modification for FY17 (If modified or canceled, provide rationale)** MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: **Plan to implement next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-12	Refinement of Water Quality Regulations	The Responsible Agencies will collaborate with the Regional Board to refine the accuracy of regulations to ensure that Non-MS4 dischargers are regulated appropriately. The goal of this exercise is to begin a dialog with the Regional Board that may lead to the following outcomes: 1) Removal of Non-MS4 discharges and the associated BMPs needed to treat those discharges from the Responsible Agencies' burden, 2) amendment of current TMDLs and the MS4 Permit to correctly assign responsibilities for Non-MS4 discharges to the appropriate entities, and 3) strengthening of Non-MS4 NPDES permits that are directly tied to the requirements of existing and future TMDLs. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Resources to implement this strategy include staff time and are currently secured.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	<u>FY16 Notes:</u> City coordinated with Regional Board to discuss bacteria TMDL addressing non-MS4 contributions.

* Strategy IDs with an asterisk indicate those strategies that are considered "jurisdictional" in the MS4 Permit, but are considered enhancements to the JRMP to target highest priority water quality conditions.

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Table D-4
City of San Diego Structural BMP Implementation Status for Los Peñasquitos WMA

Strategy Number	Strategy	Implementation Approach	Total Drainage Area (Ac)	Implementation Year*	Status	Permit Term Goal**
Green Infrastructure		**Total Acres Treated Required for Green Infrastructure:**	**2,588**			
CSD-GI-03	0.96 acre of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 37.86 acres (total drainage area of 274 ac) with a total storage volume of 1.69 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Carmel Valley Creek Subwatershed, staggered construction, operation, and maintenance of 0.96 acres of bioretention to treat an impervious drainage area of 37.86 acres (total drainage area of 274 ac) with a total storage volume of 1.69 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report.	274	FY22	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
	(Projects will be added as they reach the design stage)					
CSD-GI-04	17.18 acres of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 582.71 acres (total drainage area of 1520 ac) with a total storage volume of 27.21 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Carroll Canyon Creek Subwatershed, staggered construction, operation, and maintenance of 17.18 acres of bioretention to treat an impervious drainage area of 582.71 acres (total drainage area of 1520 ac) with a total storage volume of 27.21 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report.	1,520	FY26	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
	(Projects will be added as they reach the design stage)					
CSD-GI-05	2.40 acres of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 145.75 acres (total drainage area of 328 ac) with a total storage volume of 6.86 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Los Peñasquitos Creek Subwatershed, staggered construction, operation, and maintenance of 2.40 acres of bioretention to treat an impervious drainage area of 145.75 acres (total drainage area of 328 ac) with a total storage volume of 6.86 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report.	328	FY26	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
	(Projects will be added as they reach the design stage)					

Table D-4 (continued)
City of San Diego Structural BMP Implementation Status for Los Peñasquitos WMA

Strategy Number	Strategy	Implementation Approach	Total Drainage Area (Ac)	Implementation Year*	Status	Permit Term Goal**
CSD-GI-06	1.33 acres of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 48.97 acres (total drainage area of 466 ac) with a total storage volume of 2.14 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Los Peñasquitos Lagoon Subwatershed, staggered construction, operation, and maintenance of 1.33 acres of bioretention to treat an impervious drainage area of 48.97 acres (total drainage area of 466 ac)with a total storage volume of 2.14 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report.	466	FY28	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
	(Projects will be added as they reach the design stage)					
Green Streets		**Total Acres Treated Required for Green Streets:**	**8,233.27**			
CSD-GS-5	53.20 acres of green streets (26.6 acres of bioretention and 26.6 acres of pervious pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 1,746.8 acres with a total storage volume of 72.54 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Carmel Valley Creek Subwatershed, staggered construction, operation and maintenance of 53.20 acres of green streets (26.60 acres of bioretention and 26.60 acres of pervious pavement) to treat a total drainage area of 1,746.8 acres with a total storage volume of 72.54 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report.	1,746.80	FY26	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
	(Projects will be added as they reach the design stage)					
CSD-GS-6	55.92 acres of green streets (27.96 acres of bioretention and 27.96 acres of pervious pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 2,345.5 acres with a total storage volume of 86.16 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Carroll Canyon Creek Subwatershed, staggered construction, operation and maintenance of 55.92 acres of green streets (27.96 acres of bioretention and 27.96 acres of pervious pavement) to treat a total drainage area of 2,345.5 acres with a total storage volume of 86.16 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report.	2,345.50	FY26	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
	(Projects will be added as they reach the design stage)					

Table D-4 (continued)
City of San Diego Structural BMP Implementation Status for Los Peñasquitos WMA

Strategy Number	Strategy	Implementation Approach	Total Drainage Area (Ac)	Implementation Year*	Status	Permit Term Goal**
CSD-GS-7	121.42 acres of green streets (60.71 acres of bioretention and 60.71 acres of pervious pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 4,128.6 acres with a total storage volume of 186.11 acre-feet.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Los Peñasquitos Creek Subwatershed, staggered construction, operation and maintenance of 121.42 acres of green streets (60.71 acres of bioretention and 60.71 acres of pervious pavement) to treat a total drainage area of 4,128.6 acres with a total storage volume of 186.11 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report.	4,128.60	FY24	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
	(Projects will be added as they reach the design stage)					
CSD-GS-8	9.06 acres of green streets (4.53 acres of bioretention and 4.53 acres of pervious pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 12.37 acres.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. In the Los Peñasquitos Lagoon Subwatershed, staggered construction, operation and maintenance of 9.06 acres of green streets (4.53 acres of bioretention and 4.53 acres of pervious pavement) to treat a total drainage area of 12.37 acres. An updated inventory of green streets projects will be maintained in the WQIP Annual Report.	12.37	FY26	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
	(Projects will be added as they reach the design stage)					
Multiuse Treatment Areas		**Total Acres Treated Required for MUTAs:**	**47,985.1**			
CSD-MUTA-04	Ashley Falls	In the Los Peñasquitos Creek Subwatershed, a 0.35 acre retention basin (large scale storm storage) designed to capture a drainage area of 29.7 acres.	29.7	FY19	Design	
CSD-MUTA-05	Los Peñasquitos Lagoon Sediment Basin	In the Los Peñasquitos Creek Subwatershed, construction of a custom-designed basin to maximize sediment interception from Los Peñasquitos Creek, while minimizing effects on surrounding habitat and protecting nearby developments from flooding and preserving view corridors of nearby residents (Los Peñasquitos Lagoon Sediment Basin Monitoring & Maintenance Plan). Total footprint for this basin is 1.5 acres designed to treat a drainage area of 77 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	77(Total drainage area (Ac) treated was corrected. Additional analysis will be completed to confirm if additional acres of drainage area are required. Findings will be presented in a future WQIP Annual Report)	Prior to FY16	Completed	✓

Table D-4 (continued)
City of San Diego Structural BMP Implementation Status for Los Peñasquitos WMA

Strategy Number	Strategy	Implementation Approach	Total Drainage Area (Ac)	Implementation Year*	Status	Permit Term Goal**
CSD-MUTA-03	Multiuse Treatment Area BMPs in the Los Peñasquitos WMA.	To meet the Los Peñasquitos WMA numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. Modeled MUTA BMPs with footprints of 7.3 acres (ac) in FY21 (total drainage area of 871 ac), 4.7 ac in FY22 (total drainage area of 9,372 ac), 3.0 ac in FY23 (total drainage area of 280 ac), 3.6 ac in FY24 (total drainage area of 559 ac), 5.0 ac in FY25 (total drainage area of 449 ac), and 0.3 ac in FY26 (total drainage area of 49.4 ac). These can be wetland, infiltration, retention and/or detentions systems. An updated inventory of MUTA projects will be maintained in the WQIP Annual Report.	871	FY21	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
			9,372	FY22		
			280	FY23		
			559	FY24		
			449	FY25		
			49.4	FY26		
	Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
	(Projects will be added as they reach the design stage)					

*For additional details, please see the schedule following the City's strategy table in the WQIP.
** Projects with a check in the "Permit Term Goal" column are counted toward the green infrastructure installation goal applicable to the current Permit term. See Table D-6 for a summary.

Table D-5
City of San Diego Priority Development Project Implementation Status for Los Peñasquitos WMA

Los Peñasquitos PDP BMP Ledger (CSD-PDP-01)					
Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal***
Del Mar Mesa Neighborhood Park (Project 985)	In the Los Peñasquitos Creek Subwatershed, this site contains small catchment basins and some impervious areas treated by landscape buffers to treat a drainage area of 3.0 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	3	Prior to FY16	Completed	✓
Miramar Water Treatment Plant (Project ID 1177)	In the Los Peñasquitos Creek Subwatershed, vegetated swales (0.44 acre) are in-place to treat a drainage area of 18 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	18	Prior to FY16	Completed	✓
Carroll Canyon Road Extension (Project ID 1007)	In the Carroll Canyon Creek Subwatershed, a vegetated swale will treat onsite runoff of a drainage area of 5.3 acres, in conjunction with other multiuse treatment areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	5.3	Prior to FY16	Completed	✓
Camino Ruiz Neighborhood Park (Project ID 140)	In the Los Peñasquitos Creek Subwatershed, a vegetated swale is in-place to treat on-site runoff of a drainage area of 1.49 acres. Two bioretention areas are proposed to provide treatment of runoff generated by the 85th percentile storm from the parking lot area. These facilities are proposed to be installed within existing landscaping areas. Additional storage is required to capture the 85th percentile runoff volume from the north side of the parking area and is proposed to be provided in permeable pavement parking stalls adjacent to the proposed bioretention area. The retrofit exceeds applicable regulatory requirements by treating runoff from impervious surfaces through bioretention to capture the 85th percentile storm runoff. Funding and resources were secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by City Council.	1.49	FY15	Completed	✓
Breen Park Site - Development (Project ID 857 & 858 & 859 & 860)	In the Los Peñasquitos Creek Subwatershed, vegetated swales are in-place to treat on-site runoff of a drainage area of 1.33 acres. Swales adjacent to the parking lot are proposed to be converted into bioretention areas to provide treatment for the runoff generated by the 85th percentile storm. The landscaped area on the north side of the park entrance is proposed to be converted to a bioretention area to provide additional treatment of existing impervious area that currently discharges from the site with no treatment. The retrofit exceeds applicable regulatory requirements by treating runoff from 50,377 more square feet of impervious surface than the initial site design and providing enhanced pollutant removal through bioretention and treatment of the 85th percentile storm. Funding and resources were secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by City Council.	1.33	FY15	Completed	✓
Rancho Peñasquitos Skate park (Project ID 866)	In the Los Peñasquitos Creek Subwatershed, two small infiltration units (basins/trenches) are used to treat on-site runoff of a drainage area of 2.08 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	2.08	Prior to FY16	Completed	✓
Fire Station #47 (Project ID 992)	In the Carmel Valley Creek Subwatershed, a vegetated swale is in-place to treat on-site runoff of a drainage area of 1 acre. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	1	Prior to FY16	Completed	✓
Torrey Del Mar Neighborhood Park (Project ID 1022)	In the Carmel Valley Creek Subwatershed, two vegetated filter strips and two vegetated swales are in-place to treat on-site runoff of a drainage area of 3.68 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	3.68	Prior to FY16	Completed	✓

Table D-5 (continued)
City of San Diego Priority Development Project Implementation Status for Los Peñasquitos WMA

Los Peñasquitos PDP BMP Ledger (CSD-PDP-01)					
Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal***
Hilltop Community Park- Development of bioretention areas	In the Carmel Valley Creek Subwatershed, two bioretention facilities are proposed to provide for treatment of the majority of the study area, a drainage area of 0.273 acre. An existing landscaped area near Oviedo Way is proposed to be converted to a bioretention area along with the conversion of three landscaped areas within the existing parking lot area to bioretention areas. The parking lot bioretention areas are proposed to be linked by a narrow bioswale between parking stalls. Additional treatment is proposed to be provided through the conversion of 5 parking stalls to permeable pavement. The retrofit exceeds applicable regulatory requirements by treating runoff from impervious surfaces through bioretention to treat the 85th percentile storm runoff. Funding and resources were secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by City Council.	0.273	FY15	Completed	✓
North Torrey Pines Road Bridge (Project ID 1017)	In the Carroll Canyon Creek and Los Peñasquitos Lagoon Subwatersheds, two drainage inserts are used to treat onsite runoff. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Unknown	Prior to FY16	Completed	
Scripps Ranch Boulevard Median Improvements (Project ID 901)	In the Carroll Canyon Creek and Los Peñasquitos Lagoon Subwatersheds, two bioclean drainage inserts are used to treat onsite runoff. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Unknown	Prior to FY16	Completed	
Northwest Area Police Substation (Project ID 1365)	A Hydrodynamic Separation System is used to treat onsite runoff. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Unknown	Prior to FY16	Completed	
Peñasquitos West Grading (Project ID 1051)	In the Carmel Valley Creek Subwatershed, two Hydrodynamic Separation Systems are used to treat onsite runoff. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Unknown	Prior to FY16	Completed	
Carmel Valley Road Enhancements (Project ID 860)	In the Carmel Valley Creek Subwatershed, Hydrodynamic Separation Systems are used to treat onsite runoff. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Unknown	Prior to FY16	Completed	
Genesee Widening (Project ID 900)	In the Carroll Canyon Creek Subwatershed, Hydrodynamic Separation Systems are used to treat onsite runoff. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Unknown	Prior to FY16	Completed	
Mira Sorrento Place and Vista Sorrento Parkway (Project ID 850)	In the Carroll Canyon Creek Subwatershed, Hydrodynamic Separation Systems are used to treat onsite runoff. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Unknown	Prior to FY16	Completed	
Ocean Air Park (Project ID 906)	In the Los Peñasquitos Lagoon Subwatershed, Hydrodynamic Separation Systems are used to treat onsite runoff. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Unknown	Prior to FY16	Completed	
(Additional PDPs will be added after they are completed.)					

* Projects with a check in the “Permit Term Goal” column are counted toward the green infrastructure installation goal applicable to the current Permit term. See Table D-6 for a summary.

Table D-6
Summary of City of San Diego Priority Structural BMP Implementation Status for Los Peñasquitos WMA

Permit Term Goal FY 2018	Total Drainage Area (Ac)
Structural BMP Total Acres Treated Required by FY 18	**36.00 (Required by FY 18)**
Total Completed/Planned BMPs	77
Total Completed/Planned PDP BMPs	36.15
Remaining to Goal	-77.15 **(Goal Met/Exceeded)**
Final Goals FY 2035[1]	**Total Drainage Area (Ac)**
Green Infrastructure Total Acres Treated Required	**2,588.00**
Total Completed/Planned	0.00
Remaining to Final Amount of Acres Treated	2,588.00
Green Streets Total Acres Treated Required	**8,233.27**
Total Completed/Planned	0.00
Remaining to Final Amount of Acres Treated	8,233.27
MUTA Total Acres Treated Required	**11,687.1[2]**
Total Completed/Planned	106.7
Remaining to Final Amount of Acres Treated	11,580.4

1. Based on the “MS4 Discharges: Implement Accepted WQIP” compliance pathway. Final compliance is implementation of BMPs based on modeling analysis results.
2. Total drainage area treated by CSD MUTA-05 (Los Peñasquitos Sediment Basin) was revised from 36,675 acres to 77 acres. Analysis will be completed to confirm if additional acres of drainage area are required and will be added to this number. Findings will be presented in a future WQIP Annual Report.

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D.3.4 Modifications to the BMP Design Manual

In FY16 the City, along with other government agencies, professional engineers and members of the local development community, developed a new Regional Best Management Practices (BMP) Design Manual that conforms to the 2013 Municipal Storm Water Permit (Order No. R9-2013-0001, as amended by R9-2015-0001 and R9-2015-0100). The Manual supersedes the San Diego County-wide Model Standard Urban Runoff Storm Water Management Plan (SUSMP) and provides technical guidance and regional standards for pollutant and flow control requirements for new development and significant redevelopment. The City of San Diego's local version of the BMP Design Manual, the Storm Water Standards Manual, became effective on February 16, 2016.

D.3.5 Modifications to the Jurisdictional Runoff Management Plan

The City of San Diego is proposing the following administrative changes to its JRMP. The updated JRMP can be viewed at https://www.sandiego.gov/stormwater/plansreports/ jrmp.

JRMP Section/Appendix		JRMP Update
1	Executive Summary	Strategy categories and definitions were modified to align with the categories and definitions in the Municipal Storm Water Permit and San Diego Water Board's approved Water Quality Improvement Plans (WQIPs).
2	Section 2.3	In accordance with the Municipal Storm Water Permit, Section 2.3 was updated to state that JRMP updates can be proposed/submitted as part of the WQIP Annual Reports.
3	Section 7.3.13-8	Updated BMP #16 to provide greater clarity.
4	Section 7.3.14	Updated section to include new BMPs for herbicide application.
5	Section 10	Strategy categories and definitions were modified to align with the categories and definitions in the Municipal Storm Water Permit and San Diego Water Board's approved WQIPs. Updated tables, graphs, charts, and text to reflect funding needs to meet the goals and schedules identified in the WQIPs. Added language stating "Estimates of funding needs presented were based on the best information available at the time they were prepared."
6	Sections 7.3.1, 7.3.2, and 7.3.4-15	Updated Minimum BMP language to reflect changes to Appendix IX.

JRMP Section/Appendix		JRMP Update
7	Section 3, Section 4, Section 5, Section 6, Section 7, Section 8, Section 9	Based on updates made to the categories and definitions of strategies noted above, the "JRMP Strategies Identified in the WQIPs" tables and "Additional Public Education and Participation Program WQIP Strategies" tables for these sections have been updated for consistency. The strategy identification numbering system and text was updated to reflect administrative changes included in the WQIP Annual Reports.
8	Appendix VI- Residential Management Areas and Patrol Protocols	Updated the residential management areas maps and included newly developed patrol protocols.
9	Appendix IX - Minimum BMPs for Residential, Industrial, Commercial, and Municipal Sites/Sources	Updated references to ordinance sections, changed the "Think Blue" references to the Storm Water Division, and made minor changes to some BMP and description wording for clarification.
10	Appendix XIV- Certificate of Adequate Legal Authority	Signed Certificate of Adequate Legal Authority was added.
11	Appendix XX- Water Quality Improvement Plan Strategies	Updated strategies to reflect the administrative changes made to strategies in the Fiscal Year 2016 WQIP Annual Reports.
12	Appendix XXII- Storm Water Division Projected Funding Needs, 2016-2035	Updated Appendix XX to reflect the funding needs to meet the goals and schedules identified in the WQIPs.

D.4 County of San Diego

D.4.1 Annual Report Certifications

The County of San Diego's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.4.2 Annual Report Form

County of San Diego's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

County of San Diego

SARAH E. AGHASSI
DEPUTY CHIEF ADMINISTRATIVE OFFICER

LAND USE AND ENVIRONMENT GROUP
1600 PACIFIC HIGHWAY, ROOM 212, SAN DIEGO, CA 92101
(619) 531-6256 • Fax (619) 531-5476
www.sdcounty.ca.gov/lueg

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT LOS PEÑASQUITOS WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the County of San Diego has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 6th day of January, 2017, at the County of San Diego.

Sarah Aghassi

SARAH E. AGHASSI
Deputy Chief Administrative Officer

Date 1/6/17

ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM

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JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

I. COPERMITTEE INFORMATION

I.A Copermittee Name: County of San Diego (PIN 255223)

I.B Copermittee Primary Contact Name: Todd Snyder

I.C Copermittee Primary Contact Information:

Address: 5510 Overland Avenue, Suite 410
City: San Diego County: San Diego State: California Zip: 92123
Telephone: (858) 694-3672 Fax: (858) 495-5623 Email:Todd.Snyder@sdcounty.ca.gov

II. LEGAL AUTHORITY

II.A Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
II.B A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☒ ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

III.A Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☒ ☐
III.B If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☒ ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

IV.A Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐

IV.B.1 Number of non-storm water discharges reported by the public	286
IV.B.2 Number of non-storm water discharges detected by Copermittee staff or contractors	95
IV.B.3 Number of non-storm water discharges investigated by the Copermittee	375
IV.B.4 Number of sources of non-storm water discharges identified	115
IV.B.5 Number of non-storm water discharges eliminated	112
IV.B.6 Number of sources of illicit discharges or connections identified	85
IV.B.7 Number of illicit discharges or connections eliminated	84
IV.B.8 Number of enforcement actions issued	93
IV.B.9 Number of escalated enforcement actions issued	1

V. DEVELOPMENT PLANNING PROGRAM

V.A Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
V.B Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	☒ ☐
V.C If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☒ ☐

V.D.1 Number of proposed development projects in review	925
V.D.2 Number of Priority Development Projects in review	237
V.D.3 Number of Priority Development Projects approved	96
V.D.4 Number of approved Priority Development Projects exempt from any BMP requirements	0
V.D.5 Number of approved Priority Development Projects allowed alternative compliance	0
V.D.6 Number of Priority Development Projects granted occupancy	62

V.E.1 Number of completed Priority Development Projects in inventory	410
V.E.2 Number of high priority Priority Development Project structural BMP inspections	691
V.E.3 Number of Priority Development Project structural BMP violations	170
V.E.4 Number of enforcement actions issued	170
V.E.5 Number of escalated enforcement actions issued	0

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM

VI. A Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
VI.B.1 Number of construction sites in inventory	2,748
VI.B.2 Number of active construction sites in inventory	2,684
VI.B.3 Number of inactive construction sites in inventory	0
VI.B.4 Number of construction sites closed/completed during reporting period	1,124
VI.B.5 Number of construction site inspections	18,858
VI.B.6 Number of construction site violations	416
VI.B.7 Number of enforcement actions issued	590
VI.B.8 Number of escalated enforcement actions issued	38

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

VII.A Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
VII.B.1 Number of facilities or areas in inventory	a. 263	b. 1,779	c. 150	d.110
VII.B.2 Number of existing development inspections	a. 1,885	b. 974	c. 38	d.468
VII.B.3 Number of follow-up inspections	a. 23	b. 131	c. 12	d.165
VII.B.4 Number of violations	a. 46	b. 279	c. 31	d.346
VII.B.5 Number of enforcement actions issued	a. 28	b. 130	c. 10	d.0
VII.B.6 Number of escalated enforcement actions issued	a.0	b.1	c.0	d.0

VIII. PUBLIC EDUCATION AND PARTICIPATION

VIII.A Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

VIII.B Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Sarah Aghassi
Signature

10/26/16
Date

SARAH E. AGHASSI
Print Name

LAND USE AND ENVIRONMENT GROUP
DEPUTY CHIEF ADMINISTRATIVE OFFICER
Title

(619) 531-5451
Telephone Number

SARAH.AGHASSI@SDCOUNTY.CA.GOV
Email

ATTACHMENT D.1

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM BY WATERSHED

JRMP ANNUAL REPORT ATTACHMENT D.1 by WATERSHED

Fiscal Year 2015-2016

			SANTA MARGARITA	SAN LUIS REY	CARLSBAD	SAN DIEGUITO	PENASQUITOS	SAN DIEGO RIVER	SAN DIEGO BAY	TIJUANA RIVER	JURISDICTION TOTALS
			*(902.00)	*(903.00)	*(904.00)	*(905.00)	*(906.00)	*(907.00)	*(908.00, 909.00, 910.00)	*(911.00)	
IV.	**ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM**										
IV.B.1	Number of non-storm water discharges reported by the public		12	46	30	40	2	78	72	6	286
IV.B.2	Number of non-storm water discharges detected by Copermittee staff or contractors		9	11	7	14	1	28	24	1	95
IV.B.3	Number of non-storm water discharges investigated by the Copermittee		15	57	37	51	3	106	99	7	375
IV.B.4	Number of sources of non-storm water discharges identified		4	22	17	11	1	30	28	2	115
IV.B.5	Number of non-storm water discharges eliminated		4	21	16	10	1	30	28	2	112
IV.B.6	Number of sources of illicit discharges or connections identified		4	14	16	8	0	18	23	2	85
IV.B.7	Number of illicit discharges or connections eliminated		4	14	15	8	0	18	23	2	84
IV.B.8	Number of enforcement actions issued		4	21	17	9	1	23	16	2	93
IV.B.9	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	1	1
V.	**DEVELOPMENT PLANNING PROGRAM**										
V.D.1	Number of proposed development projects in review		27	219	109	189	0	158	183	40	925
V.D.2	Number of Priority Development Projects in review		2	53	30	53	0	43	50	6	237
V.D.3	Number of Priority Development Projects approved		4	23	11	21	0	20	11	6	96
V.D.4	Number of approved Priority Development Projects exempt from any BMP requirements		0	0	0	0	0	0	0	0	0
V.D.5	Number of approved Priority Development Projects allowed alternative compliance		0	0	0	0	0	0	0	0	0
V.D.6	Number of Priority Development Projects granted occupancy		2	16	5	8	0	18	12	1	62
V.E.1	Number of completed Priority Development Projects in inventory		12	89	54	85	0	66	93	11	410
V.E.2	Number of high priority Priority Development Project structural BMP inspections		1	100	70	273	0	110	82	55	691
V.E.3	Number of Priority Development Project structural BMP violations		1	43	31	53	0	24	8	10	170
V.E.4	Number of enforcement actions issued		1	43	31	53	0	24	8	10	170
V.E.5	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	0	0
VI.	**CONSTRUCTION MANAGEMENT PROGRAM**										
VI.B.1	Number of construction sites in inventory		63	637	397	636	2	438	513	62	2748
VI.B.2	Number of active construction sites in inventory		60	622	393	627	2	424	496	60	2684
VI.B.3	Number of inactive construction sites in inventory		0	0	0	0	0	0	0	0	0
VI.B.4	Number of construction sites closed/completed during reporting period		20	314	137	235	1	175	219	23	1124
VI.B.5	Number of construction site inspections		245	3655	4473	3934	3	2868	3361	319	18858
VI.B.6	Number of construction site violations		1	50	55	38	0	64	205	3	416
VI.B.7	Number of enforcement actions issued		1	66	64	66	0	104	286	3	590
VI.B.8	Number of escalated enforcement actions issued		1	6	8	9	0	3	9	2	38
VII.	**EXISTING DEVELOPMENT MANAGEMENT PROGRAM**										
VII.B.1	Number of facilities or areas in inventory	a. Municipal	8	23	27	34	4	63	82	22	263
		b. Commercial	154	315	196	210	2	466	410	26	1779
		c. Industrial	15	4	5	22	0	67	36	1	150
		d. Residential	12	11	11	22	1	15	21	17	110
VII.B.2	Number of existing development inspections	a. Municipal	48	181	239	244	41	421	561	150	1885
		b. Commercial	106	155	115	102	0	180	309	7	974
		c. Industrial	1	5	5	12	0	2	13	0	38
		d. Residential	17	55	67	107	2	109	77	34	468
VII.B.3	Number of follow-up inspections	a. Municipal	0	3	0	0	0	2	14	4	23
		b. Commercial	7	10	10	13	0	22	65	4	131
		c. Industrial	1	3	0	2	0	0	6	0	12
		d. Residential	3	22	30	43	0	34	24	9	165
VII.B.4	Number of violations	a. Municipal	0	7	0	1	0	5	26	7	46
		b. Commercial	15	21	25	16	0	51	140	11	279
		c. Industrial	0	7	0	4	0	0	20	0	31
		d. Residential	4	47	59	85	0	70	50	31	346
VII.B.5	Number of enforcement actions issued	a. Municipal	0	2	0	0	0	3	19	4	28
		b. Commercial	10	13	11	7	0	21	65	3	130
		c. Industrial	0	2	0	2	0	0	6	0	10
		d. Residential	0	0	0	0	0	0	0	0	0
VII.B.6	Number of escalated enforcement actions issued	a. Municipal	0	0	0	0	0	0	0	0	0
		b. Commercial	0	0	0	0	0	0	0	1	1
		c. Industrial	0	0	0	0	0	0	0	0	0
		d. Residential	0	0	0	0	0	0	0	0	0

ATTACHMENT D.2

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FISCAL ANALYSIS

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FISCAL ANALYSIS COMPONENT

1.1. Introduction

This section presents an estimated annual budget for the County's runoff management programs for FY 2015-16.

1.2. Fiscal Analysis Methods

This section continues to utilize the methodologies and standards established in *Fiscal Analysis Method* submitted by the Copermittees in January 2009.

1.3. Fiscal Analysis Results

As shown the County estimated its total FY 2015-16 expenditures at $27,414,216. This fiscal analysis addresses each of the County's Runoff Management Program elements (jurisdictional, watershed, and regional activities) for the current reporting period (FY 2015-16). Expenditures are described by department and major program area. They represent an estimate of the expenditures that the County incurred in meeting its compliance obligations for FY 2015-16. They should not be interpreted as either budgeted or actual expenditures. Because stormwater program expenditures are distributed throughout a considerable number of County programs, a single consolidated "budget" does not exist for the program as a whole. As such, these figures should be considered best estimates of stormwater-related expenditures.

1.3.1 Expenditures

1.3.1.1. Jurisdictional

Table 1.1 presents the County's estimated jurisdictional expenditures for FY 2015-16.

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

Jurisdictional Worksheet Component			Explanation/Notes
1	**ADMINISTRATION**	**$6,840,583**	These costs correspond to the DPW WPP development, administrative oversight, and assessment of the County's stormwater programs. The WPP is responsible for the development of new and augmented County stormwater programs, regulatory reporting, and program assessment. Some administrative costs are associated with other specific functions shown below, but are included here because they could not be separated out.
2	**DEVELOPMENT PLANNING**	**$1,109,654**	
A	**Land Use Planning**	$0	Expenditures not reported for FY 2015-16; included in other elements.
B	**Environmental Review**	$0	Expenditures not reported for FY 2015-16; included in other elements.
C	**Development Project Approval and Verification**	**$1,109,654**	
C1	**Public Projects (CIP)**	$824,219	
	Project Planning and Engineering	$570,229	Costs include: preparing and reviewing plans and specifications for stormwater BMPs, and SWPPP/WPCP review. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$15,000	
	BMP Implementation	$238,990	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
C2	**Private Projects**	$285,435	
	Permitting and Licensing	$285,435	This cost covers PDS plan reviews at permitted sites. Total costs are estimated as fixed percentages of annual plan-checking fees.
3	**CONSTRUCTION**	**$4,500,593**	
A	**Public Projects (CIP)**	$2,886,893	Costs include: BMP compliance inspections during construction, and implementation of construction phase BMPs. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$1,613,880	
	BMP Implementation	$1,273,013	
B	**Private Projects**	$1,613,700	
	Compliance Inspection and Enforcement	$1,613,700	This cost primarily covers DPW and PDS construction inspections at permitted sites. Total costs are estimated as fixed percentages of inspection program fees.
4	**MUNICIPAL**	**$7,572,297**	
A	**Administration**	$267,805	Expenditures associated with the administrative oversight of the stormwater programs, regulatory reporting, and program assessment of municipal facilities by the DPW - Watershed Protection Program.
B	**Streets, Roads, and Highways Element**	$2,256,091	
	Administration	$291,160	Founded road operations activities include: culvert inspections and cleaning;

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	Maintenance Inspections	$1,890,813	increased culvert waste disposal costs, street sweeping, installation and maintenance of BMPs and road structures, and the placement of additional controls. 10% of the Maintenance and Inspections and BMP Implementation is reported as Administration cost.
	BMP Implementation	$74,118	
	Other	$0	
C	**MS4 Element**	$1,530,000	
	Administration	$191,000	The combined costs shown here apply across (1) DPW Flood Control -- conversion of existing concrete lined channels to natural bottom channels, updating flood control master plans, increased maintenance of flood control systems, and construction and maintenance of regional treatment BMPs; and (2) DPW Flood Control MS4 Operation & Maintenance -- maintenance on flood control facilities throughout the unincorporated areas of the County, exclusive of facilities within road rights-of-way (included in 4.B above). Other includes the cost of disposal of debris removed from MS4.
	Maintenance Inspections	$1,046,900	
	BMP Implementation	$290,500	
	Other	$2,500	
D	**Solid Waste Facilities Element**	$406,618	
	Administration	$35,047	Costs include Regional Board stormwater permit fees, consultant costs associated with stormwater upgrade and repair projects, and office staff time.
	Maintenance Inspections	$16,922	Costs include staff time to perform site inspections.
	BMP Implementation	$79,149	Costs include stormwater consultant site inspections, sampling/testing and BMP materials.
	Other (construction)	$275,500	Drainage improvement projects and BMP site maintenance projects.
E	**Wastewater Facilities Element**	$187,000	
	Administration	$10,000	This includes costs associated with JRMP report, the sanitary sewer system and facilities including: pump stations, sewage treatment plants and Spring Valley Operations facility. Also includes the cost of BMP design, acquisition,
	Maintenance Inspections	$127,000	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$50,000	maintenance and monitoring, for wastewater Capital Improvement Projects, and Major maintenance projects, and at various wastewater facilities.
	Other	$0	
F	**Road Stations Element**	$919,867	
	Administration	$83,624	This includes DPW road station operations related to Permit compliance. The Administration cost is determined as 10% of the total costs of maintenance and Inspections and BMP Implementation as reported by the DPW Roads Divisions.
	Maintenance Inspections	$799,414	
	BMP Implementation	$36,829	
	Other	$0	
G	**Fleet Maintenance Element**	$11,722	
	Administration	$1,036	This includes costs associated with operation of the County's fleet maintenance and fueling facilities.
	Maintenance Inspections	$7,392	
	BMP Implementation	$3,294	
	Other	$0	
H	**Municipal Airfields Element**	$338,110	These costs involve site inspections, annual reporting, and maintenance of BMPs at airports, including oversight of tenant operations. The BMP implementation item includes Palomar asphalt cap repairs.
	Administration	$12,737	
	Maintenance Inspections	$0	
	Compliance Inspection and Enforcement	$0	
	BMP Implementation	$300,623	
	Other (sampling and analysis)	$24,750	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
I	**Parks & Recreational Facilities Element**	$1,214,562	
	Administration	$121,362	This includes: coordinating all training requirements, preparing and reviewing reports, and overseeing the overall implementation of the stormwater program for DPR.
	BMP Implementation	$991,603	This includes costs associated with implementation of BMPs at County parks.
	Compliance Inspection and Enforcement	$101,597	Costs are for DPR enforcement of stormwater requirements at County parks.
	Other	$0	
J	**Office Buildings & Other Municipal Facilities Element**	$297,867	
	Administration	$0	DGS conducts a variety of storm water activities including: inspections and clean-up of County-owned, occupied, and leased facilities and vacant lands; maintenance and signage of storm drain inlet inserts and trash dumpsters; placement of inlet filters; maintenance of coverage and containment improvements for on-site supplies and materials; parking lot sweeping and controlled parking lot power washing; and application of erosion and sediment control measures. These costs are exclusive of fleet maintenance and fueling operations.
	Maintenance Inspections	$99,808	
	BMP Implementation	$198,059	
	Other	$0	
	Management of Pesticides, Herbicides, & Fertilizers	$142,656	
	Administration	$142,656	Integrated Pest Control Program within the Department of Agriculture, Weights and Measures (AWM) performs eradication and control of invasive weeds. This program also provides weed control on roadsides, airports, flood control channels,
	Maintenance Inspections	$0	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$0	sewage treatment plants and inactive landfills. It also provides structural pest control to facilities owned and operated by the county.
	Other	$0	
5	**INDUSTRIAL and COMMERCIAL**	**$1,575,635**	
	Administration	$253,047	DPW and AWM conduct inspections of a variety of businesses in the unincorporated County, provide regulatory oversight of mobile businesses, and conduct follow-up and enforcement of stormwater violations.
	Compliance Inspection and Enforcement	$1,245,279	
	Educational Outreach	$77,309	
	Other expenditures	$0	
6	**RESIDENTIAL**	**$1,205,386**	
	Compliance Inspection and Enforcement	$688,453	DPW conducts complaint investigations for residential sources in the unincorporated County, and conduct follow-up and enforcement of stormwater violations. DPW also operates a regional hotline.
	Educational Outreach	$516,933	Several County departments coordinate and provide outreach to the residential sector and schoolchildren in support of Permit Section D.5 requirements. Costs reported here correspond to DPW only. Funded activities include developing pollution prevention content and providing direct outreach to various target audiences within the general residential and schoolchildren target audiences.
7	**IDDE**	**$321,523**	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

Jurisdictional Worksheet Component			Explanation/Notes
		$321,523	DPW conducts monitoring programs, assesses scientific data, and provides technical and scientific support to other County program staff. They also provide support for all technical and scientific aspects of JRMP development and implementation. These costs are exclusive of the regional monitoring program which is addressed separately under regional costs.
8	**EDUCATION**	**$0**	Education costs are included in other sections as applicable.
9	**PUBLIC PARTICIPATION**	**$0**	Public participation costs are included in other sections as applicable.
10	**SPECIAL INVESTIGATIONS**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.
11	**NON-EMERGENCY FIREFIGHTING**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.

$23,125,671

1.3.1.2 Watershed

Table 1.2 presents the County's estimated watershed expenditures for FY 2015-16.

Table 1.2 – Estimated Watershed Expenditures for FY 2015-16

	Santa Margarita WMA	San Luis Rey WMA	Carlsbad WMA	San Dieguito WMA	Peñasquitos WMA	San Diego River WMA	San Diego Bay WMA	Tijuana WMA
Administration	$37,583	$201,492	$82,653	$113,035	$75,309	$105,117	$37,583	$75,309
Cost Share Contribution	$0	$62,494	$46,204	$8,885	$1,062	$68,970	$6,659	$2,346
Watershed Activities	$626,917	$119,390	$14,860	$171,640	$26,423	$125,705	$111,491	$80,300
Other	$0	$0	$0	$0	$0	$0	$0	$0
Total Estimated Watershed Costs	**$664,500**	**$383,376**	**$143,717**	**$293,560**	**$102,794**	**$299,792**	**$155,733**	**$157,955**

1.3.1.3 Regional

Table 1.3 presents the County's estimated regional expenditures for FY 2015-16. This includes only those expenditures associated with the Copermittees' adopted Regional Budget and Work Plan. Other costs associated with regional participation (meeting attendance, etc.) are included within the jurisdictional expenditures presented above.

Table 1.3 – Estimated Regional Expenditures for FY 2015-16

Regional Programs	County Costs
Administration	$0
Cost Share Contribution	$2,087,118
Regional Activities	$0
Other	$0
Total Estimated Regional Costs	**$2,087,118**

1.3.1.4 Total Expenditures

Table 1.4 presents the County's total estimated expenditures for FY 2015-16 (jurisdictional, watershed, and regional).

Table 1.4 – Total Estimated County Expenditures for FY 2015-16

Component / Sub-component	Estimated Expenditures
Jurisdictional	
Administration	$6,840,583
Development Planning	$1,109,654
Construction	$4,500,593
Municipal	$7,572,297
Industrial And Commercial	$1,575,635
Residential	$1,205,386
IDDE	$321,523
Education	$0
Public Participation	$0
Special Investigations	$0
Non-emergency Firefighting	$0
Jurisdictional Total	**$23,125,671**
Watershed	
Santa Margarita WMA	$664,500
San Luis Rey WMA	$383,376
Carlsbad WMA	$143,717
San Dieguito WMA	$293,560
Peñasquitos WMA	$102,794
San Diego River WMA	$299,792
San Diego Bay WMA	$155,733
Tijuana WMA	$157,955
Watershed Total	**$2,201,427**
Regional	**$2,087,118**

Total Estimated County Costs	***$27,414,216***

1.3.2 Funding Source

Table 1.5 shows the major sources of funding for the County's urban runoff management programs in FY 2015-16, and describes the legal restrictions applicable to the use of each.

Table 1.5 – Legal Restrictions on the Use of Program Funding

Funding Source	Legal Restrictions
General Fund	There are no restrictions on the use of general fund for County water quality programs and activities except that they must be used only for the purposes for which they are budgeted and allocated by the County Board of Supervisors.
Flood Control District Fees	Revenue generated from these fees must be expended for activities related to flood and storm management.
Developer Deposits / Permit Fees	Deposits / fees may be used only to fund activities related to the work for which the permits are issued.
Gas Tax	Gas Tax is collected by the state and allocated to local government for transportation-related work including maintenance of existing transportation systems and construction of new transportation facilities. These funds may not be used for other purposes.
Sanitary District Fees	Sanitary District Fees are used for work related to the maintenance of sewer lines, pump stations, force mains, and several treatment plants that serve the unincorporated areas. They may be used only for such maintenance-related purposes within the respective sewer district for which they are collected.
Other Funding Sources	Other funding sources collectively account for a relatively small portion of ongoing expenditures. However, all funding for the County's stormwater compliance programs is expended within applicable legal restrictions and limitations.

1.4. Conclusions and Recommendations

The figures presented here are an estimate of the expenditures that the County incurred to meet its compliance obligations for FY 2015-16. For the reasons explained above, they should be considered only best estimates of stormwater-related expenditures.

D.4.3 County of San Diego Strategies

County of San Diego's strategies are detailed in Tables D-7 and D-8.

Table D-7
County of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
Illicit Discharge, Detection, and Elimination (IDDE) Program						
1	Maintain storm water conveyance system map to facilitate IDDE program	Yes	Updated as needed.	N	NA	Y
2	Utilize municipal personnel and contractors to identify and report Illicit Connections and Discharges	Yes	IDDE Program.	N	NA	Y
3	Updated focused training for County field staff	Yes	Updated training for BMP Design Manual and Storm water Implementers.	N	NA	Y
4	Collect effluent on the ground (EOG), sanitary sewer overflow (SSO) data	Yes, fully	Approximately 87 EOG complaints related to septic systems and 14 SSO events recorded and responded to.	N	NA	Y
5	Address septic system failures where observed	Yes, fully	Suspected septic discharges are reported to DEH HIRT Response line when they occur after hours and DEH Land and Water Quality Division during normal hours. All complaints resolved during 15-16.	N	NA	Y
6	Facilitate public reporting of ICID via telephone and email	Yes	Bilingual hotline, dedicated e-mail address, and multiple online reporting tools.	N	NA	Y
7	Refer homeless issue complaints to Sheriff or appropriate jurisdictions	Yes	Collaborate with multi-departmental group to address homeless encampments.	N	NA	Y
8	Bilingual hotline answered by a live operator (I Love a Clean San Diego) to provide better customer service	Yes	Bilingual hotline operated by ILACSD.	N	NA	Y
9	Implement practices and procedures to address spills with the potential to enter the storm drain system	Yes	NOV issued by DEH for failing septic systems when effluent could reach the storm drain. Prompt follow up and mitigation is implemented. Such cases are rare; <5 in 15-16.	N	NA	Y
10	Coordinate spill response with responsible sewer agencies	Yes	Major DEH role is to inform the public of risks associated with sewer spills, conducting sampling, reporting, posting signs, etc.	N	NA	Y
11	Implement practices and procedures to prevent/limit infiltration of seepage from sanitary sewers	Yes	If illicit connections are identified as part of an IDDE investigation, investigation will be conducted to define and eliminate the source.	N	NA	Y
12	Coordinate with upstream entities to prevent illicit discharges from upstream sources entering into the storm drain system	Yes	If illicit connections are identified as part of an IDDE investigation, investigation will be conducted to define and eliminate the source. If determined to be from an upstream entity coordination will occur.	N	NA	Y
13	Utilize municipal personnel and Contractors to monitor stormwater outfalls for discharges of potential ICIDs	Yes	This is part of the IDDE Program.	N	NA	Y
14	Develop and implement a strategy for investigating and addressing ICIDs.	Yes	Focused, collaborative investigations with Planning and Science staff of high priority outfalls.	N	NA	Y

Table D-7 (continued)
County of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
Development Planning						
15	Require implementation of source control and Low Impact Development (LID) BMPs for all development projects.	Fully	The County BMP DM requires all projects regardless of size and location to implement SC and SD BMPs. These requirements are captured in the WPO and County's BMP DM.	N	NA	Y
16	Priority Development Projects: In addition to requirement for all development projects, implement or require implementation of onsite structural BMPs to control pollutants and manage hydromodification for PDPs.	Fully	The County BMP DM requires all PDPs to implement PC and HMP BMPs. These requirements are captured in the WPO and County's BMP DM.	N	NA	Y
17	Update BMP Design Manual procedures to specify stormwater requirements applicable to development and redevelopment projects, identify and design appropriate BMPs, establish maintenance criteria, and establish where implemented alternative compliance options.	Partially	Updated to reflect the Regional Model BMP DM with additional changes to incorporate County implementation practices. BMP DM became effective on February 26, 2015. Rene can provide details on the differences between CoSD BMP DM and Model BMP DM.	N	NA	N
18	Conduct internal (staff) training on the updated BMP Manual	Fully	The JRMP requires the County to conduct internal training every fiscal year and after release of new guidance documents.	N	NA	N
19	Hold external land development workshops targeting the development community	Fully	The County conducts external training regularly and after release of new guidance documents.	N	NA	N
20	Implement a program that ensures that all structural and Low Impact Development (LID) BMPs are designed, constructed and maintained on Priority Development and Redevelopment Projects.	Fully	Structural BMPs and LID BMPs are designed and constructed per the BMP Design Manual. In addition, Structural BMPs are tracked for maintenance through inspections and self verification letters. LID BMPs that are installed as a result of implementation of the BMP Design Manual are proposed to be inspected.	N	NA	Y
21	Impose legal authority to ensure all development and redevelopment projects are in compliance with all post construction requirements.	Fully	The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated permit and the inclusion of applicant-implement offsite alternative compliance.	N	NA	Y
22	Update County codes, ordinances, and stormwater design standards consistent with the permit and the updated BMP Manual	Fully	The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated permit and the inclusion of applicant-implement offsite alternative compliance. WPO update became effective on February 26, 2016.	N	NA	N
Construction Management						
23	Maintain, update and prioritize a watershed based inventory of all projects issued local permits that allow soil disturbing activities.	Yes	Projects that are issued local permits that allow soil disturbance activities are part of the inventory that is watershed-based.	N	NA	Y

Table D-7 (continued)
County of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
24	Require implementation of BMPs that are site specific, seasonally appropriate and appropriate to the construction phase, year round.	Yes	Every project requires implementation of site specific construction BMPs, seasonably appropriate and appropriate to the construction phase.	N	NA	Y
25	Impose legal authority to ensure inventoried construction projects are in compliance with all requirements.	Yes	The Watershed Protection Ordinance is the current legal authority to insure inventoried construction projects are in compliance with all requirements.	N	NA	Y
26	Make updates to County ordinances related to construction; reference to existing grading ordinance	Yes	County ordinances are updated with subsequent Construction General Permit updates; the Watershed Protection Ordinance will be updated as necessary as a result of the future Grading Ordinance Update.	N	NA	N
27	Provide internal staff training related to construction storm water management.	Yes	The County conducts construction stormwater training annually and it targets construction inspectors in DPW-PDCI, PDS-Building, and CIP Inspectors in DPW and DGS.	N	NA	Y
Existing Development						
28	Maintain and update a watershed-based inventory of existing development (i.e. commercial, industrial, municipal and residential areas).	Yes	Inventory is tracked in Accela Automation.	Y	Database is continually updated to increase accuracy and efficiency	Y
29	Improve the tracking of watershed based inventories via consolidated database	Yes	See 28	Y	See 28	Y
30	Designate a minimum set of BMPs required for all existing development inventories, including special event venues. The designated minimum BMPs must be specific to facility or area types and pollutant generating activities, as appropriate.	Yes	JRMP establishes minimum BMPs for all land use types.	N	NA	Y
31	Create an Equestrian BMP Handbook	No	Handbook created in FY2014-15.	Y	Handbook will be revised in FY2016-17 to encompass additional BMPs and be more user friendly.	Y
32	Require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types and pollutant generating activities, as appropriate.	Yes	See 30	N	NA	Y

Table D-7 (continued)
County of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
33	Pet waste management and outreach in County Parks.	Yes	Mutt-mitt dispensers are installed and maintained in many County parks, providing people who are walking their dogs with waste disposal bags to use to pick up after their pets.	N	NA	Y
34	Implement a schedule or operation and maintenance activities for the stormwater conveyance system and related structures.	Yes	Stormwater maintenance is referred to appropriate departments when needed.	N	NA	Y
35	Implement a schedule of operation and maintenance for County paved and unpaved roads.	Yes	County Road Crews employ a schedule for maintenance of County Roads.	N	NA	Y
36	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Yes	1. 450 Facilities received the Agricultural Water Quality Best Management Practices for Pesticides through annual registration notifications. 2. Inspections were conducted at 83 Commercial Ag Facilities.	N	NA	Y
37	Promote and encourage implementation of designated BMPs in residential areas.	Yes	Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas. All Residential Management Areas were inspected in FY15-16.	N	NA	Y
38	Conduct inspections of inventoried existing development to ensure compliance	Yes	Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas.	N	NA	Y
39	Conduct focused residential inspections based on strategic assessments.	Yes	Focused, collaborative investigations with Planning and Science staff of high priority outfalls.	N	NA	Y
40	Develop a residential inspections tracking program via mobile platform - miles, violations, etc.	Yes	In pilot testing phase.	Y	Modifications based on pilot testing phase to increase effectiveness	Y
41	Improve inspections data tracking through mobile phone applications	Yes	See 40	Y	See 40	Y
42	Enforce legal authority established for all inventoried existing development to achieve compliance	Yes	See JRMP	N	NA	Y
43	Update county ordinance related to existing development; reference to existing guidance documents	Yes	Watershed Protection Ordinance and BMP Design Manuals were updated.	N	NA	N
44	Promote incentive program for BMP retrofits (e.g. water smart irrigation controllers, turf replacements programs, residential landscape evaluation program).	Yes	The County continues to collaborate with and promote the efforts of partner agencies incentive programs.	N	NA	N

Table D-7 (continued)
County of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
45	Collaborate with partner agencies and groups to promote non-County sponsored incentive programs for BMP retrofits, including rain barrels, smart controllers, soil sensors, turf replacement, etc.	Yes	The County continues to collaborate with and promote the efforts of partner agencies incentive programs.	N	NA	Y
46	Identify candidate areas of existing development for stream, channel, and/or habitat rehabilitation projects and facilitate implementation of such projects.	No	NA	N	NA	N
Outreach and Public Participation						
47	Develop, improve, distribute outreach materials.	Yes	Improved outreach materials through a focused Community-based Social Marketing approach.	Y	Continual improvement of existing materials, including translation into Spanish	Y
48	Give outreach presentations to elementary, middle, and high school students	Yes	Offer presentations to elementary, middle, and high schools serving unincorporated communities.	N	NA	Y
49	Outreach to mobile landscaping service providers	Yes	Pesticide Regulation Program collaboration with the California Department of Pesticide Regulation on a pilot program to offer workshops for maintenance gardeners. Two workshops were held where attendees were provided training materials and concluded with a pesticide certification exam. Attendees at both workshops had high success rates for the exam.	N	NA	Y
50	Conduct large residential property pet waste management outreach	No	Unable to implement due to lack of community service organization partners.	N	NA	N
51	Conduct over irrigation outreach pilot study	Yes	Community-based Social Marketing pilot study on the effectiveness of irrigation runoff prevention materials.	Y	NA	Y
52	Conduct Homeowners Associations Outreach and Coordination Pilot Study	Partial	HOA Outreach materials in draft format. Additional development will take place in FY2016-17.	Y	NA	Y
53	Expand Homeowners Associations Outreach and Coordination based on the pilot project within San Luis Rey, San Dieguito, or San Diego River as needed and as funding is identified	No	Additional development may occur based on pilot study in FY2016-17.	N	NA	N
54	Collaborate with watershed partners to develop consistent messaging to targeted audiences such as commercial, residents to conserve water and reduce dry weather flows	Yes	Collaboration between the Regional Education Workgroup and Think Blue San Diego Region to develop and distribute educational materials such as the "Be the Solution to Pollution" booklet which includes irrigation and runoff reduction measures. Other items developed under this included posters, calendars and coloring books.	N	NA	y

Table D-7 (continued)
County of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
55	Sponsor Trash Collection Events through public outreach and participation	Yes	The County sponsors ILACSD to establish cleanup sites at the Coastal Cleanup Day and Creek to Bay events.	N	NA	Y
56	Educational Workshops on Integrated Pest Management, manure management and others as needed	Yes	Various workshops presented throughout the year by County staff including UCCE, FHA and contractors.	N	NA	Y
57	Partner with Master Gardeners Programs to provide education opportunities on water use and practices for gardening	Yes	Various workshops presented throughout the year by County staff including UCCE, FHA and contractors.	N	NA	Y
58	Conduct Effectiveness Survey's on Education & Outreach programs	Yes	Surveys to determine the efficacy of watershed education to unincorporated elementary, middle, and high schools serving unincorporated communities.	N	NA	Y
Enforcement Response Plan						
59	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Yes	County implemented the ERP as described in the JRMP.	N	NA	Y
60	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) within five (5) calendar days of issuing escalated enforcement to a construction site that poses a significant threat to water quality as a result of violations or other noncompliance	Yes	County implemented the ERP as described in the JRMP.	N	NA	Y
61	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) any persons required to obtain coverage under the statewide Industrial General Permit and Construction General Permit and failing to do so, within five (5) calendar days from the time the Copermittee become aware of the circumstances.	Yes	County implemented the ERP as described in the JRMP.	N	NA	Y

Table D-7 (continued)
County of San Diego Jurisdictional Strategies for Los Peñasquitos WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
Public Education and Participation						
62	Implement a public education and participation program to promote and encourage development of programs, management practices and behaviors that reduce the discharge of pollutants in storm water prioritized by high risk behaviors, pollutants of concern, and target audiences.	Yes	The County completes numerous education and public participation programs for a diverse target audiences. See JRMP.	N	NA	Y

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Table D-8
County of San Diego Optional Strategies for Los Peñasquitos WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
Provision B.3.b.(1)(b)(i) - BMPs, incentives, or programs that may be implemented that are in addition to requirements of Provision B.3.b.(1)(a)										
1	Implement Sustainable Landscapes Program to encourage landscape retrofits.	FY 2016-17; Continuous until grant funding and incentives are depleted	Implementation of this strategy may be triggered if (1) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (2) all of the necessary resources have been secured. Continue implementation when the funding and incentives items are secured.	Staff resources, Grant funding, Incentive items, Partnerships	No	Partially	None	N	NA	Y
2	Implement an incentive program for BMP Retrofits (Public-Private Partnerships - a County sponsored program to offer incentives for rain barrel installation, downspout disconnects from the stormwater system, etc.)	FY 2015-16 Continuous, as resources allow	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Incentive items, Partnerships	No	Partially	None	N	NA	Y
3	Implement a program that provides rebates or incentives for pumping septic systems, with a focus in high risk areas adjacent to waterways (within 600 feet).	Once triggered, Pilot program 1 -2 years, as needed thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Incentive items	No	No	Funding source not identified. All 4 triggers have not been met.	No	NA	No
4	Identify where sewer and stormwater infrastructure are in close proximity and subsequently, confirm the absence of flow at nearby stormwater MS4 outfall during dry weather.	Once triggered, 2-3 years; one-time	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	No	None	No	NA	

Table D-8 (continued)
County of San Diego Optional Strategies for Los Peñasquitos WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
5	Implement a program for on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	Once triggered, 2-3 years	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) septic systems have been determined to be a pollutant sources to the MS4; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	Partially	Under the Local Area Management Plan (LAMP) for onsite wastewater treatment systems the treatment systems with supplemental treatment are required to be permitted annually. The annual operating permit will define the monitoring and maintenance requirements as specified by the manufacturer and/or qualified professional who designed the system. The LAMP ordinance can be found at: http://www.sandiegocounty.gov/content/dam/sdc/deh/lwqd/RWQCB%20Approved%20LAMP%20Final%202-24-15.pdf	N	NA	Y

Table D-8 (continued)
County of San Diego Optional Strategies for Los Peñasquitos WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
6	Divert persistent dry weather flows from storm drains to sewer	Once triggered, 3-6 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) permission is granted from sewer agency; and (4) ground water or permitted discharges have been ruled out; and (5) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Engineering design, Environmental review, Permits, Ongoing funding for operation/maintenance	No	No	Diversions are a last resort strategy and will be reviewed for outfalls that are persistently flowing after all other implementation strategies have been exhausted.	N	NA	N
Provision B.3.b.(1)(b)(ii) - Incentives or programs that may be implemented to encourage or implement projects to retrofit areas of existing development										
7	Implement trash capture program (e.g., retrofit storm drain intakes with trash capture devices)	Baseline study 2-3 years; FY 15-16 implementation as needed and as resources allow	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) baseline study completion and success; and (4) focus areas identification; and (5) detailed inlet inventory of focus areas; and (6) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Equipment, Permits, Ongoing funding for operation/maintenance	No	Partially	The County of San Diego is in process of conducting several studies to develop Baseline Trash Generation Rates.	N	NA	Y

Table D-8 (continued)
County of San Diego Optional Strategies for Los Peñasquitos WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
8	Implement a Green Streets Retrofits Program	Once triggered, 3-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered on a project-by-project basis if (1) a specified interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Each green street retrofit project is preliminary estimated to cost an average of $5,500,000 per linear mile of retrofit for construction. Resources include: Staff resources, Grant funding or alternative source, Contractor funding, Engineering or landscaping design, Permits, Environmental review, Right of way acquisition, Ongoing funding for operation/maintenance	No	Partially	Design standards and specifications have been developed. Green streets are now being used to meet compliance for all retrofit and/or redeveloped road projects that in the Capital Improvement Projects plan. Pursuing Grant Funding	N	NA	Y
9	Construct Treatment Control BMPs (retrofits projects)	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Engineering or landscaping design, Permits, Environmental review, Ongoing funding for operation/maintenance	No	No	None	N	NA	N

Table D-8 (continued)
County of San Diego Optional Strategies for Los Peñasquitos WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
10	Implement an alternative compliance program to enable "offsite" compliance for new and redevelopment projects.	Once triggered, 3-6 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Engineering design , Permits, Environmental review, Right of way acquisition (if needed), Ongoing funding for operation/maintenance	No	Partially	Currently applicant implemented offsite alternative compliance is available for use by the development community. The Water Quality Equivalency (WQE) provides the currency for structural BMPs and some natural system management practices (NSMPs). Additional work on the WQE will be conducted during FY17. The County is not currently pursuing a credit system but is participating as a stakeholder on the City of San Diego TAC and as a member of the Western Riverside Coalition of Governments (WRCOG) discussion on offsite alternative compliance.	N	NA	Y

Table D-8 (continued)
County of San Diego Optional Strategies for Los Peñasquitos WMA

	Optional Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
Provision B.3.b.(1)(b)(iii) - Incentives or programs that may be implemented to encourage or implement projects that will rehabilitate the conditions of channels or habitats										
11	Flood Control Channel Rehabilitation Projects (e.g., removal of impervious lining in flood control channel and replacement with earthen or vegetated surface)	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (4) engineering design, monitoring, and outreach plans are approved; and (5) all of the necessary resources have been secured.	Project costs vary by size and complexity. Resources include: Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Engineering design, Permits, Environmental review, Right of way acquisition (if needed), Ongoing funding for operation/maintenance	No	Partially	One project has been identified in SDR for retrofit/rehabilitation. Project planning, design and environmental review will begin in FY17	N	NA	Y
12	Implement a program to remove invasive non-native plants (i.e. Arundo) upstream areas rivers or tributaries.	Once triggered, 1-2 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) community support and partnerships established; and (4) it has been determined that invasive plants have been found to have an impact on water quality; and (5) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	No	The County has developed several Habitat Restoration Plans and Non-Native Plant Removal Guidelines including for the Otay Valley Regional Park. Implementation of projects resulting from these guidelines requires acquisition of land and funding. No projects were completed during this reporting period.	NA	NA	N

Table D-8 (continued)
County of San Diego Optional Strategies for Los Peñasquitos WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, NA)*	Planned Implementation into next FY? *(Y/N)*
13	Habitat Restoration and rehabilitation projects in County Parks	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Restoration / Rehabilitation Designs Approved, Environmental Permits issued, CEQA / NEPA Environmental review, Ongoing funding for maintenance and monitoring	No	Partially	Habitat restoration and rehabilitation has occurred in the Tijuana River Valley Regional Park and will continue for an additional 3-5 years. Additionally habitat restoration and rehabilitation has been initiated for the Sweetwater Loop Trail Phase I and Phase III however additional funding is necessary to complete Phase I. Phase III will begin in Fall 2016.	N	NA	Y

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D.4.4 Modifications to the BMP Design Manual

No modifications to the BMP Design Manual have been made since the WQIP was approved in fall 2015. The current County of San Diego's BMP Design Manual is posted on the County of San Diego's website.

D.4.5 Modifications to the Jurisdictional Runoff Management Plan

No modifications to the County of San Diego's JRMP have been made since the WQIP was approved in fall 2015. The current County of San Diego's JRMP is posted on County of San Diego's website.

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D.5 Caltrans

D.5.1 Annual Report Certification

Caltrans' required certification regarding the preparation of the Water Quality Improvement Plan Annual Report is included on the following pages.

DEPARTMENT OF TRANSPORTATION
DISTRICT 11
4050 TAYLOR STREET, M.S. 120
SAN DIEGO, CA 92110
PHONE (619) 688-0100
FAX (619) 688-4237
TTY 711
www.dot.ca.gov

Serious drought.
Help save water!

January 4, 2017

STATEMENT OF CERTIFICATION

Los Penasquitos Watershed Management Area Water Quality Improvement Plan
2015-2016 Annual Report

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

BRUCE L. APRIL
Deputy District Director, Environmental

1/6/17
Date

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Appendix E: Adaptive Management

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Adaptive Management – Changes to Water Quality Improvement Plan Elements

1. The assessment of Provision A.4 will now be considered once per MS4 Permit term during the development of the Regional Monitoring and Assessment Report.
2. A number of Responsible Agencies have made adminstrative chagnes to their strategies. Updates are described in Appendix D.

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City of Imperial Beach, California
PUBLIC WORKS DEPARTMENT
825 Imperial Beach Blvd., Imperial Beach, CA 91932 Tel: (619) 423-8311 Fax: (619) 429-4861

January 27, 2017

Mr. David Gibson
California Regional Water Quality Control Board, San Diego Region
2375 Northside Drive, Suite 100
San Diego, CA 92108-2700

Subject: **San Diego Bay WMA-PIN No. 794855:carias**
Submittal of San Diego Bay Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report

Dear Mr. Gibson:

On behalf of the San Diego Bay Watershed Management Area (WMA) Responsible Parties, the City of Imperial Beach is pleased to submit the San Diego Bay WMA Water Quality Improvement Plan Annual Report for the 2015-2016 reporting period. This document was prepared in accordance with Permit Order R9-2013-0001, as amended by Orders No. R9-2015-0001 and No. R9-2015-0100 (Permit). Please accept this submittal on behalf of the responsible parties in the watershed.

Enclosed is one (1) electronic copy of the San Diego Bay Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report, including certification statements. The following are also included the Annual Report:

- Jurisdictional Runoff Management Program (JRMP) Annual Report forms (Appendix 2);
- Legal authority certifications as required by Permit Provision E.1.b (Appendix 2);
- Descriptions of JRMP and BMP Design Manual updates, as applicable (Appendix 2);
- Proposed updates to the Water Quality Improvement Plan, including administrative updates, primarily to jurisdictional strategies (Appendix 2), and a modification to the Airport Authority's airside street sweeping goal (Section 5.1);
- Proposed addition of a hydromodification exemption for the portion of the Otay River between the Lower Otay Reservoir Dam and I-805, as shown in the revised Watershed Management Area Analysis (Appendix 5) and as discussed previously during a Consultation Panel meeting; and
- Monitoring reports for the Chollas Creek TMDLs, the Shelter Island Yacht Basin TMDL, and the City of San Diego's Annual Technical Report: Addressing Trash, Debris, and Floating Material in Chollas and Paleta Creeks (Appendix 4).

In addition to the CD submittal, the Annual Report will also be uploaded to the Regional Clearinghouse hosted by the County of San Diego at: http://www.projectcleanwater.org/. It will not be submitted to the U.S. EPA, as previously directed through email by the San Diego Water Board on June 15, 2015.

If you have any questions, please give me a call at (619) 628-1370.

Sincerely,

Chris Helmer
Assistant Public Works Director, City of Imperial Beach

Enclosures: 1. CD – San Diego Bay Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report, including certification statements

cc: (email) Christina Arias, San Diego Water Board
San Diego Bay WMA Responsible Parties

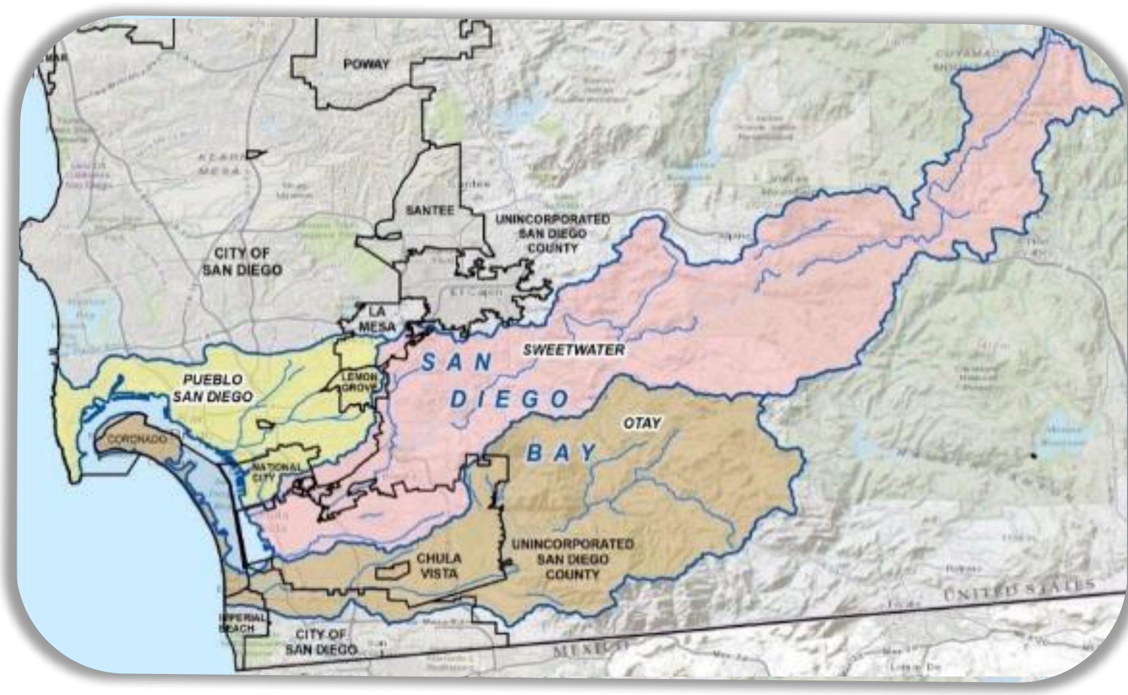
San Diego Bay

Watershed Management Area Water Quality Improvement Plan

—

FY 2016 Annual Report

Submitted to the
San Diego Regional Water Quality Control Board
by the San Diego Bay Responsible Parties



January 2017

Responsible Party Certifications and JRMP Annual Report Forms

The San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report was prepared in accordance with Permit Order No. R9-2013-0001 as amended by Orders No. R9-2015-0001 and No. R9-2015-0100 (Municipal Permit). Appendix 1 provides a crosswalk of Municipal Permit requirements and Annual Report references. The following required items are included in Appendix 2 for each of the Responsible Parties:

- Certification Statements;
- Jurisdictional Runoff Management Program Annual Report Forms; and
- Legal authority certifications as required by Permit Provision E.1.b.

Executive Summary

Background

The San Diego Bay Watershed Management Area (WMA) comprises the 444-square-mile land area in southern San Diego County that drains to San Diego Bay. Ten agencies regulated under the San Diego Regional Water Quality Control Board (Regional Board) Municipal Permit[1] for discharges from municipal separate storm sewer systems (MS4s) have jurisdictional area within this WMA. Those agencies are the cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego; the County of San Diego; the San Diego Unified Port District (Port of San Diego); and the San Diego Regional Airport Authority (Airport Authority). The California Department of Transportation (Caltrans) is not regulated by the Municipal Permit but has also chosen to participate in the Water Quality Improvement Plan (WQIP) process, which is described below. Collectively, these 11 agencies are referred to as Responsible Parties (RPs).

In accordance with the Municipal Permit, the RPs developed a WQIP for the San Diego Bay WMA, which was accepted by the Regional Board in February 2016. The WQIP identifies the Highest Priority Water Quality Conditions (Highest Priority Conditions) and Focused Priority Water Quality Conditions (Focused Priority Conditions) in the WMA, sets goals to address those conditions within a specified timeframe, and describes the strategies that will be used to meet the goals.

This San Diego Bay WQIP Annual Report provides information on the RPs' progress in implementing the WQIP during fiscal year (FY) 2016. The reporting period for FY 2016 consists of two components: 1) July 1, 2015 to June 30, 2016, consistent with the fiscal year, for the implementation of all program activities except monitoring and assessment, and 2) October 1, 2015 to September 30, 2016, consistent with the monitoring year for the monitoring and assessment programs. Together, these two periods constitute the reporting year (FY 2016) for the WQIP Annual Report.

San Diego Bay Water Quality Improvement Plan

The RPs evaluated available data, information, and public input and used a multi-step assessment process to identify priority water quality conditions in the San Diego Bay WMA. The WQIP further identified the Highest Priority Conditions and Focused Priority Conditions in the WMA, for which numeric goals were developed. Addressing these conditions is the focus of the WQIP, but many of the strategies implemented to address Highest and Focused Priority Conditions provide multiple benefits by also addressing other pollutants and water quality conditions. Additionally, many strategies are implemented across RPs' entire jurisdictions, providing water quality benefits in parts of

[1] Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100.
http://www.waterboards.ca.gov/sandiego/water_issues/programs/storm water/docs/2015-1118_AmendedOrder_R9-2013-0001_COMPLETE.pdf

the watershed outside the areas where Highest or Focused Priority Conditions have been identified. The Highest and Focused Priority Conditions are summarized in Table ES-1.

Table ES-1
San Diego Bay Watershed Management Area Summary of Highest and Focused Priority Conditions

HU	Condition	Pollutant/ Stressor	Geographic Extent (HA/HSA)	Responsible Party
Pueblo (908)	Water Quality[1]	Bacteria; Dissolved copper, lead, and zinc	Chollas Creek (908.22)	City of La Mesa City of Lemon Grove City of San Diego County of San Diego Port of San Diego Caltrans
	Water Quality	Copper and zinc (wet weather)	Airport Authority jurisdiction within HA 908.21	Airport Authority
Sweetwater (909)	Riparian Area Quality	Various	Paradise Creek—lower Sweetwater, HA 909.1[2]	City of National City
	Physical Aesthetics	Trash	The western portion of the City of Chula Vista within HA 909.1	City of Chula Vista Port of San Diego
Otay (910)	Swimmable Waters (Beaches)	Bacteria	Applicable RP jurisdiction within HA 910.1	City of Coronado Port of San Diego
	Physical Aesthetics	Trash	Applicable RP jurisdiction in HA 910.2	City of Chula Vista City of Imperial Beach Port of San Diego

Notes:
HA = hydrologic area; HU = hydrologic unit; RP = Responsible Party
1. The conditions in bold are the Highest Priority Conditions for the San Diego Bay WMA. Conditions in regular font are the Focused Priority Conditions.
2. For the purposes of the WQIP, Paradise Creek is part of the lower Sweetwater area, for which the San Diego Bay priority condition analysis has identified potential impacts to beneficial uses such as habitat and noncontact water recreation

The WQIP identifies numeric goals for each Highest Priority Condition and Focused Priority Condition, including final goals and interim goals. Many of the interim goals to be met during the current Municipal Permit term, which extends through FY 2018, are expressed in terms of performance measures, such as an amount of area treated by installation of green infrastructure. Individual schedules for each goal were established. Together, the goals and schedules define the targets for developing a program of strategies and to measure progress.

Strategies and schedules include both core Municipal Permit required compliance activities and best management practices (BMPs) that RPs have been implementing for several years, and new strategies that are not a part of explicit permit requirements (e.g., creek restoration).

The RPs developed a Monitoring and Assessment Program that is specific to the WQIP and focuses on the outcomes of program implementation. The program contains three major types of monitoring: general permit-required monitoring, Highest and Focused Priority Condition monitoring, and special studies and additional monitoring. Monitoring is intended to measure the progress that RPs make toward achieving the established goals and schedules. The program includes assessment for each of the monitoring types, as well as an integrated assessment to evaluate the overall progress in the WMA.

Water Quality Improvement Plan Implementation and Progress

The RPs implemented strategies to improve water quality and make progress toward achieving numeric goals during FY 2016. Although the WQIP was approved fairly recently (February 2016), results for FY 2016 indicate that progress toward achieving many of the numeric goals has been made within the short timeframe. Summaries of strategy implementation, monitoring, and progress toward achieving numeric goals are described below.

Strategy Implementation

The RPs implemented a variety of strategies to improve water quality in FY 2016. RPs' programs and strategies focus on the Highest and Focused Priority Conditions, as appropriate, and are described in Sections 4 through 8 of this report. Highlights of the RPs' efforts to improve water quality during the reporting year include the following:

- Green Streets: University Avenue Median Water Quality Improvement Project (City of La Mesa). This project will remove and replace impervious medians with pervious biofiltration areas that are designed to reduce pollutant discharges to receiving waters. The project is currently under construction, with an anticipated completion date of May 2017.
- Runoff Redirection (City of Lemon Grove). Lemon Grove performed initial site research to identify feasible locations for curb cuts to divert runoff from paved areas to landscaping at municipal facilities. A curb cut to direct runoff from the parking lot at City Hall to landscaping was completed in early FY 2017. The feasibility of directing downspout runoff to landscaping was also completed at municipal facilities in FY 2016.
- Storm Water BMPs (City of San Diego [City])
  - In FY 2016, more than 25 acres of drainage area were treated by green infrastructure features within the San Diego Bay WMA, and approximately 63 additional acres are expected to be treated by FY 2018.

- o To increase removal of metals and sediment, the City has started to enhance street sweeping operations in accordance with strategy CSD-JRMP-34 by sweeping a route in the Chollas Creek subwatershed with a regenerative air sweeper. The City also began sweeping routes using different sweeping technologies to determine the most effective sweeping practices for individual routes.
- o In accordance with the enhanced catch basin cleaning program identified in strategy CSD-JRMP-24, the City completed additional inspections and cleanings where necessary based on inspection results, at 2,500 catch basins in the Chollas Creek hydrologic subarea (HSA).
- o The City completed the first phase of a drainage master plan for the Chollas Creek HSA. The drainage master plan uses precise light imaging, detection, and ranging (LIDAR) data to identify a vast range of potential structural BMPs and locations. Locations are identified to maximize the efficiency of the BMP by placing the BMP in an area that will treat larger or multiple drainage areas. This planning will maximize pollutant removal from green infrastructure and reduce the number of green infrastructure projects (and associated costs) that will be needed to meet Total Maximum Daily Load (TMDL) requirements.

- <u>Dry Weather Flow Reduction and Water Conservation</u> (County of San Diego [County]): As a regional leader in water conservation, the County implements several programs and strategies, both independently and in partnership with other agencies, to help conserve local water supplies. In response to drought conditions in the region, the County developed a Drought Response Action Plan to reduce water use at its facilities, which has resulted in savings of 60 million gallons of water in County parks during FY 2015–2016. Since 2009, installation of high-efficiency irrigation heads in 20 parks county-wide, many of which are located in the San Diego Bay area, have contributed significantly to these water savings. During the fiscal year, additional efforts included two rain barrel distribution events that were facilitated by the County in partnership with other agencies. Under its WaterSmart Campaign, the County has also collaborated with the San Diego County Water Authority to help distribute water conservation educational materials. This effort included promotion of available water conservation rebates and incentives such as water efficiency audits and other tools to help save water.
- <u>Sweeping Airside Corridors</u> (Airport Authority). Aircraft and vehicle tire and brake wear is a source of copper and zinc from these locations. Under the WQIP, sweeping on the eastern end of the airfield (in particular, the runway and taxiways) will be modified and enhanced to increase the effectiveness of sweeping in FY 2017. The Airport Authority has obtained a Regen-Air vacuum sweeper, which has been shown to perform better than mechanical broom sweepers in removing fine sediments.
- <u>Restoration of Paradise Creek</u> (City of National City). National City's approach is to implement improvements directly in Paradise Creek and in areas tributary to the Creek. National City plans to restore the approximately 1,000-linear-foot reach of

Paradise Creek that runs through Kimball Park by replacing the existing concrete-bottom channel with a natural-bottom channel and replacing turf grass and invasive plant species with native plants along the banks.

- Homeless Outreach Program (City of Chula Vista). Chula Vista formed a Homeless Outreach Team during the reporting period to provide a holistic approach to addressing homelessness issues. The program targets a number of city parks, facilities, and problem areas. Staff visit these areas once per week and have been able to remove over 1,000 pounds of trash per week from the encampments.

- Municipal Solid Waste Receptacle Assessment (Port of San Diego). The Port of San Diego conducted a jurisdiction-wide evaluation of the municipal solid waste receptacles currently in use in the Port of San Diego's parks. The purpose of the assessment was to develop the information necessary to support management decisions related to (1) waste and recycling receptacle type and placement, (2) the adequacy of receptacles to prevent municipal solid waste from entering the MS4 and reduce pollution associated with municipal solid waste (i.e., lids, overhead cover, signage, etc.), and (3) recommended modifications (e.g., either by retrofitting current receptacles, replacing receptacles with more effective models, or adding receptacles/bins where needed). This assessment is scheduled to be completed in FY 2017.

- Improvement of Dirt Alleys (City of Imperial Beach). During this reporting period, Imperial Beach completed the design and construction of the first phase of alley improvements for 14 alley segments (over 1 mile of dirt alleys) in the community. The primary water quality benefit for this project is to address trash, sediment, and bacteria. This project provides a total annual storm water capture volume of 33,000 cubic feet and an annual sediment load reduction of approximately 160 pounds.

- Elimination of Groundwater Intrusion (City of Coronado). During this reporting year, Coronado initiated an MS4 capital improvement project to eliminate groundwater infiltration to the MS4. Project planning and design were completed to install a liner in the existing storm drain and to perform other repairs. Construction is scheduled to start in early 2017. Upon completion, this project will have multiple environmental benefits, including reducing potential bacteria regrowth in the MS4 from standing groundwater in the pipeline, eliminating groundwater diversion to the sanitary sewer, reducing the potential for bacteria discharge to the receiving waters, and reducing greenhouse gas emissions resulting from pump operations to dewater the MS4.

- San Diego Bay WMA Strategies (All Responsible Parties). The RPs have begun to implement wetland restoration, habitat restoration, and public access improvements to support multiple benefits in the San Diego Bay WMA through public-private partnerships and partnerships with other state, federal, and local agencies.

Monitoring

The RPs successfully completed monitoring in 2015–2016 in accordance with the Monitoring and Assessment Program Requirements (Provision D of the Municipal Permit). The monitoring completed in FY 2016 included wet and dry weather MS4 outfall monitoring and bioassessment monitoring, which was conducted in coordination with the Southern California Storm Water Monitoring Coalition (SMC). Monitoring was also conducted for the Highest and Focused Priority Conditions, which is intended to inform programs and assess progress toward the goals outlined in the WQIP. The monitoring program and results for 2015–2016 are described in Section 3 and Appendix 4. Monitoring for Highest and Focused Priority Conditions is described in Sections 4 through 8 and Appendix 4. Monitoring highlights include:

- Monitoring for the Highest Priority Condition: The Chollas Creek Bacteria, Metals, and Diazinon TMDL monitoring programs were successfully completed. Most of the samples collected from Chollas North Fork and Chollas South Fork locations had concentrations of metals that were below water quality objectives (WQOs) for metals. Pesticides, including pyrethroids and diazinon, and toxicity were not detected.
- Water Quality Due to Copper and Zinc, Airport Authority Monitoring: Extensive monitoring was conducted during storm events throughout FY 2016. Copper and zinc, the Focused Priority Condition pollutants of concern, were sampled, analyzed, and evaluated along with several other analytes to comply with the Industrial General Permit (IGP)[2]. Recordkeeping and tracking were also improved because of monitoring.
- Riparian Area Monitoring: National City initiated a special study to collect chemical testing of selenium to support the delisting of the analyte – all 48 of the 48 samples collected had concentrations of selenium that were below the WQO of 5 micrograms per liter (μg/L). Biological monitoring, including vegetation monitoring, will be conducted once restoration is completed in Paradise Creek.
- Physical Aesthetics Monitoring: 73 percent (%) of the 86 dry weather visits to major MS4 outfall locations had "optimal" levels of trash, which is defined as less than 10 pieces of trash per the monitoring methodology. Trash levels were rated on a scale previously developed by the Copermittees' Regional Monitoring Workgroup. The RPs also initiated a paired monitoring approach in which trash levels were monitored at 12 major MS4 outfall locations and adjacent receiving waters.
- Swimmable Waters Monitoring: North Beach and Tidelands Park was visited on 14 occasions and 20 samples were collected during FY 2016; monitoring will continue in FY 2017. The RPs conducted receiving water monitoring for the first time in FY 2016 and will augment their monitoring with the dry season weather data collected by the County's Department of Environmental Health (DEH)

[2] Order No. 2014-0057-DWQ, NPDES General Permit for Storm Water Discharges Associated with Industrial Activities jhttp://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2014/wqo2014_0057_dwq.pdf

(California Assembly Bill 411 [AB 411]) program. Tidelands Park was given an A grade for the summer dry season in the Heal the Bay annual report, based on the DEH AB 411 monitoring program's summer dry season results. A delisting feasibility study for Tidelands Park was also completed in FY 2016.

Monitoring and data analysis for five different special studies were performed, as described in the WQIP for Highest and Focused Priority Conditions (Sections 4 through 8; Appendix 4), and in accordance with the Monitoring and Assessment Program Requirements (Provision D of the Municipal Permit). The first year of data provides only a limited basis for conclusions and adaptations; however, the initial results described in Appendix 4 indicate progress toward improving water quality.

Progress Toward Goals

Since the acceptance of the WQIP in February 2016, the RPs have implemented strategies, as highlighted above, and have begun making progress toward achieving numeric goals. The progress toward meeting interim numeric goals, most of which are due to be achieved by FY 2018, is as follows:

- Chollas Creek Metals, Diazinon, and Bacteria:
    - La Mesa –The University Avenue Median Water Quality Improvement project, which is converting University Avenue to a green street by installing biofiltration BMPs, is on schedule to be completed in 2017.
    - Lemon Grove – Lemon Grove performed initial site research to identify feasible locations for curb cuts to divert runoff from paved areas to landscaping at municipal facilities. A curb cut to direct runoff from the parking lot at City Hall to landscaping was completed in early FY 2017.
    - City of San Diego – The City implemented green infrastructure projects that treat 25.14 acres of drainage area and is expected to achieve the 44.6-acre performance measure requirement by implementing additional projects that will treat a total of 88.24 acres by FY 2018.
    - County of San Diego – Ongoing maintenance was performed at two facilities where low-impact development (LID) BMPs were previously constructed: (1) Southeast Family Resource Center, and (2) Central Regional Public Health Center. These efforts have effectively reduced flows during storm events and reduced concentrations of key contaminants.
- Water Quality Due to Copper and Zinc (Airport Authority) – Zinc concentrations measured in MS4 discharges were lower than the current Municipal Permit term interim goal and also lower than the FY 2021 interim goal.
- Riparian Area
    - The current Municipal Permit term goal of collecting and analyzing 48 samples for selenium were achieved, with zero exceedances of the WQOs.

  - Creek restoration work for Paradise Creek to meet numeric goals for habitat restoration is underway and is on track to be completed in 2017.

- Physical Aesthetics – An optimal rating was recorded for 73% of MS4 outfall trash assessments, which exceeds the FY 2018 interim goal of 65%.
- Swimmable Waters – Tidelands Park was given an A grade for the summer dry season in the 2015–2016 Heal the Bay annual report (http://brc.healthebay.org/).

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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
µg/L	micrograms per liter
%	percent
303(d) List	Clean Water Act Section 303(d) List of Water Quality Limited Segments
AB 411	California Assembly Bill 411 (Beach Safety Act)
ABLM	Ambient Bay and Lagoon Monitoring
AEP	California Association of Environmental Professionals
Airport Authority	San Diego County Regional Airport Authority
Bight ′13	Southern California Bight 2013 Regional Monitoring Survey
BMP	best management practice
BOD	biological oxygen demand
Caltrans	California Department of Transportation
CCTV	closed-circuit television
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
City	City of San Diego
CMP	corrugated metal pipe
COD	chemical oxygen demand
Consultation Panel	Water Quality Improvement Plan Consultation Panel
Copermittee	An agency named in the Municipal Permit Provision B.1.
County	County of San Diego
CRAM	California Rapid Assessment Method
CTR	California Toxics Rule
DEH	(County of San Diego) Department of Environmental Health
EAD	Environmental Affairs Department

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
FIB	fecal indicator bacteria
FMD	Facilities Maintenance Department
Focused Priority Condition	Focused Priority Water Quality Condition
FY	fiscal year
HA	hydrologic area
Highest Priority Condition	Highest Priority Water Quality Condition
HMP	Hydromodification Monitoring Program
HSA	hydrologic subarea
HU	hydrologic unit
IC/ID	illicit connection and/or illicit discharge
ID	identification
IDDE	illicit discharge, detection, and elimination
IGP	Industrial General Permit
IPM	integrated pest management
JRMP	Jurisdictional Runoff Management Program/Plan
LID	low-impact development
LIDAR	light imaging, detection, and ranging
MAP	Monitoring and Assessment Program
MBAS	methylene blue active substances
MEP	maximum extent practicable
MS4	municipal separate storm sewer system
MSGP	Multi-Sector General Permit
Municipal Permit	San Diego Regional Water Quality Control Board Order Number R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region
NAL	non-storm water action level
NASSCO	National Steel and Shipbuilding Company (General Dynamics)

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
NH3	ammonia
NPDES	National Pollutant Discharge Elimination System
O&G	oil and grease
OPP	Office of Pesticide Programs (USEPA)
ORWMP	Otay River Watershed Management Plan
PDP	priority development project
PGA	pollutant-generating activity
Port of San Diego	San Diego Unified Port District or Port of San Diego
QSE	qualifying storm event
RCC	Rental Car Center
REC-1	Contact Water Recreation beneficial use—"Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs." (San Diego Basin Plan, Chapter 2)
Regional Board	San Diego Regional Water Quality Control Board
Responsible Party (RP)	a Copermittee named in the Municipal Permit Provision B.1; all agencies that have included water quality improvement strategies in the Water Quality Improvement Plan
RHMP	Regional Harbor Monitoring Program
ROW	right-of-way
RP	Responsible Party
RWL	receiving water limitation
SCCWRP	Southern California Coastal Water Research Project
SDG&E	San Diego Gas and Electric
SLP	Sustainable Landscapes Program
SMC	Storm water Monitoring Coalition
State	State of California

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
State Board	State Water Resources Control Board
SUSMP	Standard Urban Storm Water Mitigation Plan
SWMM	Storm Water Management Model
SWMP	Storm Water Management Plan
SWPPP	Storm Water Pollution Prevention Plan
TBD	to be determined
TCBMP	treatment control best management practice
TMDL	total maximum daily load
TPH	total petroleum hydrocarbons
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
WER	water effects ratio
WLA	waste load allocation
WMA	Watershed Management Area
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan
WQO	water quality objective

1 Introduction to San Diego Bay Watershed Management Area

The San Diego Bay Watershed Management Area (WMA) comprises the 444-square-mile land area in southern San Diego County that drains to San Diego Bay (Figure 1-1). The San Diego Regional Water Quality Control Board (Regional Board) regulates the municipal separate storm sewer systems (MS4s) in the WMA and throughout the San Diego region through the Municipal Permit.[3] The following agencies with jurisdiction in the San Diego Bay WMA are subject to the Municipal Permit: the cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego (City); the County of San Diego (County); the San Diego Unified Port District (Port of San Diego); and the San Diego Regional Airport Authority (Airport Authority). The California Department of Transportation (Caltrans) has its own permit issued by the State Water Resources Control Board (State Board) and is not regulated by the Municipal Permit, but Caltrans has chosen to voluntarily participate in the Water Quality Improvement Plan (WQIP) process (described below). Collectively, these 11 agencies are referred to as Responsible Parties (RPs). There are also additional jurisdictions in the WMA that have MS4 discharges, such as transit agencies, schools and community colleges, and federal lands, that have not chosen to participate in the WQIP process and over which the RPs do not have legal authority.

1.1 Water Quality Improvement Plan

In accordance with the Municipal Permit, the RPs developed a WQIP for the San Diego Bay WMA, which was approved by the Regional Board in February 2016. The WQIP identifies the Highest Priority Water Quality Conditions (Highest Priority Conditions) and Focused Priority Water Quality Conditions (Focused Priority Conditions) in the WMA, sets numeric goals to address those conditions and schedules for meeting the goals, and describes the strategies that RPs will implement to meet the goals. The RPs' strategies and associated procedures for implementing them are also described in their individual Jurisdictional Runoff Management Programs (JRMPs).[4]

The Highest Priority Conditions and Focused Priority Conditions were selected by the RPs using a process that follows the Municipal Permit requirements, as described in the WQIP. Highest Priority Conditions for the WMA were identified using this process, but some jurisdictions did not discharge or contribute to the Highest Priority Conditions. While this result is positive, these jurisdictions recognized the need to develop numeric goals, strategies, and schedules for selected conditions within their jurisdictions. Accordingly, these RPs identified Focused Priority Conditions. Numeric goals and associated schedules and strategies have been established for all Highest and Focused Priority

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[3] Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100. http://www.waterboards.ca.gov/sandiego/water_issues/programs/storm water/docs/2015-1118_AmendedOrder_R9-2013-0001_COMPLETE.pdf

[4] The Water Quality Improvement Plan sets forth activities that may occur within each Responsible Party's jurisdiction to satisfy permit requirements. Responsible Parties need comply only with permit conditions relating to discharges from the MS4s for which they are operators (40 Code of Federal Regulations [CFR] 122.26(a)(3)(vi))," Order R9-2013-0001 at I.2 (emphasis added), and that each Responsible Party does not necessarily operate all portions of the MS4 within its jurisdiction.

Conditions. The Highest Priority Conditions and Focused Priority Conditions for the San Diego Bay WMA are summarized in Table 1-1. Highest Priority Conditions are indicated in bold text. Maps of Highest Priority Conditions and Focused Priority Conditions are within each respective section (Sections 4 through 8).

Table 1-1
San Diego Bay WMA Summary of Highest Priority Conditions and Focused Priority Conditions

HU	Condition	Pollutant/ Stressor	Geographic Extent (HA/HSA)	Responsible Party
Pueblo (908)	Water Quality[1]	Bacteria; Dissolved copper, lead, and zinc	Chollas Creek (908.22)	City of La Mesa City of Lemon Grove City of San Diego County of San Diego Port of San Diego Caltrans
	Water Quality	Copper and zinc (wet weather)	Airport Authority jurisdiction within HA 908.21	Airport Authority
Sweetwater (909)	Riparian Area Quality	Various	Paradise Creek—lower Sweetwater, HA 909.1[2]	City of National City
	Physical Aesthetics	Trash	The western portion of the City of Chula Vista within HA 909.1	City of Chula Vista Port of San Diego
Otay (910)	Swimmable Waters (Beaches)	Bacteria	Applicable RP jurisdiction within HA 910.1	City of Coronado Port of San Diego
	Physical Aesthetics	Trash	Applicable RP jurisdiction in HA 910.2	City of Chula Vista City of Imperial Beach Port of San Diego

Notes:
HA = hydrologic area; HU = hydrologic unit; RP = Responsible Party
1. The conditions in **bold** are the Highest Priority Conditions for the San Diego Bay WMA. Conditions in regular font are the Focused Priority Conditions.
2. For the purposes of the WQIP, Paradise Creek is part of the lower Sweetwater area, for which the San Diego Bay priority condition analysis has identified potential impacts to beneficial uses such as habitat and non-contact recreation.

1.2 Water Quality Improvement Plan Annual Report

The Municipal Permit requires the RPs within each WMA to submit an annual report to communicate the status and progress of their approaches and strategies.[5] This San Diego Bay WMA WQIP Annual Report provides information on the RPs' progress to date in implementing the WQIP during fiscal year (FY) 2016. The reporting period for FY 2016

[5] Order No. R9-2013-0001 (as amended), F.3.b.(3) (page 132-133 of 139)

consists of two components: (1) July 1, 2015, to June 30, 2016, consistent with the fiscal year, for the implementation of all program activities except monitoring and assessment, and (2) October 1, 2015, to September 30, 2016, consistent with the monitoring year for the monitoring and assessment programs. Together, these two periods constitute the reporting year (FY 2016) for the WQIP Annual Report. More information about the content and structure of the WQIP Annual Report is provided later in this section.

Table 1-2 summarizes the Municipal Permit requirements that must be addressed and their locations in this Annual Report. Appendix 1 provides additional detail in a crosswalk of the specific Municipal Permit requirements and the location(s) in the Annual Report that address each requirement.[6]

Table 1-2
Regional Municipal Permit Water Quality Improvement Plan Annual Reporting Provisions and Corresponding Annual Report Sections

Municipal Permit Provisions	WQIP Annual Report Sections						WQIP Appendices			
	Section 1: Introduction	Section 2: Goals & Strategies	Section 3: Monitoring & Assessment	Sections 4 - 8 : Achieving Goals	Section 9: Adaptive Management	Section 10: Conclusions	Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
Provision A – Prohibitions and Limitations										
A.4.a.(2)			X		X		X		X	X
Provision B – Water Quality Improvement Plans										
B.5.a.					X				X	X
B.5.b.			X	X	X		X	X	X	X
B.5.c.					X					X
Provision D – Monitoring and Assessment Program Requirements										
D.1.e.(2)(c)			X						X	
D.2.b.(iv)			X						X	
D.4.b.(1)(a)(ii)			X						X	
D.4.b.(1)(b)			X		X				X	X
D.4.b.(1)(c)			X		X				X	X
D.4.b.(2)(a)					X				X	X
D.4.b.(2)(b)			X		X				X	X

[6] Order No. R9-2013-0001 (as amended), F.3.b.(3)(f) – Each Copermittee must provide any data or documentation utilized in developing the Water Quality Improvement Plan Annual Report upon request by the Regional Board. Any Copermittee monitoring data utilized in developing the WQIP Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN). Any Copermittee monitoring and assessment data utilized in developing the WQIP Annual Report must be available for access on the Regional Clearinghouse required pursuant to Provision F.4.

Table 1-2 (continued)
Regional Municipal Permit Water Quality Improvement Plan Annual Reporting Provisions and Corresponding Annual Report Sections

Municipal Permit Provisions	WQIP Annual Report Sections						WQIP Appendices			
	Section 1: Introduction	Section 2: Goals & Strategies	Section 3: Monitoring & Assessment	Sections 4 - 8 : Achieving Goals	Section 9: Adaptive Management	Section 10: Conclusions	Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
D.4.b.(2)(c)			X		X				X	X
D.4.b.(2)(d)			X		X				X	X
D.4.c.			X						X	
D.4.d.					X					X
D.4.d.(1)					X					X
D.4.d.(2)					X					X
D.4.d.(3)					X					X
Provision E – Jurisdictional Runoff Management Programs										
E.1.b.							X			
E.2.d.(4)			X						X	
E.8.c.	X						X			
Provision F – Reporting										
F.1.b.(6)					X					X
F.2.a.(2)					X		X			X
F.2.a.(3)					X		X			X
F.2.b.(1)					X		X			
F.2.b.(2)					X		X			
F.2.c.(1)(c)					X					X
F.3.b.(3)(a-f)	X		X	X	X	X	X		X	X
F.6						X			X	
Attachment E - Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2013-0001										
Attachment E			X	X					X	

Notes:
WQIP = Water Quality Improvement Plan

This San Diego Bay WMA WQIP Annual Report for FY 2016 is structured as follows:

Section 1. Introduction – Introduces the Regional MS4 Storm Water Permit (Municipal Permit), the San Diego Bay WMA WQIP, and the Annual Reporting requirements [References Appendix 1].

Appendix 1. Crosswalk of Municipal Permit Requirements and Annual Report References

Section 2. Overview of San Diego Bay Watershed Management Area Goals and Strategies – Summarizes the strategies and numeric goals and schedules developed to measure progress in addressing the Highest and Focused Priority Conditions [References Appendices 2 and 3].

Appendix 2. Jurisdictional Strategy Implementation, JRMP Annual Report Forms, Fiscal Analysis, JRMP Updates, and Best Management Practice (BMP) Design Manual Updates

Appendix 3. Water Quality Improvement Plan Numeric Goals

Section 3. Monitoring and Assessment – Summarizes the monitoring programs and provides an assessment of the data collected [References Appendix 4].

Appendix 4. Monitoring Results and Assessments

Sections 4–8. Highest Priority Conditions and Focused Priority Conditions – Provides a detailed assessment of the progress toward achieving numeric goals for each jurisdiction, with a focus on those numeric goals occurring during the Municipal Permit term. The section also provides an overview of the strategies implemented to meet the numeric goals, the status of implementation, and plans for the coming year.

Section 9. Adaptive Management – Provides a summary of the elements of the WQIP process, which can be altered during its implementation, and any changes that were made because of new information obtained during the reporting period [References Appendix 5].

Appendix 5. Adaptive Management/Modifications

Section 10. Conclusions – Provides the conclusions based on data collected and assessments conducted during implementation of the WQIP.

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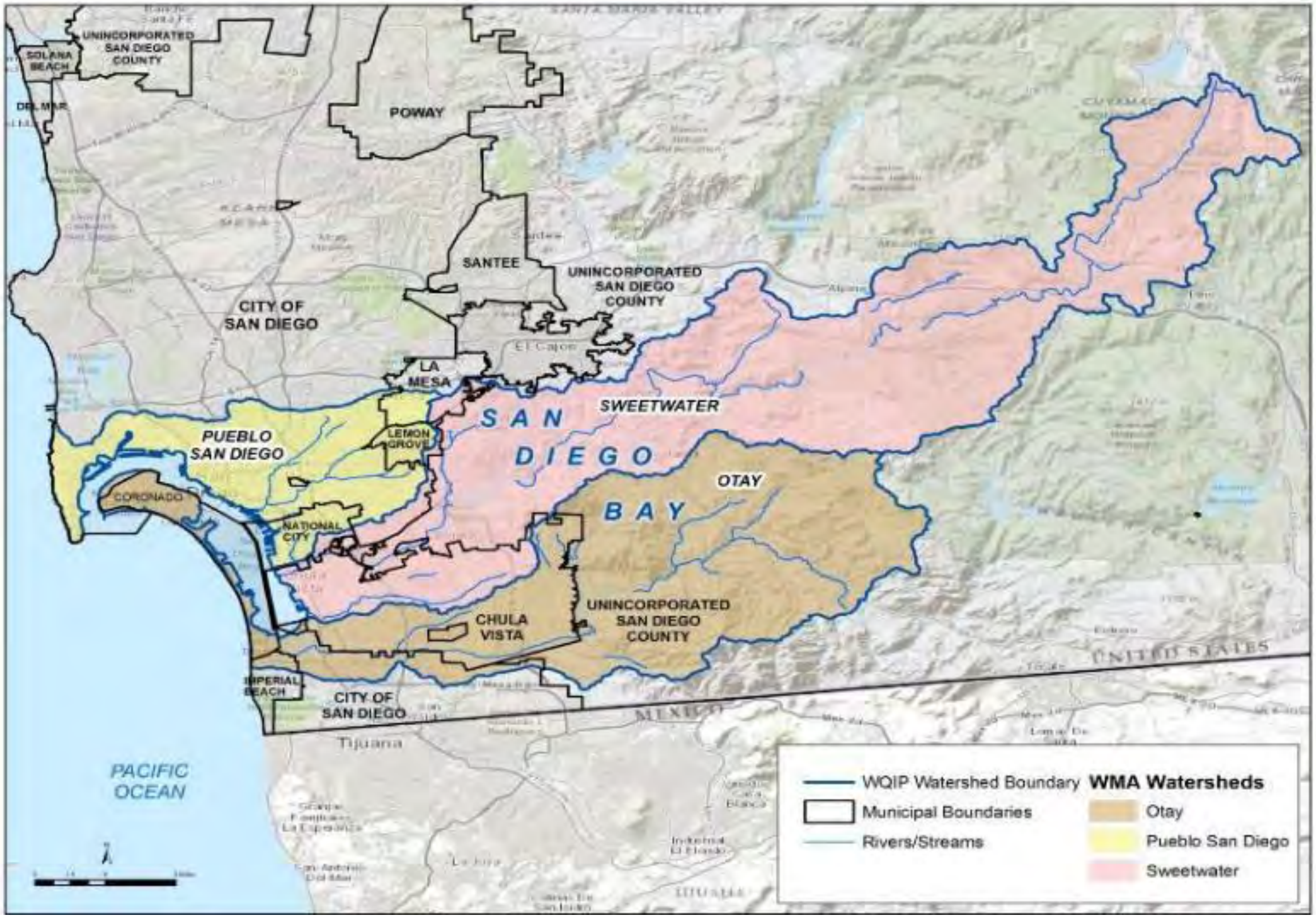

Figure 1-1
San Diego Bay Watershed Management Area

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2 Overview of San Diego Bay Watershed Management Area Goals and Strategies

The San Diego Bay WMA WQIP outlined the process by which the RPs within the watershed are identifying and prioritizing common water quality conditions, how they are prioritizing those water quality conditions, and how these prioritized conditions guide jurisdictional and watershed-scale programs to address the Highest and Focused Priority Conditions.

2.1 Water Quality Improvement Plan Numeric Goals

The numeric goals for the San Diego Bay WMA WQIP are designed to demonstrate improvements in water quality and progress toward preventing MS4 discharges from causing or contributing to beneficial use impairments in the San Diego Bay WMA receiving waters. The numeric goals within the WQIP are categorized into two distinct types:

(1) Interim goals – benchmarks for program performance that are intended to establish checkpoints along the path toward achieving final goals

(2) Final goals – end-points that mark achievement of desired water quality improvements

Interim and final goals may be applicable to either individual RPs or a subgroup of RPs. Interim goals have been developed for each five-year period beginning when the WQIP is approved. In some cases, interim goals consist of performance measures. Performance-based goals are numeric, requiring the completion of a certain number or geographic extent of activities, but may not directly measure water quality. The final goal is the end target goal for the Highest and Focused Priority Conditions. The numeric goals for Highest and Focused Priority Conditions in the San Diego Bay WMA are presented in Appendix 3.

2.2 Water Quality Improvement Strategies

The RPs in the San Diego Bay WMA have identified and implemented or are in the process of implementing various strategies discussed in the WQIP to help improve the quality of MS4 discharges and, in turn, receiving waters. These strategies are also designed to make progress toward achieving interim and final goals. The RPs identified approaches to implement strategies: (1) enhancements to previous JRMP activities, (2) list of potential strategies, and (3) ideas or concepts received via public input and discussion with the WQIP Consultation Panel. To meet the interim and final goals, strategies were selected for their ability to achieve the following specific objectives:

- Effectively prohibit non-storm water discharges to the MS4;
- Reduce pollutants in storm water discharges from the MS4 to the maximum extent practicable (MEP); and

- Implement programmatic or institutional best management practices.

Strategies may be either part of a core program or identified as an optional strategy. Core strategies, many of which have been in place for a decade or more, will be continued or implemented according to the schedules in the WQIP. Implementation of optional strategies depends on meeting one or more triggers identified for each individual optional strategy. For example, a structural BMP may be implemented only if monitoring indicates slower than anticipated progress to meet a specific goal.

Strategies may also be either jurisdiction-specific or collaborative. Each jurisdiction is individually implementing extensive water quality strategies to address the Highest and Focused Priority Conditions in the San Diego Bay WMA, as described in Sections 4 through 8. Individual jurisdictional strategies are described in Appendix 2. Jurisdictional strategies typically are implemented throughout the jurisdictional area, and are often emphasized within a specific area or for an activity to address a Highest or Focused Priority Condition.

Collaboration may take place among RPs at a regional, watershed, or multi-jurisdictional level and is intended to increase efficiency, streamline resources, and increase effectiveness through combined targeted implementation. Table 2-1 highlights key WMA strategies that were implemented or are on schedule to be implemented in the San Diego Bay WMA, identifies the RPs participating in each strategy, and provides detailed information on their implementation. Progress of implementation in this reporting period and planned future implementation are discussed in Appendix 2.

Table 2-1
Watershed Management Area Strategies

Strategy	Jurisdiction									
	San Diego Regional Airport Authority	City of Chula Vista	City of San Diego	City of Coronado	County of San Diego	City of Imperial Beach	City of La Mesa	City of Lemon Grove	City of National City	Port of San Diego
Implement an offsite alternative compliance option (WMAA)	✓	✓	✓	-	✓	✓	✓	✓	–	✓
Implement an incentive program for BMP retrofits	–	✓	✓	✓	✓	–	–	–	–	–
Implement sustainable landscapes program to encourage landscape retrofits	–	✓	✓	–	✓	✓	–	✓	✓	–
Implement wetland restoration, habitat restoration, and public access improvements to support multiple benefits in the San Diego Bay WMA through public-private partnerships and partnerships with other state, federal, and local agencies	✓	–	✓	–	✓	✓	–	–	✓	✓
Implement cleanup events	–	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-1 (continued)
Watershed Management Area Strategies

Strategy	Jurisdiction									
	San Diego Regional Airport Authority	City of Chula Vista	City of San Diego	City of Coronado	County of San Diego	City of Imperial Beach	City of La Mesa	City of Lemon Grove	City of National City	Port of San Diego
Support regional efforts to address trash and other water quality issues from homeless encampments	–	✓	✓	✓	✓	–	✓	✓	✓	✓
Collaborate with the Regional Board	*	*	✓	✓	✓	*	*	*	✓	✓
Participate in the Reference Watershed Study or similar	✓	✓	✓	✓	**	✓	✓	✓	**	✓
Participate in the San Diego Bay Trash Study[1]	–	✓	–	–	–	✓	–	–	–	✓

Notes:

Not all strategies are planned to be completed during the 2015–2016 monitoring year.

BMP = best management practice; WMAA = Watershed Management Area Analysis; WQIP = Water Quality Improvement Plan

* Collaborating with the Regional Board is included as a part of several of the RP's JRMP strategies, such as inspections of industrial businesses and construction sites.

** The jurisdiction is participating in this study as a regional effort, but it was not included as a strategy.

– Strategy not being implemented in FY 2016 by RP.

1. The San Diego Bay Trash Study is a special study component under the Southern California Bight 2013 Regional Monitoring Program.

3 Monitoring and Assessment

The Municipal Permit supports an outcome-based approach that is implemented through the WQIP. Water quality data collection and assessment provide the vehicle for determining whether the interim or final numeric goals are being achieved, or whether RPs' programs may need to be adapted to achieve the goals.

This Annual Report assesses the data in combination with the RPs' management actions (e.g., strategies, schedules, etc.) to determine what actions are improving the quality of MS4 discharges or receiving water conditions and where additional actions may be necessary (Section 9).

The Monitoring and Assessment Program for the San Diego Bay WMA includes three primary monitoring components:

(1) Receiving water and MS4 outfall monitoring required by Municipal Permit Provision D;

(2) Highest Priority Condition and Focused Priority Condition monitoring; and

(3) Special studies, total maximum daily load (TMDL) monitoring, and additional monitoring programs.

Each program component may include various types of monitoring elements, including conducting visual observations, identifying illicit discharges, and collecting flow-weighted composite samples. Monitoring during wet and dry weather is conducted to collect observational and analytical data from the receiving water and MS4 outfalls. The RPs use the data to determine whether discharges from MS4 outfalls are influencing receiving water quality, and, if so, whether the discharges are improving or degrading receiving water conditions over time. While monitoring may include water sample collection, it may also include other types of sampling, including counting the number of trash pieces on a stream bank, collecting sediment or algae grab samples, or measuring physical changes in channel width and depth.

Figure 3-1 maps the monitoring locations for all monitoring programs and for the Highest Priority Conditions and Focused Priority Conditions. Table 3-1 is an overview of the monitoring programs described in the WQIP that have been or are planned to be implemented. Monitoring data relevant to numeric goals are presented in the discussions of Highest Priority Conditions and Focused Priority Conditions in Sections 4 through 8. The Monitoring and Assessment Report (Appendix 4) provides data and results of each of the three components.

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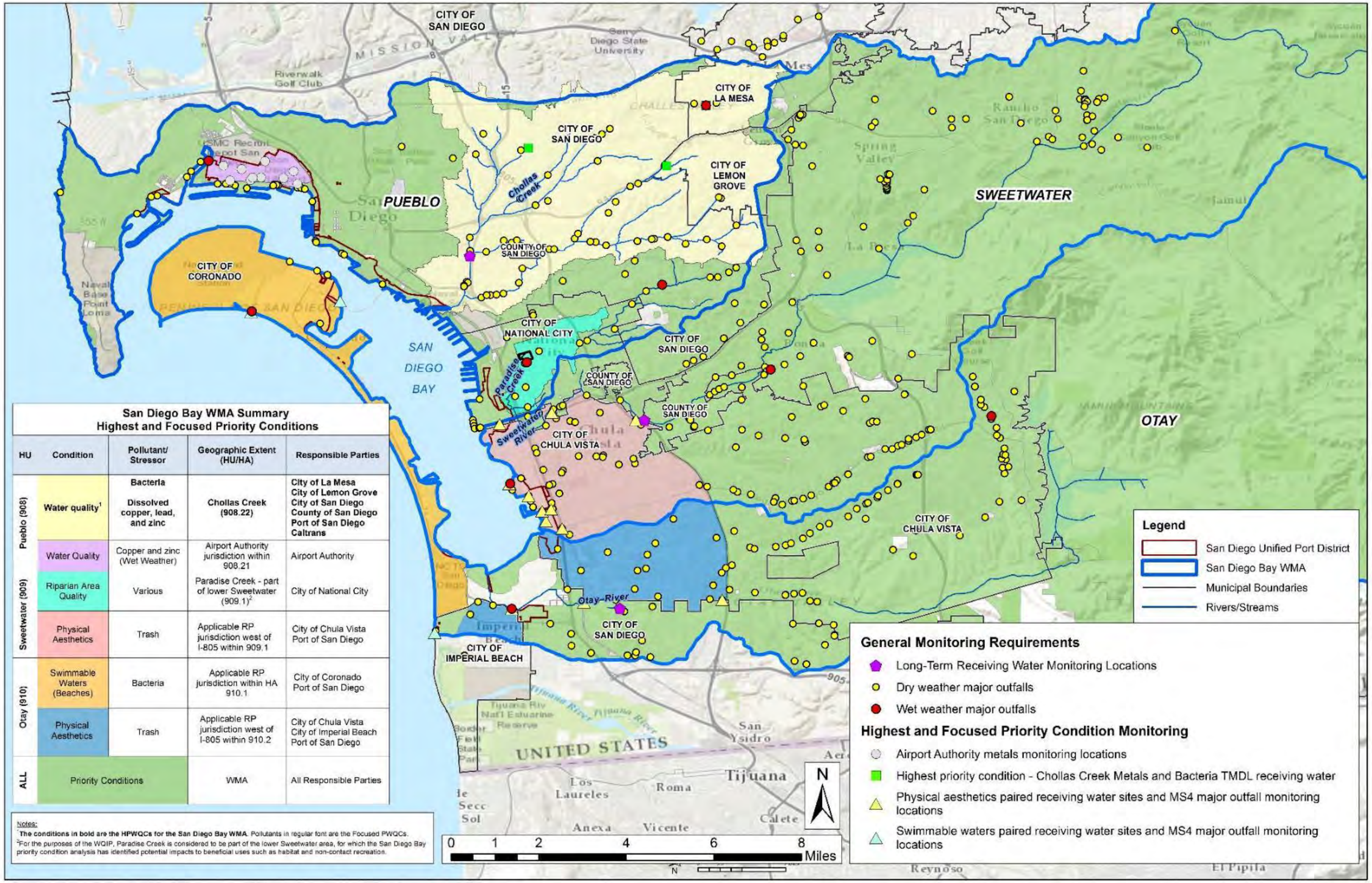

San Diego Bay WMA Summary
Highest and Focused Priority Conditions

HU	Condition	Pollutant/ Stressor	Geographic Extent (HU/HA)	Responsible Parties
Pueblo (908)	**Water quality**[1]	**Bacteria** **Dissolved copper, lead, and zinc**	**Chollas Creek (908.22)**	**City of La Mesa** **City of Lemon Grove** **City of San Diego** **County of San Diego** **Port of San Diego** **Caltrans**
	Water Quality	Copper and zinc (Wet Weather)	Airport Authority jurisdiction within 908.21	Airport Authority
Sweetwater (909)	Riparian Area Quality	Various	Paradise Creek - part of lower Sweetwater (909.1)[2]	City of National City
	Physical Aesthetics	Trash	Applicable RP jurisdiction west of I-805 within 909.1	City of Chula Vista Port of San Diego
Otay (910)	Swimmable Waters (Beaches)	Bacteria	Applicable RP jurisdiction within HA 910.1	City of Coronado Port of San Diego
	Physical Aesthetics	Trash	Applicable RP jurisdiction west of I-805 within 910.2	City of Chula Vista City of Imperial Beach Port of San Diego
ALL	Priority Conditions		WMA	All Responsible Parties

Notes:
[1] **The conditions in bold are the HPWQCs for the San Diego Bay WMA.** Pollutants in regular font are the Focused PWQCs.
[2] For the purposes of the WQIP, Paradise Creek is considered to be part of the lower Sweetwater area, for which the San Diego Bay priority condition analysis has identified potential impacts to beneficial uses such as habitat and non-contact recreation.

Figure 3-1
San Diego Bay Monitoring and Assessment Plan Monitoring Locations

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Table 3-1
Summary of Water Quality Improvement Plan Monitoring Programs

Monitoring Program	Temporal Extent	Monitoring Element[1]	Timeline (Fiscal Year)
Receiving Water Monitoring			
Long-Term Receiving Water Monitoring	Wet and dry weather	Chemistry/FIB	2013–2014
		Toxicity	
		Trash assessment	
		Bioassessment	
		Hydromodification	
Southern California Bight Regional Monitoring (Bight '13)	Dry weather	Chemistry	2013–2014
		Toxicity	
		Bioassessment	
Regional Storm water Monitoring Coalition (SMC)	Dry weather	To be determined (TBD) (bioassessment)	2013–TBD
Regional Hydromodification Monitoring Program	Wet weather	Rain gauge analysis	2013–2015 (TBD)
		Stream gauge analysis	
		Channel assessment	
		Flow	
		Sediment transport	
Sediment Quality	Dry weather	Chemistry	2013[2] –2018
		Toxicity	
		Bioassessment	
		Trash assessment	
Regional Harbor Monitoring Program (RHMP)	Dry weather	Chemistry	2013–2014
		Bioassessment	
		Trash assessment	
MS4 Monitoring			
MS4 Field Screening	Dry weather	Flow	2013–2018
		Trash	
		IC/ID	
		Condition	
MS4 Outfall Monitoring	Wet and dry weather	Chemistry/FIB	2013–2018
		Visual observations	
		In-situ measurements	
Highest Priority Condition Monitoring			
Chollas Creek Metals TMDL	Wet and dry weather*	Chemistry/FIB	2013–2018
Chollas Creek Bacteria TMDL	Wet and dry weather	FIB	2013–2018

Table 3-1 (continued)
Summary of FY 2016 Monitoring Programs

Monitoring Program	Temporal Extent	Monitoring Element[1]	Timeline (Fiscal Year)
Focused Priority Condition Monitoring			
Airport Metals[3]	Wet weather	Chemistry (metals)	2013–2018
Riparian Area Monitoring (Paradise Creek)	Dry weather	Bioassessment (CRAM), Plant communities	2014 (TBD)–2018
Physical Aesthetics (Sweetwater and Otay)[4]	Wet weather (post-storm) and dry weather	Trash assessments	2016–2018
Swimmable Waters—Beaches (Otay)[2]	Wet weather	FIB	2016–2018
	Dry weather		1999–2018
Additional TMDL Monitoring			
Shelter Island Yacht Basin Copper TMDL—Receiving Water	See Regional Board Investigative Order No. No. R9-2011-0036.		
Shelter Island Yacht basin Copper TMDL—MS4 Outfall	Wet and dry weather	Chemistry (dissolved copper)	2013–2018
Shelter Island Shoreline Park Bacteria TMDL	Wet and dry weather	FIB	2013–2018
Special Studies and AB411 Monitoring			
San Diego Regional Reference Streams and Beaches	Wet and Dry Weather	Chemistry/FIB	2013–2016 (TBD)
		Flow	
		Bioassessment	
San Diego Bay Debris Study	Dry Weather	Trash Assessment	2015-2017
		Physical Habitat	
Pueblo HU Refuse Assessment Program	Dry Weather	Trash Assessment	2013–2018
Chollas Jurisdictional Boundary Study	Wet Weather	Chemistry	2013–2015 (TBD)
Riparian Area Selenium Study	Wet and Dry Weather	Chemistry (selenium)	2013–2015 (TBD)
Regional Beach Water Quality (AB 411)[5]	Dry Weather	FIB	1999–2018

Table 3-1 (continued)
Summary of FY 2016 Monitoring Programs

Monitoring Program	Temporal Extent	Monitoring Element[1]	Timeline (Fiscal Year)

Notes:

AB 411 = California Assembly Bill 411; Bight '13 = Southern California Bight 2013 Regional Monitoring Survey; BOD = biological oxygen demand; CRAM = California Rapid Assessment Method; FIB = fecal indicator bacteria; HMP = Hydromodification Monitoring Program; IC/ID = illicit connection and/or illicit discharge; RHMP = Regional Harbor Monitoring Program; SMC = Southern California Storm water Monitoring Coalition; TBD = to be determined; TMDL = total maximum daily load

* Dry weather metal monitoring in Chollas Creek has been completed as part of the Regional Monitoring Program.

1. Some monitoring elements may not be conducted under the entire temporal extent of the program. See Appendix K of the WQIP for details.
2. Completed under the Ambient Bay and Lagoon Monitoring (ABLM) Program, as part of Bight '13.
3. Airport monitoring for metals will be conducted as part of the Industrial General Permit (IGP) monitoring. Additional constituents are monitored under that program.
4. Monitoring is paired. Receiving Water and MS4 Outfall will be monitored the same day.
5. The AB 411 program monitoring is conducted during the dry season by the County of San Diego Department of Environmental Health (DEH) will be tracked and incorporated into bacteria-related receiving water assessments. Monitoring under AB 411 is not required under Provision D of the Municipal Permit, but bacteria monitoring is required as part of the Bacteria TMDL (Municipal Permit Attachment E.6). AB 411 monitoring may be used to augment RP monitoring and will be reviewed as part of the data assessment. RPs will be doing dry weather monitoring during wet weather season starting in fiscal year (FY) 2016.

3.1 Receiving Water Monitoring

The Long-Term Receiving Water Monitoring Program was completed during the October 2014 through September 2015 monitoring period, which fulfilled the requirements of long-term monitoring outlined in Appendix K of the WQIP. The results of this monitoring were previously presented in the Transitional Monitoring and Assessment Program Report[7] for the San Diego Bay WMA (2014–2015) (San Diego Bay Watershed Copermittees, 2015). Results reported included water quality monitoring during dry and wet weather, trash assessments, hydromodification monitoring, and bioassessment at the long-term monitoring locations. Further discussion and descriptions of the receiving water monitoring programs are in Section 1.1 of Appendix 4.

[7] Transitional Monitoring and Assessment Repot can be found on the Project Clean Water website: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=24&Itemid=64

3.2 MS4 Outfall Monitoring

The San Diego Bay WMA RPs implemented the wet and dry weather MS4 outfall monitoring program, as described in Section 5 and Appendix K of the WQIP. The dry weather MS4 monitoring program is a combination of field screening and sample collection at major persistently flowing outfalls. Field screening allows visual monitoring of all major MS4 outfalls to identify and eliminate sources of persistently flowing non-storm water discharges. This information is also used to track the progress of some of the Municipal Permit interim goals to be assessed by 2018. Water quality sample collection during dry weather provides information on the impact of MS4 outfalls on receiving water quality.

The goal of the wet weather MS4 monitoring program is to identify pollutants in storm water discharges from the MS4s and to guide pollutant source identification efforts by collecting paired water quality samples and flow data. Bacteria indicator samples are collected during both dry and wet weather MS4 analytical sampling events to assess bacteria concentration loads coming from the MS4.

Sections 1.2 and 1.3 of Appendix 4 provide more information on dry weather and wet weather MS4 monitoring programs, respectively. Attachments F and G of Appendix 4 provide detailed calculations with regard to these monitoring programs. The data collected as part of this program will be used to assess MS4 discharges and the RPs' compliance pathways in future years.

3.3 Special Study Monitoring

Special studies in the San Diego Bay WMA have been selected to further investigate the Highest Priority Conditions and Focused Priority Conditions. The RPs are participating in five different special studies: San Diego Regional Streams and Beaches Studies, San Diego Bay Debris Study, Creek Refuse Assessment Program in the Pueblo HU, Chollas Jurisdictional Boundary Study for Metals and Bacteria, and Riparian Area Selenium Study. The RPs also utilized California Assembly Bill 411 (AB 411) data obtained by the County of San Diego DEH to supplement the Swimmable Waters bacteria monitoring and the Shelter Island Shoreline Park Bacteria TMDL required monitoring. Table 3-1 summarizes the programs, including the monitoring elements addressed and the implementation timelines. Section 5 of Appendix 4 summarizes the special studies and additional program conducted in San Diego Bay WMA.

Pursuant to Section A.4 of the Municipal Storm Water Permit (Regional Board, Order No. R9-2013-0001, as amended by order nos. R9-2015-0001 and R9-2015-0100) and letter from Mr. John H. Robertus dated December 18, 2002 (Regional Board, 2002), requiring technical reports pursuant to California Water Sections 13267, 13225, and 13383 regarding exceedances of Water Quality Objectives for trash, debris, and other floating material in Chollas and Paleta Creeks, the City of San Diego was required to report twice a year on existing and planned BMPs intended to prevent or reduce trash, debris, and floating materials in Chollas and Paleta Creeks. As addressed in the WQIP, the City of San Diego agreed to incorporate the technical report addressing trash, debris, and floating material in Chollas and Paleta Creeks (annual technical report) into the January 2017 WQIP Annual Report. This change in reporting frequency was formally agreed to by the Regional Board in a letter from Mr. David W. Gibson dated February 5, 2014 (Regional Board, 2014). The annual technical report covers the activities conducted during FY 2016 (July 1, 2015, through June 30, 2016) and includes the information summarized in the semi-annual report covering the activities conducted during the first half of FY 2016 (July 1, 2015, through December 31, 2015) that was submitted to the Regional Board on March 15, 2016. The annual technical report for trash, debris, and other floating material in Chollas and Paleta Creeks is included in Appendix 4.

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4 Highest Priority Condition: Bacteria and Metals in Chollas Creek Hydrologic Subarea

The Chollas Creek Watershed is located within the Pueblo HU in a highly urbanized portion of central San Diego (Figure 4-1). Bacteria and dissolved copper, lead, and zinc in the Chollas Creek hydrologic subarea (HSA) have been identified as Highest Priority Conditions for the San Diego Bay WMA. TMDLs have also developed by the Regional Board for these constituents.[8]

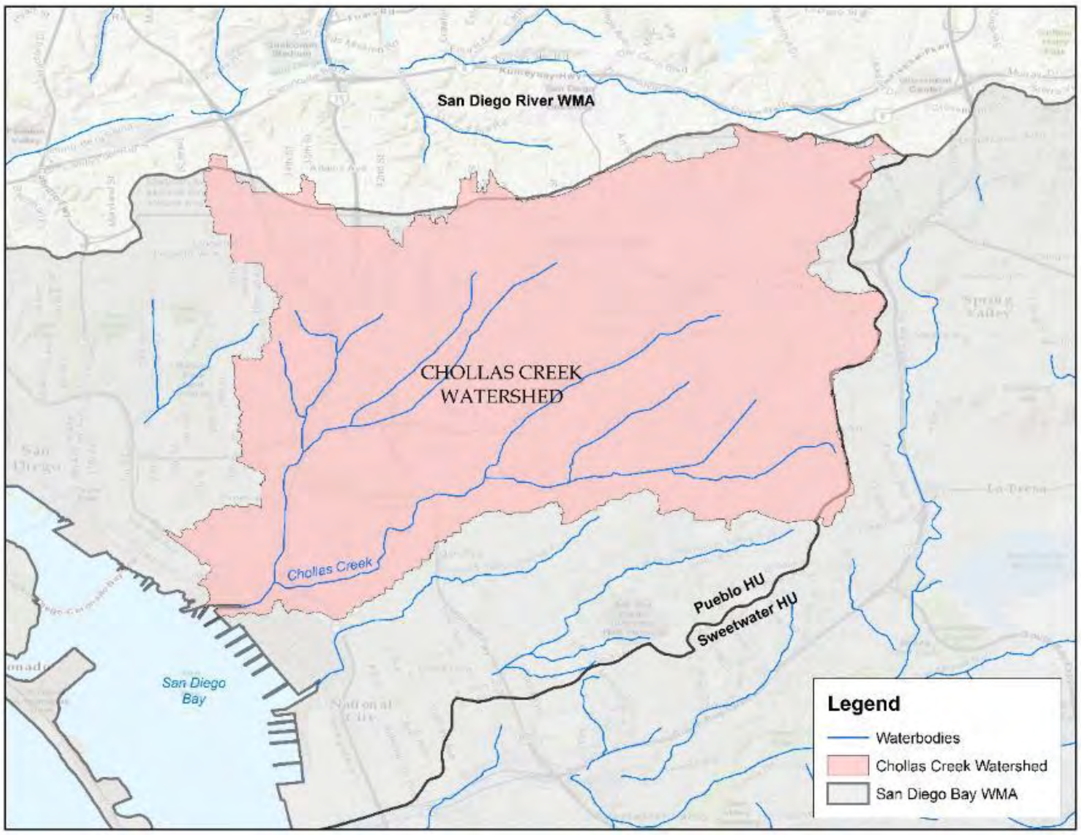

Figure 4-1
Chollas Creek Watershed

4.1 Chollas Creek TMDL Numeric Goals and Performance Measures

The WQIP identified interim and final numeric goals for the Chollas Creek Highest Priority Condition that matched the numeric standards in the TMDLs. These goals are in

[8] Region - Chollas Creek TMDL for Diazinon: adopted August 14, 2002.
http://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/chollascreekdiazinon.shtml;
San Diego Region - Chollas Creek TMDL for Metals: adopted June 13, 2007.
http://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/chollascreekmetals.shtml;
Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek): adopted February 10, 2010. http://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/bacteria.shtml.

Appendix 3. In the WQIP, RPs identified additional interim goals, referred to as "Performance Measures," to be achieved during the Municipal Permit term. The Performance Measures were included to measure the short-term jurisdictional progress toward achieving goals, given that sustained water quality improvement is typically demonstrated over a longer timeframe.

Performance Measures assess the outcome of a strategy or suite of strategies, and provide an interim link to demonstrate reasonable incremental progress in the quality of MS4 discharges and receiving waters.

These Performance Measures, and the RPs' progress toward achieving them, are discussed in detail for each RP in Sections 4.2 through 4.7.

The jurisdictions within the Chollas Creek HSA implement strategies to help achieve the numeric goals established for the watershed. Interim, performance-based goals are intended as milestones that help assess progress toward the longer term goals established for the Chollas Creek HSA. Monitoring programs also collect specific data for Chollas Creek to help track progress toward goals, as discussed in Section 3. The following subsections describe jurisdictional strategy implementation and progress toward interim goals. Watershed monitoring results are presented in light of the applicable numeric goals following the jurisdiction-specific discussions.

4.2 City of La Mesa (La Mesa)

The portion of the La Mesa's jurisdiction that drains to Chollas Creek is mainly south of Interstate 8. This southern half of La Mesa is the targeted area for strategies to be implemented to meet the final and interim goals. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis will be updated as needed to provide assurance that numeric goals will be met. Performance-based goals are included to measure the short-term jurisdictional progress toward achieving goals, given that monitoring is required to demonstrate sustained water quality improvement over time.

4.2.1 Strategies and Schedules

During FY 2016, La Mesa implemented the strategies in the Chollas Creek HSA described in the WQIP. The implementation status of strategies listed in the San Diego Bay WMA WQIP is included in Appendix 2. La Mesa has selected jurisdictional strategies that best suit the topography and characteristics of its jurisdiction to comply with Municipal Permit requirements. The following summarizes the implementation approach and key strategies that have been identified to address the Highest Priority Condition in La Mesa's jurisdiction within the Chollas Creek HSA. Figure 4-2 shows La Mesa's jurisdiction within the Chollas Creek Highest Priority Condition.

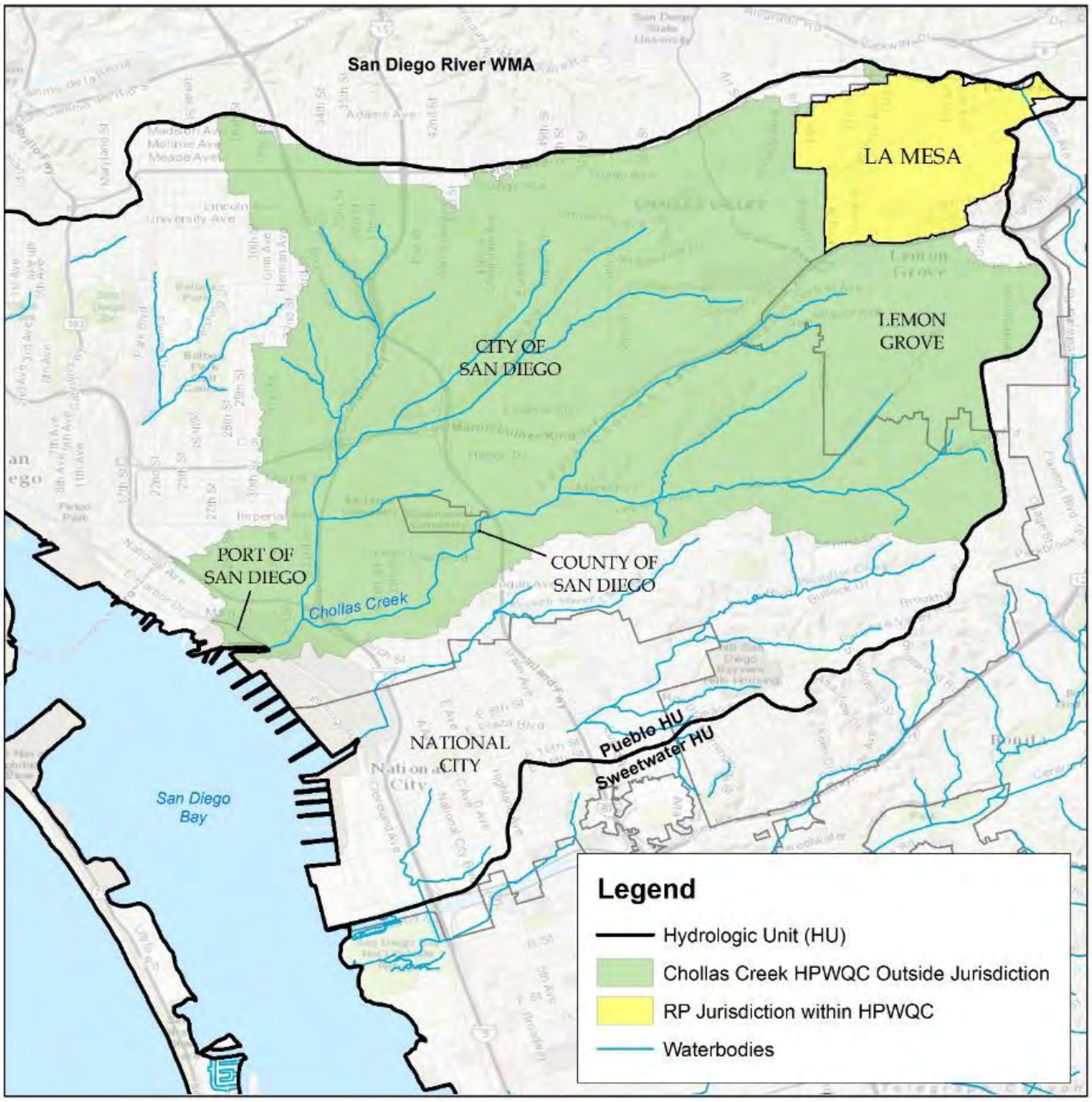

Figure 4-2
La Mesa's Jurisdiction Within the Chollas Creek Highest Priority Condition

To address bacteria, metals, and other pollutants in MS4 discharges in wet and dry weather, La Mesa plans to implement or continue public area enhancements, including low-impact development (LID) retrofit projects in roadway medians, sanitary sewer infrastructure replacement, and enhanced operation and maintenance activities for MS4 infrastructure and public roadways, such as installing trash capture devices in catch basins.

Specifically, La Mesa has been awarded a grant from the State Board Proposition 84 Storm Water Grant Program for the University Avenue Median Water Quality Improvement project to remove and replace impervious medians with pervious bioretention areas that will reduce pollutant discharges to receiving waters. The project is currently under construction, with an anticipated completion date of May 2017, and consists of the conversion of five large roadway median islands into bioretention basins with flows diverted from the outer edge of the crowned roadway. The project also includes Silva Cell type tree boxes, roadway, street light, and landscape improvements. The project will treat storm water from approximately 52 areas of residential, commercial, and transportation areas.

Replacing impervious areas with bioretention areas along University Avenue

In addition, a major effort to prevent bacteria from entering the receiving water is planned. Aging sewer infrastructure within the flood plain will be removed and relocated to reduce the potential for sewer leaks and breaks.

To reduce pollutants from private land uses, La Mesa is planning to expand the commercial facility and construction site inspection program and to increase public education and outreach. High-priority commercial businesses may be inspected twice per year, while high-priority construction sites will be inspected twice per week. La Mesa has a robust education and outreach program that includes collaboration with the Environmental Sustainability Commission, which targets residents and commercial business owners. Educational activities include supporting Boy Scouts of America groups in their efforts to build information kiosks to provide information about pet waste, trash pickup and other park rules.

Table 4-1 summarizes these strategies and schedules for La Mesa within the Chollas Creek HSA. Implementation of the optional strategies is contingent on circumstances supported by the need for the additional effort, the cost/benefit as compared with other options and strategies, and the availability of funding. The full list of optional strategies applicable to the City of La Mesa and the implementation status of each are provided in Appendix 2.

Table 4-1
Summary of Strategies for Chollas Creek—City of La Mesa

Strategy	Jurisdictional Area		Multiple Benefits				Implementation Status			
	Jurisdiction-Wide	Chollas	Trash	Bacteria[1]	Nutrients	Metals[1]	Previous Fiscal Year(s)	FY 2016	FY 2017	Future Fiscal Year(s)
University Avenue median water quality improvements		X	X	X	X	X			P	
Sanitary sewer infrastructure replacement	X	X		X	X				P	
MS4 infrastructure and outfall operation and maintenance	X	X	X	X	X	X				P
Enhanced street sweeping	X	X	X	X		X				P
Installation of trash capture devices on catch basin inlets	X	X	X						P	
Inspection programs	X	X	X	X	X	X	✓	✓	P	P
Education and outreach	X	X	X	X	X	X	✓	✓	P	P
Monitoring		X				X	✓	✓	P	P
Optional Jurisdictional Strategies										
Collaborate with homeowners' associations	X		X	X	X		Strategy was not triggered during the reporting period.			
Participate in a regional social services effort for homelessness	X		X	X			Strategy was not triggered during the reporting period.			
Implement sweeping and maintenance of private roads and parking lots in targeted areas			X	X		X	Strategy was not triggered during the reporting period.			
Replace La Mesa-owned vehicle brake pads with copper-free brake pads as they become commercially available						X	Strategy was not triggered during the reporting period.			
Implement other green infrastructure projects			X	X	X	X	Strategy was not triggered during the reporting period.			

Notes:
FY = fiscal year; MS4 = municipal separate storm sewer system
1. Highest Priority Conditions are highlighted in orange.
Implementation of strategies is dependent on approval of fiscal budgets and available resources.
✓ - Implemented, P – Planned to be implemented; X – Indicates condition benefit

4.2.2 Progress Toward Achieving Numeric Goals

Table 4-2 summarizes La Mesa's progress toward its interim goal established for the Municipal Permit term.

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Table 4-2
Progress Toward City of La Mesa Municipal Permit Term Numeric Goal for the Chollas Creek HSA

Planning Period			Assessment Period		
Performance Measure – Achieve by FY 2018					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
Approximately 4,540 linear feet of bioretention areas will replace impervious areas along University Avenue between La Mesa Boulevard and Harbison Avenue.	Linear feet of LID installation	No LID had been installed in the target area before the WQIP was prepared.	Upon completion of construction in spring 2017, wet weather water quality data will be collected according to the monitoring plan.	The design of a large LID retrofit project was largely completed during 2015–2016. The project went out to bid in early summer 2016, and construction started in summer 2016. Construction is anticipated to be completed in spring 2017.	No modifications to the numeric goal, schedule, or supporting strategies are proposed.

Notes:
FY = fiscal year; LID = low-impact development; WQIP = Water Quality Improvement Plan

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4.2.3 Water Quality Strategies and Schedules Adaptations

No modifications to La Mesa's goals, strategies, and schedules presented in the San Diego Bay WMA WQIP are proposed at this time.

4.3 City of Lemon Grove (Lemon Grove)

Lemon Grove's jurisdiction within the Chollas Creek HSA is relatively small and includes a mixture of residential, light industrial, and commercial developments. Industrial and commercial development is primarily concentrated along Federal Boulevard and Broadway. Lemon Grove primarily discharges to the South Fork of Chollas Creek.

4.3.1 Strategies and Schedules

The portion of Lemon Grove located in the Chollas Creek HSA, where the Highest Priority Conditions have been identified, is shown in yellow in Figure 4-3. A small portion of Lemon Grove's jurisdiction, which is east of the yellow area in the figure, is in the Sweetwater HU. Because Lemon Grove is small, and most of the its jurisdiction is in the Chollas Creek HSA, many of Lemon Grove's strategies to address bacteria and metals in the Chollas Creek HSA, the Highest Priority Conditions, were also implemented city-wide.

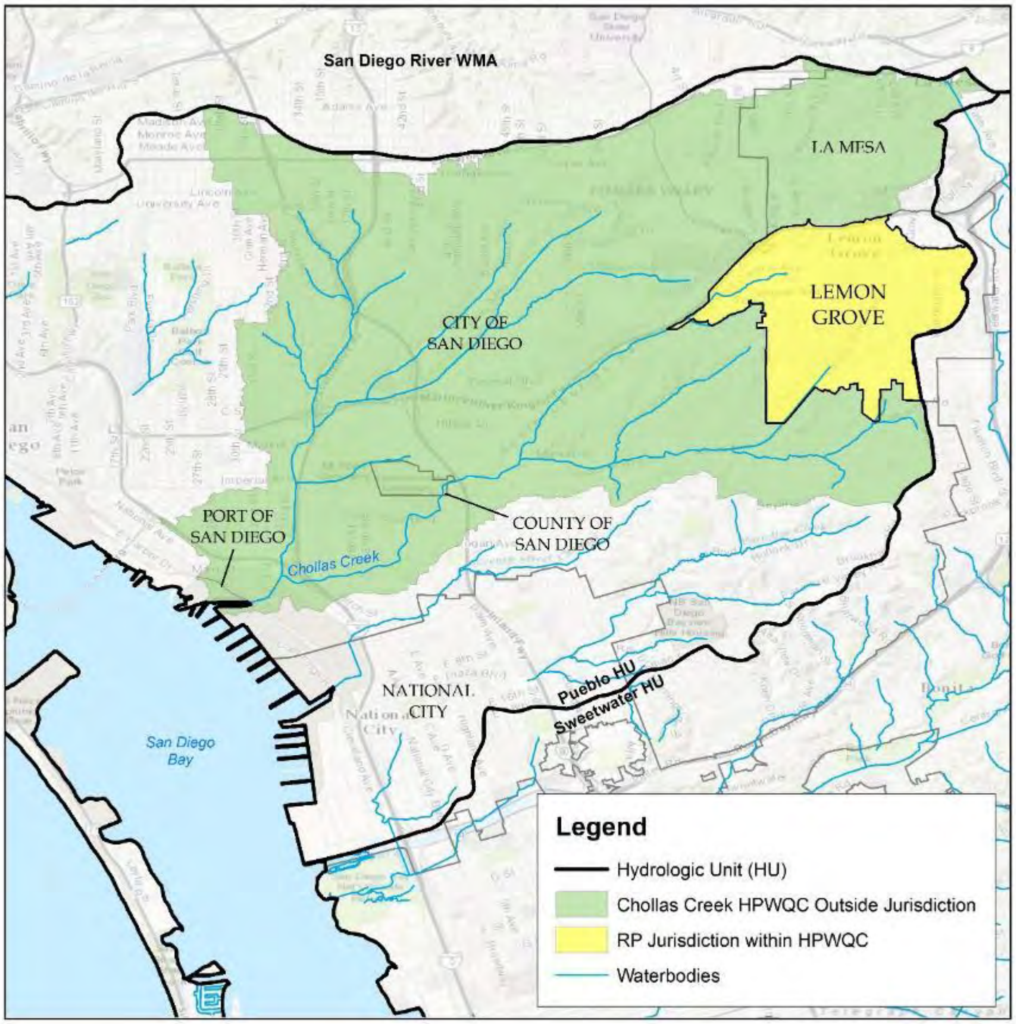

Figure 4-3
Lemon Grove's Jurisdiction Within the Chollas Creek HSA

Goals and strategies for the current Municipal Permit term focus on dry weather implementation of BMPs, specifically the reduction of irrigation runoff, beginning with municipal facilities. Goals and strategies for wet weather during the current Municipal Permit term also focus on municipal facilities and activities, including installation of downspout disconnections and enhanced street sweeping. The enhanced street sweeping program includes regular use of vacuum street sweepers, which are more effective in removing fine particles associated with metals, and higher frequency sweeping and sweeping of medians in the downtown commercial area and business areas, and along arterial streets. Lemon Grove also has implemented a robust inspection program that targets restaurants to reduce bacteria loading and that assesses the potential for implementing retrofits such as disconnecting downspouts, xeriscaping, directing runoff from paved areas to pervious areas, and installing rain barrels.

Lemon Grove downtown commercial area

Additional information on strategies that Lemon Grove implemented during FY 2016 is provided in the following areas:

- Table 4-3 highlights key strategies implemented during FY 2016.
- Appendix 2 includes a table that lists all the strategies that Lemon Grove included in the San Diego Bay WMA WQIP, including optional strategies, along with FY 2016 implementation information for each strategy.

Table 4-3
Summary of Strategies for Chollas Creek—City of Lemon Grove

Strategy[1]	Where Implemented	Multiple Benefits					Implementation Notes
		Trash	Bacteria[2]	Nutrients	Sediment	Metals[2]	
Conduct pilot projects to disconnect downspouts and direct runoff from impervious areas to pervious areas at municipal facilities (LG-41, LG-42).	Municipal Facilities	X	X	X	X	X	Performed initial site research to identify feasible locations in FY 2016. Created curb cuts to direct runoff from the City Hall parking lot to landscaping in early FY 2017.
Perform enhanced street sweeping, including sweeping medians and using vacuum street sweepers (LG-24, LG-25, LG-36).	City-wide	X	X	X	X	X	Applied median sweeping and higher sweeping frequencies to business areas and arterial streets. Alternated vacuum street sweepers with mechanical sweepers every other sweeping for all routes city-wide. Vacuum sweepers are more effective at picking up fine particles to which metals tend to adsorb, and mechanical sweepers are more effective at picking up trash.
Require BMPs to control metals and bacteria discharges from existing development (LG-11).	City-wide	X	X	X	X	X	Implemented via inspection programs.
Conduct higher frequency inspections for high-priority sources of bacteria and metals (LG-35).	Chollas Creek HSA		X			X	Targeted inspection programs at sources of bacteria and metals in Chollas Creek for inspection, and trained inspectors to focus on and identify sources of metals and bacteria.
Install municipal irrigation control system smart controllers (LG-21).	4 parks, 2 medians, and City Hall	X	X	X		X	Performed operations and maintenance on systems to ensure efficient irrigation.

Table 4-3 (continued)
Summary of Strategies for Chollas Creek—City of Lemon Grove

Strategy[1]	Where Implemented	Multiple Benefits					Implementation Notes
		Trash	Bacteria[2]	Nutrients	Sediment	Metals[2]	
Implement outreach, incentives, and increase enforcement to reduce irrigation runoff from private properties (LG-19, LG-20, LG-29, LG-34).	City-wide	X	X	X		X	Partnered with Helix Water District to publicize water conservation incentives and education; followed up on reported discharges identified via inspections and storm water hotline.
Require covered trash enclosures for development projects (LG-5).	City-wide	X	X	X	X	X	Implemented via permitting process.
Require LID at development projects (LG-1, LG-2, LG-4, LG-8).	City-wide	X	X	X	X	X	Implemented a revised project intake system to ensure that project proponents are notified of LID requirements at the initial stage of the permitting process.
Conduct construction site management (LG-10).	City-wide	X	X		X	X	Collaborated with the Regional Board on enforcement actions to address sediment discharges and BMP deficiencies at a project that discharges to Encanto Channel, a tributary of Chollas Creek.

Notes:
BMP = best management practice; FY = fiscal year; LID = low-impact development
1. Strategy identification (ID) numbers from Appendix 2 are included in parentheses at the end of each strategy description. More information about each strategy, and information about additional strategies that are not referenced in this table, is available in Appendix 2.
2. Highest Priority Conditions are highlighted in orange.

4.3.2 Progress Toward Achieving Numeric Goals

Like the other jurisdictions in the Chollas Creek HSA, Lemon Grove is subject to TMDLs for metals and bacteria, and these pollutants are also the relevant Highest Priority Conditions. Monitoring data from the previous three monitoring years at Lemon Grove's jurisdictional boundary have shown metals levels below the TMDL final targets. Lemon Grove's dry weather MS4 outfall monitoring program has determined that only one site in the city has persistent flow, and the rest of the sites are dry.

In addition to the TMDL-derived goals applicable to Lemon Grove described in Appendix 3, progress toward jurisdiction-specific interim WQIP wet and dry weather goals is presented in Table 4-4. Performance-based goals are included to measure short-term jurisdictional progress toward achieving goals.

Table 4-4
Progress Toward City of Lemon Grove Municipal Permit Term Numeric Goals for the Chollas Creek HSA

Metric	Numeric Goal	Schedule	Data Collected/Results	Progress	Adaptive Management Actions
Dry Weather Goal					
Install smart irrigation systems at municipal facilities.	8 Cal-Sense smart irrigation systems installed	Achieve by FY 2018	7 Cal-Sense systems have been installed to date.	Lemon Grove anticipates being able to install one additional Cal-Sense system by FY 2018.	None at this time.
Wet Weather Goals					
Store restaurant used cooking oil bins in covered areas and protect from run-on.	75%	Achieve by FY 2018	Data from the past two fiscal years' inspection programs have been used to develop a baseline, which has been identified as 22%.	Lemon Grove will complete targeted outreach to restaurants and inspections during FY 2017. An update on progress toward the goal after these efforts have been completed will be provided in the FY 2017 Annual Report.	None at this time.
OR					
Redirect parking lot runoff to pervious areas.	2 municipal facilities retrofitted	Achieve by FY 2018	Municipal facilities were evaluated for retrofit suitability during FY 2016.	One retrofit has been completed as of early FY 2017. Lemon Grove expects to complete an additional retrofit before the goal deadline.	None at this time.
Redirect roof downspouts to pervious areas.	2 municipal facilities retrofitted	Achieve by FY 2018	Municipal facilities were evaluated for initial retrofit suitability during FY 2016 inspections.	Potential disconnection locations have been identified at three facilities, and a more detailed assessment to determine which ones will be disconnected will be completed in FY 2017.	None at this time.

Notes:
% = percent; FY = fiscal year

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4.3.3 Water Quality Strategies and Schedules Adaptations

No modifications to the goals and schedules applicable to Lemon Grove that were presented in the San Diego Bay WMA WQIP are proposed at this time. One minor correction to the description of strategy LG-25, which relates to street median sweeping, is listed in Appendix 2.

4.4 City of San Diego (City)

During FY 2015–2016, the City implemented the strategies described in the WQIP. A summary of the progress made in implementing strategies to meet goals for metals and bacteria in the Chollas Creek HSA is presented in Section 4.4.1. The City's progress toward achieving jurisdiction-specific goals is presented in Section 4.4.2. A complete list of strategies planned for implementation within the WMA and the progress made on each strategy during the reporting period are provided in Appendix 2. The jurisdiction of the City o within the WMA is illustrated in Figure 4-4.

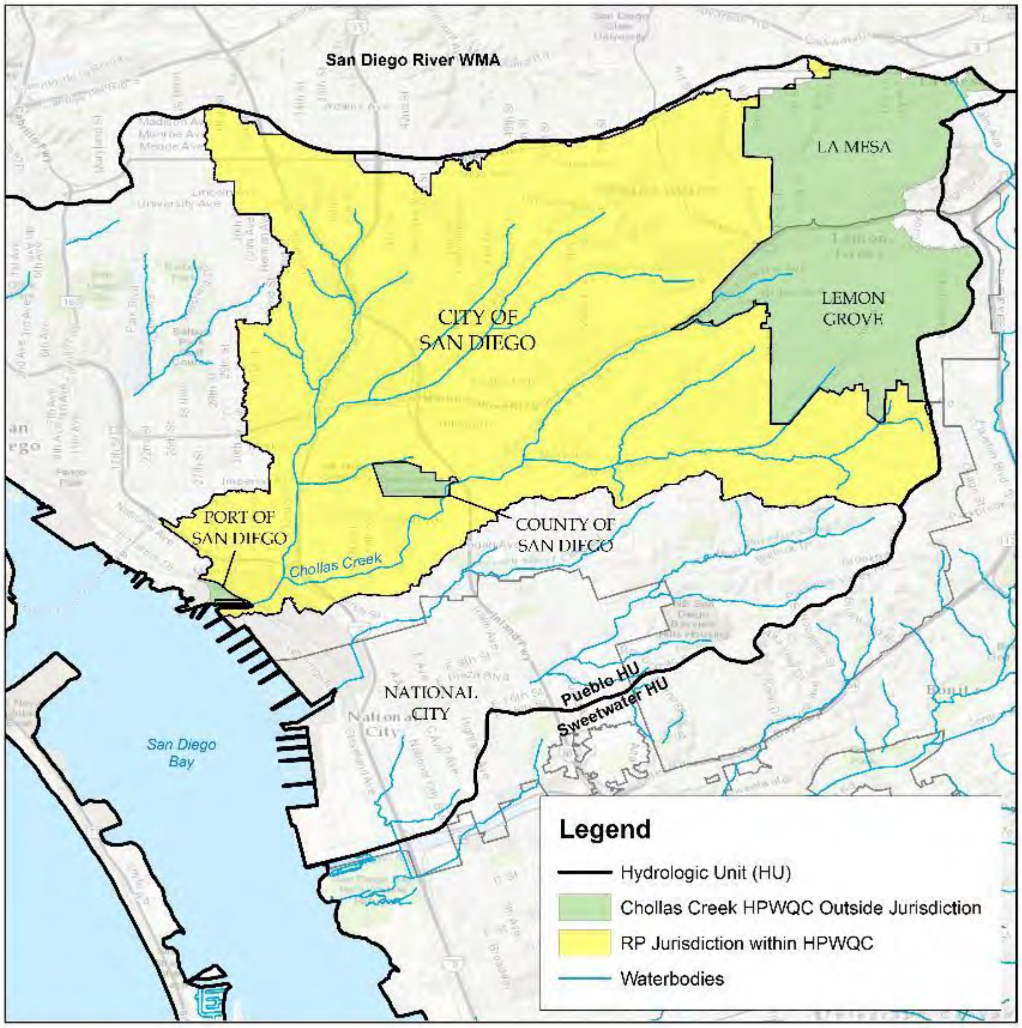


Figure 4-4
City of San Diego's Jurisdiction Within the Chollas Creek Highest Priority Condition

4.4.1 Strategies and Schedules

Highlights of strategies implemented by City to address metals and bacteria in the Chollas Creek HSA are shown in Figure 4-5. Additional strategies being implemented are listed in Table 4-5.

Chollas Creek HSA Drainage Master Plan

The City completed a drainage master plan for the Chollas Creek HSA. The drainage master plan identifies areas where structural BMPs can be completed in the future. Identification of locations is based on maximizing the efficiency of the BMP by locating the facility in an area that will treat larger and/or multiple drainage areas. This planning will maximize pollutant removal from green infrastructure and reduce the number of green infrastructure projects (and associate costs) that will be needed to meet TMDL requirements.

Structural Controls

In FY 2016, more than 25 acres of drainage area were treated by green infrastructure features within the San Diego Bay WMA, and approximately 63 additional acres are expected to be treated by FY 2018.

Enhanced Street Sweeping

To increase removal of metals and sediment, the CIty has started to enhance street sweeping operations in accordance with strategy CSD-JRMP-26 and CSD-JRMP-33 by sweeping a route in the Chollas Creek subwatershed with a regenerative air sweeper. The City also began sweeping routes with different sweeping technologies to determine the most effective sweeping practices for individual routes.

Figure 4-5
Highlights of City of San Diego Strategies

Table 4-5
Summary of Strategies for the San Diego Bay WMA—City of San Diego

Strategy	Multiple Benefits[1]						
	Bacteria[2]	Nutrients	Metals[2]	Trash	Sediment	Flow[3]	Habitat/Wildlife
Storm Drain Structure Cleaning: 11,047 storm drain structure inspections were conducted, resulting in the cleaning of 3,434 structures and removal of 842.2 tons of debris in the WMA.	X		X	X	X		
New in FY 2016: Enhanced Catch Basin Cleaning Optimization: Enhanced catch basin cleaning is a strategy to address pollutant removal by inspecting catch basins more than the JRMP-required minimum of once per year in the Tijuana River, San Diego Bay, and Los Peñasquitos WMAs to meet specific TMDL pollutant removal requirements. In an effort to further optimize its drain cleaning program, the City analyzed eight years of catch basin cleaning data and assigned priorities to individual basins based on historical debris removal. This enhancement will allow the City to target high priority drains to maximize pollutant removal while maintaining cost efficiencies.	X		X	X	X		
Street Sweeping: Approximately 36,646 curb miles of roads, streets, highways, medians, parking lots, and operations yards were swept in the WMA.	X	X	X	X	X		
New in FY 2016: Median Sweeping: 4,315 median miles were swept citywide.	X	X	X	X	X		
New in FY 2016: Targeted Aggressive Street Sweeping Pilot: The City completed a pilot study that quantified the effectiveness of posting limited-hour “no parking” signs on typically nonposted routes. The study found that posting routes resulted in an approximate 50% increase in pollutant removal because the sweeper had more access to curbs and gutters. Based on this finding, the City will consider posting additional routes if supported by the community.	X	X	X	X	X		

Table 4-5 (continued)
Summary of Strategies for the San Diego Bay WMA—City of San Diego

Strategy	Multiple Benefits[1]						
	Bacteria[2]	Nutrients	Metals[2]	Trash	Sediment	Flow[3]	Habitat/Wildlife
New in FY 2016: MS4 Maintenance: In addition to routine maintenance of the MS4, the City repaired or replaced 12 pump stations and modernized another 14 pump stations, closed-circuit television (CCTV) surveyed 28,000 linear feet of pipe in 62 locations citywide, and began developing the Waterways Maintenance Plan and Channel Maintenance Prioritization Plan. To help minimize the risk of flooding in a flood-prone drainage area, the City also installed a 2,400-volt automatic transfer switch and generator to a 130,000-gallon-per-minute pump station, allowing for sustained function in the event of a power outage.	X		X	X	X		
Illicit Discharge Detection and Elimination (IDDE) Program: 634 discharges were reported by the public, 1,021 cases were investigated, 796 discharges or illicit connections were eliminated, 819 enforcement actions were issued, and 445 escalated enforcement actions were issued in the WMA. New in FY 2016: Launch of the Get It Done App: This app allows illicit discharges to be reported quickly and accurately via any smartphone. Lastly, the Tiger Team (a proactive escalated monitoring and enforcement team that involves multiple City departments and divisions) was developed to identify, locate, and eliminate sources of human specific bacteria in the MS4. Over several months during the reporting year, one problem area within the City was investigated extensively and a source of human-specific bacteria in the MS4 was identified and abated.	X	X	X	X	X	X	X

Table 4-5 (continued)
Summary of Strategies for the San Diego Bay WMA—City of San Diego

Strategy	Multiple Benefits[1]						
	Bacteria[2]	Nutrients	Metals[2]	Trash	Sediment	Flow[3]	Habitat/Wildlife
Commercial and Industrial Business Inspections: 3,299 inspections were completed, 314 follow-up inspections were completed, 545 violations were issued, 667 enforcement actions were issued, and 228 escalated enforcement actions were issued in the WMA. In addition, the City conducted property-based inspections that focus on common areas/activities shared among multiple businesses or tenants that generate pollution. A previously conducted pilot study on inspection practices found property-based inspections to be more effective at identifying and resolving water quality issues (e.g., improper trash disposal practices and irrigation runoff, etc.) associated with commercial and industrial businesses.	X	X	X	X	X	X	X
Trash Cleanups: 4 cleanup events were sponsored through I Love a Clean San Diego that collected a total of 14,732 pounds of trash and debris in the WMA (see Appendix 2 for a list of specific projects).				X			
Rebates to Reduce Irrigation Runoff: Rebates were issued to convert 106,041 square feet of turf in the WMA and rebates for rain barrels were issued to capture 772,740 gallons of rainwater citywide.	X	X	X	X	X	X	X
New in FY 2016: Offsite Alternative Compliance Program: The City implemented Phase I of the Alternative Compliance Program to give development projects that would require onsite structural BMPs the ability to propose offsite alternative compliance projects. The development of Phase II was also initiated and will include the establishment of an in-lieu fee structure and credit system.	X	X	X	X	X	X	X
New in FY 2016: Bacteria Regrowth Study: The City completed a study to characterize the magnitude and extent of potential *Enterococcus* loading because pf regrowth within the City's storm drain system. This study quantifies the amount of bacteria in receiving water samples that are harmless to humans and would potentially be used to refine bacteria water quality standards of the Bacteria TMDL as a part of the Reopener process.	X						

1. X – Addresses the water quality conditions.

Table 4-5 (continued)
Summary of Strategies for the San Diego Bay WMA—City of San Diego

Strategy	Multiple Benefits[1]						
	Bacteria[2]	Nutrients	Metals[2]	Trash	Sediment	Flow[3]	Habitat/Wildlife

2. Highest Priority Condition is highlighted in orange.
3. Flow is defined as storm water and non-storm water discharges to receiving waters, including freshwater inputs.

% = percent; FY = fiscal year; JRMP = Jurisdictional Runoff Management Plan;
MS4 = municipal separate storm sewer system; TMDL = total maximum daily load; WMA = Watershed Management Area

4.4.2 Progress Toward Achieving Numeric Goals

The City implemented green infrastructure projects that treat 25.14 acres of drainage area and is expected to achieve the 44.6-acre FY 2018 Performance-Based Goal requirement by implementing additional projects that will treat a total of 69.74 acres by FY 2018. Details regarding achievement of the performance based goals are described further below.

In accordance with the requirements of the WQIP, baseline values were calculated for MS4 discharges in this first Annual Report. The baseline values that will be used for subsequent annual reports are summarized in Table 4-6.

Table 4-6
Baseline Values for Numeric Goals for San Diego Bay WMA—City of San Diego

Compliance Pathway	Metric	Baseline
Wet Weather Metals		
MS4 Discharges # of Direct or Indirect MS4 Discharges[1] to Receiving Water	Number of persistently flowing major storm drain outfalls	94 discharges[1]
Wet Weather Indicator Bacteria		
MS4 Discharges % Days Exceeding WQO	Fecal coliform	100%[2]
	Enterococcus	100%[2]
	Total coliform	100%[2]
MS4 Discharges # of Direct or Indirect Storm Drain Discharges[1] to Receiving Water	Number of flowing major storm drain outfalls during wet weather monitoring	94 discharges[1]
Dry Weather Metals		
MS4 Discharges Allowable % Above Effluent Limitations	Copper	TBD
	Lead	TBD
	Zinc	TBD
MS4 Discharges # of Direct or Indirect MS4 Discharges to Receiving Water	Number of persistently flowing major storm drain outfalls	94 discharges
Dry Weather Bacteria		
MS4 Discharges % Days Exceeding WQO	Fecal coliform	100%[3]
	Enterococcus	100%[3]
	Total coliform	100%[3]
MS4 Discharges # of Direct or Indirect MS4 Discharges to Receiving Water	Number of persistently flowing major storm drain outfalls	94 discharges

Table 4-6 (continued)
Baseline Values for Numeric Goals for San Diego Bay WMA—City of San Diego

Compliance Pathway	Metric	Baseline
Performance-based Goals (Wet and Dry Weather)		
Implement runoff reduction programs, including targeted education and outreach, enhanced inspections, rebates, and increased enforcement	Dry weather flow[4] measured at persistently flowing outfalls in the watershed	Average Dry Weather Flow[4]: 1.3 gallons per minute Maximum Dry Weather Flow[4]: 10.8 gallons per minute

1. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
2. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008, through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 Municipal Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical five-year period.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008, through September 30, 2013. Rolling five-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical five-year period.
4. Calculated using historical dry weather MS4 outfall data from 2009–2014. Calculations are described in in Appendix 3.

% = percent; MS4 = municipal separate storm sewer system; WQO = water quality objective

As discussed in Section 2, interim and final numeric goals were established for the watershed as a means of measuring reasonable progress toward addressing metals and bacteria; the goals are included in Appendix 3. Performance-based goals are included to measure short-term jurisdictional progress toward achieving these goals, given that sustained water quality improvement is typically demonstrated over a longer timeframe. Performance-based goals are intended to measure an outcome from a strategy or suite of strategies, and to provide an interim link to demonstrate reasonable incremental progress in the quality of MS4 discharges and receiving waters by FY 2018. The suite of strategies presented have been selected as goals because they are measurable and provide a direct water quality benefit in the near term.

The City's progress during FY 2015–2016 toward meeting performance-based goals is summarized in Table 4-7 and Figures 4-6 and 4-7.

Table 4-7
Progress Toward City of San Diego Municipal Permit Term Numeric Goals for the Chollas Creek HSA

Performance-Measure	Weather (Wet/Dry)	Baseline	FY 2018 Goal	FY 2016 Progress	Adaptive Management Actions
Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	Wet and Dry	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	Treat 44.6 acres of drainage area through construction of 6 green infrastructure BMPs	The City has made the following progress in the achievement of this performance measure. The City has begun the process for developing a green infrastructure policy. The City implemented green infrastructure projects that treat 25.14[a] acres of drainage area and is expected to exceed the performance measure by implementing additional projects that treat 63.1[b] acres of drainage area for a total of 88.24 acres treated by 2018.	No adaptive management actions are required.
Implement runoff reduction programs, including targeted education and outreach, enhanced inspections, rebates, and increased enforcement	Dry	<u>Average Dry Weather Flow[1]:</u> 1.3 gallons per minute <u>Maximum Dry Weather Flow[1]:</u> 10.8 gallons per minute	Reduce prohibited dry weather flow from baseline measured at persistently flowing outfalls in the WMA by 10%	Performance measure has been achieved. Average dry weather flow in FY 2016 was 0.9 gallons per minute, representing a 27.2% reduction from the baseline average flow.	No adaptive management actions are required.

1. Calculated using historical dry weather MS4 outfall data from 2009–2012. Calculations are described in in Appendix 3.

% = percent; BMP = best management practice; FY = fiscal year; TMDL = total maximum daily load; WMA = Watershed Management Area

a. 43rd and Logan structural BMP (6.49 acres); Memorial Park structural and priority development project (18.65 acres)

b. Southcrest Park structural BMP (36 acres), Beta Street (2.1 acres), Alamo Green Street (25 acres)

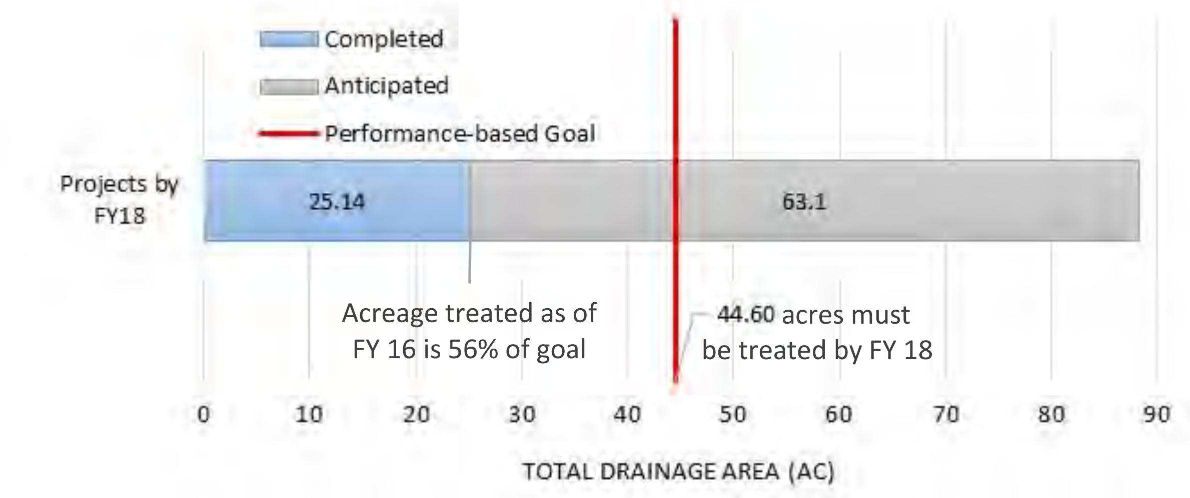


Figure 4-6
Acreage of Drainage Area Treated by Green Infrastructure (Current and Planned) for San Diego Bay—City of San Diego

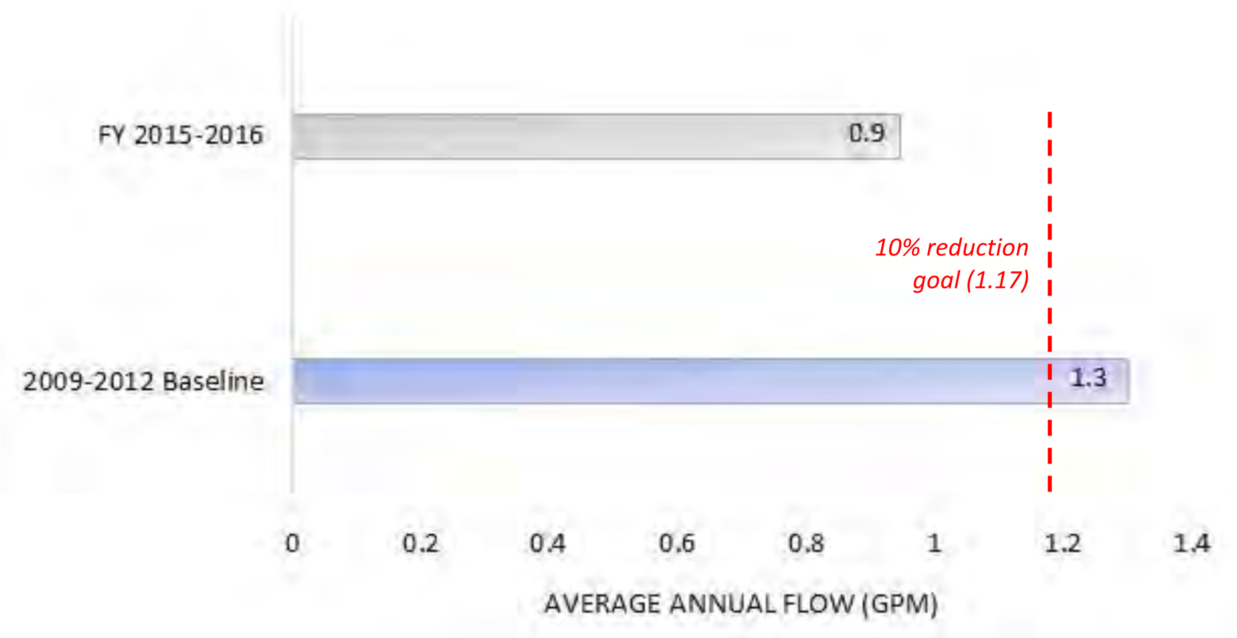


Figure 4-7
Progress Made in Reducing Anthropogenic Dry Weather Flow Relative to the Performance-based Goal for San Diego Bay

4.4.3 Water Quality Strategies and Schedules Adaptations

No modifications to the City's goals, strategies, and schedules presented in the San Diego Bay WMA WQIP are proposed at this time.

4.5 County of San Diego (County)

The key strategies identified to address the Highest Priority Conditions in the County's jurisdiction are presented in Section 4.5.1. The County's WQIP final and interim goals are presented in Appendix 3. In the Chollas Creek HSA, the County's limited jurisdiction includes a cemetery, part of one road, one residence, a YMCA facility, and part of one MS4 outfall. The outfall discharges sheet flow from the cemetery during wet weather, and is reported to be dry (i.e., no discharges) during dry weather. These runoff characteristics will be verified through increased monitoring and visual surveillance. There are no catch basins in the County's area of jurisdiction. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules demonstrate that numeric goals will be met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis will be updated as needed to provide assurance that numeric goals will be met.

4.5.1 Strategies and Schedules

The County selected jurisdictional strategies that best suit the characteristics of its jurisdiction to comply with Municipal Permit requirements. A complete list of jurisdictional strategies implemented or planned for implementation within the WMA is provided in Appendix 2. The following summarizes the implementation approach and key strategies that were identified to address the Highest Priority Conditions in the County's jurisdiction within the Chollas Creek HSA. Figure 4-8 shows the County's jurisdiction within the Chollas Creek Highest Priority Condition where the strategies will be implemented.

Optional strategies that have been considered (based upon need and resource availability) are also summarized. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules demonstrate that numeric goals will be met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis will be updated as needed to provide assurance that numeric goals will be met.

Figure 4-8
County's Jurisdiction Within the Chollas Creek Highest Priority Condition

Throughout its jurisdiction, the County has taken a multi-faceted approach to reduce water consumption and limit dry weather flows by promoting collaboration among departments. In response to drought conditions in the region, the County recently implemented a Water Shortage and Drought Response Plan to reduce water use at its facilities. Since 2009, the Department of Parks and Recreation has completed installation of high-efficiency irrigation heads and smart irrigation controllers in 20 parks county-wide. Many of these parks, including Sweetwater Summit Regional Park, Cottonwood Park, and Woodhaven Park (among others), lie within the San Diego Bay WMA and provide immediate water quality benefits to its receiving waters. These efforts have enabled the County to save over 60 million gallons of irrigation water in County parks during FY 2015–2016. Other measures taken include, but are not limited to, elimination of regularly scheduled exterior window washing at County facilities and identification of parks and County facilities with the potential for recycled water connections.

Furthermore, potential dry weather flows were evaluated through inspections of MS4 outfalls discharging to receiving waters. The County has shifted to a more active field program to better locate and abate dry weather flows. Staff members spend a greater amount of time in unincorporated communities to identify nuisance anthropogenic flows and to address them through appropriate education and enforcement strategies. County staff members have been trained to identify and report illicit discharges and illicit connections during required annual storm water training; this training has been updated to reflect recent Municipal Permit changes.

In an effort to spread awareness of ways to reduce over-irrigation, the Sustainable Landscapes Program (SLP) was developed by the County in collaboration with a diverse group of partners. The program is intended to integrate multiple sustainability concepts and resource benefits for residential-scale urban landscapes, reduce the amount of potable water applied to the landscape, capture and use rainwater as a resource, and reduce pollutant infiltration into local waterways. The comprehensive approach includes (1) development of landscape guidelines, (2) residential and professional landscape training courses, (3) technical landscaping assistance, including planting and irrigation plans, (4) marketing and outreach, (5) financial incentives for turf conversions, and (6) landscape materials provisions, including mulch and compost/compost tea. During FY 2015–2016, the SLP partners offered free education and training opportunities to more than 1,000 homeowners and professionals throughout the County. All training opportunities align with the San Diego SLP Guidelines, which describe best practices and recommendations for a watershed approach to landscaping, such as downspout diversion to landscaped areas, LID (Site Design BMPs), use of water efficient irrigation equipment, low water use plants, and compost and mulch to amend soils for maximum water retention. Financial incentives for turf conversions and discounts on landscape material are scheduled to commence in late 2016.


Bioretention swale on Logan Ave

The County recently undertook efforts to update its 2007 LID Handbook[9] to better align with the County's Standard Urban Storm Water Mitigation Plan (SUSMP) and Hydromodification Management Plan (HMP), and to reflect the most current data on LID approaches and their efficacy. For its efforts, the County was named the recipient of the 2015 Outstanding Innovation in Green Planning and Design Award by the San Diego Chapter of the California Association of Environmental Professionals (AEP), a nonprofit organization established in 1974 and dedicated to enforcing and supporting the California Environmental Quality Act

[9] County of San Diego Low Impact Development Handbook http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

(CEQA). Additionally, the County received a similar award in October 2016 for work during the fiscal year on development of its Guidance on Green Infrastructure[10], a document outlining tools to uniformly design, install, and maintain LID features in the public right-of-way.

The County has implemented a number of watershed strategies to reduce pollutants in storm water runoff discharges from storm drain outfalls. Within the County, a schedule was developed for operation and maintenance of the storm water conveyance system and related structures, including retrofits. To reduce metals in MS4 discharges, the County also continued to implement a road maintenance schedule for public roadways within its jurisdiction and has increased the frequency of street sweeping. In two recent examples of retrofit projects that targeted potential runoff from County facilities, LID approaches were utilized in conjunction with drainage and parking improvements at the Southeast Family Resource Center and Central Regional Public Health Center. Previously, the facilities consisted primarily of impervious areas composed of rooftops and parking lots. However, the improvements effectively reduced flows during storm events and reduced concentrations of metals. Table 4-8 lists the key strategies and schedule for the County's jurisdiction within the Chollas Creek HSA. Several optional jurisdictional strategies and their implementation status are also presented in Table 4-8. Implementation of the optional strategies has been and will continue to be contingent upon circumstances supported by the need for the additional effort, the cost/benefit as compared with other options and strategies, and the availability of funding. The full list strategies applicable to the County and the implementation status of each are provided in Appendix 2.

[10] County of San Diego BMP Design Manual Appendix K Guidance on Green Infrastructure
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/DevelopmentandConstruction/BMP_Design_Manual.html

Table 4-8
Summary of Strategies for Chollas Creek—County of San Diego

Strategy	Jurisdictional Area		Priority Condition				Implementation Status			
	Jurisdiction-Wide	Chollas	Trash	Bacteria[1]	Nutrients	Metals[1]	Previous Fiscal Year(s)	FY 2016	FY 2017	Future Fiscal Year(s)
Implement a schedule of operation and maintenance for County paved and unpaved roads.	X	X	X	X	X	X	✓	✓	P	P
Provide enhanced outreach and education on reducing over irrigation.	X	X	X	X	X	X		✓	P	P
Implement a schedule of operation and maintenance activities for the storm water conveyance system and related structures.	X	X	X	X	X	X	✓	✓	P	P
Optional Jurisdictional Strategies										
Implement sustainable landscapes program to encourage landscape retrofits.	X	X		X	X	X	Strategy was not triggered during the reporting period, but was partially implemented in FY 2016.			
Collaborate with partners in watershed on flood control channel rehabilitation projects.	X	X	X	X	X	X	Strategy was not triggered during the reporting period, but was partially implemented in FY 2016.			

FY = fiscal year
1. Highest Priority Conditions are highlighted in orange.
Implementation of strategies is dependent on approval of fiscal budgets and available resources.
✓ - Implemented, P – Planned to be implemented; X – Indicates condition benefit

4.5.2 Progress Toward Achieving Numeric Goals

During FY 2015–2016, the County successfully implemented strategies outlined in the WQIP and is expecting to meet interim goals. In the Chollas Creek HSA (908.22), ongoing maintenance was performed at two facilities where LID BMPs were previously implemented: (1) Southeast Family Resource Center, and (2) Central Regional Public Health Center. LID implementation and subsequent maintenance have contributed to significantly reduced flows during storm events and lower concentrations of bacteria and metals in the receiving waters.

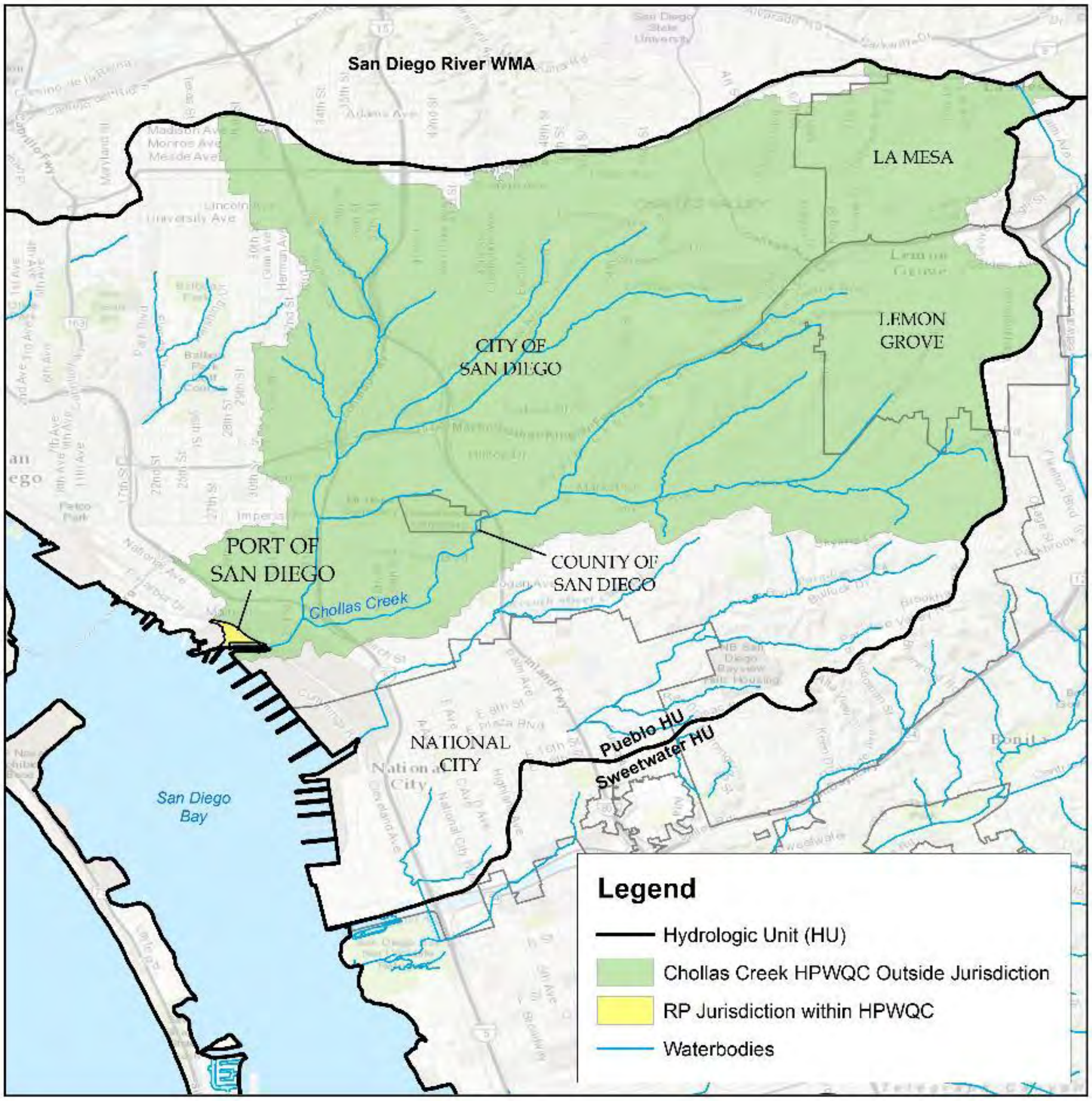
4.5.3 Water Quality Strategies and Schedules Adaptations

No modifications to the County's goals, strategies, and schedules presented in the San Diego Bay WMA WQIP are proposed at this time.

4.6 Port of San Diego

The Port of San Diego's approach to address the Highest Priority Conditions and to comply with the TMDL-derived watershed goals in Chollas Creek takes into account the nominal, if any, discharges from the Port of San Diego areas to the Chollas Creek HSA. Within the Chollas Creek drainage area, the Port of San Diego's jurisdictional authority is limited to a single tenant, General Dynamics National Steel and Shipbuilding Company (NASSCO). This facility represents less than 1 percent (%) of the Chollas Creek drainage area. The entire NASSCO facility is regulated by an individual National Pollutant Discharge Elimination System (NPDES) permit. As a result of the toxicity standards in NASSCO's NPDES permit, NASSCO elected to install a self-contained retention/treatment system that captures and treats all storm water discharges at its facility. Therefore, NASSCO has minimized potential discharges to San Diego Bay and eliminated discharges from its facility to Chollas Creek. The area highlighted in yellow in Figure 4-9 shows the Port of San Diego's boundaries within the Chollas Creek HSA.

Given the limited jurisdictional area of the Port of San Diego in the Chollas Creek HSA, its approach is to employ strategies that address the Highest Priority Conditions (trash, metals, and bacteria) by verifying that the Port of San Diego's tenant, NASSCO, is in compliance with Municipal Permit-required BMPs, providing education outreach to various audiences that live and/or work in the drainage area, participating in cleanup events within the creek. This approach will help support other water quality efforts in Chollas Creek. The FY 2016 strategies are listed in Section 4.6.1. The complete list of strategies implemented by the Port of San Diego is in Appendix 2.



Notes:
As stated above, the Port of San Diego does not operate any segment of MS4 that discharges to Chollas Creek.

Figure 4-9
Port of San Diego's Jurisdiction Within the Chollas Creek Highest Priority Condition

4.6.1 Strategies and Schedules

The Port of San Diego completed all of the strategies outlined for the Chollas Creek HSA for FY 2016. This work includes several public outreach and cleanup events. The Port of San Diego sponsored 16 cleanups overall in Port of San Diego tidelands/San Diego Bay. Two cleanup events occurred within the Chollas Creek HSA. The Port of San Diego also completed a routine MS4 permit facility inspection at the NASSCO facility. The strategies employed during FY 2016 are discussed further below and are summarized in Table 4-9.

The Port of San Diego's inspection of NASSCO on March 21, 2016, found 100% compliance with the BMP requirements of the Municipal Permit during this reporting period (PO-7). Therefore, no follow-up was required. NASSCO is also required to comply with its own individual NPDES permit reporting requirements (Order NO. R9-2009-0099) and is required to submit results annually. The individual NPDES permit reports are submitted to the Regional Board by NASSCO separately from this WQIP Annual Report.

The Port of San Diego addressed trash, metals (copper and zinc), and bacteria and increased public awareness by providing educational opportunities to various audiences throughout the reporting year, including residential communities, the general public, school children, and underserved audiences (PO-17). Four programs specifically focused on school children in the Chollas Creek HSA (Table 4-9). The programs reached approximately 2,645 students in the Chollas Creek HSA during the reporting year.

One of the Port of San Diego's optional strategies for the Chollas Creek HSA was triggered in FY 2016. Cleanup events hosted or sponsored by the Port of San Diego (PO-35 optional) also provided opportunities for the public to develop a sense of stewardship for the environment and to participate in efforts within the Chollas Creek HSA, as well as at other locations within Port of San Diego's jurisdiction.

In addition, the Port of San Diego sponsored the annual regional seminar on Integrated Pest Management (IPM) for Landscape Professionals (PO-12). Approximately 117 attendees attended the May 19, 2016, public seminar to learn more about environmentally friendly pest management methods. While the seminar was not specific to the Chollas Creek HSA, the landscape professionals in attendance may employ IPM concepts when working within the Chollas Creek HSA.

The Port of San Diego also participated in the San Diego Regional Reference Study, as discussed in Appendix 4. The study assessed the microbial water quality at reference beaches following dry and wet weather events in southern California, with a focus on the San Diego region. The goal is to be able to revise the Bacteria TMDL to base it on local conditions. The findings of the study will be submitted to the Regional Board to include in their analysis when the Bacteria TMDL is reopened.

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Table 4-9
Summary of Strategies for Chollas Creek – Port of San Diego

Strategy	Multiple Benefits			Implementation Status
	Trash	Bacteria[1]	Metals[1]	**FY 2016**
PO-7: Core JRMP Programs – Existing Development (Commercial/Industrial)	X		X	Annual Municipal Permit Industrial Facility Inspections: • The Port of San Diego conducted one facility inspection of National Steel and Shipbuilding Company (NASSCO) on 3/21/2016; 100% of required MS4 Permit BMP compliance was achieved during this reporting period; no follow-up required; therefore, no corrective action was necessary.
PO-17: Core JRMP Programs – Public Education and Outreach[3]	X	X	X	Many of the Port of San Diego's education activities are implemented jurisdiction or San Diego Bay watershed-wide. However, educational programs specifically occurring within the Chollas Creek HSA include: • Groundwork San Diego-Chollas Creek's *Chollas Creek to San Diego Bay Waterkeepers Initiative* – 600 third to seventh graders reached with 27% increase in knowledge • Ocean Discovery Institute – The *Wetlands Avengers* program provided 953 fourth grade students from 11 different schools in the City Heights community with field and classroom activities. • Ocean Discovery Institute – *Ocean Science Explorers: City to Bay Scientists* provided 950 fifth grade students from the City Heights community opportunities to do hands-on experiments in the classroom. • I Love A Clean San Diego, Watershed Education Presentations – Six presentations focused in Chollas Creek HSA to 142 high school students
PO-35: Cleanup and Collection Events	X	X	X	• The Port of San Diego sponsored 16 cleanups overall in Port tidelands/San Diego Bay. • Approximately 100 people collected 962 pounds of trash/debris in two Port-sponsored cleanup events within the Chollas Creek HSA during the reporting year.

Notes:
1. Highest Priority Conditions are highlighted in orange.
% = percent; BMP = best management practice; FY = fiscal year; HSA = hydrologic subarea; JRMP = Jurisdictional Runoff Management Program/Plan; MS4 = municipal separate storm sewer system

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4.6.2 Water Quality Strategies and Schedules Adaptations

No modifications to the Port of San Diego's goals, strategies, and schedules presented in the San Diego Bay WMA WQIP are proposed at this time.

4.7 Caltrans

Caltrans is not regulated under the Municipal Permit; however, Caltrans is subject to similar requirements through its MS4 Permit (Caltrans Permit) (Regional Board, 2012). Caltrans has voluntarily contributed to the WQIP effort to provide a consistent and watershed-wide approach to meeting applicable TMDL requirements. The baseline strategies are continuously implemented and augmented as resources become available.

Attachment IV of the Caltrans Permit outlines a methodology for prioritizing stream segments included in TMDLs to which Caltrans is subject. The Caltrans Permit establishes BMP implementation requirements, evaluated in terms of compliance units. Caltrans is expected to achieve 1,650 compliance units per year through the implementation of retrofit BMPs, cooperative implementation, and post-construction treatment beyond permit requirements.

Impaired reaches throughout the state will be prioritized on the basis of several factors, including, but not limited to, percent reduction needed, Caltrans drainage area contributing to the reach, and proximity to receiving waters. Reaches with metals TMDLs will likely be prioritized. Caltrans continued its efforts to reduce pollutant discharges to receiving waters through ongoing compliance activities and by implementing a consistent statewide approach to address Attachment IV requirements for the named pollutants.

Caltrans' jurisdiction areas include roadway, land adjacent to roadways, and facilities. Caltrans' jurisdictional strategies specifically focus on BMP implementation to reduce known pollutants within these areas. Caltrans' strategies vary from those of other RPs (in both type and name) to best address freeway characterization discharges from its Right-of-Way (ROW). Strategies include programs developed by Caltrans Headquarters for statewide execution and District 11 implementation. Caltrans' implementation of strategies with the WMA is dependent on legislative approval.

4.7.1 Strategies and Schedules

Caltrans' strategies vary from those of other RPs (in both type and name) to best address typical freeway characterization discharges from its ROW. Strategies include programs developed by Caltrans Headquarters for statewide execution and District 11 implementation. Caltrans' implementation of strategies within the WMA is dependent on legislative approval. A complete list of strategies, including optional strategies, and their anticipated implementation schedule are provided in Appendix 2. The strategies and schedules are subject to change and are contingent upon annual budget approvals and funding availability. They will be modified through the adaptive management process as needed.

Several optional jurisdictional strategies and their implementation status are presented in Table 4-8. Implementation of the optional strategies is contingent on circumstances supported by the need for the additional effort, the cost/benefit as compared with other options and strategies, and the availability of funding. The full list of optional strategies applicable to Caltrans and the implementation status of each are provided in Appendix 2.

4.7.2 Progress Toward Achieving Numeric Goals

For the Bacteria TMDL, Caltrans is expected to eliminate dry weather flows by implementing control measures to ensure effective prohibition. For wet weather flows, Caltrans is expected to implement control measures or BMPs to prevent discharge of bacteria from the ROW; these measures can include source control and pre-emptive activities such as street sweeping, cleanup of illegal dumping, and public education on littering. Implementation of these controls is in accordance with the TMDL prioritization list currently under development.

Caltrans' WQIP goals for dry and wet weather are presented in Table 4-10.

Table 4-10
Progress Toward Caltrans Permit Term Numeric Goals for the Chollas Creek HSA

Planning Period			Assessment Period		
Performance Measure – Ongoing					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
Dry Weather					
Eliminate dry weather flows by implementing control measure to ensure effective prohibition.	MS4 Discharges	See Caltrans Annual Report	See Caltrans Annual Report	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.
OR					
Implement drought-tolerant landscaping and conversion to smart irrigation controllers within the watershed.	MS4 Discharges	See Caltrans Annual Report	See Caltrans Annual Report	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.

Table 4-10 (continued)
Progress Toward Caltrans Permit Term Numeric Wet Weather Goal for the Chollas Creek HSA

Planning Period			Assessment Period		
Performance Measure – Ongoing					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
Wet Weather					
Achieve compliance units by contributing funds to a cooperative implementation agreement or grant program.	MS4 Discharges	See Caltrans Annual Report	See Caltrans Annual Report	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.
OR					
Continued implementation of wet weather nonstructural BMP activities within the watershed	MS4 Discharges	See Caltrans Annual Report	See Caltrans Annual Report	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.
OR					

Table 4-10 (continued)
Progress Toward Caltrans Permit Term Numeric Wet Weather Goal for the Chollas Creek HSA

Planning Period			Assessment Period		
Performance Measure – Ongoing					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
Continue to implement wet weather structural BMP activities for proposed projects within the watershed.	MS4 Discharges	See Caltrans Annual Report	See Caltrans Annual Report	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time.

Notes:
Caltrans = California Department of Transportation; MS4 = municipal separate storm sewer system

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4.7.3 Water Quality Strategies and Schedules Adaptations

No modifications to Caltrans' goals, strategies, and schedules presented in the San Diego Bay WMA WQIP are proposed at this time.

4.8 Chollas Creek HSA Monitoring and Assessment

Monitoring for the Highest Priority Condition was developed to comply with the two TMDLs in effect for Chollas Creek. The subsections below provide a brief overview of the monitoring programs and results.

4.8.1 Bacteria Monitoring Results

The 2015–2016 Chollas Creek Bacteria TMDL compliance monitoring is designed to meet the requirements under Resolution No. R9-2010-0001 (Regional Board, 2010)[11], as incorporated into the Regional Board's Order Number R9-2013-0001[12] (Municipal Permit) in 2013. The Bacteria TMDL monitoring program assesses the conditions of the receiving waters and has the following objectives:

- Characterize levels of bacteria concentrations at compliance monitoring locations.
- Track progress toward meeting the Bacteria TMDL numeric targets.

Fecal indicator bacteria (FIB) sampling for the compliance monitoring season (October 2015 through September 2016) was conducted at three creek monitoring locations. Wet weather samples were collected within the first 24 hours after the end of rainfall for three wet weather events. Dry weather samples were collected at least weekly between April and October 2015, and at least monthly on dry weather days from November 2015 through March 2016.

The Chollas Creek Bacteria TMDL 2015–2016 Water Quality Compliance Monitoring Report summarizes FIB concentrations and key hydrologic data by compliance monitoring location and season for the 2015–2016 monitoring season. Compliance is assessed by comparing analytical results for *Enterococcus* and fecal coliform with applicable receiving water limitations (RWLs), in accordance with the Bacteria TMDL requirements in Attachment E of the Municipal Permit. The RWLs are a combination of numeric targets for bacteria density and allowable exceedance frequencies. The compliance schedule includes interim milestones that must be achieved to demonstrate progress prior to attaining full compliance with the TMDL.

Results for 2015–2016 are summarized in Appendix 4, and are discussed in detail in the Chollas Creek Bacteria TMDL 2015–2016 Water Quality Compliance Monitoring Report.

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[11] A Resolution Amending the Water Quality Control Plan (Regional Board, 1994) or the San Diego Basin (9) To Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek), February 10, 2010

[12] National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region, May 14, 2013.

4.8.2 Metals Monitoring Results

The Chollas Creek Diazinon and Dissolved Metals TMDLs Compliance Monitoring program is designed to meet the requirements of Order No. R9-2004-0277 (Regional Board, 2004) and State Board Resolution No. 2008-00054 (Regional Board, 2008). To determine compliance with these TMDLs, the RPs conducted wet weather water quality monitoring at two mass loading stations during three wet weather events during the 2015–2016 wet season.

Samples were analyzed for the TMDL compliance constituents: diazinon, dissolved metals (copper, lead, and zinc), total hardness, and toxicity. Additional constituent analyses were selected by the RPs fill data gaps and track potential water quality contaminants or issues in Chollas Creek.

Compliance was assessed by comparing analytical results with applicable water quality criteria set forth in the approved TMDLs for the Chollas Creek HSA, the pesticide criteria of the California Department of Fish and Wildlife (CDFW), and the Aquatic Life Benchmarks of the United States Environmental Protection Agency (USEPA) Office of Pesticide Programs (OPP) (USEPA, 2014).

Results for 2015–2016 are summarized in Appendix 4, and details are provided in the Chollas Creek Metals and Diazinon TMDL Monitoring Annual Report (Attachment C). Key findings from the report include:

- Concentrations of metals in samples at Chollas Creek South Fork did not exceed WQOs for metals.
- Copper concentrations in samples at Chollas Creek North Fork exceeded WQOs for copper in two of three samples, but did not exceed WQOs for lead or zinc.
- Diazinon was not detected in the samples.
- Toxicity was not observed in the samples.

The City has developed and submitted a Water Effects Ratio (WER) Confirmation Study (City of San Diego, 201) to the Regional Board for dissolved copper and dissolved zinc at Z Street and SD8(1). If approved, the updated WERs would provide for an alternative assessment of compliance with the TMDL waste load allocations (WLAs). The alternative WERs will assess dissolved copper and zinc specific to the ambient water chemistry within Chollas Creek rather than the default WER provided in the California Toxics Rule (CTR).

5 Focused Priority Condition: Water Quality Within Airport Authority Jurisdiction

Water quality impairment due to copper and zinc concentrations in wet weather discharges from the Airport Authority is a Focused Priority Condition in the Pueblo HU. The geographic extent of the Focused Priority Condition is the jurisdiction of the Airport Authority, which is the sole RP for the condition. The Airport Authority identified copper and zinc concentrations in wet weather discharges as a Focused Priority Condition based on a history of sampling results that show that copper and zinc concentrations consistently exceeded the 2008 USEPA NPDES Multi-Sector General Permit (MSGP) benchmark values. The Airport Authority has identified goals and strategies that will be implemented throughout its jurisdiction to address this Focused Priority Condition. In addition, three drainage areas with historically higher concentrations of dissolved copper and zinc have been identified for targeted BMP implementation. Figure 5-1 shows the Airport Authority's jurisdiction within the Water Quality Focused Priority Condition where the strategies will be implemented.

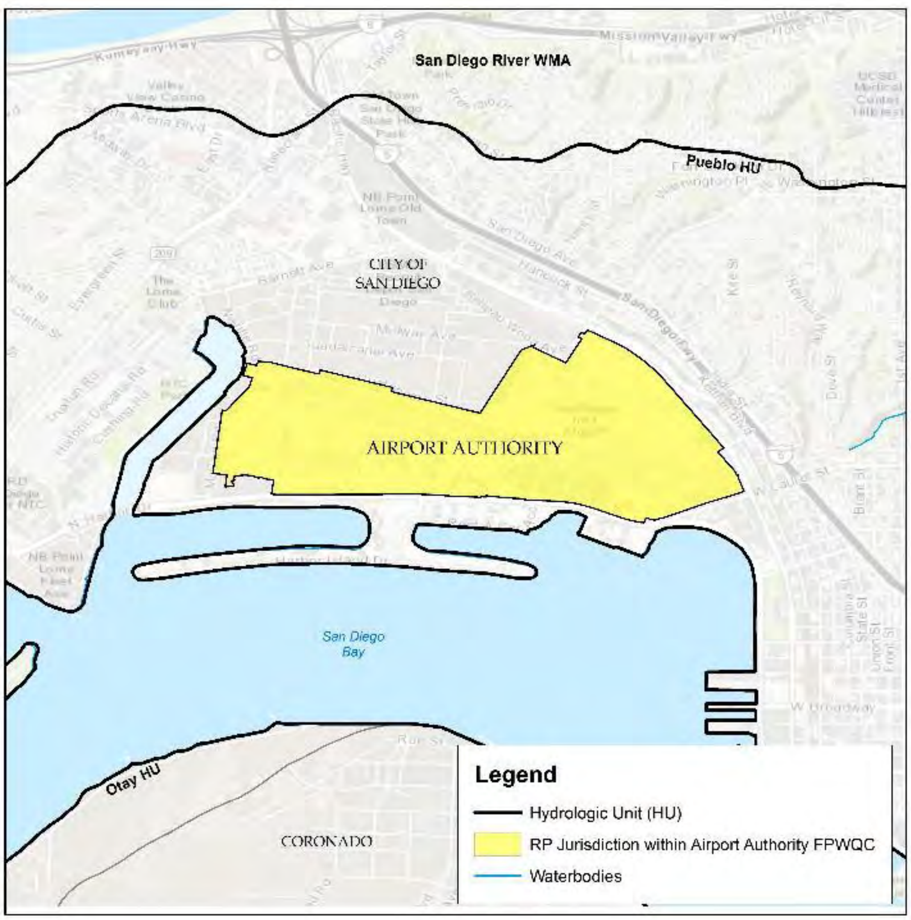

Figure 5-1
Airport Authority's Jurisdiction Within the Water Quality Focused Priority Condition

5.1 Airport Authority Jurisdiction Numeric Goals

Goals developed for the Focused Priority Condition target MS4 discharge concentrations. The goals and schedule for meeting final and interim goals for this Focused Priority Condition are listed in Appendix 3. The interim concentration goals are based on the Numeric Action Levels (NALs) for copper and zinc established in the Industrial General Permit (IGP) (NPDES Permit No. CAS000001) (with the NALs themselves based on the 2008 MSGP benchmarks) and the final concentration goals are based on the CTR criteria for copper and zinc. The interim goals are expressed as the percentage of wet weather discharge samples with concentrations of contaminants that exceed the NALs for copper and zinc (33.2 micrograms per liter [µg/L] and 260 µg/L, respectively). The final goals are expressed as the percentage of wet weather discharge samples with concentrations of contaminants that exceed the CTR values for copper and zinc in saltwater (4.8 µg/L and 90 µg/L, respectively).

The Airport Authority implements strategies designed to achieve the numeric goals established for the area. The Airport Authority has also set an interim goal to be achieved during the Municipal Permit term. Interim goals are intended as milestones that help assess progress toward the longer-term goals. A monitoring program also collects data to be used to help track progress toward goals. The following subsections describe jurisdictional strategy implementation and progress toward interim goals. Monitoring results are then presented in light of the applicable numeric goals following the strategy implementation discussion.

The WQIP numeric goals for the Focused Priority Condition are provided in Appendix 3. Interim goals for the Airport Authority are as follows:

- MS4 discharges jurisdiction-wide (70% of wet weather samples with concentrations exceeding target) for dissolved copper;
- MS4 discharges jurisdiction-wide (65% of wet weather samples with concentrations exceeding target) for dissolved zinc;

  OR

- MS4 discharges in sub-basins 1, 3, and 5 (in total) with 34 acres per week treated with street sweeping.

During FY 2016, the Facilities Management Department (FMD) and the Environmental Affairs Department (EAD) implemented more efficient methods to track the location, date, and frequency of sweeping activities. The total area of runway and taxiways that was swept in sub-basins 1, 3, and 5 combined in FY 2016 was approximately 364 acres, resulting in an average of 7 acres of runway and taxiway pavement swept weekly in these sub-basins. Given that the WQIP FY 2018 interim performance goal for street sweeping in this area was a three-fold increase amount of area currently being swept, the Airport Authority proposes to correct the FY 2016 interim performance goal to 7 acres per week, instead of 34 acres per week, and the FY 2018 interim performance goal for street sweeping to 21 acres/week instead of 100 acres per week of runway and taxiway pavement in sub-basins 1, 3, and 5 combined. The new proposed goals table is presented in Appendix 3.

This goal correction is a result of better recordkeeping, communication, and analysis by FMD and EAD. For the WQIP, the FMD and EAD incorrectly determined that 34 acres of runway and taxiway were being swept weekly in 2015 in sub-basins 1, 3 and 5. The focus of this performance goal was the eastern portion of the runway and taxiways alone (where drainage sub-basins 1, 3, and 5 are located). In addition to this goal, the Airport Authority has focused the optional strategy of an enhanced rubber removal and power-washing program (if it is implemented) on this same eastern portion of the runway for the same reason (because that end of the runway is predominantly used by landing aircraft).

The Airport Authority also proposes some minor modifications to the strategies and schedules in the San Diego Bay WMA WQIP. Those minor modifications are discussed in Appendix 2.

5.2 Strategies and Schedules

The Airport Authority's approach focuses on areas that generate the Focused Priority Condition metals, i.e., the airside impermeable surfaces (e.g., runways and taxiways) and parking lots. Removing pollutant materials from the ground surface and disposing of them properly before they are mobilized by runoff during rain events are fundamental. The Airport Authority's implementation of strategies to achieve the WQIP goals in FY 2016 included implementing enhanced source control BMPs, which were added to the Airport Authority's Storm Water Management Plan prior to the start of FY 2016; continuing the active street sweeping program on the airside to remove copper and zinc generated from aircraft and vehicle tires and brakes; and increasing the frequency of facility and operations storm water BMP inspections. The Airport Authority has also continued its program of sweeping passenger parking lots.

However, the primary method to minimize pollutants entering runoff has been use of green infrastructure and treatment systems that collect and treat parking lot runoff prior to discharge. Development projects completed in FY 2015 or FY 2016, and that became operational in FY 2016, include several projects in parking lots where new, post-construction BMPs, both proprietary and nonproprietary (such as pervious pavement, rock swales, etc.), were deployed. In addition, new treatment control BMP systems were added to the airside in FY 2016.

Catch basin cleaning is also key to addressing general areas of discharge. During FY 2016, the Airport Authority continued the frequency of basin inspection and cleaning from the previous fiscal year, and plans to optimize catch basin cleaning in FY 2017. In FY 2016, this strategy continued to help collect pollutants before they are discharged to receiving waters during rain events; for FY 2017, it is anticipated that more pollutants can be collected as this activity is optimized.

The Airport Authority's key strategies (as well as optional strategies) for FY 2016 are summarized below. A complete list of strategies implemented in FY 2016 within the WMA is provided in Appendix 2. Strategies and implementation schedules were identified during the development of the WQIP using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. Proposed modifications to the Airport Authority's goals are discussed in Section 5.1. The implementation of each strategy has been and will continue to be contingent upon annual budget approvals and funding availability.

Sweeping Airside Corridors

The Airport Authority has been sweeping the runway, taxiways, ramp areas, roads, and parking lots for several years, if not decades, prior to FY 2016. Aircraft and vehicle tire and brake wear are sources of copper and zinc from these locations. Under the WQIP, sweeping on the eastern end of the airfield (in particular, the runway and taxiways) will be modified and enhanced to optimize its effectiveness in FY 2017. Modifications or enhancements are expected to result in an increase in the area swept and/or the frequency of sweeping by FY 2018, depending on available funding.

Implementation of the street sweeping program during FY 2016, along with compilation of the street sweeping tracking data, has revealed the lack of specificity in the performance metrics for this particular goal. The total airside pavement area (runway, taxiways, ramp and service roads) that was swept in FY 2016 was approximately 1,832 acres. The total area of runway and taxiways that was swept in sub-basins 1, 3, and 5 combined in FY 2016 was approximately 364 acres. As a result, an average of 35 acres of airside pavement were swept each week during FY 2016 and an average of 7 acres of runway and taxiway pavement in sub-basins 1, 3, and 5 combined were swept each week during FY 2016.

Sweeping Landside Parking Lots and Roadways

The Airport Authority has been sweeping the parking lots and roadways for many years. The following roads are swept five times per week (Monday through Friday) for three hours per day: Commuter Terminal and Terminal 1 Roadway System, Winship Lane, Stillwater Road, Airlane Road, Terminal 2 East and Terminal 2 West Roadway System, and Spruance Road. All accessible portions of the parking lots, including the Long-Term Lot, Economy Lot, Lot 6, Cell Phone Lot, Taxi Hold Lot, NTC Lot, and the Terminals 1 and 2 Lots, are swept weekly.

Green Infrastructure, Treatment Systems, and IGP Advanced BMPs

Parking lots, building roofs, and ramp areas are sources of copper and zinc at the airport. To target these areas, the Airport Authority has been focusing on green infrastructure, treatment system, and advanced BMP projects to control these sources of heavy metals in storm water runoff:

During FY 2016:

- The new Rental Car Center (RCC), opened in early 2016, incorporated 1.25 acres of bioretention swales to address heavy metals, including copper and zinc, and other pollutants.
- An overhead canopy was constructed at the FedEx facility. The canopy protects the FedEx cargo work area, reducing contact of rainwater with any potential pollutants from cargo and equipment loading/unloading activities.
- The Airport Authority constructed an enclosed storage area for hazardous waste.

- The RCC Bus Parking facility was completed. The project includes a storm drainage detention basin and two modular wetland systems, among other BMPs, to target trash, debris, sediment, and heavy metals.
- The Taxi Hold Lot was also completed. The project includes an infiltration trench and a permeable pavement bed/area.
- Four permeable pavement/stone reservoir beds were included in the Parking Lot 6 Expansion project, which was completed in March 2016.

Catch Basin Cleaning

The Airport Authority continued its current Storm Water Management Plan (SWMP)/JRMP program of quarterly cleaning of high priority catch basins at San Diego International Airport. High priority areas are typically closer to terminals. All other catch basins are inspected annually, and cleaning and maintenance are performed as necessary. The Airport Authority intends to verify the current high priority catch basins and to identify other high priority areas that may benefit from more frequent inspection and cleaning during FY 2017. The Airport Authority will also determine and implement optimal frequencies for catch basin cleaning. To increase metals removal, catch basins will be cleaned more frequently and additional high priority catch basins will be designated on the basis of the inspections.

Enhanced Tenant and Airport Operations BMP Inspections and Enforcement

The Airport Authority increased inspection and enforcement of BMPs required in tenant and airport operational areas. The required BMPs are generally source controls designed to reduce pollutants, including copper and zinc that are generated by tenant and airport operational activities. These BMPs are listed in Table I.1.2 in Appendix I of the WQIP. Several BMPs have been updated and new BMPs have been developed for:

- Electric Vehicle Maintenance;
- Erodible Areas;
- Construction and Remodeling/Repair.

To ensure compliance, the Airport Authority increased the frequency of inspection from quarterly to monthly; continued education and outreach by inspectors; provided classroom training with other tenants; and fostered a more cooperative approach through ramp walks and numerous meetings with Airport Authority employees and tenants. The increased frequency of inspections, increased visibility of issues using database tracking, and regular follow-up by inspectors all serve to encourage tenants to implement BMPs. Additionally, *ad hoc* inspections following a sampling event were added to the Airport Authority's web-based/interactive inspection response and enforcement database to ensure that action was taken on any BMP deficiencies observed during storms.

Public Education and Participation

The Airport Authority's SWMP/JRMP and WQIP include details on the Public Education and Participation Program. The following highlights some of the education and public participation activities that occurred in FY 2016:

- Classroom and on-the-job training. Over 140 Airport Authority employees and support staff received storm water training in FY 2016.
- Tours of the airport are offered twice per month for students in grades 2 through 8.
- Printed and audiovisual guidance on BMPs and storm water management procedures during storm water training provided by the Airport Authority. Topics included urban runoff concepts; impacts on receiving waters; NPDES permits; the Airport Authority SWMP/JRMP and WQIP; the Airport Authority's Focused Priority Condition; sources, goals, strategies, and Focused Priority Condition BMPs; impacts of construction and land development; inspections; and minimum and advanced BMPs. All of these topics were covered during the storm water training that was provided by the Airport Authority. Posters highlighting the proper implementation of BMPs will be displayed in various airport and tenant employee areas in FY 2017.

Source Identification Study for Highest Pollutant-Generating Areas/Activities

In 2005, the Airport Authority designed, implemented, and evaluated a source identification study to determine the highest potential pollutant-generating activities (PGAs). This "Site Audit" also doubles as the annual comprehensive facility compliance evaluation required under the IGP, and is conducted every two years. It generates a Relative Pollutant Risk Factor for each drainage basin, and tenant and Airport Authority facility, to determine the highest PGA areas and activities and to better target appropriate BMPs or improve existing BMPs for those areas or activities. The next Site Audit was conducted in fall 2016. Additionally, every year following the completion of the annual storm water sampling, a "hot spot" map for copper and zinc is developed to indicate the areas of the airport that generate higher levels of copper and zinc, and recommendations are made to reduce those levels. As part of the IGP Exceedance Response Actions, an evaluation was completed by October 1, 2016. In addition, a report that addresses BMP improvements to reduce any exceedances of benchmarks will be submitted to the State Board in compliance with the IGP by January 1, 2017.

Increased Inspections of Highest Pollutant Generating Areas/Activities

The Airport Authority will increase the inspection frequency for the highest potential PGAs in FY 2018, subject to available funding.

Key Strategies Implemented in FY 2016

The following key strategies were implemented in FY 2016 to achieve the specified goals in Table 5-1:

(1) Continued the current street sweeping program;

(2) Continued the current catch basin cleaning program;

(3) Continued to identify and target high-priority areas for enhanced inspections, increased BMP implementation and enforcement, and compliance incentives;

(4) Continued to implement green infrastructure at San Diego International Airport; and

(5) Continued the Airport Authority's public education and participation, and illicit discharge, detection, and elimination (IDDE) efforts.

Future Key Strategies To Be Implemented

The key strategies to be implemented to achieve the specified goals in Table 5-1 in future fiscal years are as follows:

(1) Determine and implement optimal street sweeping;

(2) Determine and implement optimal catch basin cleaning;

(3) Continue to identify and target high-priority areas for enhanced inspections, increased BMP implementation and enforcement, and compliance incentives;

(4) Continue to implement green infrastructure at San Diego International Airport;

(5) Continue the Airport Authority's public education and participation efforts; and

(6) Continue IDDE program efforts.

Optional Strategies

Optional strategies were implemented in FY 2016, including investigation and research of emerging BMP technologies, capture and reuse of air conditioning condensate, and development of a Draft Master Plan for Water Reuse; implementation of IGP advanced BMPs and LID or treatment control best management practices (TCBMPs); and collaboration with local agencies on habitat restoration and the Reference Watershed Study. During FY 2017 and FY 2018, other optional strategies may be implemented, if triggered, including enhanced runway rubber removal activities (described below); source reduction initiatives such as copper-free brake pads; and collaboration on regional education and outreach activities.

Rubber Removal and Power Washing

The Airport Authority identified runway rubber removal and power washing as a potential optional jurisdictional strategy. Aircraft tires and brakes, known to contain heavy metals, are considered likely to be major sources of copper and zinc on the runway. In FY 2018, if increased airside sweeping in the focused runway/taxiway areas of sub-basins 1, 3, and

5 does not result in meeting interim goals, and if funding and resources allow and consensus agreement is reached, the Airport Authority's optional strategy of determining the optimal runway rubber removal frequencies, equipment, methods, and locations to maximize pollutant removal may be triggered. Expanding rubber removal and/or power washing to a larger portion of the runway, beyond the touchdown zone, is expected to improve runoff water quality.

Collaboration with Local Agencies on Habitat Rehabilitation in San Diego Bay

The San Diego International Airport now includes properties that were once major industrial aircraft manufacturing facilities on Port of San Diego tidelands and lands that were once part of the United States Navy's Naval Training Center. The historical uses at these locations have been identified as potential sources of pollutants to San Diego Bay, and in particular, the Navy Boat Channel, Convair Lagoon, and the Laurel-Hawthorn Embayment. The Airport Authority has and will continue to work with the Port of San Diego, the United States Navy, and other local agencies to investigate these potential source areas and eliminate the sources and restore habitats as necessary and appropriate.

Summary of Strategies Within Airport Authority Jurisdiction

Table 5-1 summarizes the jurisdictional strategies implemented in FY 2016 or before for meeting final and interim goals for this Focused Priority Condition.

Several optional jurisdictional strategies that were implemented in FY 2016 are also presented in Table 5-1. Implementation of the optional strategies is contingent on circumstances supported by the need for the additional effort, the cost/benefit as compared with other options and strategies, and the availability of funding. The full list of optional strategies applicable to the Airport Authority and the implementation status of each are provided in Appendix 2.

Table 5-1
Summary of Strategies for Water Quality (Copper and Zinc) Within Airport Authority Jurisdiction

Strategy	Multiple Benefits					Implementation Status			
	Trash	Bacteria[1]	Nutrients	Sediment	Metals[1]	Previous Fiscal Year(s)	**FY 2016**	FY 2017	Future Fiscal Year(s)
Green infrastructure and treatment systems — parking lot BMPs	X	X	X	X	X	✓	✓	P	P
Green infrastructure and treatment systems —green build terminal expansion project	X	X	X	X	X	✓			
Green infrastructure and treatment systems —northside BMPs	X	X	X	X	X		✓	P	P
Enhanced tenant and airport operational area BMP inspections and enforcement, with incentives for improved BMP implementation	X	X	X	X	X	✓	✓	P	P
Catch basin cleaning	X	X	X	X	X	✓	✓	P	P
Sweeping of airside corridors[3]	X	X	X	X	X	✓	✓	P	P
Continued IDDE Program	X	X	X	X	X	✓	✓	P	P
Continued public education, participation, and staff and tenant storm water training	X	X	X	X	X	✓	✓	P	P
Continued enforcement	X	X	X	X	X	✓	✓	P	P
Optional Strategies[2]									
Investigation and research of emerging BMP technology	X			X	X		✓	P	
Phase in of advanced BMPs (as defined in the IGP) in priority areas	X	X	X	X	X		✓	P	
Collaboration with regional education and outreach activities	X	X	X	X	X		✓	P	
Collaboration on habitat rehabilitation					X		✓		
Additional green infrastructure and proprietary BMPs	X	X	X	X	X		✓		

Notes:
BMP = best management practice; FY = fiscal year; IDDE = illicit discharge, detection, and elimination; IGP = Industrial General Permit
1. Focused Priority Water Quality Conditions are highlighted in orange
2. Implementation of strategies is dependent on approval of fiscal budgets and available resources
3. Refer to Adaptive Management Section 9 or complete strategy table in Appendix 2 for more details and for a list of Optional Strategies not triggered in this reporting period.

✓ – Implemented; P – Planned to be implemented; X – Indicates condition benefit

5.3 Airport Authority Jurisdiction Monitoring and Assessment

To comply with both the Municipal Permit and the IGP, the Airport Authority conducts extensive monitoring during storm events throughout the year. Section 5.3.1 describes the wet weather monitoring program at the San Diego International Airport. Copper and zinc, the Focused Priority Condition pollutants of concern for the Airport Authority, are sampled, analyzed, and evaluated for all sites. Monitoring results are presented in Appendix 4.

5.3.1 MS4 Monitoring

Section XI of the IGP requires wet weather monitoring and assessment of storm water runoff. The major monitoring objectives, as outlined in the IGP Fact Sheet, are to:

(1) Demonstrate compliance with the IGP, per the monitoring implementation plan requirements;

(2) Help implement the Storm Water Pollution Prevention Plan (SWPPP) (which is an integral part of the Airport Authority's SWMP/JRMP); and

(3) Measure the effectiveness of BMPs in reducing or preventing pollutants in storm water discharges and authorized non-storm water discharges.

The IGP requires that oil and grease (O&G), total suspended solids (TSS), and pH must be analyzed at all sites. In addition, samples must be analyzed for analytes that are likely to be found in storm water runoff, including any related to receiving waters on the Clean Water Act Section 303(d) list of water quality limited segments (303(d) List) or any approved TMDLs. Three analytes, biochemical oxygen demand (BOD), chemical oxygen demand (COD), and ammonia (NH3), are listed specifically by the IGP for air transportation facilities. The other original analytes, total metals (aluminum, copper, iron, lead, and zinc), dissolved metals (copper and zinc), methylene blue active substances (MBAS), ethylene glycol, and total petroleum hydrocarbons (TPH), were selected on the basis of a review of historical water quality results and activities conducted within the drainage basins at the airport. The suite of analytes was expanded twice in the last few fiscal years, including at the end of FY 2015, to comply with new Municipal Permit and IGP requirements. The latest changes made in FY 2015 to meet new IGP requirements were effective from the start of FY 2016.

Sixteen sampling locations, and one alternative location, have been identified at the San Diego International Airport, pursuant to the IGP. The sampling locations were selected on the basis of a review of the potential pollutants and pollutant sources, the scope of operations within the drainage basins, and the requirements of the IGP. Sampling locations were selected as far downstream as feasible to capture as many areas as possible with industrial activities within a given drainage basin. Where sampling locations were tidally influenced or access was restricted (e.g., when they are in the aircraft movement area), sheet flow runoff was collected. As required by Section XI.B.2 of the IGP, the Airport Authority sampled two qualifying storm events (QSEs) during the first half of the reporting year (July 1 through December 31, 2015) and two QSEs during the second half (January 1 through June 30, 2016). All sites were sampled for all four storms, with the exception of one site that was under construction during the first part of FY 2016.

A hot spot map showing copper and zinc results, in terms of concentration, was developed so that future efforts can be targeted to the highest PGAs for the focused priority pollutants of concern (i.e., copper and zinc).

Wet weather compliance monitoring activities were also conducted at the airport under the San Diego Bay WMA WQIP MS4 Outfall Monitoring Program. Under the Municipal Permit, 10 outfall sites were required to be monitored during one event during the wet season, October 1 through April 30. The three storms for which the outfalls were monitored met the mobilization criteria for monitoring (i.e., greater than or equal to 0.1 inch of rainfall with a forecast of 70%, preceded by 72 hours of less than or equal to 0.1 inch rainfall), and all 10 sites were successfully monitored. The wet weather outfall station for the Airport Authority is upstream from Outfall 12, because the outfall is tidally influenced. Monitoring was conducted on April 7 and 8, 2016. The analytes monitored included turbidity, nitrate and nitrite, phosphorus, cadmium, copper, lead, and zinc.

Finally, pollutant concentrations have been measured at an airside gate area site for the previous 10 years to (1) assess trends in concentrations, and (2) determine the effectiveness of treatment control BMPs in reducing or preventing pollutants in storm water discharges. In FY 2016, the influent, effluent, and bypass of a media filter unit in a terminal parking lot were monitored during five storms.

Overall, many analytes are monitored and compared with Municipal Permit and IGP benchmarks in the Airport Authority's program. Although modifications to strategies are being proposed to target the Focused Priority Conditions (namely, copper and zinc), there are many strategies that will also contribute to reducing other pollutants at the same time (e.g., sweeping and catch basin cleaning will remove trash, sediment, debris, and metals; and green infrastructure, TCBMPs, and advanced BMPs will remove many different pollutants, depending on the type of BMP installed).

5.4 Progress Toward Achieving Numeric Goals

Table 5-2 presents the interim and final goals for the Airport Authority, as well as the goals achieved in FY 2016 in terms of percentage of IGP compliance samples with concentrations of contaminants exceeding the IGP NALs and acres of airside area swept in sub-basins 1, 3, and 5 combined. Table 5-3 shows the target concentrations for dissolved copper and zinc (i.e., the IGP NALs), the number of samples analyzed during FY 2016, the number and percentage of samples with concentrations of pollutants of concern exceeding the target, and the interim goals. Table 5-4 shows the airside street sweeping interim performance goal and the actual airside acreage of runway and taxiways in sub-basins 1, 3, and 5 combined that were swept in FY 2016.

Tables 5-2 and 5-3 compare the analytical results from FY 2016 with the interim goals, showing that the number of samples with dissolved copper concentrations that exceeded the dissolved copper benchmark in FY 2016 (i.e., 76%) has improved from the baseline 2013–2014 sampling results, when the exceedance frequency was 89%. The schedule for the first interim goal to be met is in FY 2017, so the progress toward that goal for copper is on track. FY 2018 and FY 2021 goals are 30% and 20% exceedance frequencies, respectively, with the FY 2026 goal being 0% exceedance frequency for dissolved copper.

The number of samples with dissolved zinc concentrations that exceeded the dissolved zinc benchmark in FY 2016 (i.e., 19%) has greatly improved from the baseline 2013–2014 sampling results, when the exceedance frequency was 78%. The schedule for the first interim goal is FY 2017, so the goal for zinc is ahead of schedule, because FY 2016 results have met not only the FY 2017 goal, but also the FY 2018 and FY 2021 goals (35% and 25%, respectively). The FY 2026 goal for dissolved zinc is 0% exceedance frequency.

Tables 5-2 and 5-4 compare the sweeping conducted in the focused area of the jurisdiction with the FY 2016 street sweeping goal of 34 acres of airside runway and taxiway pavement in drainage sub-basins 1, 3 and 5 combined. The goal was not met, and was missed in part because of inaccurate descriptions and information initially used to establish this performance goal. As such, the Airport Authority has used Section 5.1 and Appendix 3 of this Annual Report to correctly outline the street sweeping performance goal.

Table 5-5 shows the progress toward the numeric goals for water quality to comply with the Municipal Permit within the Airport Authority jurisdiction. The table includes information for three measures: dissolved copper, dissolved zinc, and acres swept. The table describes the interim goal and progress, the metric for progress evaluation, baseline data, data collected/results, progress toward the goal, and the adaptive management actions.

Table 5-2
Interim and Final Goals and FY 2016 Progress Toward Goals

Type	FY 2016 Goal	FY 2017 Goal	FY 2018 Goal	FY 2021 Goal	FY 2026 Goal	Achieved in FY 2016
Dissolved Copper	–	<70% of wet weather samples with concentrations exceeding target for dissolved copper	<30% of wet weather samples with concentrations exceeding target for dissolved copper	<20% of wet weather samples with concentrations exceeding target for dissolved copper	0% of wet weather samples with concentrations exceeding target for dissolved copper	76% of wet weather samples had concentrations exceeding target for dissolved copper (no goal for FY 2016, and not yet meeting FY 2017 goal)
Dissolved Zinc	–	<65% of wet weather samples with concentrations exceeding target for dissolved zinc	<35% of wet weather samples with concentrations exceeding target for dissolved zinc	<25% of wet weather samples with concentrations exceeding target for dissolved zinc	0% of wet weather samples with concentrations exceeding target for dissolved zinc	19% of wet weather samples had concentrations exceeding target for dissolved zinc. (no goal for FY 2016, but already meeting goals for FY 2017, FY 2018, and FY 2021)
Street Sweeping of the Airside Portions of Sub-basins 1, 3, and 5 (total)	34 acres per week (current frequency)	–	21 acres per week (approx. 3-fold increase in area)[1]	–	–	7 acres per week (FY 2016 goal not met)

Notes:

< = less than; FY = fiscal year

1. The original FY 2016 goal was 34 acres per week and increased three-fold by FY 2018. Based on better record keep and tracking, only 7 acres per week were swept in sub-basins 1, 3, and 5. Therefore, the new proposed goal for FY 2018 will be a three-fold increase of 21 acres per week (see Section 5.1).

Table 5-3
Comparison of FY 2016 Monitoring Season Results with FY 2017 With Numeric Goals

Pollutant	Target Concentration	Number of Samples Collected in FY 2016	Number of Samples Exceeding Target	Frequency of Samples Exceeding Target	Interim WQIP Frequency Goal (FY 2017 Goal)
Dissolved Copper	33.2	62	47	76%	< 70%
Dissolved Zinc	260	62	12	19%	< 65%

Notes:
FY = fiscal year; WQIP = Water Quality Improvement Plan

Table 5-4
Comparison of FY 2016 Sweeping Achieved With FY 2016 Interim Numeric Goal

Performance Metric	Actual Average Acres Per Week Swept	Interim WQIP Goal (total acres/week) (FY 2016 Goal)
Street Sweeping of the Airside Portions of Sub-basins 1, 3, and 5 (total)	7	34[1]

Notes:
WQIP = Water Quality Improvement Plan
1. Based on better record keeping, the new proposed FY 2016 interim goal will be 7 acres per week, and the FY 2018 interim goal will be 21 acres per week (see Section 5.1)

Table 5-5
Progress Toward Municipal Permit Term Numeric Goal for Water Quality (Copper and Zinc) Within Airport Authority Jurisdiction

Planning Period			Assessment Period		
Performance Measure – Achieve by FY 2017					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
MS4 Discharges Jurisdiction-wide (<70% of Wet Weather Samples With Concentrations Exceeding Target)	Dissolved Copper	The baseline data are the Airport Authority's 2013–2014 IGP compliance sampling results' exceedance frequency for dissolved copper at 89% exceedance frequency.	Data used to support the progress evaluation toward meeting numeric goals are the Airport Authority's 2015–2016 IGP compliance sampling results' exceedance frequency for dissolved copper.	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time. FY 2016 achieved 76% of samples with concentrations exceeding target for dissolved copper.	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time. Some minor adjustments to the schedule are proposed.

Table 5-5 (continued)
Progress Toward Municipal Permit Term Numeric Goal for Water Quality (Copper and Zinc) Within Airport Authority Jurisdiction

Planning Period			Assessment Period		
Performance Measure – Achieve by FY 2017					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
MS4 Discharges Jurisdiction-wide (<65% of Wet Weather Samples With Concentrations Exceeding Target)	Dissolved Zinc	The baseline data are the Airport Authority's 2013–2014 IGP compliance sampling results' exceedance frequency for dissolved zinc at 78% exceedance frequency.	Data used to support the progress evaluation toward meeting numeric goals are the Airport Authority's 2015–2016 IGP compliance sampling results' exceedance frequency for dissolved zinc.	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time. FY 2016 achieved 19% of samples with concentrations exceeding target for dissolved zinc.	The project is progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time. Some minor adjustments to the schedule are proposed.
OR					

Table 5-5 (continued)
Progress Toward Municipal Permit Term Numeric Goal for Water Quality (Copper and Zinc) Within Airport Authority Jurisdiction

Planning Period			Assessment Period		
Performance Measure – Achieve by FY 2017					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
MS4 Discharges Sub-basins 1, 3, and 5 (in total) 34 Acres/Week Area Treated with Street Sweeping	Acres Swept per Week	The baseline data are the Airport Authority's 2013–2014 areas swept data (for drainage basins 1, 3, and 5). However, this goal needs to be adjusted because of inaccurate collection of baseline data, as previously discussed.	Data used to support the progress evaluation toward meeting numeric goals are the Airport Authority's 2015–2016 acres of area swept in drainage basins 1, 3, and 5. Data collection methods have been improved in FY 2016.	Given inaccuracies in the initial establishment of this goal, the project is not progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time. An adjustment to the goal is proposed. FY 2016 achieved 7 acres/week treated with street sweeping.	Given inaccuracies in the initial establishment of this goal, the project is not progressing in accordance with a schedule that will allow completion on or before the scheduled achievement time. The adaptive management action needed is to adjust the goal to better reflect actual areas swept currently, and the projected areas to be swept in future fiscal years, dependent on budget.

Notes:
< = less than; FY = fiscal year; IGP = Industrial General Permit

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5.5 Water Quality Strategies and Schedules Adaptations

The Airport Authority proposes to modify the performance goal for airside street-sweeping, as described in Section 5.1.

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6 Focused Priority Condition: Riparian Area Habitat in Paradise Creek

Riparian area habitat in Paradise Creek is a Focused Priority Condition in the Lower Sweetwater HU. The geographic extent of the Focused Priority Condition is the drainage area of Paradise Creek within the jurisdiction of the City of National City (National City), which is the sole RP for the condition. National City has identified goals and strategies that will be implemented to achieve the goals.

6.1 Riparian Area Habitat in Paradise Creek Numeric Goals

Goals developed for the Focused Priority Condition target MS4 discharge concentrations and creek restoration outcomes. Paradise Creek was chosen as the focused area because it was deemed to have the greatest potential for improvements benefiting both water quality and the community. While most of the other water bodies within National City are channelized and fenced off to prevent public access, several segments of Paradise Creek are directly accessible to the public in National City parks. In Paradise Creek, impacts on riparian area quality include a concrete channel bottom and non-native bank vegetation in the Kimball Park area and occasional trash at various points along the creek.

Improving riparian area quality along Paradise Creek is part of National City's larger vision to provide residents in the central and western portions of its jurisdiction with improved access to natural environments and green spaces. National City expects that improvements to riparian area quality in Paradise Creek will positively impact the downstream Paradise Marsh portion of the Sweetwater Marsh Complex, which is part of the San Diego Bay National Wildlife Refuge. In addition, Paradise Creek is on the 303(d) List for selenium and one of National City's goals is to implement strategies that will lead to its removal from the 303(d) List. Complete goals tables, including final goals for Delisting and Habitat Restoration, are in Appendix 3. Interim goals for the Focused Priority Condition in Paradise Creek and progress made toward achieving them are described in Section 6.4 and Table 6-2.

6.2 Strategies and Schedules

National City implements water quality improvement strategies across its entire jurisdiction, such as street sweeping, inspections of businesses and construction sites, requiring LID for development projects. In addition to those city-wide strategies, National City is also implementing additional strategies to address its Focused Priority Condition, riparian area quality in Paradise Creek. Figure 6-1 shows National City's jurisdiction within the Paradise Creek drainage area.

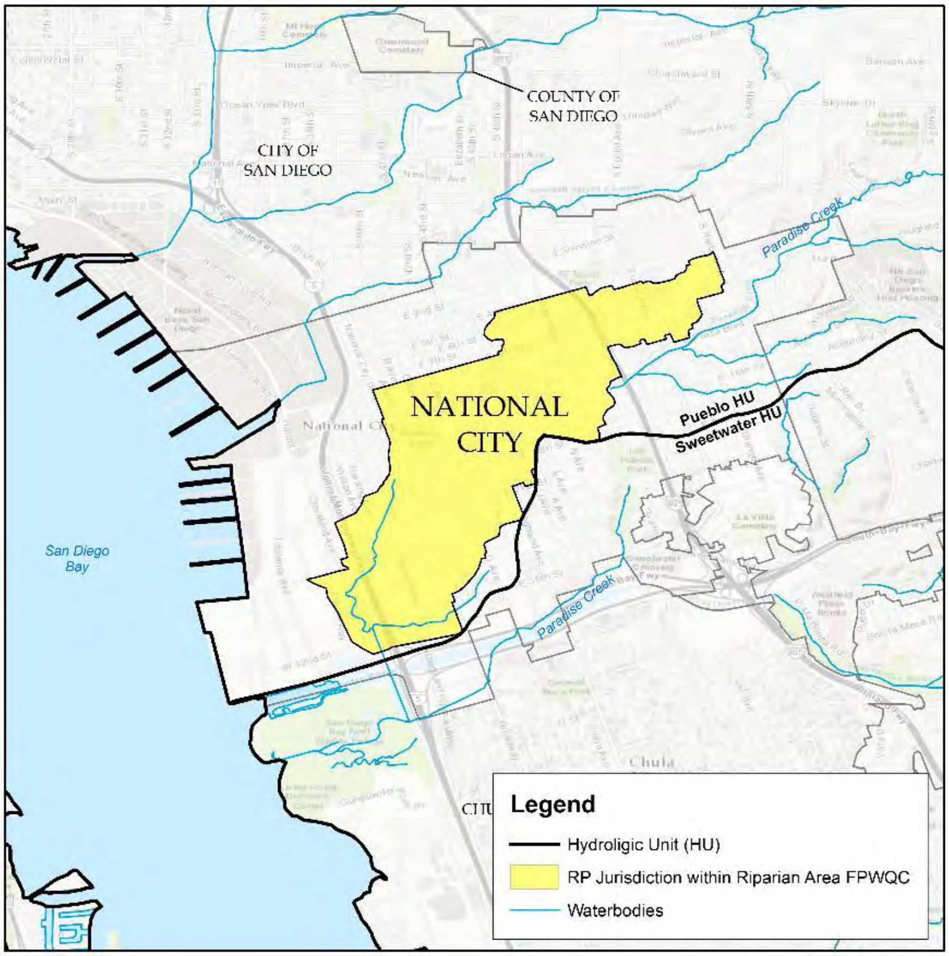

Figure 6-1
National City's Jurisdiction within the Paradise Creek Drainage Area

National City's approach is to implement improvements directly in Paradise Creek and in areas tributary to the Creek. These strategies provide improved aesthetics and better access to green space and natural habitats in a highly urbanized area, improve pedestrian access and walkability, and benefit riparian habitat and water quality. Other benefits include reducing runoff volume and levels of metals, trash, and other pollutants. Key strategies are summarized below, and a complete list of National City's strategies, including optional strategies, is included in Appendix 2.


Infiltration basin installed as part of the "A" Avenue Green Street and Pedestrian Pathway Project

National City completed the "A" Avenue Green Street and Pedestrian Pathway Project ("A" Avenue Green Street Project) in FY 2016, which treats and captures runoff from 49 acres of urban area within the Paradise Creek drainage area. The “A” Avenue Green Street Project included the installation of 10 LID BMPs—bioretention and infiltration basins—and an underground 30,000-gallon cistern with a hydrodynamic separator to remove trash and other pollutants.

The Kimball Park LID and Paradise Creek Restoration Project is currently under construction and will be completed in FY 2017. This project uses LID to improve urban runoff water quality, restores habitat in Paradise Creek, and provides an opportunity for the public to interact with the newly restored creek in a park setting. The project includes installation of multiple bioretention and infiltration areas within Kimball Park and along surrounding streets to improve water quality of runoff associated with approximately 73 acres of highly urbanized area. The project will restore approximately 1,000 linear feet of Paradise Creek by removing the concrete channel, widening the creek to maintain existing capacity, and restoring the wetland habitat. The project is also removing invasive and non-native plants along the creek banks and replacing them with native plants.

National City is also converting its existing Public Works maintenance yard, which directly borders Paradise Creek, to a transit-oriented residential housing project and a public park. In addition to converting these areas to land uses with lower pollutant discharge potential, water quality treatment measures are being incorporated into the project designs.

With the help of a community group, Paradise Creek Educational Park, Inc., National City was able to secure a grant for Paradise Creek Educational Park that provides the resources to remove existing impervious area and replace it with native vegetation. As part of the project, a bioretention area and an educational garden will also be installed at Paradise Creek Educational Park. Paradise Creek Educational Park, Inc. also maintains native vegetation along portions of Paradise Creek and completes regular creek cleanups.

During industrial and commercial facility inspections during FY 2016, shopping centers and restaurants were targeted in the Paradise Creek drainage area because they can be sources of trash. Inspections focused on requiring facilities to keep dumpster lids closed and surrounding areas clean. Through its development review process, National City also requires all newly constructed trash enclosures to have a full four-sided enclosure, be located away from storm drains, and have structural overhead cover.

To eliminate illicit discharges and connections, National City inspects its major MS4 outfalls twice per year and operates a public hotline to receive reports from the public and city staff and contractors. National City has also coordinated with the Sweetwater Authority on water conservation efforts, including reducing irrigation runoff.

Table 6-1 summarizes the key strategies identified for meeting numeric goals for this Focused Priority Condition. National City’s full list of strategies, including optional strategies and the implementation status of each, is provided in Appendix 2.

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Table 6-1
Summary of Strategies for Riparian Area Habitat in Paradise Creek

Strategy	Priority Condition Addressed						Implementation Schedule			
	Bacteria	Nutrients	Habitat/Wildlife[1]	Trash	Sediment	Metals	Previous Fiscal Year(s)	**FY 2016**	FY 2017	Future Fiscal Year(s)
Paradise Creek restoration in Kimball Park (NC-32)	X	X	X	X	X			X	X	X
Green infrastructure and other structural BMPs (NC-29 through 31, NC-34)	X	X	X[2]	X	X		X	X	X	X
Impervious surface reduction (NC-33)	X	X	X	X	X			X	X	X
Community partnerships to address trash (NC-35, NC-38)			X[2]	X			X	X	X	X
Catch basin cleaning (NC-14)	X	X	X[2]	X	X		X	X	X	X
Enhanced street sweeping, including using vacuum street sweepers (NC-18)	X	X	X[2]	X	X		X	X	X	X
Inspections of existing development, including higher frequency inspections for sources of trash (NC-9, NC-36)	X	X	X[2]	X	X			X	X	X
Outreach, incentives, and enforcement to reduce irrigation runoff from private properties, partnering with Sweetwater Authority (NC-23, NC-25, NC-26)	X	X	X[2]	X	X			X	X	X

Notes:

µg/L = micrograms per liter; FY = fiscal year; WQO = water quality objective

1. Focused Priority Condition is highlighted in orange.

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6.3 Riparian Area Habitat in Paradise Creek Monitoring and Assessment

Biological monitoring is the primary type of monitoring being completed for the riparian area quality focused priority condition. Vegetation monitoring will be completed once restoration has been completed. California Rapid Assessment Method (CRAM) assessments are also being completed before and after the creek restoration work in Paradise Creek.

In addition to biological monitoring, chemical testing for selenium is also being completed because Paradise Creek is on the 2010 303(d) List as having a selenium impairment. Because the 303(d) listing is based on a small number of samples from 2005, National City initiated a special study to collect sufficient data to support delisting of the selenium impairment. All 48 of the 48 samples collected had selenium concentrations that were below the WQO of 5 μg/L. When combined with the small number of previously collected samples that did include exceedances, the total exceedance rate is low enough to justify removal from the 303(d) List under the State Listing Policy. The study's Monitoring Plan, Quality Assurance Project Plan, and summary report with results are provided in Appendix 4.

6.4 Progress Toward Achieving Numeric Goals

During FY 2016, National City made significant progress toward achieving its interim goals. Table 6-2 summarizes results for habitat restoration goals, and Table 6-3 summarizes results for the selenium delisting interim goal. In FY 2016, laboratory data collected during the Paradise Creek Selenium Special Study were submitted to the State Board during the 2014 303(d) List public comment period. National City has requested the data to be considered during the 2014 303(d) List development; however, this period was not considered to be a data solicitation period. Depending on the State Board's response to National City's comments, the data will also be submitted during the next solicitation period determined by the State Board by FY 2018.

Progress toward meeting habitat restoration goals is presented in Table 6-3.

6.5 Water Quality Strategies and Schedules Adaptations

No modifications to National City's goals, strategies, and schedules presented in the San Diego Bay WMA WQIP are proposed at this time.

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Table 6-2
Progress Toward City of National City Municipal Permit Term Habitat Restoration Goals for the Riparian Area Habitat in Paradise Creek

Planning Period			Assessment Period		
Performance Measure – Achieve by FY 2017					
Interim Goal	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
Remove concrete bottom from Paradise Creek: 1,000 linear feet	Linear feet of restored creek	Zero (0) linear feet removed.	Creek restoration that will achieve the numeric goals is under construction.	The Paradise Creek Restoration project is progressing in accordance with a schedule that will allow completion in FY 2017.	None at this time.
Wetland restoration: 6,000 square feet	Square feet of restored wetland	Zero (0) square feet of restored wetlands.			None at this time.
Total native plant restoration, including wetlands: 35,000 square feet	Square feet of native plant restoration	Zero (0) square feet of native plant restoration.			None at this time.
Provide treatment for tributary urbanized areas: 130 acres	Acres of area treated	58.7 acres of treated tributary areas.	49 acres of area treated through LID and other water quality improvement BMP implementation, principally through the “A” Avenue Green Street project.	107.7 of 130 acres treated to date (83%). Additional projects that will treat over 70 acres are currently under construction.	None at this time.

Notes:
% = percent; FY = fiscal year; LID = low-impact development

Table 6-3
Progress Toward City of National City Municipal Permit Term Delisting Goals for the Riparian Area Habitat in Paradise Creek

Planning Period			Assessment Period		
Interim Goal	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
Performance Measure – Achieve by FY 2016					
Collect and Analyze 48 Samples for Selenium, with Zero Exceedances, to Support Removal of Paradise Creek 303(d) Selenium Listing	Data Collection	Four (4) of four (4) samples collected from Paradise Creek in 2005 exceeded the WQO of 5 µg/L.	All 48 of 48 samples collected in 2014 did not exceed the WQO of 5 µg/L.	All 48 samples were collected, with zero (0) exceedances. The goal was 100% achieved.	None at this time, interim goal has been achieved.
Performance Measure – Achieve by FY 2018					
If data support removal of segment from 303(d) List, submit data during earliest available solicitation period (1 data submission).	Data Submission	Zero (0) data submittals from National City.	Data collected in 2014 (48 samples) was submitted during the 2014 303(d) List public comment period, which occurred in 2016. The City has been informed that data from 2014 is not yet being considered, but that it is possible that the State Water Board will allow for an off cycle data submittal within the next couple years.	Data has been submitted, but it has not been formally accepted since no solicitation period for data from 2014 has occurred yet. Data has been uploaded to CEDEN and will be available for the next listing cycle.	None at this time.

Notes:
% = percent; µg/L = micrograms per liter; CEDEN = California Environmental Data Exchange Network; FY = fiscal year; WQO = water quality objective

7 Focused Priority Condition: Physical Aesthetics in Lower Sweetwater and Otay HUs

Physical aesthetics impairment due to trash is a Focused Priority Condition in the Lower Sweetwater and Otay HUs. Trash assessment data, including historical data, public input, existing management plans such as the Otay River Watershed Management Plan (ORWMP), and anticipated future development along the San Diego Bayfront, were factors that elevated physical aesthetics impairments to a Focused Priority Condition. In addition, the RPs proactively aligned their goals and strategies to address the upcoming state-led Trash Amendments. The monitoring and assessment (Section 7.3) for the physical aesthetics Focused Priority Condition will also initiate the analysis and assessment of the trash condition in the Focused Priority Area requirements in the Trash Amendments.

The geographic extent of the Focused Priority Condition in the Lower Sweetwater HU is the jurisdiction of the City of Chula Vista (Chula Vista) west of Interstate 805 and the Port of San Diego south of Sweetwater River to the northern boundary of the site of the former South Bay Power Plant. The geographic extent of the Focused Priority Condition in the Otay River HU is the jurisdiction of Chula Vista west of Interstate 805, the eastern portion of the City of Imperial Beach, and the Port of San Diego jurisdiction from the southern shoreline of the Sweetwater River channel south to Pond 20 (collectively the RPs).

Trash not only affects the physical aesthetics of an area, but also can pose a health risk to humans and wildlife and can affect the beneficial uses of waterways. By focusing on physical aesthetics, the RPs can increase public awareness and education about proper waste disposal, which will ultimately reduce amounts of trash, leading to improvements in water quality. The RPs worked collaboratively to identify final and interim goals for this Focused Priority Condition. RPs have identified strategies to reduce amounts of trash, improve water quality, and increase public awareness and education within their jurisdictions. In addition to reducing trash, implementing strategies to address trash will also address other pollutants, such as bacteria and other water quality pollutants (e.g., sediment and metals), and will protect wildlife from harmful debris, thus achieving multiple pollutant benefits.

7.1 Numeric Goals for Physical Aesthetics

The RPs have implemented strategies to achieve the numeric goals established for the area. The RPs have also set at least one interim goal to be achieved during the Municipal Permit term (see Appendix 3). Interim goals are intended to serve as milestones that help assess progress toward the longer-term goals outlined in the subsections below. A monitoring program also collects data that can be used to help track progress toward goals. The following subsections describe jurisdictional strategy implementation and progress toward interim goals. Monitoring results are then presented in light of the applicable numeric goals following the jurisdiction-specific discussions.

7.2 Strategies and Schedules for Physical Aesthetics

The RPs' approach to improving the physical aesthetics within the Focused Priority Condition during this reporting period was to identify targeted areas within their jurisdictions and implement strategies focused primarily on trash. An initial assessment is built upon available historical maintenance and monitoring to identify high trash-generating areas within the geographic extent of the Focused Priority Condition for Chula Vista, Imperial Beach, and the Port of San Diego. As part of this assessment, opportunities for retrofits or other treatment methods are being identified and prioritized. Retrofits may be structural BMPs such as trash guards or catch basin inserts within the MS4. Other structural BMP options may include requiring retrofits of trash enclosures on private and public property. The RPs have also provided targeted education and outreach within the Focused Priority Condition areas during this reporting period.

The RPs continue to implement their core JRMP requirements, including many strategies that have positive impacts on the water quality of MS4 discharges. To make progress toward their identified goals, the RPs have identified existing JRMP strategies to enhance and have also implemented optional strategies focused on the physical aesthetics Focused Priority Condition.

It is anticipated that a combination of strategies will allow the RPs to make progress toward, and ultimately achieve, the established goals for this Focused Priority Condition. Overall, the RPs have successfully implemented strategies to address the high-priority sources as well as medium-priority sources of trash in the 909.1 and 910.2 HAs during the reporting period (Table 7-1).

Table 7-1
Sources Addressed by RPs' Strategies in FY 2016

Source	Chula Vista	Port of San Diego	Imperial Beach[1]
High Priority			
General Retail/Commercial Areas, Including Eating or Drinking Establishments (or special events)	X	X	X
Medium Priority			
General Industrial Areas	X	X	
Homeless Encampments[2]	X	X	X
Illegal Dumping	X	X	X
Institutional Facilities	X	N/A	N/A
Roads and Highways[3]	X	X	X

Notes:

N/A = not applicable

1. City of Imperial Beach is only in the 910.2 HA.
2. Recognizing that homeless encampments and illegal dumping are neither fully controllable not fully uncontrollable, they have been assigned a priority of medium.
3. Roads and highways are not limited to Chula Vista and Imperial Beach, and the Port of San Diego's jurisdictions.

The RPs initiated baseline trash assessment studies in the reporting period to better understand trash sources in their respective jurisdictions, gauge the adequacy of current efforts, map out potential “hot spot” locations, and identify solutions. The assessments were considered an important first step in the RPs’ approach to meeting the interim and final goals. The findings of the assessments inform management decisions and identify appropriate strategies. Utilizing available data such as historical MS4 maintenance and monitoring data can help the RPs identify high trash generating areas, and evaluate which BMPs are most effective. The baseline assessments are anticipated to be completed in FY 2017

The RPs are participating in the ongoing San Diego Bay Debris Study, which involves collaboration with a number of local and regional governmental agencies, the United States Navy, environmental groups, and academia. The RPs are participating in this WMA optional strategy via financial support or in-kind services contributions, such as field work assistance. The study intends to provide a first-time assessment of San Diego Bay with respect to trash. Together with the jurisdictional MS4-focused baseline trash assessment, the San Diego Debris Study will help guide RP efforts to assess current efforts and also identify potential future management actions to help address land-based watershed sources of trash and debris.

A complete list of strategies, including optional strategies, to be implemented within the WMA, is provided in Appendix 2. Key strategies implemented during the reporting period are summarized in Table 7-2. Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP will be updated. The implementation of each strategy will be contingent upon annual budget approvals and funding availability.

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Table 7-2
Summary of Strategies for Physical Aesthetics in Sweetwater and Otay River HUs

Strategy	Jurisdiction[1]			Additional Water Quality Condition Addressed by Strategy				Highlight Summary
	Chula Vista	Port of San Diego	Imperial Beach	Bacteria	Nutrients	Sediment	Metals	
Enhanced commercial, industrial, and/or municipal inspections	CV-24	PO-9, PO-21	IB-17	X		X	X	• Chula Vista amended its inspection form (CV-24) to collect additional data about trash management from industrial and commercial facilities. Over 260 inspections were performed that included this additional data. • The Port of San Diego assessed eight special events (>500 people) at two parks (Chula Vista Bayside Park and Chula Vista Marina View Park) in the 909.1 HA. The Port of San Diego established a set of designated BMPs for all special events and conducted pre- and post-event inspections for each event (PO-9). All of the events properly implemented BMPs. • The Port of San Diego inspected five general retail or commercial facilities and six industrial facilities in the two HAs. One commercial facility and two industrial facilities were cited for unauthorized non-storm water discharges and/or for BMPs to address trash, bacteria, and/or metals and required escalated enforcement. • Imperial Beach amended its commercial inspection form (IB-17) to collect additional trash data from commercial facilities.

Table 7-2 (continued)
RP's Strategies Identified for Meeting Interim and Final Goals
Physical Aesthetics in Sweetwater and Otay River HUs

Strategy	Jurisdiction[1]			Additional Water Quality Condition Addressed by Strategy				Highlight Summary
	Chula Vista	Port of San Diego	Imperial Beach	Bacteria	Nutrients	Sediment	Metals	
Installation of structural controls (partial/full capture trash BMPs), where feasible		PO-02, PO-45	IB-63	X		X	X	• The Port of San Diego installed a fence along the southern perimeter of Pond 20 in the 910.2 HA to prevent trash and debris from entering Pond 20 starting in FY 2015 (PO-45 Optional). • All bioretention facilities and high-rate media filters were properly maintained at two Port of San Diego PDPs (PO-02) in the 909.1 HA (H Street Extension project and the South Campus Phase 4A Demolition project).
San Diego Bay Watershed education initiatives	CV-22, CV-25	PO-17	IB-43b	X	X	X	X	• Chula Vista continued to improve upon its CLEAN education campaign (CV-22, CV-25) by making significant improvements to its website, updating its residential storm water education brochures, and providing educational information in its bimonthly trash bills.

Table 7-2 (continued)
RP's Strategies Identified for Meeting Interim and Final Goals
Physical Aesthetics in Sweetwater and Otay River HUs

Strategy	Jurisdiction[1]			Additional Water Quality Condition Addressed by Strategy				Highlight Summary
	Chula Vista	Port of San Diego	Imperial Beach	Bacteria	Nutrients	Sediment	Metals	
San Diego Bay Watershed education initiatives (continued)	CV-22, CV-25	PO-17	IB-43b	X	X	X	X	• The Port of San Diego provided funding toward the Chula Vista Elementary School District Coastal Education Program through its core Public Education and Participation program (PO-17). Through classroom and hands-on activities, approximately 4,900 students learned about San Diego Bay's diverse wildlife and vegetation and environmental challenges, including storm water and trash related issues. • Port of San Diego staff created an approximately 15-minute bilingual (English and Spanish) training video "*Storm water Best Management Practices (BMP) Training for Industrial and Commercial Facilities*" in FY 2016 and showed it at a number of training events for commercial and industrial tenants and Port of San Diego staff. https://www.youtube.com/watch?v=Xytid-LlxMk • Imperial Beach amended the agreement with I Love a Clean San Diego to have additional education activities in the special events held within the city. (IB-43)

Table 7-2 (continued)
RP's Strategies Identified for Meeting Interim and Final Goals
Physical Aesthetics in Sweetwater and Otay River HUs

Strategy	Jurisdiction[1]			Additional Water Quality Condition Addressed by Strategy				Highlight Summary
	Chula Vista	Port of San Diego	Imperial Beach	Bacteria	Nutrients	Sediment	Metals	
Trash cleanups	CV-37	PO-35		X				• The Port of San Diego participated in and/or sponsored 16 cleanups overall in Port tidelands/San Diego Bay (PO-35 optional). Nine cleanup events occurred in the 909.1 and 910.2 HAs during the reporting period. A total of 2.7 tons of trash and debris were collected by approximately 398 people. • Chula Vista hosted three cleanup events (CV-37) in 910.2 that focused efforts on trash and graffiti removal within specific communities.
Regional efforts to address pollutants associated with homelessness	CV-36, CV-37	PO-35, PO-37	IB-68	X			X	• Chula Vista initiated a Homeless Outreach Team (CV-36) that coordinates weekly cleanups of trash and debris from city parks and facilities and problem areas. It is estimated that over 1,000 pounds of trash are collected each week. • The Port of San Diego coordinates, as needed, with Chula Vista to identify problem areas impacting the tidelands and to determine appropriate actions. In addition, the Port of San Diego worked with the Alpha Project (PO-37 optional) to provide referrals and/or services for approximately 465 people on tidelands between January and July 2016.

Table 7-2 (continued)
RP's Strategies Identified for Meeting Interim and Final Goals
Physical Aesthetics in Sweetwater and Otay River HUs

Strategy	Jurisdiction[1]			Additional Water Quality Condition Addressed by Strategy				Highlight Summary
	Chula Vista	Port of San Diego	Imperial Beach	Bacteria	Nutrients	Sediment	Metals	
Baseline Trash Assessments and Other Studies	CV-31, CV-33	PO-26, PO-34	IB-63, IB-66					• Baseline Trash Assessments (CV-33, IB-66, and PO-34 optional) were conducted to identify high trash generating areas and potential opportunities for retrofits, such as installation of full capture systems to capture trash in storm water. • The Port of San Diego initiated a trash receptacle assessment in 18 parks (PO-26 optional) to gain insight on existing trash measures and potential retrofit opportunities. The assessment is set to be completed early FY 2017. • Imperial Beach completed an analysis of the feasibility of a trash capture system for the drainage basin H (IB-63). • Chula Vista (CV-31), the Port of San Diego, and Imperial Beach expanded their trash monitoring programs to assess paired receiving water and MS4 outfall sites, and collect additional trash source identification information within the focused area.

Table 7-2 (continued)
RP's Strategies Identified for Meeting Interim and Final Goals
Physical Aesthetics in Sweetwater and Otay River HUs

Strategy	Jurisdiction[1]			Additional Water Quality Condition Addressed by Strategy				Highlight Summary
	Chula Vista	Port of San Diego	Imperial Beach	Bacteria	Nutrients	Sediment	Metals	
San Diego Bay Debris Study	CV-39b	PO-39	IB-66	X			X	• Chula Vista (CV-39b), Imperial Beach, and the Port of San Diego (PO-39 optional) is collaborating with a workgroup[1] led by SCCWRP and Amec Foster Wheeler to characterize and assess the trash and debris in San Diego Bay and its associated watersheds. The final report is currently scheduled to be available in FY 2017.

Notes:

BMP = best management practice; FY = fiscal year; HA = hydrologic area; PDP = priority development project; SCCWRP = Southern California Coastal Water Research Project

1. Other participants include: the San Diego Regional Water Quality Control Board, US Naval Facilities Engineering Command, San Diego Coastkeeper, Ocean Discovery Institute, California Sea Grant, WILDCOAST, Surfrider Foundation San Diego, members of the San Diego Bay Port Tenants Association, Southern California Coastal Waters Research Project, and Amec Foster Wheeler Environment & Infrastucture, Inc.

The RPs coordinated in the wet weather monitoring efforts of the San Diego Bay Monitoring and Assessment Program (MAP). During FY 2016, the RPs coordinated their field efforts for physical aesthetics MS4 outfall and receiving water monitoring at their respective monitoring locations, as described in the WQIP Monitoring and Assessment Program. Monitoring efforts are discussed further in Section 7.3 and Appendix 4, Section 5.

7.2.1 City of Chula Vista Strategies and Schedules

Chula Vista is located within the Sweetwater River and Otay River subwatersheds, as shown in Figures 7-1 and 7-2. The western portion of Chula Vista, west of Interstate 805, typically has older infrastructure and is more densely populated. The portion of Chula Vista east of Interstate 805 generally has newer development and infrastructure, consisting of more pervious area and permanent BMP implementation, because this area was developed under more the recent Municipal Permit land development requirements. Although the Focused Priority Condition area is in the western portion of Chula Vista, the majority of strategies were implemented city-wide. Jurisdictional strategies target a number of pollutants; however, the focus of most strategies is to target trash.

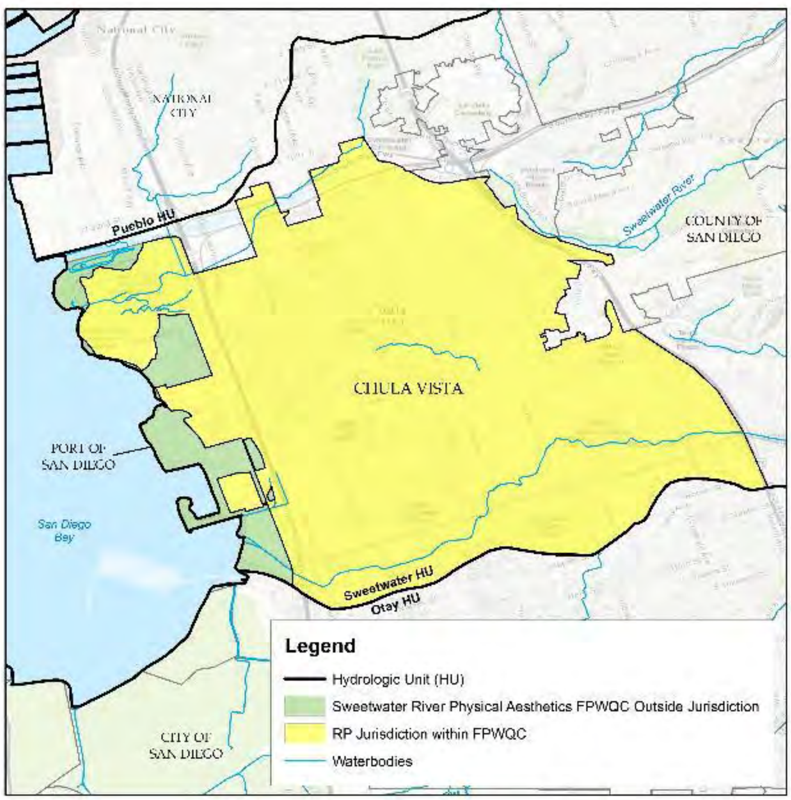

Figure 7-1
Chula Vista's Jurisdiction Within the Sweetwater Physical Aesthetics Focused Priority Area

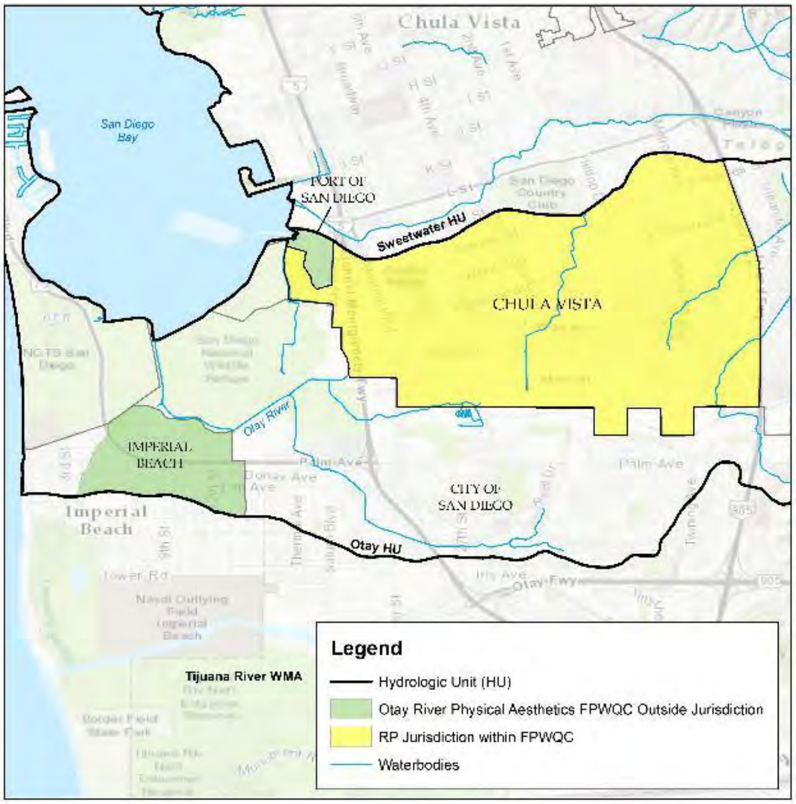

Figure 7-2
Chula Vista's Jurisdiction Within the Otay Physical Aesthetics Focused Priority Condition

Education and Outreach

Chula Vista has a well-rounded education and outreach program, which includes distribution of educational inserts in bimonthly trash bills, coordination of cleanup events with I Love a Clean San Diego, a revamped website that provides easier access to city resources, and updated residential storm water education brochures. The Chula Vista CLEAN Team, which consists of the Conservation, Environmental Services, and Storm Water Management Sections, partner together to provide residents with a cohesive environmental message. The CLEAN Team regularly collaborates on City special events, educational brochures, and environmental programs. In addition, a new City Operations Sustainability Plan, detailing water use, energy use, green purchasing, recycling and waste management, pollution prevention, transportation, green

Chula Vista community members stenciling storm drains at the Annual Beautify Chula event buildings, and green infrastructure, was adopted in June 2014. Chula Vista also participates in the Regional Think Blue San Diego educational program.

Inspections Program

The WQIP identified general retail and commercial areas, including eating and drinking establishments, as a high-priority source of trash. To address this source, Chula Vista enhanced its commercial and industrial facility inspection forms to collect additional information about the trash enclosures and trash receptacles of these facilities. FY 2016 was the first reporting period in which this additional information was collected. Chula Vista can use these data to help individual facilities improve their trash management BMP implementation, and data collected over time can help Chula Vista identify particular areas where additional efforts are needed, such as targeted education or increased inspection frequency.

Homeless Outreach Team

Notably, Chula Vista formed a Homeless Outreach Team during the reporting period, which consists of Chula Vista Parks, Police Department, Public Works staff, and a variety of nonprofit entities that help to provide a holistic approach to tackling homelessness issues. The program targets a number of city parks, facilities, and problem areas. Staff visit these areas once per week and can remove over 1,000 pounds of trash per week from the encampments. Funding for additional staff was added during the reporting period, which helps to bolster and strengthen the program.

Baseline Trash Assessment Study

An important portion of targeting trash in Chula Vista was the initiation of a Baseline Trash Assessment and BMP Feasibility Study. Planning for the study took place in the reporting period, with results of the study expected in the next fiscal year. The goal of the study is to identify the problem trash areas of Chula Vista and to determine which BMPs are the most appropriate to implement. In addition to helping Chula Vista achieve its strategies and goals to target trash, it helps to guide the city in compliance with the Statewide Trash Amendments. Results of the study are expected to help inform Chula Vista about where program improvements and adjustments are needed, where BMP retrofits and installations are feasible, and how to plan for meeting the WQIP trash goals.

Trash Monitoring and Assessment

In collaboration with the Port of San Diego and Imperial Beach, Chula Vista also expanded its trash assessment monitoring program to help assess progress in implementing strategies and meeting goals. The expanded program includes additional source identification data gathering for MS4 outfalls in the Focused Priority Condition area, as well as paired receiving water and MS4 outfall monitoring.

Although this reporting year was based on only four months of implementation of the WQIP, Chula Vista made strides in implementing several strategies that work toward achieving WQIP goals. Enhanced educational programs in collaboration with the CLEAN Team, the commencement of the Trash Study, and expanded trash inspections and monitoring are a few of the notable activities that took place during the reporting period. Strategies and implementation schedules will be adjusted as necessary over time through the adaptive management process

7.2.2 Port of San Diego Strategies and Schedules

The Port of San Diego's approach to addressing this Focused Priority Condition (physical aesthetics due to trash pollution) was to implement core JRMP and optional strategies (both jurisdictional and WMA). The approach includes implementing some strategies jurisdiction-wide, while targeting sources and collaborating with Chula Vista and Imperial Beach, when possible, in the Lower Sweetwater River (909.1 HA) and Otay River (910.2 HA). The Port of San Diego identified physical aesthetics (due to trash) because public input and the ORWMP identified trash as a priority issue in these HAs, and the recently adopted Trash Amendments. Figures 7-3 and 7-4 show the Port of San Diego's jurisdiction within the two HAs.

Lower Sweetwater (909.1 HA): The Port of San Diego's jurisdictional area in this HA is approximately 347 acres of the tidelands overlaying portions of Chula Vista. Existing facilities or land uses that may be potential sources of trash in this area include four commercial facilities, 6 industrial facilities, 12 municipal facilities, and 3 parks (Chula Vista Bayside Park, Chula Vista Bayfront Park, and Chula Vista Marina View Park). In addition to identifying strategies to address the current sources, the Port of San Diego is also identifying methods to address trash in the future development of the Chula Vista Bayfront area as part of the Port's Chula Vista Bayfront Master Plan.

Otay River (910.2 HA): The Port of San Diego's jurisdictional area in this HA is approximately 241 acres. Although current use of the property within the Port of San Diego in this area is limited, the future Chula Vista Bayfront development will likely require a variety of strategies to be implemented to address trash from both development and commercial and industrial sources. Existing facilities or land uses that may be potential sources of trash in this area of the Port of San Diego's boundaries include one commercial facility and the site of the former South Bay Power Plant. To effectively target potential problem areas, address the potential sources identified above, and prioritize efforts to address trash, the Port of San Diego has used the same approach used in the Lower Sweetwater River HA.

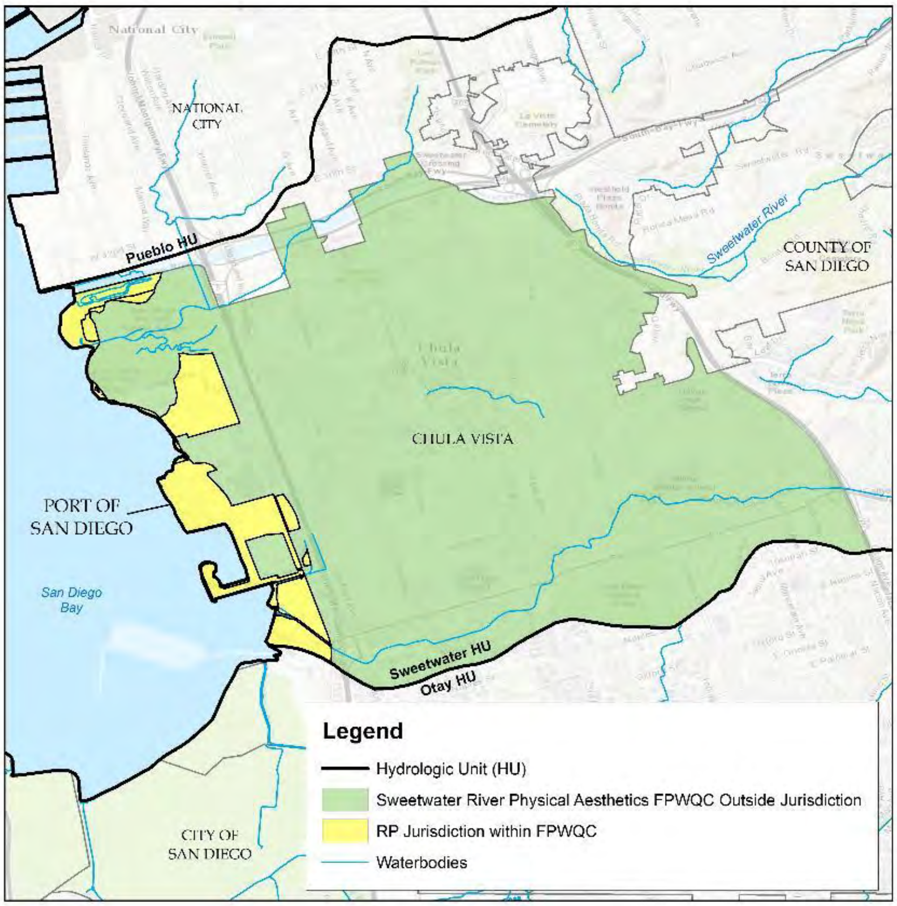

Figure 7-3
Port of San Diego's Jurisdiction within the Lower Sweetwater HA Physical Aesthetics Focused Priority Condition

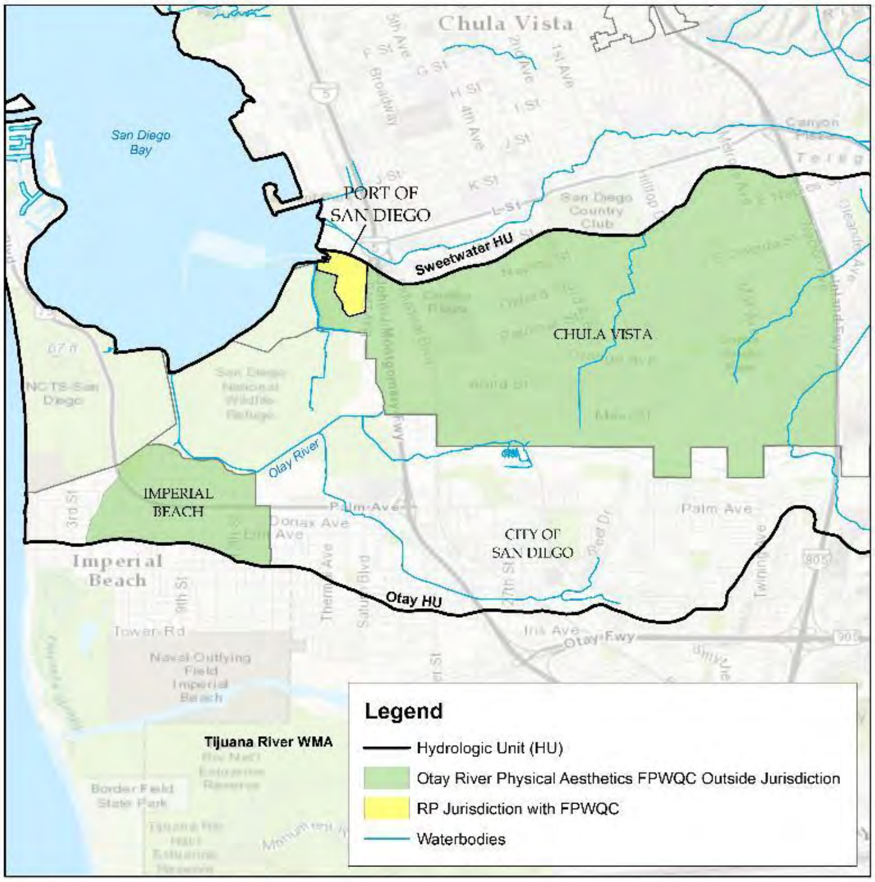

Figure 7-4
Port of San Diego's Jurisdiction Within the Otay River HA Physical Aesthetics Focused Priority Condition

Strategies and implementation schedules focused on high and medium sources of trash and were chosen on the basis of the best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. Source control strategies targeting trash include education and outreach, and a review of existing municipal trash and waste diversion measures (i.e., strategies to reduce the amount of waste going to local landfills or contributing to littering) to identify potential need for structural or source control improvements at high-volume trash-generating areas. A total of 24 strategies, including core jurisdictional and optional strategies, were implemented as planned in the reporting year. To expand on strategies highlighted in Table 7-1, a brief summary of jurisdictional strategies results for this reporting year is provided below. Additional information on all of the Port of San Diego's strategies implemented in FY 2016 are in Appendix 2.

Development Projects

One PDP project occurred in this area of the Port of San Diego tidelands (PO-2). The Port carried out an annual project inspection at the H Street Extension Project that required a follow-up to verify all required post-construction BMPs (i.e., bioretention facilities and high-rate media filters) were installed and maintained as required. The follow-up inspection found no citations or escalated enforcement was required. To ensure the new Municipal Permit and WQIP requirements were understood and followed, Port of San Diego staff also provided outreach and training to applicable internal departments and to the development community throughout the reporting year (PO-3 and PO-4).

Bioretention facility at H Street Extension

Construction Activities

No escalated enforcement measures were required on any project within the Port's jurisdiction during the 2015-16 year. The Minor Maintenance and Construction Activities BMP Guidance document was developed in this reporting period (PO-24 optional). The guidance document was designed to help General Services staff be aware of and to implement necessary BMP procedures to mitigate the discharge of trash, contaminated debris, and other pollutants when engaged in minor maintenance and construction activities at municipal facilities and parks such as Chula Vista Bayside Park and Chula Vista Marina View Park. One training events were provided for 88 staff on the use of the guidance document to select, implement, and monitor the BMPs (PO-25 optional).

Commercial and Industrial Activities

A highlight of the Port of San Diego's commercial and industrial program was a training video created in-house by staff to provide facilities information on storm water management concepts and on the new Municipal Permit requirements. The training video, entitled "*Port of San Diego's Storm water Best Management Practices (BMP) Training for Industrial and Commercial Facilities,*" is approximately 15 minutes long and is in English and Spanish. The video was made available to commercial and industrial tenants to be shown at training events. The training video has been viewed 1,191 times since it was published in November 2015 (https://www.youtube.com/watch?v=Xytid-LIxMk).

The Port of San Diego inspected five commercial facilities and six industrial facilities (PO-7) in the two HAs during the reporting year. Overall, the commercial facilities were successfully implementing BMPs; however, one facility was cited for unauthorized non-storm water discharges and for waste handling BMPs and required escalated enforcement.

Inspections of the six industrial facilities in the 909.1 HA found two facilities that were correctly implementing the BMPs, as described in their respective SWPPPs. Of the remaining four industrial facilities where enforcement was necessary, two were cited for unauthorized non-storm water discharges and/or for BMPs to address trash, bacteria, and/or metals and required escalated enforcement. All commercial and industrial non-compliance issues requiring corrective enforcement actions were resolved and closed.

Municipal Activities

Strategies that are also core JRMP municipal activities that effectively reduced trash and, to a lesser extent, bacteria include, but are not limited to, MS4 infrastructure cleaning (PO-10), street sweeping (PO-11), and municipal facility inspections (PO-8). Five years of Port of San Diego-wide MS4 monitoring data were assessed (PO-30 optional) in FY 2016 to identify MS4 structures with trash and debris levels that would trigger an adjustment to their cleaning frequencies. The analysis found the current cleaning frequency appears adequate for all MS4 structures in the 909.1 or 910.2 HAs, with no adjustments needed for the MS4 structures in those areas. The Port of San Diego also purchased a regenerative air street sweeper (PO-28 optional) in FY 2015 to improve sweeping effectiveness of the roads and parking lots it maintains. The Port of San Diego began to use the street sweeper in FY 2016. An assessment of the effectiveness of the new sweeper after the first year of use will likely occur in FY 2017.

Municipal inspections found that BMPs to minimize trash were successfully implemented in the Port's municipal parks located in these HAs (PO-8). Any issues identified in the initial inspection of municipal facilities such as parks in these HAs were subsequently addressed by Port of San Diego staff. Special events (for more than 500 people) are held periodically through each fiscal year at the Port of San Diego's various parks. The Port of San Diego established a set of designated BMPs, including those for trash, and conducts pre- and post-event inspections for each event (PO-9). Special events at two parks (Chula Vista Bayside Park and Chula Vista Marina View Park) in these HAs often include eating and drinking activities that generate trash. Pre and post-event inspections found all eight special events in the two HAs have been successful in implementing BMPs to address trash and bacteria.

The Port of San Diego-wide trash receptacle assessment (PO-26 optional) initiated in FY 2016 included the three parks in this area. The information gained from the study upon its completion in the next reporting period will improve trash management in the parks with the goal of reducing littering or illegal dumping and promoting proper waste disposal. The Port of San Diego will continue to implement its core program for publicly maintained facilities such as MS4 infrastructure, roadways, and parks.

Installation of Structural Controls

The Port of San Diego installed a 950-foot custom fence that replaced a chain-link fence along the southern perimeter of the 95 acre Pond 20 site at 1400 Palm Avenue. The Port of San Diego funded the project through its Capital Improvement Program. The new fence was designed with significant public input and incorporates local flora, fauna, and surfboards to enhance the site's unique, panoramic bay view. The fence also helps protect the Pond 20 area from trash and debris.

Baseline Trash Assessment

To gain insight of the current trash conditions and to be able to help guide future management actions that may be needed, the Port of San Diego initiated an assessment of available trash data to identify high-volume trash-generating areas and locations where implementation of Trash BMP retrofits may be feasible (PO-34 optional). Data assessed were from previous JRMP activities (i.e., dry weather monitoring, street sweeping, MS4 maintenance, and park maintenance), cleanup events, and other data sources relevant to this portion of the Port of San Diego’s jurisdiction. The assessment will be completed in FY 2017, and will help prioritize land uses or areas, and identify where full capture systems or partial capture devices may potentially be implemented to meet the WQIP goals and comply with the Trash Amendments. The information will be integrated into the Port of San Diego-wide approach to address trash and will be used to select strategies to be used, ranging from source control activities and retrofitting opportunities to installation of full capture systems.

The full list of optional strategies applicable to the Port of San Diego and the implementation status of each are provided in Appendix 2.

7.2.3 City of Imperial Beach Strategies and Schedules

Imperial Beach’s approach to improving the physical aesthetics within the Otay River HA is to identify targeted areas within its jurisdiction and to implement strategies focused primarily on trash. Imperial Beach maintains two major outfalls (H-line and K-line) in the Otay River HA that have known sources of trash from commercial areas, Highway 75, and illegal dumping. Figure 7-5 shows Imperial Beach’s jurisdiction within the Otay Focused Priority Condition, where the strategies will be implemented.

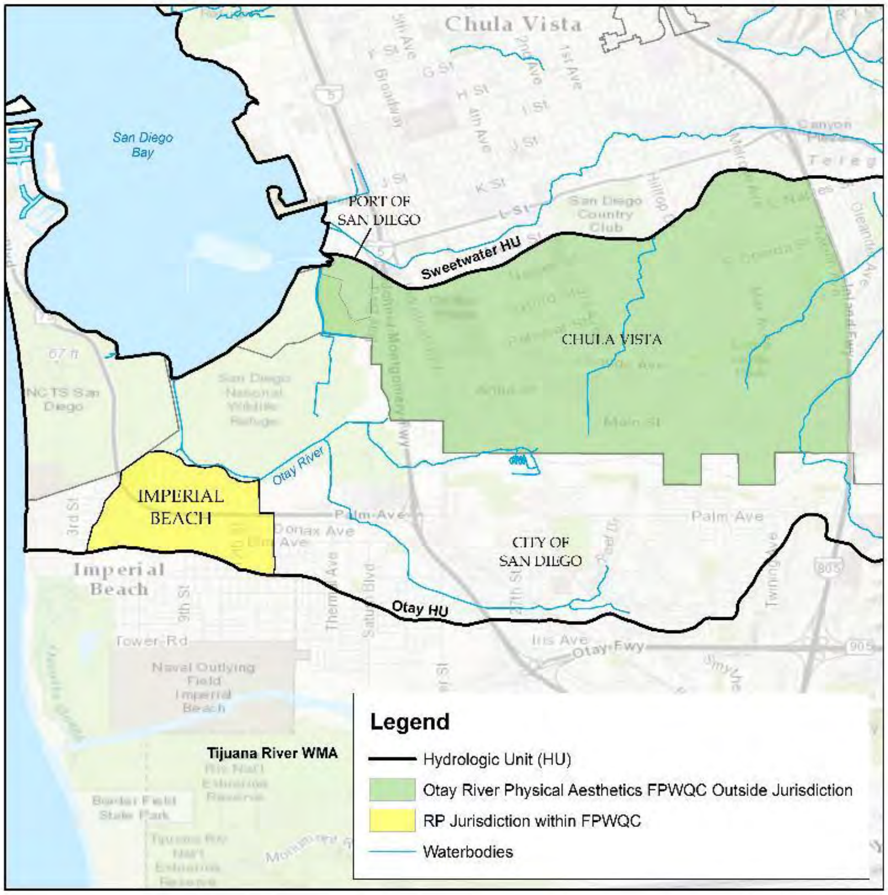

Figure 7-5
Imperial Beach's Jurisdiction Within the Otay River HU Physical Aesthetics Focused Priority Condition

To provide details of the strategies implemented in this reporting period (FY 2016) as summarized in Appendix 2, a synopsis of implemented jurisdictional strategies is provided below.

Improvement of Dirt Alleys (IB-53)

During this reporting period, Imperial Beach completed design and construction of the first phase of alley improvements for 14 alley segments (over 1 mile of dirt alleys) in the community. This first phase of alley improvements specifically targets alleys in the Tijuana River watershed and implements a green streets design that involves permeable concrete, storm water retention, and dry wells. (See the Tijuana River WQIP Annual Report for project details.)

Because of the success of and significant community support for the first phase of alley improvements, on November 18, 2016, the Imperial Beach City Council authorized the accelerated design and construction of the second phase of alley improvements for the eight remaining unimproved alley segments in the city. The alleys included in this second project phase will provide a multi-pollutant water quality benefit and will add another 0.53 mile of green alleys in Imperial Beach. The alleys that are included for the second phase are all located in the San Diego Bay WMA and are designed to specifically target the priority pollutants for trash and sediment.

Street Sweeping

Imperial Beach provides street sweeping service around the high priority areas to target trash, sediment, and debris collected on the street. A total of 130 curb miles are swept per month, including weekly sweeping of commercial areas such as open stripped and raised curb medians on Palm Avenue, Highway 75, 13th Street, Seacoast Drive, and Ocean Lane.

10th St Bikeway Access Project (IB-34b) and Habitat Restoration (IB-54)

In February 2014, Imperial Beach completed the 10th Street Bikeway Access project that includes a storm water bioswale to treat urban runoff from the Public Works facility and flow from the surrounding residential neighborhood. Trash is captured in the energy dissipation system and in the detention pond during storm events and is cleaned up by Imperial Beach maintenance crews on a routine basis. The bioswale provides storm water capture and retention of 33,300 cubic feet. During this reporting period, Imperial Beach provided regular maintenance of the bioswale and over 1 acre of native plant restoration onsite. In addition, Imperial Beach supported an Eagle Scout Project by Troop 53 in North Park to provide continuing maintenance for the native habitat on the site.

Imperial Beach's Bikeway Access Project is also part of the larger United States Fish and Wildlife Service Birder's Point Project (IB-54) to complete a walking trail and series of overlook observation decks along southern San Diego Bay. During the reporting period, the Fish and Wildlife Service completed construction on the walking path and two of the overlook observation decks. This project includes native plant restoration and various interpretive elements to engage the public. Imperial Beach will continue to coordinate restoration efforts and shared maintenance responsibilities with the Fish and Wildlife Service along the city's boundary with San Diego Bay.

El Niño impacts of flooding on the Bayshore Bike Path in Imperial Beach

Bikeway Village Redevelopment Project (IB-58)

The Bikeway Village Project is a public private partnership to redevelop the northern end of 13th Street and to refurbish old industrial buildings into new commercial uses. This project supports Imperial Beach's eco-tourism vision and multiple storm water benefits that include improving a blighted area of the community where illegal dumping is a known issue and creating new storm water retention basins. The Port of San Diego is also partnering in this project and is constructing a new decorative wrought iron fence along the eastern perimeter of 13th Street. During this reporting period, the developer received permit approval and started construction on the project. The developer, Imperial Beach, and Port of San Diego will continue construction over the next reporting period.

Trash Capture H-Outfall Drainage Basin (IB-63)

Imperial Beach's primary outfall into San Diego Bay WMA is the H-line outfall. The city completed multiple studies during the reporting period to investigate options for installing a full trash capture system for this drainage basin, including:

- Bayside Drainage Feasibility Analysis
- Imperial Beach Sea Level Rise and Adaptation Study
- Imperial Beach Drainage Basin H Trash Capture Feasibility Study

These studies identified very serious flooding concerns from impacts of sea level rise on the existing undersized H storm drain line. Even the warm water associated with the El Niño during this reporting period resulted in record sea level heights for San Diego Bay and street flooding through the H storm drain line during high tides. Full trash capture is feasible on the H-line, but it will need to be done as part of a project to increase the drainage capacity for the H-line and part of an overall adaptation plan for sea level rise.

Collaboration with other watershed stakeholders is integral to Imperial Beach's approach to water quality improvement. Imperial Beach is bordered to the north by the South San Diego Bay Unit of the National Wildlife Refuge, which includes 2,620 acres of important intertidal mudflats, eel grass beds, salt marshes, and submerged tidelands. Imperial Beach partners with the Fish and Wildlife Service and other agencies to protect and enhance wildlife habitat in and around South San Diego Bay, which also serves to provide water quality benefits to the upper watershed. There are several ongoing or planned restoration projects for the South San Diego Bay tidelands and Otay River flood plain that Imperial Beach supports through WMA strategies.

In addition to supporting WMA strategies, Imperial Beach implements a green streets program that incorporates LID and storm water treatment facilities where feasible into capital improvement program projects. Numerous projects are currently being implemented or are under design in the Otay River HA section of Imperial Beach and will provide addition storm water treatment and retention opportunities before discharging into San Diego Bay.

Imperial Beach also implements an effective source control program to maintain MS4 infrastructure and public roadways, and to address discharges from existing development to reduce bacteria, trash, and other pollutants from MS4s to meet the physical aesthetics goals. Effective jurisdictional strategies for trash include street sweeping, annual MS4 operations and maintenance, and targeted cleanup activities. Imperial Beach also maintains numerous trash capture devices throughout the city and is investigating expansion of the program. For the Otay River HA, Imperial Beach is investigating the feasibility of a new trash capture system for the H-outfall drainage basin. The careful consideration of the appropriate trash capture device for any location in Imperial Beach is a necessity because the flat grade and proximity to sea level can result in the flooding of public and private property. Imperial Beach plans to add additional structural treatment controls for trash where feasible.

7.3 Monitoring and Assessment for Physical Aesthetics

Physical aesthetics monitoring was a collaborative effort by the Port of San Diego, Chula Vista, and Imperial Beach. To assess progress toward meeting the interim goal, a total of 64 MS4 outfall locations in the Focused Priority Condition area were visited at least once and up to three times, depending on the RP, as part of the dry weather major MS4 outfall monitoring program.

In FY 2016, the RPs also began a paired monitoring approach at 12 MS4 outfalls. The RPs selected nine sites in the Sweetwater HU and three sites in the Otay HU, where the RPs assessed trash in the receiving water adjacent to the major MS4 outfall. Paired monitoring was conducted during two dry weather events (one dry season [May to September] and one wet season [October to April]) and one wet weather event (event within three days following a storm event with at least 0.2 inch of precipitation) annually.

The RPs collaborated on development of a field monitoring sheet to capture an extensive description of the trash conditions at the MS4 outfalls and adjacent receiving water areas that were monitored by each jurisdiction. On November 12, 2015, a calibration field training session was conducted by the participating RPs at two of the paired monitoring locations. The goal of the calibration and training was to standardize the monitoring and observational procedures for all events.

A total of 64 major MS4 outfalls were visited a combined total of 86 times during dry weather within Chula Vista (68 visits), Port of San Diego (16 visits), and Imperial Beach (2 visits). Assessments were conducted by calculating the percentage of visits observed as having “optimal” trash scores or better of the total number of visits. Optimal is defined as less than 10 pieces of trash observed at a site, as set forth by the Trash Assessment form from the Regional Copermittee Monitoring Workgroup.

Of the 86 visits to major MS4 outfall locations, 73% of the visits had “optimal” levels of trash. The most common trash type found at the MS4 sites was categorized as general packaging or plastic bags, with potential source identifications (IDs) noted as littering or household waste. At the receiving water sites, the most prevalent trash was categorized as general packaging with source IDs as transient, household waste, dumping, or littering.

The site visits and the monitoring results, including trash types, potential trash sources, and routes, are further detailed in Appendix 4 and Attachment E.1 of Appendix 4.

7.4 Progress Toward Achieving Numeric Goals

The RPs initiated the water quality data collection for the physical aesthetics Focused Priority Condition during this reporting period that will allow them to report progress toward achieving numeric goals.

Overall, the initial trash assessment results from the MS4 outfall dry weather monitoring results (86 visits) in the combined Sweetwater and Otay HUs showed an optimal (or greater) trash percentage significantly above the baseline percentage of 60%. In addition, the three RPs initiated baseline trash assessment studies in their respective jurisdictions that will also help assess the percentage of drainage area treated by BMPs to be implemented in the future. The trash assessment results will be available in FY 2017. Table 7-3 summarizes the RPs’ progress toward interim goals established for the Municipal Permit term in the Sweetwater and Otay HUs.

Table 7-3
Progress Toward Municipal Permit Term Numeric Goal for Physical Aesthetics in Lower Sweetwater HU and Otay River HU

Planning Period			Assessment Period		
Performance Measure – Achieve by FY 2018					
Interim Goal and Progress Information	Performance Metric	Interim Goal[1]	Data Collected/ Results	Progress	Adaptive Management Actions
MS4 Discharges % Optimal[2] Trash Assessment Scores	MS4 Outfalls Assessed for Trash	65% Optimal Trash Assessment scores	Visual trash assessment data was collected from 86 visits to major outfall sites.	73% optimal scores were achieved.[3]	No modifications to the numeric goal, schedule, or supporting strategies are proposed.
OR					
MS4 Discharges % of High Volume Trash Drainage Area Treated for Trash within HSAs 909.1 and 910.2[4]	% Drainage Area Feasible for BMP retrofit	10% High Volume Trash Drainage Area Treated	Data were collected in early FY 2016. Results will be available in the report in FY 2017	Studies were implemented in reporting period and will be completed in FY 2017	No modifications to the numeric goal, schedule, or supporting strategies are proposed.

Notes:
% = percent; FY = fiscal year; MS4 = municipal separate storm sewer system
1. Baseline for % Optimal Trash Assessment Scores is 60% and is based on the RPs' cumulative number of site visits of major MS4 outfalls in the Focused Priority Condition area for dry weather and MS4 outfall monitoring during FY 2012 through FY 2014. Baseline for % of High Volume Trash Drainage Area Treated is based on historical trash assessment data. An assessment is needed and will incorporate review of all available trash and source assessment data, drainage areas, and potential locations in high-volume trash-generating areas to feasibly implement structural control BMPs to identify or verify high-volume trash areas and percentage of area feasible to retrofit with trash BMPs. The goals may be updated accordingly and provided in a future annual report.
2. Based on the RPs' cumulative number of site visits of major MS4 outfalls in the Focused Priority Condition area for dry weather and MS4 outfall monitoring during FY 2012 through FY 2014.
3. 76% of 58 outfall visits in 909.1 had optimal or better trash ratings; 68% of 28 outfall visits in 910.2 had optimal trash ratings or better. Trash ratings in both HAs were above the baseline of 60%.
4. These values are based on best available information and current jurisdictional knowledge. A feasibility study is required to determine where BMP retrofits can be implemented. The interim goals may be adapted if needed.

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7.5 Adaptations to Water Quality Strategies and Schedules

No modifications to the goals, strategies, and schedules presented in the San Diego Bay WMA WQIP for Chula Vista, the Port of San Diego, or Imperial Beach are proposed at this time.

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8 Focused Priority Condition: Swimmable Waters (Beaches) in the Coronado HA

Swimmable water at beaches is a Focused Priority Condition within the Coronado HA of the Otay HU. For the purposes of the WQIP, the term swimmable waters relate to use of the receiving water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These beneficial uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, and fishing. Bacteria typically are the pollutant of concern for protecting public health during recreational activities; however, the RPs will adapt this Focused Priority Condition to address other pollutants of concern as they are identified in the future.

The geographic extent of the Focused Priority Condition is the jurisdictional boundaries of the City of Coronado (Coronado) and the Port of San Diego (collectively, RPs) within the Coronado HA of the Otay HU. Swimmable waters (beaches) strategies apply only to the areas within the RPs' jurisdictions and exclude federal properties (e.g., United States Navy facilities).

Progress toward implementing various strategies and monitoring related to these goals is presented in the sections below. This is the first annual report related to this Focused Priority Condition for swimmable waters and because of the timing of the completion of the San Diego Bay WMA WQIP, the programs have been in place and implemented only since February 2016. The relatively short implementation time limits assessment of the program's effectiveness.

8.1 Swimmable Waters in the Coronado HA Numeric Goals

The WQIP interim (FY 2018) and final numeric goals for the Focused Priority Condition are provided in Table 8-1. The RPs identified at least one interim goal to be achieved during the Municipal Permit term. Interim goals during the current permit term are intended to serve as milestones to help assess progress toward the long-term goals to be achieved at the end of FYs 2021 and 2023, as described in Appendix 3.

The RPs implemented a monitoring program to collect data to help track progress toward the goals. The following subsections summarize jurisdictional strategy implementation, assessment of RPs' progress toward interim goals, and monitoring programs.

Public perception of water quality will also be assessed as a strategy starting in FY 2017, following the development of a survey. The public's perception of water quality is equally as important to the RPs within the Coronado HA as is the impairment assessment. Monitoring data alone may not identify the areas of public concern or perception. Survey results will be used within the adaptive management framework to assess the effectiveness of current strategies and to determine changes that may be needed.

8.2 Strategies and Schedules for Swimmable Waters in the Coronado HA

The RPs' approach to improving swimmable beaches is to implement strategies designed to reduce sources of bacteria.

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Table 8-1
Summary of Strategies for Swimmable Waters in the Coronado HA

Strategies	Additional Water Quality Conditions Addressed by Strategy[1]				Summary
	Trash	Nutrients	Sediment	Metals	
Development/redevelopment (residential, commercial)	X	X	X	X	Coronado (CO-4) amended its BMP Design Manual for trash areas to require full four-sided and/or covered enclosures, away from storm drains. The BMP Design Manual was amended for animal-related facilities such as shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, and pet care stores to address sources in outdoor, storage, and other areas as applicable. Coronado's Municipal Code was amended to support additional requirements in the BMP Design Manual that target Focused Priority Conditions identified through plan review and field inspections.
Existing development (commercial/industrial)	X	X	X	X	Coronado (CO-7) and the Port of San Diego (PO-7) coordinated commercial inspection schedules during the reporting year so that the inspections occurred simultaneously at bayside facilities.
Existing development (municipal)	X	X	X		• Coronado (CO-13.1 and 13.3) implemented enhanced beach patrols, beach maintenance activities for trash and debris, additional trash can placement during peak periods, and replenishment of dog bag dispensers. • The Port of San Diego continued to provide public pet waste bags by maintaining bag dispensers at the park and beach (PO 22 optional).

Table 8-1 (continued)
Summary of Strategies for Swimmable Waters in Coronado HA

Strategies	Additional Water Quality Conditions Addressed by Strategy[1]				Summary
	Trash	Nutrients	Sediment	Metals	
MS4 infrastructure			X	X	Coronado (CO-15.3) prepared a Capital Improvement Program to line storm drain segment to prevent groundwater intrusion.
Enhanced existing development inspections	X	X	X	X	• Coronado (CO-12) coordinated with the Port of San Diego on commercial inspection schedules in during the reporting year so the inspections occurred simultaneously. • The Port of San Diego also assessed three special events (for more than 500 people) at Tidelands Park (PO-9) and completed inspections at the all of the events to ensure compliance with Municipal Permit requirements. Of the three special events in the 910.1 HA, all were properly implementing BMPs.
Inspection and/or preventive maintenance program to prevent sewer system backups in public restrooms		X		X	The Port of San Diego effectively implemented the preventative maintenance program for public restrooms at Tidelands Park (PO-23 optional) to prevent sewer discharges from reaching the MS4. In addition, there was no evidence of bathroom cleaning activities being tracked outdoors at the time of the municipal inspection (PO-8) at Tidelands Park in June 2016. Coronado implements a similar inspection, maintenance, and cleaning program at all public restrooms located near beaches and at parks (CO-6 and CO-13.2) to prevent sewer back-ups and spills.

Table 8-1 (continued)
Summary of Strategies for Swimmable Waters in Coronado HA

Strategies	Additional Water Quality Conditions Addressed by Strategy[1]				Summary
	Trash	Nutrients	Sediment	Metals	
Trash and waste measures	X	X			The Port of San Diego initiated an optional strategy for trash and waste in the 910.1 HA in FY 2016. The assessment of trash receptacle assessments in parks (PO-26 optional) was initiated and is scheduled to be completed in FY 2017.

Notes:
BMP = best management practice; FY = fiscal year; HA = hydrologic area
1. High and medium sources identified in Appendix I of the WQIP. *The RPs complete of strategies are located in Appendix 2.
X – Indicates condition benefit

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The RPs have continued to implement their core JRMP requirements, including many strategies that have positive impacts on the water quality of MS4 discharges. To make progress toward their identified goals, the RPs have identified existing JRMP (core) strategies to enhance and have also implemented optional strategies focused on this Focused Priority Condition.

Overall, Coronado and the Port of San Diego successfully implemented strategies to address the high priority sources as well as medium priority sources of bacteria in the 910.1 HA during the reporting period. Table 8-2 highlights a subset of the RPs' strategies identified to meet interim and final goals for this Focused Priority Condition.

It is anticipated that a combination of strategies will allow the RPs to make progress toward, and ultimately achieve, the established goals for this Focused Priority Condition. All strategies were implemented as scheduled in the reporting period. Additional information on Coronado's and the Port of San Diego's approach and strategies is provided in Sections 8.2.1 and 8.2.2, respectively. RPs' complete lists of strategies are provided in Appendix 2.

Table 8-2
Sources Addressed by RPs' Strategies in FY 2016

Source	City of Coronado	Port of San Diego
High Priority		
Animal facilities	X	N/A
Eating or drinking establishments or special events	X	X
Pet waste	X	X
Sewage Infrastructure and activities	X	X
Medium Priority		
Residential Areas[1]	X	N/A
Groundwater	X	N/A
Over-irrigation	X	X

Notes:
N/A = not applicable
1. The Port of San Diego does not have residential land uses.

Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. The modifications of core JRMP strategies or optional strategies, or the addition of new strategies, may also be needed to adequately address MS4 sources so that Tidelands Beach can be delisted from the 303(d) List in the future. As strategies are modified, the WQIP will be updated. The implementation of each strategy will be contingent upon annual budget approvals and funding availability.

Implementation of the optional strategies is contingent on circumstances supported by the need for the additional effort, the cost/benefit as compared with other options and strategies, and the availability of funding.

8.2.1 City of Coronado Strategies and Schedules

Coronado's approach to improve swimmable beaches is to implement strategies focused on sources of bacteria and trash, and to obtain a better understanding of the public's perception of water quality conditions. Figure 8-1 shows Coronado's jurisdiction within the Coronado HA Focused Priority Condition, where the strategies are being implemented.

Figure 8-1
Coronado's Jurisdiction Within the Coronado HA Swimmable Beaches Focused Priority Condition

Medium-ranked sources that are non-existent in Coronado include nurseries/greenhouses. Coronado may collaborate or confer with the Port of San Diego about potential non-MS4 sources from boat waste, homeless encampments, and groundwater contribution if suspected or believed to be a potential source depending on jurisdictional authority or boundaries. Coronado may consider low-ranking sources as part of its strategies at its discretion and may add them as part of its adaptive management approach to achieve interim or final goal metrics for swimmable waters.

Core jurisdictional strategies and BMPs listed in Appendix 2 were implemented as planned for the reporting year. Some examples include performing frequent maintenance of public areas, including parks, beaches, and special events, and engaging the public to implement best practices and desirable behaviors (e.g., pet waste collection and disposal). Specifically, jurisdictional strategies underway include daily beach patrols for trash and debris removal and weekly street sweeping and hardscape cleaning in the commercial corridor where eating and drinking establishments are primarily located. In Coronado, most of the MS4 outfalls, including major outfalls, within the Focused Priority Condition area, have low-flow and first-flush diversions to the sanitary sewer to prevent bacteria from entering the receiving waters during dry weather and during the initial portions of storms. There are 13 low-flow and first-flush diversions from the MS4 to the sanitary sewer throughout Coronado that are proactively inspected bimonthly. Coronado has an extensive, comprehensive operation and maintenance program of its storm drain (or MS4) and sewage infrastructure that is instrumental to achieving and maintaining swimmable beaches. Examples include daily restroom inspections/cleaning and twice-per-week inspections at pump stations at beach restrooms. Staff activities in terms of operation and maintenance, and response to incidents focus on health and safety of employees, the public, and the environment with emphasis on preserving beach water quality.

Coronado’s North Beach (Dog Beach)

The continuous maintenance of public areas and facilities reduces the amounts of trash, bacteria, sediment, and other pollutants on beaches and in receiving waters. In addition, Coronado administers surveys to collect data to inform targeted education and outreach campaigns and to evaluate municipal services. Collaboration with the other RPs to assess public perception will build upon historical data to guide adaptive management for Coronado. The assessments are planned for next fiscal year as originally scheduled.

To expand on examples provided in Table 8-1, jurisdictional strategies that were implemented this reporting year include the following.

Development Planning Component

Jurisdictional strategy CO-4: Coronado’s BMP Design Manual and Municipal Code were amended to address potential sources of bacteria through BMP requirements. Coronado enhanced the Model BMP Design Manual to include additional BMPs and requirements for potential sources of bacteria from specific types of development (for example, trash enclosure types and design requirements for restaurants identified through inspections that have persistent problems with trash management). To support the enhanced BMP Design Manual, Coronado's Municipal Code was updated to provide the required legal authority.

Existing Development (Commercial/Industrial) Component

Jurisdictional strategy CO-7: High-priority commercial facilities were inspected. Several facilities located along the bay's waterfront were jointly inspected by Coronado and the Port of San Diego to ensure that potential sources of bacteria are inspected, identified, and addressed, if needed. Some of these facilities may have operations in only one of the RP's jurisdictions or in both. By conducting joint inspections, RPs ensure that each facility receives a thorough inspection and that all BMPs are properly implemented. These joint inspections also provide for more uniform requirements and enforcement, when needed.

MS4 Infrastructure

Jurisdictional strategy CO-15.3: Coronado is proactively repairing/replacing MS4 infrastructure for proper operation and function. During this reporting year, Coronado initiated an MS4 capital improvement project to eliminate groundwater infiltration to the MS4 in the Country Club/Parker drainage basin on the northwestern end of the city's village area. Project planning and design to install a liner in the existing storm drain and perform other repairs were completed. The Public Services and Engineering Department prepared bid documents and initiated regulatory permitting just as the fiscal year ended. The project is scheduled to start construction in early 2017. Upon completion, this project will have multiple environmental benefits, including reducing potential bacteria regrowth in the MS4 from standing groundwater in the pipeline, eliminating groundwater diversion to the sanitary sewer (which in turn reduces the risk of sewer system overflows and strain on the system), reducing the potential for bacteria to the receiving waters, and reducing greenhouse gases from pump operations to dewater the MS4.

Enhanced existing development inspections

Jurisdictional strategy CO-12: Coronado and the Port of San Diego are implementing enhanced inspections in marina areas. As noted earlier, joint inspections were conducted by Coronado and the Port of San Diego. Joint inspection of the Glorietta Bay boat launch areas was conducted as part of this new enhanced oversight related to swimmable waters. Although this strategy is listed as optional and would normally be triggered by an assessment of the goal, it was conducted this reporting year.

Generally, implementation of the optional strategies is contingent on circumstances supported by the need for the additional effort, the cost/benefit as compared with other options and strategies, and the availability of funding. The full list of optional strategies applicable to Coronado and the implementation status of each are provided in Appendix 2.

8.2.2 Port of San Diego Strategies and Schedules

The Port of San Diego's approach to address this Focused Priority Condition and to comply with the WMA goals involved implementing core JRMP and optional strategies, as applicable, to reduce or eliminate sources of bacteria within its MS4. The Port of San

Diego's jurisdictional area in the Coronado HA is approximately 242 acres. There are 32 commercial facilities (including eating and drinking establishments, marinas, general retail, and hotels) and three parks in the Port's jurisdiction in the HA.

While the majority of the Port of San Diego's strategies to address sources of bacteria apply throughout its jurisdiction, the Port of San Diego implemented a targeted effort to address potential sources of bacteria to Tidelands Park. Tidelands Park is a 22-acre waterfront park that offers a small beach, recreational fields, picnic areas, and open space for a variety of outdoor activities. The park is currently on the 303(d) List for *Enterococcus*. Figure 8-2 shows the Port of San Diego's jurisdiction within the Coronado HA Focused Priority Condition, where the strategies are being implemented.

Port of San Diego Tidelands Park

Figure 8-2
Port of San Diego's Jurisdiction Within the Coronado HA Swimmable Beaches Focused Priority Condition

Core jurisdictional strategies and BMPs listed in Appendix 2 were implemented as planned for the reporting year. The Port of San Diego's strategies in Tidelands Park focused on reducing bacteria and trash from sources such as sewage infrastructure and activities from public facilities, pet waste, special events, eating and drinking establishments, and recreational land uses. The Port of San Diego effectively implemented both core and optional strategies in FY 2016 in Tidelands Park. Core JRMP strategies impacting the park included frequent maintenance and inspections (PO-8) of municipal areas (including parks, beaches, and special events (PO-9), MS4 inspection and cleaning (PO-10), and maintenance of streets and parking lots (PO-11). In addition, nine of the Port of San Diego's optional strategies impacting Tidelands Park were triggered for implementation in FY 2016.

Table 8-1 highlights a subset of the Port of San Diego's strategies directly impacting Tidelands Park that will help it meet interim and final goals for this Focused Priority Condition. The full list of strategies applicable to the Port of San Diego and the implementation status of each are provided in Appendix 2.

To expand on strategies highlighted in Table 8-1, jurisdictional strategies that were implemented this reporting year in Tidelands Park include the following.

Enhanced Existing Development Inspections

As stated earlier, the Port of San Diego's approach was to implement a targeted effort to address potential sources of bacteria to Tidelands Park. The Port of San Diego inspected three special events (for more than 500 people) at Tidelands Park to ensure compliance with Municipal Permit requirements. Event organizers were provided a list of BMPs (PO-9) to ensure that the event organizer was knowledgeable about the BMP requirements and was implementing them. Of the three special events in the 910.1 HA, all were found to be properly implementing BMPs. In addition, the Port of San Diego began to coordinate with Coronado on joint inspections of existing development facilities in this HA. Although this strategy was initially implemented in the Glorietta Bay boat launch area, the effort represents a new management approach to implement greater oversight of potential sources of bacteria that may exist in this HA. There were also no new development or construction activities in Coronado HA during FY 2016.

Preventive Maintenance of Public Bathrooms at Tidelands Park

The Port of San Diego's updated Storm Water Ordinance requirements were incorporated into the new janitorial services contract requiring implementation of measures to prevent the discharge of waste material generated from public restroom facilities at parks (PO-23 optional). These preventive maintenance measures help to minimize or prevent discharges from the sewer system or other public bathroom facilities at Tidelands Park. Findings of the June 2016 municipal inspection (PO-8) at Tidelands Park support that these measures have been effective (i.e., no evidence of bathroom activities being tracked outdoors).

Port of San Diego-Wide Park Municipal Solid Waste Receptacle Assessment

One optional strategy initiated in FY 2016 addresses trash management at Tidelands Park. A Port of San Diego-wide park municipal solid waste receptacle assessment was initiated in this reporting period to evaluate the waste receptacles currently in use in the Port of San Diego's parks (PO-26 optional),including Tidelands Park. The purpose of the study is to develop the information necessary to support management decisions related to waste and recycling receptacle type and placement, which will support compliance with California waste diversion mandates, upcoming Trash Amendments requirements, and the San Diego Bay WMA WQIP Focused Priority Conditions. The study is scheduled to be complete in FY 2017. The findings will be used to guide management actions and potential future retrofits to trash enclosures in municipal areas, specifically parks (optional PO-46 optional).

Municipal Guidance Documents and Training

The Minor Maintenance and Construction Activities BMP Guidance document was developed in this reporting period (PO-24 optional). The guidance document was designed to help General Services staff be aware of and to implement necessary BMP procedures to mitigate the discharge of trash, contaminated debris, and other pollutants when doing minor maintenance and construction activities at municipal facilities and parks such as Chula Vista Bayside Park and Chula Vista Marina View Park. One training event was provided to 88 staff on the use of the guidance document to select, implement, and monitor the BMPs (PO-25 optional).

Public education and outreach (PO-17) also continues to be a key component of the Port of San Diego's approach jurisdiction-wide. Engaging the public encourages them to implement best practices and desirable behaviors (e.g., pet waste collection and disposal (optional PO-22 optional), proper trash disposal, and trash cleanups).

8.3 Swimmable Waters in the Coronado HA Monitoring and Assessment

The RPs initiated data collection for the swimmable waters Focused Priority Condition in November 2015 following completion of the final WQIP. The Swimmable Waters monitoring program was implemented in Coronado HA, as detailed in Appendix K of the San Diego Bay WMA WQIP. Data collection for bacterial indicators has proceeded as planned and includes year-round (wet and dry weather) sampling to augment existing data sets, such as the dry weather data collected by the County of San Diego Department of Environmental Health (DEH) for the AB 411 program. The RPs initiated wet weather sampling at two beaches (Tidelands Park and North Beach) in the Coronado HA and sampled three storm events: November 2, 2015, January 5, 2016, and March 8, 2016.

Dry weather site visits were conducted on 14 occasions from November 2015 through September 2016 to inspect the MS4 outfalls and to evaluate conditions for sampling the receiving water and/or MS4 outfalls. The data collected during this reporting period, when combined with data planned for FY 2017, will allow the RPs to begin assessing water quality and progress toward meeting the swimmable waters goals. Further discussion and description of monitoring efforts and monitoring results for Swimmable Waters Focused Priority Condition, is presented Appendix 4. The complete set of monitoring data collected during this reporting year is presented in Attachment E.1.

8.3.1 Receiving Water Monitoring

Receiving water monitoring related to swimmable waters includes bacterial indicators at two sites, one on San Diego Bay at Tidelands Park managed by the Port of San Diego and one on the Pacific Ocean at North Beach in Coronado. Receiving water monitoring for wet season was initiated at both locations in November 2015. Both dry and wet weather monitoring are slated to continue in the coming reporting year.

During the reporting period, the Port of San Diego initiated a monitoring approach to assess Tidelands Park year-round. In addition to assessing dry weather monitoring data from the DEH AB 411 program, the Port of San Diego began to assess the receiving water during dry weather and wet weather in the wet season period. A total of 35 receiving water samples were collected during dry and wet seasons at Tidelands Park. Four, or 12.5%, of the 32 dry weather samples collected overall (six samples by the Port of San Diego and 26 samples by the DEH) at Tidelands Park beach had concentrations of *Enterococcus* that exceeded the WQO. For the wet season/wet weather receiving water monitoring, *Enterococcus* concentrations exceeded the WQO during one of the three rain events.

Receiving water monitoring at North Beach was initiated in FY 2016 and is being conducted year-round. For North Beach, there are limited receiving waters (beach/ocean) monitoring data points for the site in the previous few years, because the site is no longer monitored by the DEH under the AB 411 program. At North Beach, Coronado collected 14 receiving water samples in the Pacific Ocean surf during the reporting year.

The wet weather receiving water monitoring data set is limited at both locations because this was the first year in which the monitoring was conducted. As planned, receiving water samples will continue to be collected during dry and wet weather over the next two years so that the RPs can obtain a more robust dataset to adequately assess the 2018 interim goals at Tidelands Park and North Beach. A full description and a complete set of receiving water monitoring data collected during this reporting year is presented in Appendix 4.

8.3.2 MS4 Monitoring

MS4 outfall monitoring related to swimmable waters includes bacterial indicators at two locations, at North Beach (Coronado) and one at Tidelands Park (Port of San Diego). MS4 outfall monitoring is performed when flow or standing water is detected at the outfall. The MS4 monitoring related to the Focused Priority Monitoring was initiated in November 2015 and is slated to continue in the coming reporting year. The additional MS4 outfall data collected by RPs will be used to support any future BMP decisions and assess effectiveness, should they be necessary, to meet the interim and final goals.

At Tidelands Park, 14 site visits were conducted during the reporting year resulting in collection of seven MS4 outfall samples (at one outfall site during the dry season/dry weather and at all three outfalls on two of the wet season/wet weather monitoring events). At North Beach, 14 site visits were conducted during the reporting year, resulting in collection of six MS4 outfall samples. Monitoring efforts and monitoring data collected during this reporting year are presented in Appendix 4. The RPs will continue to collect additional MS4 outfall data to support any future BMP decisions and assess effectiveness, should they be necessary, to meet the interim and final goals.

8.4 Progress Toward Achieving Numeric Goals

The RPs' water quality monitoring program was initiated in November 2015 upon approval of the WQIP and the Monitoring and Assessment Program and the program continued through September 2016. The monitoring program will allow the RPs gain data to report progress toward achieving swimmable waters numeric goals.

The dry weather monitoring results for *Enterococcus* at Tidelands Park indicates that the receiving water quality continued to maintain the current or baseline dry weather exceedance rate at this location. Although, wet weather sampling was initiated in this reporting period, the data set is limited to one year and additional monitoring data will be beneficial in understanding what the exceedance rate of wet weather samples may be and if it may be decreasing. The RPs anticipate having a more robust data set at the end of FY 2017. Table 8-3 summarizes the RPs' progress toward interim goals established for the Municipal Permit term.

In addition, recent Heal the Bay Report Card results indicate that Tidelands Park continued to meet baseline conditions in the receiving water during summer dry season. Tidelands Park was given an A grade for the summer dry season/dry weather in the 2015–2016 Heal the Bay Report[13], using data collected by the DEH in 2014–2015. North Beach was not evaluated by Heal the Bay. Additional data were collected at both sites starting in November 2015 and these data will help track progress toward the goals related to water quality and future report cards assessments (i.e., Heal the Bay).

[13]Heal the Bay Beach Report Card, http://www.healthebay.org/sites/default/files/BRC_2016_final.pdf

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Table 8-3
Progress Toward Municipal Permit Term Numeric Goal for Swimmable Waters in the Coronado HA

Planning Period			Assessment Period		
Performance Measure – Achieve by FY 2018					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
Receiving Water Removal from the 303(d) List for Recreation Water Contact (REC-1 Beneficial Use)	% of samples exceeding single-sample *Enterococcus* WQO[1]	Below 15% for dry weather monitoring[2] 44% for wet weather monitoring[3]	12.5% of the dry weather receiving water samples collected at Tidelands Park exceeded single sample *Enterococcus* WQO in this reporting period. Initial wet weather data collection began in November 2015, and a more robust data set is anticipated by the end of FY 2017. During this reporting year, both wet and dry weather data were collected and will be continued as planned. Data collected are presented in Appendix 4.	Data collection is progressing in accordance with a schedule that will allow completion on or before the scheduled completion period.	No adaptive management actions identified or required during this reporting period.
OR					

Table 8-3 (continued)
Progress Toward Coronado Municipal Permit Term Numeric Goal for Swimmable Waters in Coronado HA

Planning Period			Assessment Period		
Performance Measure – Achieve by FY 2018					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions
	Dry Weather				
Water Quality Report Card – Achieve grade and inform the public	% Water Quality Report Card grade achieved (dry weather)[5]	80% – Grade A[6]	% Water Quality Report Card grade achieved (dry weather)[5]	Tidelands Park was given an A grade for the summer dry season by the 2015–2016 Heal the Bay report using 2014-2015 data. Data collection is progressing in accordance with a schedule that will allow an assessment once the report card is developed.	% Water Quality Report Card grade achieved (dry weather)[5]
	Wet Weather				
Water Quality Report Card – Achieve grade and inform the public (continued)	% Water Quality Report Card grade achieved (wet weather)	58% – Grade A[7]	% Water Quality Report Card grade achieved (wet weather)	Data collection is progressing in accordance with a schedule that will allow an assessment once the report card is developed.	% Water Quality Report Card grade achieved (wet weather)

Table 8-3 (continued)
Progress Toward Coronado Municipal Permit Term Numeric Goal for Swimmable Waters in Coronado HA

Planning Period			Assessment Period		
Performance Measure – Achieve by FY 2018					
Interim Goal and Progress Information	Performance Metric	Baseline Data	Data Collected/ Results	Progress	Adaptive Management Actions

Notes:

% = percent; CEDEN = California Environmental Data Exchange Network; FY = fiscal year; REC-1 = water contact recreation beneficial use; WQO = water quality objective

1. To include wet weather and wet season (November–March) data in the assessment, which are not collected frequently enough for a geometric mean calculation, single sample WQOs for *Enterococcus* will be used for assessment purposes.
2. Cumulative data from 1999–2014 showed a dry weather exceedance rate below the allowable threshold for 303(d) delisting consideration. Because of this finding, the interim and final goals are focused on maintaining the current dry weather exceedance rate, while simultaneously lowering the exceedance rate of wet weather samples.
3. Baseline determined from line of evidence 27343 in the Final California 2010 Integrated Report 303(d) List/305(b) Report), which found 4 out of 9 wet weather receiving water samples exceeded the *Enterococcus* WQO. At the time the baseline was established, no other wet weather data was available to the RPs.
4. The Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) list states that WQOs for bacteria are not exceeded using a binomial distribution methodology. The Policy also allows use of a reference beach to compare results. The binomial distribution allows approximately 15% of samples to exceed WQO.
5. Percentage of beaches will be calculated using a five-year rolling average of two beaches, Tidelands Park and North Beach within in the Coronado HA (910.1), using the report card methodology from Heal the Bay. Data will be collected as planned and will continue to feed into future reports.
6. Baseline for dry weather was calculated using a five-year rolling average (2010–2011 through 2014–2015) for Tidelands Park from the Heal the Bay report cards. Results: Four As all years except for one B in 2012–2013 yield the 80% baseline. Data will be collected for North Beach starting in FY 2016. Interim and final targets are based on the five-year rolling average grade card scores received for Tidelands Park and North Beach locations using the Heal the Bay methodology.
7. Using the Heal the Bay Annual Reports, the baseline for wet weather was calculated using a five-year rolling average for approximately 40 San Diego County Beaches. However, the five-year rolling average scores include data collected drought conditions as noted in the Heal the Bay Report for 2014–2015. Using a five-year rolling average is anticipated to attenuate variability between drought and normal/high rainfall years. Wet weather data to be collected to determine percentage of years the beaches (Tidelands and North Beach) achieve water quality report grade of A.

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8.5 Water Quality Strategies and Schedules Adaptations

Coronado identified one modification to its strategies and schedules. Further evaluation of the MS4 inventory revealed that there are no remaining corrugated metal pipe (CMP) components in the system. Therefore, a Capital Improvement Plan specifically targeting MS4 improvements to replace CMP to mitigate infiltration and reduce diversion flows to the sewer system was not necessary. Jurisdictional strategy CO-15.5 for a CMP Capital Improvement Plan of the MS4 will be deleted because it is no longer relevant. Other types of jurisdictional strategies to improve the MS4 infrastructure and operation will continue in place to prevent infiltration (CO-17), repair and replacement (CO-15.3), etc.

There were no modifications or additions to the Port of San Diego’s strategies and schedules.

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9 Adaptive Management

Adaptive management uses an iterative approach to re-evaluate major components of the WQIP based on the requirements of the Municipal Permit. The WQIP details how the RPs use new data and information to improve it through updates to priorities, assessments of and adjustments to goals, updates to strategies to meet the latest goals, and updates to the monitoring and assessment program to provide the necessary data to support the process.

The adaptive management process is used in conjunction with water quality and programmatic data to evaluate whether modifications to numeric goals, schedules, or strategies are necessary to achieve compliance with the interim and final numeric goals. The timing of the adaptive management process may be applied annually but is more likely to be completed at the end of the Municipal Permit term.

9.1 Potential Triggers for Adaptation

The adaptive management process may be triggered when new information becomes available. New information to be considered includes results of routine monitoring and special studies, new regulatory drivers, results of program effectiveness assessments and progress towards numeric goals, and recommendations from the public or Regional Board. The Municipal Permit describes various triggers that may warrant program adaptation, including exceedances of water quality standards in receiving waters, new information, Regional Board recommendations, and input by the public. Effectiveness assessments of JRMP programs and strategies may also trigger adaptations to the Water Quality Improvement Plan.

Modifications may be made to the priority water quality conditions, goals, strategies, schedules, or the Monitoring and Assessment Program. The potential triggers for adaptation that must be considered annually are summarized in Table 9-1; however, no triggers for adapting or modifying the WQIP for this monitoring period were met.

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Table 9-1
Causes for Adaptive Management Within the Water Quality Improvement Plan

Trigger	Frequency for Assessment	Potential Area(s) for Adaptation				Adaptive Management Action for FY 2017?
		Priority Water Quality Conditions	Goals and Schedules	Strategies and Schedules	Monitoring and Assessment	
Exceedances of Receiving Water Limitations	Annual	—	—	X	X	No
Exceedances of Non-Storm Water Action Levels or Storm Water Action Levels	Annual	—	—	X	X	No
Special Studies Results	Annual, as results are available	—	X	X	X	No
New Regulatory Actions	Annual, as applicable	X	X	X	X	No
Regional Board Recommendations	Annual, as applicable	X	X	X	X	No
Program Effectiveness Assessments/ Progress Toward Goals	Annual	—	—	X	X	No[1]

Notes:

FY = fiscal year

1. Minor changes to strategies of multiple jurisdictions are provided in Appendix 2.

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9.2 Water Quality Improvement Plan Elements for Adaptation

The San Diego Bay WMA WQIP was approved by the Regional Board in February 2016. As a result, the RPs have implemented the WQIP and their jurisdictional programs and strategies for approximately a five-month period. Therefore, no adaptations have been made to the Highest Priority Conditions and Focused Priority Conditions. One interim goal was modified after the FY 2016 monitoring year: the Airport Authority has adapted one performance goal, as further discussed in Section 9.2.1. Since the implementation of strategies, multiple jurisdictions have made minor changes to their strategies; all strategy modifications are in Appendix 2 including any new strategies added by jurisdictions. The modifications are summarized in Table 9-2 and details are in Appendix 5.

Table 9-2
FY 2016 Water Quality Improvement Plan Annual Report Adaptations

Elements for Adaptation	FY 2016 Annual Report Adaptation
Highest and Focused Priority Water Quality Conditions	There are no adaptations to the Highest and Focused Priority Water Quality conditions during this reporting period. No new regulations, policies, or recommendations from the Regional Board have triggered adaption of this Water Quality Improvement Plan Element.
Goals and Schedules	The Responsible Parties are on track to meet their 2018 interim Water Quality Improvement Plan goals and do not propose any adaptations to their goals or the related schedules for this reporting period. In addition, the Airport Authority has modified one performance-based goal.
Strategies and Schedules	The Responsible Parties have just begun implementation of their Water Quality Improvement Plan strategies. They plan to continue implementing the strategies with minor modifications, if needed, with the goal of obtaining pollutant reduction benefits.[1]

Notes:
1. Proposed minor administrative changes to select strategies completed by various jurisdictions in FY 2016 do not qualify as an update to the WQIP.

9.2.1 Airport Authority Goal Adaptation

The Airport Authority proposes to modify the performance goal for airside street sweeping in sub-basins 1, 3, and 5 combined as a result of better recordkeeping, communication, and analysis. During FY 2016, the FMD and EAD implemented more efficient methods to track the location, date, and frequency of sweeping activities. The total area of runway and taxiways that was swept in sub-basins 1, 3, and 5 combined in FY 2016 was approximately 364 acres, resulting in an average of 7 acres of runway and taxiway pavement swept weekly. The Airport Authority proposes to modify the FY 2018 interim performance goal for street sweeping to 21 acres/week of runway and taxiway pavement in sub-basins 1, 3, and 5 combined. The Airport Authority's FY 2018 current interim performance goal for street sweeping in this area, as listed in the WQIP, was a three-fold increase amount of area currently being swept. The modification also increases specificity in the performance goal and focuses street sweeping to the eastern portion of the runway and taxiways alone.

Further details and progress towards goals are provided in Section 5.

9.3 Otay Hydromodification Exemption

A technical study, including hydrologic modeling and an erosion potential analysis supporting a proposed hydromodification management requirements exemption for a portion of the Otay River, was prepared and submitted to the RPs on behalf of developers. The specific portion of the Otay River that the study considered is between Lower Otay Lakes and I-805; the RPs with jurisdictional area that drains to this reach are Chula Vista, the City of San Diego, and the County of San Diego. Figure 9-1 shows the USEPA Storm Water Management Model (SWMM) study areas used in the erosion potential analysis study. These three agencies commissioned a third-party review of the submitted study, which indicated that the study appeared to meet the relevant Municipal Permit requirements for a hydromodification management exemption. The study prepared by developers and the third-party review of the study were provided to the Consultation Panel for review and comment. A public Consultation Panel meeting was also held on August 23, 2016, to discuss comments on the study. No comments objecting to the proposed exemption from hydromodification requirements were submitted by the Consultation Panel. Accordingly, the exemption has been incorporated into the WQIP by modifying the Watershed Management Area Analysis (WMAA), included at Attachment A of Appendix 5. The updated WMAA is considered acceptable for inclusion into the WQIP ninety days after submission, unless the RPs are otherwise notified by the Regional Board.

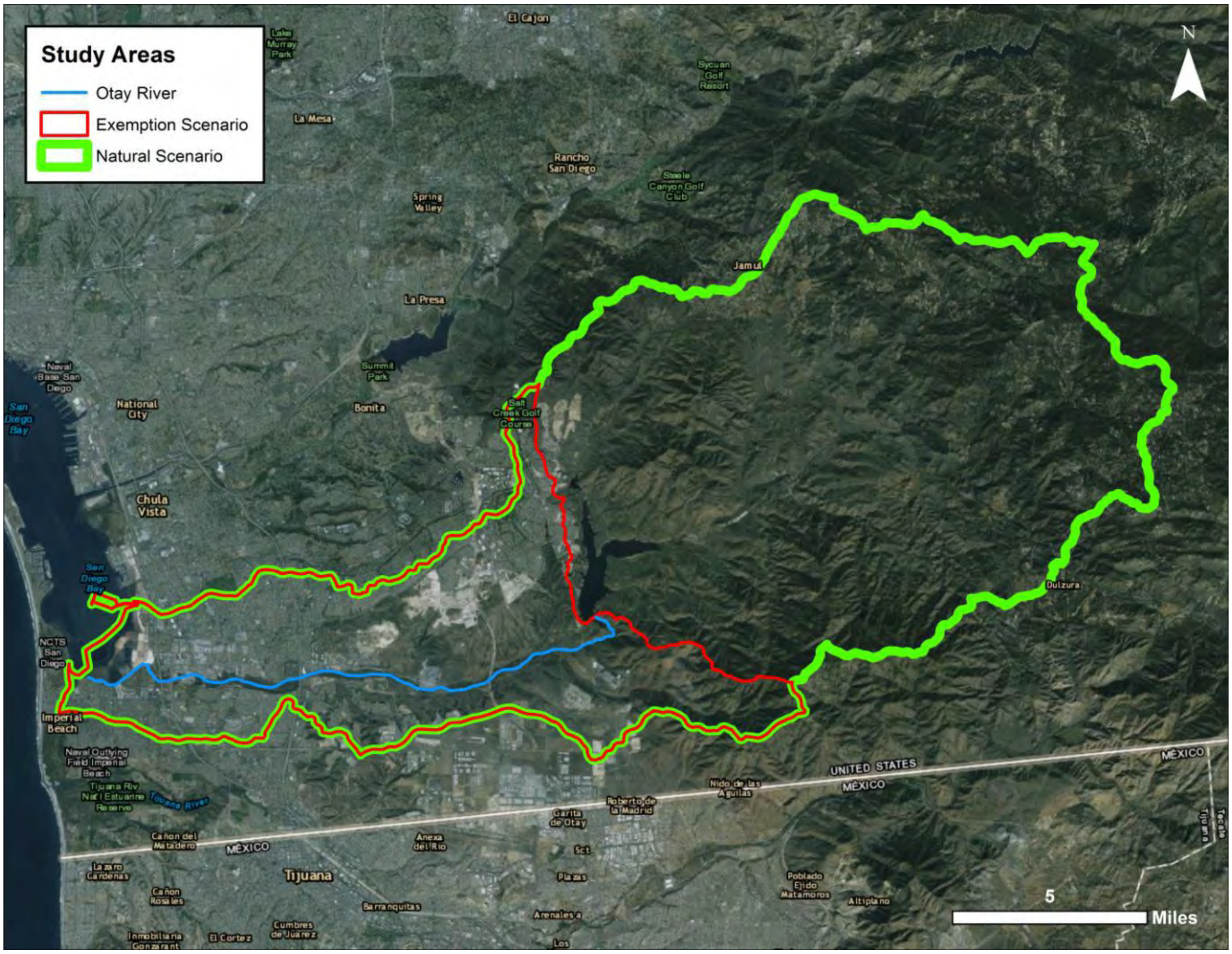

Figure 9-1
Storm Water Management Model Study Areas

9.4 Summary of Previous Adaptation and Implementation

The 2015–2016 San Diego Bay WMA WQIP Annual Report is the first Annual Report submitted by the RPs under the 2013 Municipal Permit. However, in 2016, RPs updated their 2007 permit-based JRMPs, and modified their programs to comply with the 2013 Municipal Permit's WQIP and JRMP requirements. The updated JRMPs are available on each RP's website.

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10 Conclusions

The RPs successfully implemented the FY 2016 program set forth in the WQIP. Although the WQIP has only just begun to be implemented—implementation began after Regional Board acceptance in February 2016—results for FY 2016 indicate significant progress toward achieving numeric goals. Highlights of strategies implemented during FY 2016 and progress toward numeric goals are provided below.

Strategy Implementation

RPs' programs and strategies target the applicable Highest or Focused Priority Conditions but also often provide additional water quality benefits, as described in Sections 4 through Section 8. For example, installing green streets or green infrastructure reduces a wide range of pollutants. Highlights of the RPs' strategy implementation to improve water quality during the reporting year include the following:

- Green Streets: University Avenue Median Water Quality Improvement Project (La Mesa). This project will remove and replace impervious medians with pervious bioretention areas that are designed to reduce pollutant discharges to receiving waters. The project is currently under construction, with an anticipated completion date of May 2017.
- Runoff Redirection (Lemon Grove). Lemon Grove performed initial site research to identify feasible locations for curb cuts to divert runoff from paved areas to landscaping at municipal facilities. A curb cut to direct runoff from the parking lot at City Hall to landscaping was completed in early FY 2017. Feasibility of directing downspout runoff to landscaping was also completed at municipal facilities in FY 2016.
- Storm Water BMPs (City of San Diego [City])
    - In FY 2016, more than 25 acres of drainage area were treated by green infrastructure features within the San Diego Bay WMA, and approximately 63 additional acres are expected to be treated by FY 2018.
    - To increase removal of metals and sediment, the City has started to enhance street sweeping operations in accordance with strategy CSD-JRMP-34 by sweeping a route in the Chollas Creek subwatershed with a regenerative air sweeper. The City also began sweeping routes with different sweeping technologies to determine the most effective sweeping practices for individual routes.
    - In accordance with the enhanced catch basin cleaning program identified in strategy CSD-JRMP-24, the City completed additional inspections, and cleanings where necessary, based on inspection results, at 2,500 catch basins in the Chollas Creek HSA.
    - The City completed the first phase of a drainage master plan for the Chollas Creek HSA. The drainage master plan uses precise light imaging, detection

and ranging (LIDAR) data to identify a vast range of potential structural BMPs and locations. Locations are identified to maximize the efficiency of the BMP by locating the facility in an area that will treat larger and/or multiple drainage areas. This planning will maximize pollutant removal from green infrastructure and reduce the number of green infrastructure projects (and associated costs) that will be needed to meet TMDL requirements.

- Dry Weather Flow Reduction and Water Conservation (County of San Diego [County]). As a regional leader in water conservation, the County implements several programs and strategies, both independently and in partnership with other agencies to help conserve local water supplies. In response to drought conditions in the region, the County developed a Drought Response Action Plan to reduce water use at its facilities, which has resulted in savings of 60 million gallons of water in County parks during FY 2015–2016. Since 2009, the installation of high-efficiency irrigation heads in 20 parks county-wide, many of which are located in the San Diego Bay area, have contributed significantly to these water savings. During the fiscal year, additional efforts included two rain barrel distribution events that were facilitated by the County in partnership with other agencies. Under its WaterSmart Campaign, the County has also collaborated with the San Diego County Water Authority to help distribute water conservation educational materials. This effort has included promotion of available water conservation rebates and incentives such as water efficiency audits and other tools to help save water.

- Sweeping Airside Corridors (Airport Authority). Aircraft and vehicle tire and brake wear are sources of copper and zinc from these locations. Under the WQIP, sweeping on the eastern end of the airfield (in particular, the runway and taxiways) will be modified and enhanced to increase the effectiveness of sweeping in FY 2017. The Airport Authority has obtained a Regen-Air vacuum sweeper, which has been shown to perform better than mechanical broom sweepers in removing fine sediments.

- Restoration of Paradise Creek (National City). National City's approach is to implement improvements directly in Paradise Creek and in areas tributary to the creek. During FY 2016 the City began a project to restore the approximately 1,000-linear-foot reach of Paradise Creek that runs through Kimball Park by replacing the existing concrete-bottom channel with a natural-bottom channel and replacing turf grass and invasive plant species with native plants along the banks.

- Homeless Outreach Program (Chula Vista). Chula Vista formed a Homeless Outreach Team during the reporting period to provide a holistic approach to addressing homelessness issues. The program targets a number of city parks, facilities, and problem areas. Staff visit these areas once per week and have been able to remove over 1,000 pounds of trash per week from the encampments.

- Municipal Solid Waste Receptacle Assessment (Port of San Diego). The Port of San Diego conducted a jurisdiction-wide evaluation of the municipal solid waste receptacles currently in use in the Port of San Diego's parks. The purpose of the assessment was to develop the information necessary to support management decisions related to (1) waste and recycling receptacle type and placement, (2) the adequacy of receptacles to prevent municipal solid waste from entering the MS4 and reduce pollution associated with municipal solid waste (i.e., lids, overhead cover, signage, etc.), and (3) recommended modifications (e.g., either by retrofitting current receptacles, replacing receptacles with more effective models, or adding receptacles/bins where needed). This assessment is scheduled to be completed in FY 2017.

- <u>Improvement of Dirt Alleys</u> (Imperial Beach). During this reporting period, Imperial Beach completed the design and construction of the first phase of alley improvements for 14 alley segments (over 1 mile of dirt alleys) in the community. The primary water quality benefit for this project is to address the pollutants for trash, sediment, and bacteria. This project provides a total annual storm water capture volume of 33,000 cubic feet and an annual sediment load reduction of approximately 160 pounds.
- <u>Elimination of Groundwater Intrusion</u> (Coronado). During the reporting period, Coronado initiated an MS4 capital improvement project to eliminate groundwater infiltration to the MS4. Project planning and design were completed to install a liner in the existing storm drain and perform other repairs. The project is scheduled to start construction in early 2017. Upon completion, this project will have multiple environmental benefits, including reducing potential bacteria regrowth in the MS4 from standing groundwater in the pipeline, eliminating groundwater diversion to the sanitary sewer, reducing the potential for bacteria to enter the receiving waters, and reducing greenhouse gases from pump operations to dewater the MS4.
- <u>San Diego Bay WMA Strategies (All Responsible Parties)</u>: The RPs have begun to implement wetland restoration, habitat restoration, and public access improvements to support multiple benefits in the San Diego Bay WMA through current public-private partnerships and partnerships with other state, federal, and local agencies.

Progress Toward Goals

The RPs have demonstrated achievement of the performance measures planned for 2015–2016, and have either met, surpassed, or demonstrated progress toward achieving the interim numeric goals set for the term of the current Municipal Permit. Goals and examples of performance measures achieved include:

- Chollas Creek Metals, Diazinon, and Bacteria:
  - La Mesa – The University Avenue Median Water Quality Improvement project, which is converting University Avenue to a green street by installing biofiltration BMPs, is on schedule to be completed in 2017.

- Lemon Grove – Lemon Grove performed initial site research to identify feasible locations for curb cuts to divert runoff from paved areas to landscaping at municipal facilities. A curb cut to direct runoff from the parking lot at City Hall to landscaping was completed in early FY 2017.
- City of San Diego – The City implemented green infrastructure projects that treat 25.14 acres of drainage area and is expected to achieve the 44.6-acre performance measure requirement by implementing additional projects that will treat a total of 88.24 acres by FY 2018.
- County of San Diego – Ongoing maintenance was performed at two facilities where LID BMPs were previously constructed: (1) Southeast Family Resource Center, and (2) Central Regional Public Health Center. These efforts have effectively reduced flows during storm events and reduced concentrations of key contaminants.

- Water Quality Due to Copper and Zinc (Airport Authority) – Zinc concentrations measured in MS4 discharges were lower than the FY 2021 goal.
- Riparian Area (National City)
    - The current Municipal Permit term goals of collecting and analyzing 48 samples for selenium were achieved, with zero exceedances of the WQO.
    - Creek restoration work for Paradise Creek is underway and is on track to be completed in 2017.
- Physical Aesthetics (Chula Vista, Imperial Beach, and Port of San Diego) – An optimal rating was recorded for 73% of MS4 outfall trash assessments, which exceeds the 2018 interim goal of 65%.
- Swimmable Waters (Coronado and Port of San Diego) – Tidelands Park was given an A grade for the summer dry season in the 2015–2016 Heal the Bay report (http://brc.healthebay.org/).

11 References

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APPENDIX 1

CROSSWALK OF MUNICIPAL PERMIT REQUIREMENTS AND ANNUAL REPORT REFERENCES

Table 1-1
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices: Appendix 2: WQIP Numeric Goals	Appendix 3: Jurisdictional Information	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management	Appendix 6: GIS Shapefiles
Provision A							
A.4.a.(2)	If ***exceedance(s) of water quality standards persist in receiving waters*** notwithstanding implementation of this Order, the Copermittees must comply with the following procedures: (2) Upon a **determination** by either the Copermittees or the San Diego Water Board that discharges from the MS4 are **causing or contributing to a new exceedance** of an applicable water quality standard **not addressed** by the Water Quality Improvement Plan, the Copermittees must submit the following updates to the Water Quality Improvement Plan pursuant to Provision F.2.c ***or as part of the Water Quality Improvement Plan Annual Report*** required under Provision F.3.b, unless the San Diego Water Board directs an earlier submittal:	Section 9		X	X	X	X
	(a) The water quality improvement ***strategies being implemented that are effective and will continue to be implemented***,	Section 9		X			
	(b) ***Water quality improvement strategies (i.e. BMPs, retrofitting projects, stream and/or habitat rehabilitation projects, adjustments to jurisdictional runoff management programs, etc.) that will be implemented*** to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards,	Section 9		X		X	
	(c) ***Updates to the schedule for implementation*** of the existing and additional water quality improvement strategies, and	Section 9		X		X	
	(d) ***Updates to the monitoring and assessment program*** to track progress toward achieving compliance with Provisions A.1.a, A.1.c and A.2.a of this Order;	Section 9		X		X	X
Provision B							
B.5.a.	a. The **priority water quality conditions** and potential **water quality improvement strategie**s included in the Water Quality Improvement Plan pursuant to Provisions B.2.c and B.2.e ***may be re-evaluated by the Copermittees as needed during the term of this Order as part of the Water Quality Improvement Plan Annual Report***. Re-evaluation and recommendations for modifications to the priority water quality conditions and potential water quality improvement strategies **must be provided in the Report of Waste Discharge**, and must consider the following: (1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan; (2) New information developed when the requirements of Provisions B.2.a-c have been re-evaluated; (3) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality conditions and implementation strategies to address the highest priority water quality conditions; (4) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees; (5) San Diego Water Board recommendations; and (6) Recommendations for modifications solicited through a public participation process.	Section 9			X	X	

Table 1-1 (continued)
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices				
			Appendix 2: WQIP Numeric Goals	Appendix 3: Jurisdictional Information	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management	Appendix 6: GIS Shapefiles
B.5.b.	b. The water quality improvement goals, strategies and schedules, included in the Water Quality Improvement Plan pursuant to Provisions B.3, ***must be reevaluated and adapted as new information becomes available*** to result in more effective and efficient measures to address the highest priority water quality conditions identified pursuant to Provision B.2.c. ***Re-evaluation of and modifications to the water quality improvement goals, strategies and schedules must be provided in the Water Quality Improvement Plan Annual Report***, and must consider the following:	Section 9	X			X	
	(1) Modifications to the **priority water quality conditions** based on Provision B.5.a;	Section 9				X	X
	(2) Progress toward **achieving interim and final numeric goals** in receiving waters and MS4 discharges for the highest priority water quality conditions in the Watershed Management Area,	Sections 4-8	X				
	(3) Progress toward achieving outcomes according to established schedules;	Sections 4-8		X			
	(4) New policies or regulations that may affect identified numeric goals;	Section 9				X	
	(5) Measurable or demonstrable reductions of non-storm water discharges to and from each Copermittee's MS4;	Section 3			X		
	(6) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;	Sections 4-8			X		
	(7) New information developed when the requirements of Provisions B.2.b and B.2.d have been re-evaluated;	Section 9			X	X	X
	(8) Efficiency in implementing the Water Quality Improvement Plan;	Section 9		X		X	
	(9) San Diego Water Board recommendations; and	Section 9				X	
	(10) Recommendations for modifications solicited through a public participation process.	Section 9				X	
B.5.c.	c. The water quality improvement monitoring and assessment program, included in the Water Quality Improvement Plan pursuant to Provision B.4, ***must be reevaluated and adapted when new information becomes available***. Re-evaluation and recommendations for modifications to the monitoring and assessment program, pursuant to the requirements of Provision D, ***may be provided in the Water Quality Improvement Plan Annual Report***, but must be provided in the Report of Waste Discharge.	Section 9			X	X	X

Table 1-1 (continued)
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices				
			Appendix 2: WQIP Numeric Goals	Appendix 3: Jurisdictional Information	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management	Appendix 6: GIS Shapefiles
Provision D							
D.1.e.(2)(c)	**Sediment Quality Monitoring** (c) The Copermittees must incorporate a ***Sediment Monitoring Report as part of the Water Quality Improvement Plan Annual Report*** in accordance with the schedule contained in the Sediment Monitoring Plan, unless otherwise directed in writing by the San Diego Water Board Executive Officer. The Sediment Monitoring Report must contain the following information: (i) Analysis: An evaluation, interpretation and tabulation of the water and sediment monitoring data, including interpretations and conclusions as to whether applicable Receiving Water Limitations in this Order have been attained at each sample station; (ii) Sample Location Map: The locations, type, and number of samples must be identified and shown on a site map; and (iii) California Environmental Data Exchange Network: A statement certifying that the monitoring data and results have been uploaded into the California Environmental Data Exchange Network (CEDEN).	Section 3			X		
D.2.b.(iv)	**Dry Weather MS4 Outfall Discharge Monitoring** (iv) Each Copermittee must document ***removal or re-prioritization of the highest priority persistent flow MS4 outfall monitoring stations identified under Provision D.2.b.(2)(a) in the Water Quality Improvement Plan Annual Report***. Persistent flow MS4 outfall monitoring stations that have been removed must be replaced with the next highest prioritized major MS4 outfall in the Watershed Management Area within its jurisdiction, unless there are no remaining qualifying major MS4 outfalls within the Copermittee's jurisdiction in the Watershed Management Area.	Section 3			X		
D.4.b.(1)(a)(ii)	**Non-Storm Water Dischargers Reduction Assessments** (a) Each Copermittee must assess and report the ***progress of its illicit discharge detection and elimination program***, required to be implemented pursuant to Provision E.2, toward effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction as follows: (ii) Based on the data collected pursuant to Provisions D.2.b, the ***assessments required under <u>Provision D.4.b.(1)(c)</u> must be included in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3).***	Section 3			X		
D.4.b.(1)(b)	(b) Based on the transitional dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.a.(2), each Copermittee must assess and report the following: (i) Identify the known and suspected controllable sources (e.g. facilities, areas, land uses, pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area; (ii) Identify sources of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area that have been reduced or eliminated; and (iii) Identify modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.	Section 3			X	X	

Table 1-1 (continued)
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices: Appendix 2: WQIP Numeric Goals	WQIP Appendices: Appendix 3: Jurisdictional Information	WQIP Appendices: Appendix 4: Monitoring & Assessments	WQIP Appendices: Appendix 5: Adaptive Management	WQIP Appendices: Appendix 6: GIS Shapefiles
D.4.b.(1)(c)	(c) Based on the ***dry weather MS4 outfall discharge field screening monitoring*** required pursuant to Provision D.2.b.(1), each Copermittee must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(1)(b); (ii) Based on the data collected and applicable NALs in the Water Quality Improvement Plan, rank the MS4 outfalls in the Copermittee's jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan, with the goal of eliminating persistent flow non-storm water discharges and/or pollutant loads in order of the ranked priority list through targeted programmatic actions and source investigations; (iii) For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identify the known and suspected sources within the Copermittee's jurisdiction in the Watershed Management Area that may cause or contribute to the NAL exceedances; (iv) Each Copermittee must analyze the data collected pursuant to Provision D.2.b, and utilize a model or other method, to calculate or estimate the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually. [a] Each Copermittee must calculate or estimate the annual non-storm water volumes and pollutant loads collectively discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall; [b] Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters.	Section 3			X		
	(v) Each Copermittee must review the data collected pursuant to Provision D.2.b and findings from the assessments required pursuant to Provision D.4.b.(1)(c)(i)-(iv) at least once during the term of this Order to: [a] Identify reductions and progress in achieving reductions in non-storm water and illicit discharges to the Copermittee's MS4 in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction, with an estimate, if possible, of the non-storm water volume and/or pollutant load reductions attributable to specific water quality strategies implemented by the Copermittee; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittee in the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction. (vi) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(1)(c)(i)-(v).	Section 3			X		X

Table 1-1 (continued)
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices				
			Appendix 2: WQIP Numeric Goals	Appendix 3: Jurisdictional Information	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management	Appendix 6: GIS Shapefiles
D.4.b.(2)(a)	**Storm Water Pollutant Discharge Reduction Assessments** (a) The Copermittees must assess and report the ***progress of the water quality improvement strategies, required to be implemented pursuant to Provisions B and E, toward reducing pollutants in storm water discharges*** from the MS4s within the Watershed Management Area as follows: (ii) Based on the data collected pursuant to Provisions D.2.c, the ***assessments required under Provision D.4.b.(2)(c) must be included in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).	Section 3			X		
D.4.b.(2)(b)	(b) Based on the transitional wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.a.(3) the Copermittees must assess and report the following: (i) The Copermittees must analyze the monitoring data collected pursuant to Provision D.2.a.(3), and utilize a watershed model or other method, to calculate or estimate the following for each monitoring year: [a] The average storm water runoff coefficient for each land use type within the Watershed Management Area; [b] The volume of storm water and pollutant loads discharged from each of the Copermittee's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch; [c] The total flow volume and pollutant loadings discharged from the Copermittee's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and [d] The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch.(ii) Identify modifications to the wet weather MS4 outfall discharge monitoring locations and frequencies necessary to identify pollutants in storm water discharges from the MS4s in the Watershed Management Area pursuant to Provision D.2.c.(1).	Section 3			X		
D.4.b.(2)(c)	(c) Based on the wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.c the Copermittees must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(2)(b); (ii) Based on the data collected and applicable SALs in the Water Quality Improvement Plan, analyze and compare the monitoring data to the analyses and assumptions used to develop the Water Quality Improvement Plans, including strategies developed pursuant to Provision B.3, and evaluate whether those analyses and assumptions should be updated as a component of the adaptive management efforts pursuant to Provision B.5 for follow-up action to update the Water Quality Improvement Plan; (iii) The Copermittees must review the data collected pursuant to Provision D.2.c and findings from the assessments required pursuant to Provisions D.4.b.(2)(c)(i)-(ii) at least once during the term of this Order to: [a] Identify reductions or progress in achieving reductions in pollutant concentrations and/or pollutant loads from different land uses and/or drainage areas discharging from the Copermittees' MS4s in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters within the Watershed Management Area to the MEP, with an estimate, if possible, of the pollutant load reductions attributable to specific water quality strategies implemented by the Copermittees; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittees in the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters in the Watershed Management Area to the MEP. (iv) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(2)(c)(i)-(iii).	Section 3			X		
D.4.b.(2)(d)	(d) The Copermittees must evaluate all the data collected pursuant to Provision D.2.c, and incorporate new outfall monitoring data into time series plots for each long-term monitoring constituent for the Watershed Management Area, and perform statistical trends analysis on the cumulative long-term wet weather MS4 outfall discharge water quality data set.	Section 4			X		

Table 1-1 (continued)
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices				
			Appendix 2: WQIP Numeric Goals	Appendix 3: Jurisdictional Information	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management	Appendix 6: GIS Shapefiles
D.4.c.	**Special Studies Assessments** c. The Copermittees must ***annually evaluate the results and findings from the special studies developed and implemented pursuant to Provision D.3***, and assess their relevance to the Copermittees' efforts to characterize receiving water conditions, understand sources of pollutants and/or stressors, and control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters in the Watershed Management Area. The Copermittees must ***report the results of the special studies assessments applicable to the Watershed Management Area, and identify any necessary modifications or updates to the Water Quality Improvement Plan based on the results in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).	Section 2, Section 7, Section 9			X	X	X
D.4.d.	Integrated Assessment of Water Quality Improvement Plan d. As part of the ***iterative approach and adaptive management process*** required for the Water Quality Improvement Plan pursuant to Provision B.5, the Copermittees in each Watershed Management Area must integrate the data collected pursuant to Provisions D.1-D.3, the findings from the assessments required pursuant to Provisions D.4.a-c, and information collected during the implementation of the jurisdictional runoff management programs required pursuant to Provision E to assess the effectiveness of, and identify necessary modifications to, the Water Quality Improvement Plan as follows:	Section 9			X	X	
D.4.d.(1)	(1) The Copermittees ***must re-evaluate the priority water quality conditions and numeric goals for the Watershed Management Area, as needed, during the term of this Order pursuant to Provision B.5.a.*** The re-evaluation and recommendations for modifications to the priority water quality conditions, and/or numeric goals and corresponding schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The priority water quality conditions and numeric goals for the Watershed Management Area must be reevaluated as follows: (a) Re-evaluate the receiving water conditions in the Watershed Management Area in accordance with Provision B.2.a; (b) Re-evaluate the impacts on receiving waters in the Watershed Management Area from MS4 discharges in accordance with Provision B.2.b; (c) Re-evaluate the identification of MS4 sources of pollutants and/or stressors in accordance with Provision B.2.d; (d) Identify beneficial uses of the receiving waters that are protected in accordance with Provision D.4.a; (e) Evaluate the progress toward achieving the interim and final numeric goals for protecting impacted beneficial uses in the receiving waters.	Section 9			X	X	X

Table 1-1 (continued)
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices				
			Appendix 2: WQIP Numeric Goals	Appendix 3: Jurisdictional Information	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management	Appendix 6: GIS Shapefiles
D.4.d.(2)	(2) The Copermittees ***must re-evaluate the water quality improvement strategies for the Watershed Management Area during the term of this Order pursuant to Provision B.5.b.*** The re-evaluation and recommendations for modifications to the water quality improvement strategies and schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The water quality improvement strategies for the Watershed Management Area must be re-evaluated as follows: (a) Identify the non-storm water and storm water pollutant loads from the Copermittees' MS4 outfalls in the Watershed Management Area, calculated or estimated pursuant to Provisions D.4.b; (b) Identify the non-storm water and storm water pollutant load reductions, or other improvements to receiving water or water quality conditions, that are necessary to attain the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters; (c) Identify the non-storm water and storm water pollutant load reductions, or other improvements to the quality of MS4 discharges, that are necessary for the Copermittees to demonstrate that non-storm water and storm water discharges from their MS4s are not causing or contributing to exceedances of receiving water limitations; (d) Evaluate the progress of the water quality improvement strategies toward achieving the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters.	Section 9		X		X	
D.4.d.(3)	(3) The Copermittees ***must re-evaluate and adapt the water quality monitoring and assessment program for the Watershed Management Area when new information becomes available to improve the monitoring and assessment program pursuant to Provision B.5.c.*** The re-evaluation and recommendations for modifications to the monitoring and assessment program ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. Modifications to the water quality monitoring and assessment program must be consistent with the requirements of Provision D.1-D.3. The re-evaluation of the water quality monitoring and assessment program for the Watershed Management Area must consider the data gaps identified by the assessments required pursuant to Provisions D.4.a-b, and results of the special studies implemented pursuant to Provision D.4.c	Section 9			X	X	X
Provision E							
E.1.b.	b. With the first ***Water Quality Improvement Plan Annual Report*** *required pursuant to Provision F.3.b.(3),* ***each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority*** within its jurisdiction to implement and enforce each of the requirements contained in this Order.	Certification Statement		X			

Table 1-1 (continued)
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices				
			Appendix 2: WQIP Numeric Goals	Appendix 3: Jurisdictional Information	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management	Appendix 6: GIS Shapefiles
E.2.d.(4)	(4) Each Copermittee must submit a ***summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its jurisdiction with each Water Quality Improvement Plan Annual Report required under Provision F.3.b.(3)*** of this Order.	JRMP Forms		X	X		
E.8.c.	c. Each Copermittee must submit a ***summary of the annual fiscal analysis with each Water Quality Improvement Plan Annual Report required pursuant to Provision F.3.b.(3)***.	Fiscal Analysis		X			
Provision F							
F.1.b.(6)	(6) During implementation of the Water Quality Improvement Plan the Copermittees must ***correct any deficiencies in the Plan identified by the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report*** following a request by the Board to do so.	Section 9				X	
F.2.a.(2)	(2) Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the jurisdictional runoff management program document based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;***	Section 9		X		X	
F.2.a.(3)	(3) Each Copermittee must submit ***updates to its jurisdictional runoff management program, with the supporting rationale for the modifications, either in the Water Quality Improvement Plan Annual Report*** required pursuant to Provision F.3.b.(3), or as part of the Report of Waste Discharge required pursuant to Provision F.5.b	Section 9		X		X	
F.2.b.(1)	(1) Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provisions E.3.a-d concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the BMP Design Manual based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;***	Section 9		X			
F.2.b.(2)	(2) Any ***future updates to the BMP Design Manual*** made after it update pursuant to Provision F.2.b.(1) is completed must be consistent with the requirements of Provisions E.3.a-d and ***must be submitted as part of the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b; and	Section 9		X			
F.2.c.(1)(c)	(c) The Copermittees for each Watershed Management Area ***must submit 1) proposed updates to the Water Quality Improvement Plan and supporting rationale, and 2) recommendations received from the public and the Water Quality Improvement Consultation Panel and the rationale for the requested updates, either in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b.	Section 9				X	X

Table 1-1 (continued)
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices				
			Appendix 2: WQIP Numeric Goals	Appendix 3: Jurisdictional Information	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management	Appendix 6: GIS Shapefiles
F.3.b.(3)(a-f)	(3) Water Quality Improvement Plan Annual Reports - The Copermittees for each Watershed Management Area must ***submit a Water Quality Improvement Plan Annual Report for each reporting period no later than January 31*** of the following year. The annual reporting period consists of two different periods: 1) July 1 to June 30 of the following year for the jurisdictional runoff management programs, 2) October 1 to September 30 of the following year for the monitoring and assessment programs. The Water Quality Improvement Plan Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each ***Annual Report must include the following***:	-					
	(a) The receiving water and MS4 outfall discharge monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;	Section 3			X		
	(b) The progress of the special studies required pursuant to Provision D.3, and the findings, interpretations and conclusions of a special study, or each phase of a special study, upon its completion;	Section 3			X		
	(c) The findings, interpretations and conclusions from the assessments required pursuant to Provision D.4;	Section 3			X		
	(d) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following: (i) The ***progress toward achieving the interim and final numeric goals*** for the highest water quality priorities for the Watershed Management Area;	Sections 4-8					
	(ii) The water quality improvement ***strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods***;	Sections 4-8		X		X	
	(iii) The water quality improvement strategies planned for implementation during the next reporting period;	Sections 4-8		X		X	
	(iv) Proposed modifications to the water quality improvement strategies, the public comments received and the supporting rationale for the proposed modifications;	Section 9		X		X	X
	(v) Previous modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area; and	Section 9		X		X	
	(vi) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;	Section 9		X		X	X
	(e) A completed Jurisdictional Runoff Management Program Annual Report Form (contained in Attachment D to this Order or a revised form accepted by the San Diego Water Board) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative; and	JRMP Forms		X			
	(f) Each Copermittee must provide any data or documentation utilized in developing the Water Quality Improvement Plan Annual Report upon request by the San Diego Water Board. Any Copermittee monitoring data utilized in developing the Water Quality Improvement Plan Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN). Any Copermittee monitoring and assessment data utilized in developing the Water Quality Improvement Plan Annual Report must be available for access on the Regional Clearinghouse required pursuant to Provision F.4.	CEDEN Upload Certifications			X		X
F.6	Each Copermittee must comply with all the reporting and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.	Section 9		X			X
Attachment E							
Attachment E	Specific Monitoring and Assessment Requirements for each TMDL.TMDL monitoring and assessment results must be submitted as part of Water Quality Improvement Plan Annual Reports required under Provision F.3.b	Section 3			X		

APPENDIX 1

CROSSWALK OF MUNICIPAL PERMIT REQUIREMENTS AND ANNUAL REPORT REFERENCES

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Table 1-1
Crosswalk of Municipal Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices			
			Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
Provision A						
A.4.a.(2)	If *exceedance(s) of water quality standards persist in receiving waters* notwithstanding implementation of this Order, the Copermittees must comply with the following procedures: (2) Upon a determination by either the Copermittees or the San Diego Water Board that discharges from the MS4 are causing or contributing to a new exceedance of an applicable water quality standard not addressed by the Water Quality Improvement Plan, the Copermittees must submit the following updates to the Water Quality Improvement Plan pursuant to Provision F.2.c *or as part of the Water Quality Improvement Plan Annual Report* required under Provision F.3.b, unless the San Diego Water Board directs an earlier submittal:	Section 9	X		X	X
	(a) The water quality improvement *strategies being implemented that are effective and will continue to be implemented*,	Section 9.2	X			
	(b) *Water quality improvement strategies (i.e. BMPs, retrofitting projects, stream and/or habitat rehabilitation projects, adjustments to jurisdictional runoff management programs, etc.) that will be implemented* to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards,	Section 9.2	X			X
	(c) *Updates to the schedule for implementation* of the existing and additional water quality improvement strategies, and	Section 9.2	X			X
	(d) *Updates to the monitoring and assessment program* to track progress toward achieving compliance with Provisions A.1.a, A.1.c and A.2.a of this Order;	Section 9	X			X
Provision B						
B.5.a.	a. The priority water quality conditions and potential water quality improvement strategies included in the Water Quality Improvement Plan pursuant to Provisions B.2.c and B.2.e *may be re-evaluated by the Copermittees as needed during the term of this Order as part of the Water Quality Improvement Plan Annual Report*. Re-evaluation and recommendations for modifications to the priority water quality conditions and potential water quality improvement strategies must be provided in the Report of Waste Discharge, and must consider the following: (1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan; (2) New information developed when the requirements of Provisions B.2.a-c have been re-evaluated; (3) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality conditions and implementation strategies to address the highest priority water quality conditions; (4) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees; (5) San Diego Water Board recommendations; and (6) Recommendations for modifications solicited through a public participation process.	Section 9			X	X

Table 1-1 (continued)
Crosswalk of Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices			
			Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
B.5.b.	b. The water quality improvement goals, strategies and schedules, included in the Water Quality Improvement Plan pursuant to Provisions B.3, *must be reevaluated and adapted as new information becomes available* to result in more effective and efficient measures to address the highest priority water quality conditions identified pursuant to Provision B.2.c. *Re-evaluation of and modifications to the water quality improvement goals, strategies and schedules must be provided in the Water Quality Improvement Plan Annual Report*, and must consider the following:	Section 9		X		X
	(1) Modifications to the priority water quality conditions based on Provision B.5.a;	Section 9				X
	(2) Progress toward achieving interim and final numeric goals in receiving waters and MS4 discharges for the highest priority water quality conditions in the Watershed Management Area,	Sections 4-8		X		
	(3) Progress toward achieving outcomes according to established schedules;	Sections 4-8	X			X
	(4) New policies or regulations that may affect identified numeric goals;	Section 9				X
	(5) Measurable or demonstrable reductions of non-storm water discharges to and from each Copermittee's MS4;	Section 3			X	
	(6) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;	Sections 4-8			X	
	(7) New information developed when the requirements of Provisions B.2.b and B.2.d have been re-evaluated;	Section 9			X	X
	(8) Efficiency in implementing the Water Quality Improvement Plan;	Section 9	X			X
	(9) San Diego Water Board recommendations; and	Section 9				X
	(10) Recommendations for modifications solicited through a public participation process.	Section 9				X
B.5.c.	c. The water quality improvement monitoring and assessment program, included in the Water Quality Improvement Plan pursuant to Provision B.4, *must be reevaluated and adapted when new information becomes available*. Re-evaluation and recommendations for modifications to the monitoring and assessment program, pursuant to the requirements of Provision D, *may be provided in the Water Quality Improvement Plan Annual Report*, but must be provided in the Report of Waste Discharge.	Section 9			X	X

Table 1-1 (continued)
Crosswalk of Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices			
			Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
Provision D						
D.1.e.(2)(c)	Sediment Quality Monitoring (c) The Copermittees must incorporate a *Sediment Monitoring Report as part of the Water Quality Improvement Plan Annual Report* in accordance with the schedule contained in the Sediment Monitoring Plan, unless otherwise directed in writing by the San Diego Water Board Executive Officer. The Sediment Monitoring Report must contain the following information: (i) Analysis: An evaluation, interpretation and tabulation of the water and sediment monitoring data, including interpretations and conclusions as to whether applicable Receiving Water Limitations in this Order have been attained at each sample station; (ii) Sample Location Map: The locations, type, and number of samples must be identified and shown on a site map; and (iii) California Environmental Data Exchange Network: A statement certifying that the monitoring data and results have been uploaded into the California Environmental Data Exchange Network (CEDEN).	Section 3			X	
D.2.b.(iv)	Dry Weather MS4 Outfall Discharge Monitoring (iv) Each Copermittee must document *removal or re-prioritization of the highest priority persistent flow MS4 outfall monitoring stations identified under Provision D.2.b.(2)(a) in the Water Quality Improvement Plan Annual Report*. Persistent flow MS4 outfall monitoring stations that have been removed must be replaced with the next highest prioritized major MS4 outfall in the Watershed Management Area within its jurisdiction, unless there are no remaining qualifying major MS4 outfalls within the Copermittee's jurisdiction in the Watershed Management Area.	Section 3			X	
D.4.b.(1)(a)(ii)	Non-Storm Water Dischargers Reduction Assessments (a) Each Copermittee must assess and report the *progress of its illicit discharge detection and elimination program*, required to be implemented pursuant to Provision E.2, toward effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction as follows: (ii) Based on the data collected pursuant to Provisions D.2.b, the *assessments required under* <u>*Provision D.4.b.(1)(c)*</u> *must be included in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3).*	Section 3			X	
D.4.b.(1)(b)	(b) Based on the transitional dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.a.(2), each Copermittee must assess and report the following: (i) Identify the known and suspected controllable sources (e.g. facilities, areas, land uses, pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area; (ii) Identify sources of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area that have been reduced or eliminated; and (iii) Identify modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.	Section 3			X	X

Table 1-1 (continued)
Crosswalk of Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices: Appendix 2: Jurisdictional Information	WQIP Appendices: Appendix 3: Numeric Goals	WQIP Appendices: Appendix 4: Monitoring & Assessments	WQIP Appendices: Appendix 5: Adaptive Management
D.4.b.(1)(c)	(c) Based on the dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.b.(1), each Copermittee must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(1)(b); (ii) Based on the data collected and applicable NALs in the Water Quality Improvement Plan, rank the MS4 outfalls in the Copermittee's jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan, with the goal of eliminating persistent flow non-storm water discharges and/or pollutant loads in order of the ranked priority list through targeted programmatic actions and source investigations; (iii) For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identify the known and suspected sources within the Copermittee's jurisdiction in the Watershed Management Area that may cause or contribute to the NAL exceedances; (iv) Each Copermittee must analyze the data collected pursuant to Provision D.2.b, and utilize a model or other method, to calculate or estimate the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually. [a] Each Copermittee must calculate or estimate the annual non-storm water volumes and pollutant loads collectively discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall; [b] Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters.	Section 3			X	
	(v) Each Copermittee must review the data collected pursuant to Provision D.2.b and findings from the assessments required pursuant to Provision D.4.b.(1)(c)(i)-(iv) at least once during the term of this Order to: [a] Identify reductions and progress in achieving reductions in non-storm water and illicit discharges to the Copermittee's MS4 in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction, with an estimate, if possible, of the non-storm water volume and/or pollutant load reductions attributable to specific water quality strategies implemented by the Copermittee; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittee in the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction. (vi) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(1)(c)(i)-(v).	Section 3			X	

Table 1-1 (continued)
Crosswalk of Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices			
			Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
D.4.b.(2)(a)	Storm Water Pollutant Discharge Reduction Assessments (a) The Copermittees must assess and report the *progress of the water quality improvement strategies, required to be implemented pursuant to Provisions B and E, toward reducing pollutants in storm water discharges* from the MS4s within the Watershed Management Area as follows: (ii) Based on the data collected pursuant to Provisions D.2.c, the *assessments required under <u>Provision D.4.b.(2)(c)</u> must be included in the Water Quality Improvement Plan Annual Reports* required pursuant to Provision F.3.b.(3).	Section 3			X	
D.4.b.(2)(b)	(b) Based on the transitional wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.a.(3) the Copermittees must assess and report the following: (i) The Copermittees must analyze the monitoring data collected pursuant to Provision D.2.a.(3), and utilize a watershed model or other method, to calculate or estimate the following for each monitoring year: [a] The average storm water runoff coefficient for each land use type within the Watershed Management Area; [b] The volume of storm water and pollutant loads discharged from each of the Copermittee's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch; [c] The total flow volume and pollutant loadings discharged from the Copermittee's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and [d] The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch.(ii) Identify modifications to the wet weather MS4 outfall discharge monitoring locations and frequencies necessary to identify pollutants in storm water discharges from the MS4s in the Watershed Management Area pursuant to Provision D.2.c.(1).	Section 3			X	
D.4.b.(2)(c)	(c) Based on the wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.c the Copermittees must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(2)(b); (ii) Based on the data collected and applicable SALs in the Water Quality Improvement Plan, analyze and compare the monitoring data to the analyses and assumptions used to develop the Water Quality Improvement Plans, including strategies developed pursuant to Provision B.3, and evaluate whether those analyses and assumptions should be updated as a component of the adaptive management efforts pursuant to Provision B.5 for follow-up action to update the Water Quality Improvement Plan; (iii) The Copermittees must review the data collected pursuant to Provision D.2.c and findings from the assessments required pursuant to Provisions D.4.b.(2)(c)(i)-(ii) at least once during the term of this Order to: [a] Identify reductions or progress in achieving reductions in pollutant concentrations and/or pollutant loads from different land uses and/or drainage areas discharging from the Copermittees' MS4s in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters within the Watershed Management Area to the MEP, with an estimate, if possible, of the pollutant load reductions attributable to specific water quality strategies implemented by the Copermittees; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittees in the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters in the Watershed Management Area to the MEP. (iv) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(2)(c)(i)-(iii).	Section 3			X	

Table 1-1 (continued)
Crosswalk of Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices			
			Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
D.4.b.(2)(d)*	(d) The Copermittees must evaluate all the data collected pursuant to Provision D.2.c, and incorporate new outfall monitoring data into time series plots for each long-term monitoring constituent for the Watershed Management Area, and perform statistical trends analysis on the cumulative long-term wet weather MS4 outfall discharge water quality data set.	--	--	--	--	--
D.4.c.	Special Studies Assessments c. The Copermittees must *annually evaluate the results and findings from the special studies developed and implemented pursuant to Provision D.3*, and assess their relevance to the Copermittees' efforts to characterize receiving water conditions, understand sources of pollutants and/or stressors, and control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters in the Watershed Management Area. The Copermittees must *report the results of the special studies assessments applicable to the Watershed Management Area, and identify any necessary modifications or updates to the Water Quality Improvement Plan based on the results in the Water Quality Improvement Plan Annual Reports* required pursuant to Provision F.3.b.(3).	Section 2			X	X
D.4.d.	Integrated Assessment of Water Quality Improvement Plan d. As part of the *iterative approach and adaptive management process* required for the Water Quality Improvement Plan pursuant to Provision B.5, the Copermittees in each Watershed Management Area must integrate the data collected pursuant to Provisions D.1-D.3, the findings from the assessments required pursuant to Provisions D.4.a-c, and information collected during the implementation of the jurisdictional runoff management programs required pursuant to Provision E to assess the effectiveness of, and identify necessary modifications to, the Water Quality Improvement Plan as follows:	Section 9			X	X
D.4.d.(1)	(1) The Copermittees *must re-evaluate the priority water quality conditions and numeric goals for the Watershed Management Area, as needed, during the term of this Order pursuant to Provision B.5.a.* The re-evaluation and recommendations for modifications to the priority water quality conditions, and/or numeric goals and corresponding schedules *may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)*, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The priority water quality conditions and numeric goals for the Watershed Management Area must be reevaluated as follows: (a) Re-evaluate the receiving water conditions in the Watershed Management Area in accordance with Provision B.2.a; (b) Re-evaluate the impacts on receiving waters in the Watershed Management Area from MS4 discharges in accordance with Provision B.2.b; (c) Re-evaluate the identification of MS4 sources of pollutants and/or stressors in accordance with Provision B.2.d; (d) Identify beneficial uses of the receiving waters that are protected in accordance with Provision D.4.a; (e) Evaluate the progress toward achieving the interim and final numeric goals for protecting impacted beneficial uses in the receiving waters.	Section 9			X	X

Table 1-1 (continued)
Crosswalk of Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices			
			Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
D.4.d.(2)	(2) The Copermittees *must re-evaluate the water quality improvement strategies for the Watershed Management Area during the term of this Order pursuant to Provision B.5.b.* The re-evaluation and recommendations for modifications to the water quality improvement strategies and schedules *may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)*, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The water quality improvement strategies for the Watershed Management Area must be re-evaluated as follows: (a) Identify the non-storm water and storm water pollutant loads from the Copermittees' MS4 outfalls in the Watershed Management Area, calculated or estimated pursuant to Provisions D.4.b; (b) Identify the non-storm water and storm water pollutant load reductions, or other improvements to receiving water or water quality conditions, that are necessary to attain the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters; (c) Identify the non-storm water and storm water pollutant load reductions, or other improvements to the quality of MS4 discharges, that are necessary for the Copermittees to demonstrate that non-storm water and storm water discharges from their MS4s are not causing or contributing to exceedances of receiving water limitations; (d) Evaluate the progress of the water quality improvement strategies toward achieving the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters.	Section 9	X			X
D.4.d.(3)	(3) The Copermittees *must re-evaluate and adapt the water quality monitoring and assessment program for the Watershed Management Area when new information becomes available to improve the monitoring and assessment program pursuant to Provision B.5.c.* The re-evaluation and recommendations for modifications to the monitoring and assessment program *may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)*, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. Modifications to the water quality monitoring and assessment program must be consistent with the requirements of Provision D.1-D.3. The re-evaluation of the water quality monitoring and assessment program for the Watershed Management Area must consider the data gaps identified by the assessments required pursuant to Provisions D.4.a-b, and results of the special studies implemented pursuant to Provision D.4.c	Section 9			X	X
Provision E						
E.1.b.	b. With the first *Water Quality Improvement Plan Annual Report required pursuant to Provision F.3.b.(3), each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority* within its jurisdiction to implement and enforce each of the requirements contained in this Order.	Cert Statement	X			

Table 1-1 (continued)
Crosswalk of Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices			
			Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
E.2.d.(4)	(4) Each Copermittee must submit a *summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its jurisdiction with each Water Quality Improvement Plan Annual Report required under Provision F.3.b.(3)* of this Order.	JRMP Forms	X		X	
E.8.c.	c. Each Copermittee must submit a *summary of the annual fiscal analysis with each Water Quality Improvement Plan Annual Report required pursuant to Provision F.3.b.(3).*	Fiscal Analysis	X			
Provision F						
F.1.b.(6)	(6) During implementation of the Water Quality Improvement Plan the Copermittees must *correct any deficiencies in the Plan identified by the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report* following a request by the Board to do so.	Section 9				X
F.2.a.(2)	(2) Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must *correct any deficiencies in the jurisdictional runoff management program document based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;*	Section 9	X			X
F.2.a.(3)	(3) Each Copermittee must submit *updates to its jurisdictional runoff management program, with the supporting rationale for the modifications, either in the Water Quality Improvement Plan Annual Report* required pursuant to Provision F.3.b.(3), or as part of the Report of Waste Discharge required pursuant to Provision F.5.b	Section 9	X			X
F.2.b.(1)	(1) Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provisions E.3.a-d concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must *correct any deficiencies in the BMP Design Manual based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;*	Section 9	X			
F.2.b.(2)	(2) Any *future updates to the BMP Design Manual* made after it update pursuant to Provision F.2.b.(1) is completed must be consistent with the requirements of Provisions E.3.a-d and *must be submitted as part of the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)*, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b; and	Section 9	X			
F.2.c.(1)(c)	(c) The Copermittees for each Watershed Management Area *must submit 1) proposed updates to the Water Quality Improvement Plan and supporting rationale, and 2) recommendations received from the public and the Water Quality Improvement Consultation Panel and the rationale for the requested updates, either in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)*, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b.	Section 9				X

Table 1-1 (continued)
Crosswalk of Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices			
			Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
F.3.b.(3)(a-f)	(3) Water Quality Improvement Plan Annual Reports - The Copermittees for each Watershed Management Area must *submit a Water Quality Improvement Plan Annual Report for each reporting period no later than January 31* of the following year. The annual reporting period consists of two different periods: 1) July 1 to June 30 of the following year for the jurisdictional runoff management programs, 2) October 1 to September 30 of the following year for the monitoring and assessment programs. The Water Quality Improvement Plan Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each *Annual Report must include the following*:	-				
	(a) The receiving water and MS4 outfall discharge monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;	Section 3			X	
	(b) The progress of the special studies required pursuant to Provision D.3, and the findings, interpretations and conclusions of a special study, or each phase of a special study, upon its completion;	Section 3			X	
	(c) The findings, interpretations and conclusions from the assessments required pursuant to Provision D.4;	Section 3			X	
	(d) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following: (i) The progress toward achieving the interim and final numeric goals for the highest water quality priorities for the Watershed Management Area;	Sections 4-8				
	(ii) The water quality improvement strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods;	Sections 4-8	X			X
	(iii) The water quality improvement strategies planned for implementation during the next reporting period;	Sections 4-8	X			X
	(iv) Proposed modifications to the water quality improvement strategies, the public comments received and the supporting rationale for the proposed modifications;	Section 9	X			X
	(v) Previous modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area; and	Section 9	X			X
	(vi) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;	Section 9	X			X
	(e) A completed Jurisdictional Runoff Management Program Annual Report Form (contained in Attachment D to this Order or a revised form accepted by the San Diego Water Board) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative; and	JRMP Forms	X			
	(f) Each Copermittee must provide any data or documentation utilized in developing the Water Quality Improvement Plan Annual Report upon request by the San Diego Water Board. Any Copermittee monitoring data utilized in developing the Water Quality Improvement Plan Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN). Any Copermittee monitoring and assessment data utilized in developing the Water Quality Improvement Plan Annual Report must be available for access on the Regional Clearinghouse required pursuant to Provision F.4.	CEDEN Upload Certifications			X	
F.6	Each Copermittee must comply with all the reporting and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.	Section 9	X			X
Attachment E						

Table 1-1 (continued)
Crosswalk of Permit Requirements and Annual Report References

Municipal Permit Provisions	Permit Language	WQIP Annual Report Sections	WQIP Appendices			
			Appendix 2: Jurisdictional Information	Appendix 3: Numeric Goals	Appendix 4: Monitoring & Assessments	Appendix 5: Adaptive Management
Attachment E	Specific Monitoring and Assessment Requirements for each TMDL.TMDL monitoring and assessment results must be submitted as part of Water Quality Improvement Plan Annual Reports required under Provision F.3.b	Section 3			X	

* This provision requires creation of time-series plots for long-term monitoring data collected under Provision D.2.c and a trend analysis on this cumulative long-term wet weather MS4 outfall discharge monitoring data set. This assessment will be addressed when sufficient data (i.e., at least three monitoring years) have been collected.

APPENDIX 2

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORMS, FISCAL ANALYSIS, UPDATED BMP MANUALS, AND JURISDICTIONAL STRATEGIES

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1 JURISDICTIONAL ANNUAL REPORTS AND STRATEGIES

1.1 JURISDICTIONAL ANNUAL REPORTS

This WQIP annual report includes each of the Copermittee's Jurisdictional Runoff Management Plan (JRMP) annual report for fiscal year (FY) 16. The FY 16 JRMP annual reports include the legal authority certification, annual report certification page, the JRMP annual report form; annual report form supplemental information, as applicable; and the fiscal analysis review summary. As required by the Municipal Permit, each Copermittee has included information on any modifications to their BMP Design Manual and JRMP document as part of the annual report.

1.2 JURISDICTIONAL STRATEGIES

Jurisdictional strategies are required as part of the Water Quality Improvement Plan (WQIP), under Provision B of the San Diego Regional Water Quality Control Board (Regional Board) National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region, Order Number R9-2013-0001(Municipal Permit). The Responsible Parties (RPs) identified water quality improvement strategies outlined in the WQIP and implemented those strategies in FY 2016, the first year of WQIP implementation, to address the Highest Priority Conditions or Focused Priority Conditions. Nonstructural and structural strategies selected by each RP to address Priority Conditions are presented in this document. RP-specific tables for implementation of the selected strategies that outline the method, cost, and additional stakeholder participation are presented in the sections below. The strategies were selected on the basis of their ability to effectively and efficiently eliminate non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the maximum extent practicable (MEP), and achieve the interim and final numeric goals identified in the San Diego Bay Watershed Management Area (WMA) WQIP.

In addition to the strategies and schedules presented in this Appendix, the jurisdictions implemented baseline jurisdictional programs as summarized in the jurisdictional annual reports.

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2 SAN DIEGO COUNTY REGIONAL AIRPORT AUTHORITY

2.1 ANNUAL REPORT CERTIFICATION

The San Diego Airport Authority's signed Statement of Certification for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report is included on the following page.

SAN DIEGO
INTERNATIONAL AIRPORT
LET'S GO.

STATEMENT OF CERTIFICATION

San Diego Bay Watershed Management Area, Water Quality Improvement Plan Fiscal Year 2015-2016 Annual Report

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the San Diego County Regional Airport Authority has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Brendan Reed, Director
Environmental Affairs

1/20/2017
Date

LET'S GO.

PO Box 82776 • San Diego, CA 92138-2776
www.san.org

2.2 ANNUAL REPORT FORM

The Airport Authority's completed JRMP Annual Report form for FY16 is included on the following pages.

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JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM

FY 2015-2016

I. COPERMITTEE INFORMATION

Copermittee Name: San Diego County Regional Airport Authority

Copermittee Primary Contact Name: Richard Gilb

Copermittee Primary Contact Information:
Address: PO Box 82776
City: San Diego County: San Diego State: CA Zip: 92138
Telephone: (619) 400-2790 Fax: (619)-400-2784 Email: rgilb@san.org

II. LEGAL AUTHORITY

Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES	☒
	NO	☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES	☒
	NO	☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES	☒
	NO	☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

Number of non-storm water discharges reported by the public	0
Number of non-storm water discharges detected by Copermittee staff or contractors	4
Number of non-storm water discharges investigated by the Copermittee	4
Number of sources of non-storm water discharges identified	4
Number of non-storm water discharges eliminated	4
Number of sources of illicit discharges or connections identified	1
Number of illicit discharges or connections eliminated	1
Number of enforcement actions issued	1
Number of escalated enforcement actions issued	0

V. DEVELOPMENT PLANNING PROGRAM

Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES	☒
	NO	☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES	☒
	NO	☐

Number of proposed development projects in review	7
Number of Priority Development Projects in review	4
Number of Priority Development Projects approved	3
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	2

Number of completed Priority Development Projects in inventory	19
Number of high priority Priority Development Project structural BMP inspections	19
Number of Priority Development Project structural BMP violations	0
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM	
Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Number of construction sites in inventory	12
Number of active construction sites in inventory	4
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	8
Number of construction site inspections	198
Number of construction site violations	2
Number of enforcement actions issued	2
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	44	6	33	0
Number of existing development inspections	44	6	30	0
Number of follow-up inspections	0	0	0	0
Number of violations	25	14	60	0
Number of enforcement actions issued	25	14	60	0
Number of escalated enforcement actions issued	0	0	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES ☒ NO ☐

X. CERTIFICATION

I ☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

October 28, 2016
Date

BRENDAN REED
Print Name

Director of Environmental Affairs
Title

(619) 400-2785
Telephone Number

breed@san.org
Email

2.3 SAN DIEGO REGIONAL AIRPORT AUTHORITY STRATEGIES

The San Diego County Regional Airport Authority (Airport Authority) has selected strategies to meet the water quality goals for copper and zinc in wet weather discharges to best suit the unique characteristics of the Airport Authority's jurisdiction, namely, the San Diego International Airport (SDIA). For example, the airport is almost entirely paved, and the space required for many traditional structural BMPs is severely limited. The Airport Authority has continued to implement its core Jurisdictional Runoff Management Plan (JRMP) in FY16, which includes many strategies that have positive impacts on the water quality of MS4 discharges. To make progress toward its identified goals, the Airport Authority enhanced some existing JRMP strategies and also implemented new strategies that concentrate on the Focused Priority Conditions.

In 2013, the Airport Authority completed a major expansion of the airport facilities at a cost of nearly $1B. The new terminal portion of the project was awarded Leadership in Energy and Environmental Design (LEED) Platinum certification from the U.S. Green Building Council. The project included BMPs such as permeable pavement, bioretention swales, and modular wetland treatment units. During FY16, other development projects were completed or initiated, incorporating various structural BMPs, as outlined in Table 2-1. Future projects will continue to consider storm water and water quality improvements during design and implementation, where feasible.

The Airport Authority's FY16 implementation of its jurisdictional strategies to meet WQIP goals is presented in Table 2-1. Any modifications to strategies and implementation schedules have been incorporated based on information gathered on the level of effort and further detail gained during the FY16 WQIP implementation. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allowed for these modifications of original strategies. As strategies are modified, the WQIP will be updated. The implementation of each strategy was contingent upon annual budget approvals and funding availability.

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Table 2-1
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
JRMP (E.2 – E.7) Strategies (E.3.b.(1)(a))									
E.3 Development Planning									
All Development Projects									
AA-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement Low Impact Development (LID) BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to SWMP/JRMP Sections 4, 6 & 7 and Appendix B, Sustainability Policy, and LEED. All development projects, once complete, will be inspected monthly. Annual inspections include examination of all structural BMPs at a project to verify that each structural BMP is working, being maintained properly, and is in compliance with all applicable Authority codes, plans and permits. Funding mechanisms for project construction and long-term maintenance include the rolling five year capital improvement program and tenant leases.	Fiscal Year (FY)16	Yes	Yes	Treatment Control (TC) BMP Inventory updated and all TCBMPs/LID BMPs inspected and maintenance requirements identified.	Clarified funding mechanisms to include tenant leases.	Clarification	Yes
Priority Development Projects (PDPs)									
AA-2	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to SWMP/JRMP Sections 4, 6 & 7 and Appendix B, Sustainability Policy, and LEED. Annual inspections include examination of all structural BMPs at a project to verify that each structural BMP is working, being maintained properly, and is in compliance with all applicable Authority codes, plans and permits. Funding mechanisms for project construction and long-term maintenance include the rolling five year capital improvement program and tenant leases.	FY16	Yes	Yes	SWMP was updated with BMP Design Manual to replace SUSMP in February 2016. Four (4) PDPs submitted either an Urban Storm Water Mitigation Plan (USMP) to comply with SUSMP or a Storm Water Quality Management Plan (SWQMP) to comply with BMP Design Manual	Clarified funding mechanisms to include tenant leases.	Clarification	Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
E.4 Construction Management									
AA-3	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Refer to SWMP/JRMP Section 5. Inspections performed by the Authority provide verification that each site is in conformance with the SWMP/JRMP. All inspections are performed weekly. Please see Table I.1.2 in the WQIP for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the FPWQC. Funding is from the EAD budget.	Prior to FY16	Yes	Yes	198 construction inspections were conducted in FY 16	Clarified source of budget.	Clarification	Yes
E.5 Existing Development									
Commercial, Industrial, and Municipal Facilities and Areas									
AA-4	Administer and enforce a program to require implementation of minimum BMPs for existing development (commercial, industrial, and municipal) that are specific to the facility, pollutant-generating activities (PGAs), and areas, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to SWMP/JRMP Sections 6 and 7. All industrial, municipal, and commercial areas are inspected monthly. Please see Table I.1.2 of the WQIP for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the FPWQC. Funding is from the EAD budget.	FY16	Yes	Yes	408 inspections were conducted in FY 16			Yes
AA-4	1. Update minimum BMPs for existing commercial and industrial development.	Refer to SWMP/JRMP Appendix B. Please see Table I.1.2 of the WQIP for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the FPWQC. Funding is from the EAD budget.	FY16	Yes	Yes	Added the following BMPs during the SWMP update: SC02C – Electric Vehicle Maintenance SC20 – Erodible Areas SC21 – Construction and Remodeling/Repair			Yes
AA-4	2. Design, implement, and enforce pollutant-generating-area-based and PGA-based inspections.	Refer to SWMP/JRMP Sections 6 and 7. Please see Table I.1.2 of the WQIP for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the FPWQC. Funding is from the EAD budget.	FY16	Yes	Yes	SWMP updated prior to start of FY16, which included updating the PGAs and pollutants generated, and implementation of updated SWMP began in FY16			Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
AA-4 (cont)	3. Increased inspection frequency for highest potential pollutant generating areas and PGAs.	Funding will be from the EAD budget.	FY18	Not triggered during FY 16					
MS4 Infrastructure									
AA-5	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.) for water quality improvement.	Refer to SWMP/JRMP Section 6. In order to limit inflow of pollutants and reduce pollutant loads, inspection and maintenance of the MS4 is conducted quarterly. Funding is from the EAD, Facilities Management Department (FMD), and FDD budgets.	FY16	Yes	Yes	Annual inspections of catch basins were conducted airport-wide in July 2015, and catch basin cleaning was conducted in July and October/November 2015 and April 2016, airport-wide. Drain inlet insert BMPs were inspected prior to storms, when ≥ 50% chance of rain, and, when needed, after storms. Maintenance was conducted on an as-needed basis. T2 Airside StormFilter unit was maintained (sediment removed).			Yes
	1. Determine and implement optimal catch basin cleaning locations and frequencies to maximize pollutant removal.		FY17	Not triggered during FY 16					

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Hardscapes (Runway, Taxiways, Ramps, Roads, Streets, and Parking Lots)									
AA-6	Implement operation and maintenance activities for runway, taxiways, ramp areas, roadways, and parking lots.	Refer to SWMP/JRMP Sections 6 and 7, and Appendix B. Please see Table I.1.2 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the FPWQC. Funding is from the FMD and EAD budgets.	FY16	Yes	Yes	Approximately 1,832 acres were swept during FY 16 on the airside of the Airport's property. This resulted in 35 acres of total airside pavement swept per week. Runway rubber removal is conducted every 6-8 weeks depending on the skidometer testing results. The following roads are swept 5 times per week (Monday through Friday) for three hours per day: Commuter Terminal and Terminal 1 Roadway System, Winship Lane, Stillwater Road, Airlane Road, Terminal 2 East and Terminal 2 West Roadway System, and Spruance Road. All of the parking lots, which include the Long Term Lot, Economy Lot, Lot 6, Cell Phone Lot, Taxi Hold Lot, NTC, and Terminal 1 & 2, are swept weekly.	Modification required. Airside sweeping performance goal for FY16 in sub-basins 1, 3, and 5 was not met. Information used to establish this goal was misinterpreted.	Improve sweeping data collection and analysis methods and correction to sweeping goals	Yes
	1. Determine and implement optimal street sweeping locations and frequencies on runway, taxiways, ramp areas, roads, and parking lots to maximize pollutant removal.	Refer to SWMP/JRMP Sections 6 and 7. The Authority will increase sweeping in sub-basins 1, 3, and 5, to address apparent sources of higher concentrations of copper and zinc (the FPWQC).	FY17	Not triggered during FY 16					

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Pesticides, Herbicides, and Fertilizer BMP Program									
AA-7	Require implementation of BMPs in an integrated pest management (IPM) program to address application, storage, and disposal of pesticides, herbicides, and fertilizers in commercial, industrial, and municipal areas. Includes education, permits, and certifications.	Refer to SWMP/JRMP Sections 6, 7 and 9, and Appendix B. All storage and disposal areas are inspected monthly. Funding is from the FMD and EAD budgets.	FY16	Yes	Yes	• FMD is in charge of the herbicides, fertilizer and landscaping • EAD is in charge of the pesticides • 133 gallons and 494.15 grams of pesticides were used in FY 16 • IPM program transferred from FMD to EAD's control. • Areas are inspected at a minimum of twice per month. • SAN was nominated for an IPM Achievement Award from the California Department of Pesticide Regulation. The recipient of the award has not been selected as of 8/29/2016.			Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Retrofit and Rehabilitation in Areas of Existing Development									
AA-8	Identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Refer to SWMP/JRMP Sections 4 and 6 and Appendix C. The Authority will identify those areas of existing development that are candidates for retrofitting where feasible, to reduce pollutants and/or stressors that contribute to the FPWQC. If retrofitting projects are deemed infeasible, the Authority will collaborate and cooperate with other Responsible Parties in the WMA to identify, develop, and implement regional retrofitting projects adjacent to and/or downstream from the Authority's areas of existing development. Funding mechanisms for project construction and long-term maintenance include the rolling five year capital improvement program and tenant leases.	FY16	Yes	Yes	Areas including the 90 Day Facility and FedEx Overhead Canopy were retrofitted. Both projects are located on the North Ramp of the Airport. The 90 Day Facility is the designated storage for hazardous materials before they are taken off site for proper disposal. The FedEx Overhead Canopy extends over a 700 ft^2 area and was installed to protect the FedEx cargo work area.	Clarified funding mechanisms to include tenant leases.	Clarification	Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program									
AA-9	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the SWMP/JRMP. Requirements include: maintaining an MS4 map, using municipal personnel, tenants, contractors, and vendors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to SWMP/JRMP Sections 3 and 7, and Appendix D. The Authority visually inspects 2 major MS4 outfalls and all sampling locations twice a year during dry weather conditions, as well as inspecting all drainage basins monthly for authorized and unauthorized non-storm water discharges. Please see Table I.1.2 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the FPWQC.	Prior to FY16	Yes	Yes	Thirty (30) Hotline entries are documented for fiscal year 2016. Only 4 spills/leaks (1 fuel, 3 water) reached the storm drain and were immediately cleaned or eliminated. Another fuel spill was captured in the oil water separator at the fuel loading islands, and again was cleaned. MS4 map was updated in March 2016. Airport's 2 major MS4 outfalls and industrial permit sampling locations throughout the airport were inspected in May and June of 2016 during the dry weather inspections, and all areas were inspected monthly for any authorized and unauthorized non-storm water discharges. The only unauthorized discharge observed was eliminated.			Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
E.7 Public Education and Participation (B.3.b.(1)(a)(iii))									
AA-10	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to WQIP Section 4.4.2 and SWMP/JRMP Section 9.	Prior to FY16	Yes	Yes	The 3 outreach events that the Airport has promoted include the 31st Annual California Coastal Cleanup Day, the 14th Annual Creek to Bay Cleanup, and the EarthFair in Balboa Park. Tours are available for students in grades 2 through 8 and are offered twice a month. Additional public participation opportunities include, Airport Authority Board Meetings, Lindbergh Airport Managers Committee Meetings, Tenant Safety Committee Meetings, the Authority Webpage, Project Clean Water Webpage, THINK BLUE Webpage, THINK BLUE Hotline, and the Authority 24-Hour Airport Hotline.			Yes
AA-11	Provide municipal staff and tenant training. Highlight goals and strategies of WQIP, in particular copper and zinc as FPWQC for the Authority, sources and BMPs.	Refer to SWMP/JRMP Section 9.	Prior to FY16	Yes	Yes	Authority and tenant employees training was conducted November-January. Over 140 individuals were trained. Storm Water BMP posters are being finalized and will be displayed in various airport and tenant employee areas in FY17			Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
E.6 Enforcement Response Plan									
AA-12	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for illicit discharge detection and elimination (IDDE), development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to SWMP/JRMP Sections 2, 3, 4, 5, 6, and 7. Escalated enforcement will include, when applicable, highlighting sources of any copper and zinc issues during inspections and during enforcement actions, as a reminder of the Authority's FPWQC, and the requirement, where appropriate, to undergo additional training on copper and zinc as water quality issues.	Prior to FY16	Yes	Yes	Two NOVs were issued by Environmental Affairs Dept. for construction projects during the fiscal year. Every BMP deficiency observed during industrial, municipal, commercial and construction site inspections was brought to the attention of the responsible party and resolved. Education and outreach with tenants and employees was performed throughout the fiscal year.			Yes
Non-JRMP Strategies (Optional Strategies, B.3.b.(1)(b))									
Nonstructural									
AA-13	Determine and implement optimal runway rubber removal locations and frequencies to maximize pollutant removal in Drainage Basins 1, 3 and 5.	This strategy may be implemented at any time at the Authority's discretion if the following triggers are met: 1) increased street sweeping in ramp/runway areas does not result in lower concentrations and loads of the FPWQC, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) consensus and community support has been achieved. All budgets are contingent upon approval by the Authority Board.	FY17	Not triggered during FY 16				FY 18	No
AA-14	Determine and implement potential enhancements to runway rubber removal operations and equipment.	This strategy may be implemented at any time at the Authority's discretion if the following triggers are met: 1) increased street sweeping in ramp/runway areas does not result in lower concentrations and loads of the FPWQC, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) consensus and community support has been achieved. All budgets are contingent upon approval by the Authority Board.	FY18	Not triggered during FY 16					

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
AA-15	Investigation and research of emerging BMP technology.	The Authority periodically conducts literature reviews, communication with other municipalities, researchers and vendors outside of the Authority, and pilot studies of new or emerging BMP technologies, with the goal of updating BMPs available and feasible for reducing pollutant loads from development and redevelopment sites. Funding and resources will be sought for FY2016. Funding for future fiscal years is contingent on annual budget approval by Authority Board.	Prior to FY16	Yes	Yes	Implemented pervious pavement, bioswales, and bioretention. Researched novel treatment control BMPs such as alternative filter media and filter media enhancements (e.g., biochar as filter media for tree boxes, latest developments in downspout filters, and inlet filter socks) to address zinc and copper.			Yes
AA-16	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas.	This strategy may be implemented at any time at the Authority's discretion if the following triggers are met: 1) proposed project includes naturally functioning area, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) consensus and community support has been achieved. All budgets are contingent upon approval by the Authority Board.	FY17	Not triggered during FY16.				FY17	Yes
AA-17	Industrial BMP: Capture and Reuse of Air Conditioning Condensate	The existing Capture and Reuse of Air Conditioning Condensate program will continue for industrial facilities for water collection, conservation, and reuse using drums to collect the condensate, and final use of the water for power washing of sidewalks.	Prior to FY16	Yes	Yes	70,700 gallons of condensate water were collected and reused during FY16.			Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
AA-18	Implement source reduction initiatives.	Reduce FPWQC concentrations and loads by requiring Authority departments and tenants to replace vehicle and aircraft brake pads with copper-free brake pads. This strategy may be implemented at any time at the Authority's discretion if the following triggers are met: 1) funding is identified and secured, 2) technology is available and cost-effective, 3) consensus and community support has been achieved, and 4) interim and/or final goals have not been met. All Authority budgets are contingent upon approval by the Authority Board.	FY18+	Not triggered during FY 16					
	1. Replace Authority-owned vehicle brake pads with copper-free brake pads as they become commercially available.		FY18+	Not triggered during FY 16					
	2. Require replacement of tenant-owned vehicle brake pads with copper-free brake pads as they become commercially available.		FY18+	Not triggered during FY 16					
	3. Require use of maintenance-free, leak-proof batteries for electric vehicles as available.		FY18+	Not triggered during FY 16					
Structural									
Green Infrastructure									
AA-19	Since 2013, approximately 6 acres of permeable surface have been installed at the airport.	Funding is from the rolling five-year capital improvement program, which is contingent on budget approval by Authority Board.	Prior to FY16	Yes	Yes	Permeable pavement installations have continued. Total acreage of permeable pavement currently installed at airport (by end of FY16) is approximately 8.9 acres.			Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
AA-20	Implement runoff water capture and reuse projects and facilitate the implementation of such projects.	Refer to Sustainability Policy and Draft Master Drainage Plan/Water Reuse Plan. Currently, the Authority is conducting workshops to investigate water capture and reuse opportunities.	FY18	In planning phase	No - ongoing	Draft Master Drainage Plan/Water Reuse Plan is being developed			Yes
AA-21	Phase in advanced BMPs (as defined in Industrial General Permit (IGP) i.e., shelters/structures, LID BMPs, TCBMPs and other BMPs) in high priority areas (e.g., runway, taxiways, ramps: sub basins 1, 3, and 5).	Reduce FPWQC concentrations and loads by requiring Authority departments and tenants to phase in advanced BMPs. This strategy may be implemented at any time at the Authority's discretion if the following triggers are met: 1) funding is identified and secured, 2) technology is available and cost-effective, 3) consensus and community support has been achieved, and 4) interim and/or final goals have not been met. All Authority budgets are contingent upon approval by the Authority Board.	FY17 or Trigger	Yes	Yes	Advanced BMPs that were installed were the 90 Day Facility, 1 Overhead Canopy and 1 Clearwater inlet BMP at FedEx, 7 Clearwater inlet BMPs, 1 detention basin, and 2 modular wetland systems at RCC Bus Parking, 1 Clearwater inlet BMP, 1 infiltration trench and 1 permeable pavement area at Taxi Hold Lot, 7 Clearwater inlet BMPs and 1 BioClean inlet skimmer box at Terminal Link Rd, 1 Contech StormFilter and 0.5 acres of permeable pavement at FBO, 4 permeable pavement/stone reservoir beds in Parking Lot 6, and 6 bioretention swales at RCC.		FY 16	Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Multiuse Treatment Area									
Infiltration and Detention Basins									
AA-22	Since 2013, approximately 2 acres of bioswales have been installed as part of the airport Terminal 2 Expansion Project and other improvement projects.	Future developments will consider bioswales and other LID BMPs per final adopted BMP Design Manual and Authority codes and rules/regulations. This strategy may be implemented at any time at the Authority's discretion if the following triggers are met: 1) funding is identified and secured, 2) consensus and community support has been achieved, and 3) interim and/or final goals have not been met. All Authority budgets are contingent upon approval by the Authority Board.	Prior to FY16			.			No
AA-23	Bioretention swales being constructed as part of the Rental Car Center.	Future developments will consider bioretention and LID BMPs per final adopted BMP Design Manual and Authority codes and rules/regulations. This strategy may be implemented at any time at the Authority's discretion if the following triggers are met: 1) funding is identified and secured, 2) consensus and community support has been achieved, and 3) interim and/or final goals have not been met. All Authority budgets are contingent upon approval by the Authority Board.	FY17	Yes	Yes	6 bioretention swales totaling 2.8 acres were installed at RCC.		FY 16	No

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Stream, Channel and Habitat Rehabilitation Projects (B.3.b.(1)(b)(iii))									
AA-24	Habitat rehabilitation projects, as necessary and appropriate, in the Navy Boat Channel, Convair Lagoon, or Laurel-Hawthorne Embayment portions of San Diego Bay	This strategy may be triggered as 1) Investigative Orders or other regulatory orders/permits are issued, 2) partners have been identified and collaborative agreements have been developed, 3) funding to address MS4 discharges is identified and secured, 4) habitat rehabilitation is required and projects have been identified and designed, 5) staff resources are identified and secured, and 6) permits required by regulatory agencies are secured. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the Authority's discretion: 1) Obtain Authority Board approval of Capital Improvement Projects budget 2) Assign budget 3) Initiate preliminary engineering to narrow project scope 4) Hire design consultant to develop detailed construction plans and construction cost estimates 5) Complete construction contractor bid and award process for construction phase 6) Construct project (project timing and construction costs are TBD and are based on size of the project). 7) Operation and maintenance will be in perpetuity. Funds and staff resources for this function will be approved by Authority Board.	Triggered	Yes	Yes	Public meeting for the Navy Boat Channel was held on March 3, 2016.			TBD

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Water Quality Improvement BMPs									
Proprietary BMPs									
AA-25	SANPark PacHwy paid public parking lot; North Side Interior Road; Terminal Link Road; Rental Car Center (RCC); RCC Bus Parking Facility; Employee Parking Lot 6 Expansion; Taxicab Hold Lot; Terminal 2 Parking Plaza.	Since 2013, the following proprietary TC BMPs have been installed at the airport: 12 modular wetland treatment units, 6 high-rate media filters, and 4 hydrodynamic separators. Proprietary TC BMPs are currently included in the construction plans for the facilities approved for construction in 2015 and 2016.	Prior to FY16	Yes	Yes	TCBMPs that have been installed in FY16 are 1 Clearwater inlet BMP at FedEx, 7 Clearwater inlet BMPs, 1 detention basin, and 2 modular wetland systems at RCC Bus Parking, 1 Clearwater inlet BMP, 1 infiltration trench and 1 permeable pavement area at Taxi Hold Lot, 7 Clearwater inlet BMPs and 1 BioClean inlet skimmer box at Terminal Link Rd, 1 Contech StormFilter at FBO, 4 permeable pavement/stone reservoir beds in Parking Lot 6, and 6 bioretention swales at RCC.		FY 17	Yes

Table 2-1 (continued)
Airport Authority Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
WMA Strategies (Optional Strategies, B.3.b.(2))									
AA-26	Offsite Alternative Compliance Option (WMAA)	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. This strategy may be implemented at the Authority's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) consensus and community support has been achieved, and 4) interim/final goals are not met. Funding for future fiscal years is contingent on budget approval by Authority Board.	Must be Triggered	Not triggered during FY 16					
AA-27	Participate in Reference Watershed Study	The San Diego Regional Reference Stream Study as currently being conducted by the Southern California Coastal Water Research Project. The study will develop numeric targets that account for “natural sources” to establish the concentrations or loads from streams in a minimally disturbed or “reference” condition.	Prior to FY16	Yes	Yes	The Airport helped fund the San Diego Regional Reference Stream Study as part of the Storm Water Copermittees’ FY16 Regional Shared Costs Budget		FY 17	Yes

Notes:
1. Metals, and in particular, copper and zinc, are the Airport Authority’s Focused Priority Water Quality Condition (FPWQC).

2.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The Airport Authority BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. The Airport Authority updated its BMP Design Manual in accordance with Municipal Permit requirements during FY16; the BMP Design Manual replaced the Standard Urban Storm Water Mitigation Plan (SUSMP). No additional changes to the BMP Design Manual have been made since it went into effect. The Airport Authority BMP Design Manual can be accessed via the Project Clean Water website at: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=244&Itemid=212.

2.5 MODIFICATION PROGRAM

No modifications to the Airport Authority's JRMP have been made since the WQIP was approved in spring 2016. The current Airport Authority JRMP is posted on the Airport Authority's website, and the link to this page is listed on Project Clean Water.

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3 CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)

3.1 ANNUAL REPORT CERTIFICATIONS

Caltrans' signed Statement of Certification for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report is included on the following page.

DEPARTMENT OF TRANSPORTATION
DISTRICT 11
4050 TAYLOR STREET, M.S. 120
SAN DIEGO, CA 92110
PHONE (619) 688-0100
FAX (619) 688-4237
TTY 711
www.dot.ca.gov

Serious drought.
Help save water!

January 4, 2017

STATEMENT OF CERTIFICATION

San Diego Bay Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

BRUCE L. APRIL
Deputy District Director, Environmental

1/6/17
Date

3.2 CALTRANS AUTHORITY STRATEGIES

The jurisdiction areas of Caltrans include roadways, land adjacent to roadways, and facilities; Caltrans' jurisdictional strategies specifically focus on BMP implementation to reduce known pollutants within these areas. Caltrans is not permitted within the Municipal Permit; however, Caltrans is subject to similar requirements through its MS4 Permit (SWRCB, 2013). Though not permitted within the MS4 Permit, Caltrans has voluntarily contributed to the Water Quality Improvement Plan Annual Report effort to provide a consistent and subwatershed-wide approach to meeting applicable TMDL requirements. Caltrans voluntary contributions include a detailed list of strategies developed and provided in Table 2-3-1. The strategies and schedules presented in Table 2-3-1 are subject to change and are contingent upon annual budget approvals and funding availability. They are modified through the adaptive management process as needed.

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Table 3-1
Caltrans Jurisdictional Strategies

ID	Strategy	Implementation Approach/ Level of Effort	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as Planned in Current FY (FY 16)?	Completed in Current FY (FY 16)?	Notes	Modification (if modified or cancelled, provide rationale)	Modification Type (schedule, approach, new)	Planned Implementation into the Next FY? (Y/N)
Jurisdictional Strategies									
Design Storm Water Program									
CT-1	Update and implement design BMPs.	The Office of Storm Water Management Design (OSWMD) develops, evaluates, and enhances guidance documents and tools.	FY16	Yes	Yes				Yes
	1. Update and implement Landscape Architecture Program (LAP).	The OSWMD provides technical assistance on new and ongoing research related to permanent erosion control and permanent BMPs. In addition, the LAP develops methods to enhance roadside vegetation, which protects slopes from erosion and sediment loss, and may remove pollutants from storm water runoff.	FY16	Yes	Yes				Yes
	2. Implement native landscape/LID Design Guide Strategy.	Require native landscaping/LID in project plan design guide. The Project Planning and Design Guide (PPDG) includes an online training program.	FY16	Yes	Yes				Yes
CT-2	Train staff on Design Storm Water Program.	Train staff on Design Storm Water Program. Curriculum updated to reflect the latest strategies.	FY16	Yes	Yes				Yes
CT-3	Plan and implement treatment BMPs as appropriate.	Treatment BMPs are planned and implemented to comply with Caltrans NPDES Permit project development requirements, TMDL waste load allocations, location specific requirements, and the requirements in the Project Planning and Design Guide (PPDG) according to the Targeted Design Constituent (TDC) approach.	FY16	Yes	Yes				Yes
CT-4	Develop procedures to encourage mitigation for projects within the same watershed.	Caltrans will investigate procedures to mitigate within the same watershed as new projects.	FY16	Yes	Yes				Yes
CT-5	Implement a self-audit program to ensure BMPs are designed, implemented, and maintained.	Design Compliance Monitoring Program is a self-audit program that uses various tools for documenting compliance with the design pollution prevention and treatment BMP requirements of the 2013 NPDES Permit and the Caltrans Statewide SWMP. The Project Designs are reviewed to ensure that BMPs are being considered and appropriately incorporated into Caltrans' projects. This review also ensures storm water compliance throughout the project planning and design phases.	FY16	Yes	Yes				Yes

Table 3-1 (continued)
Caltrans Jurisdictional Strategies

ID	Strategy	Implementation Approach/ Level of Effort	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as Planned in Current FY (FY 16)?	Completed in Current FY (FY 16)?	Notes	Modification (if modified or cancelled, provide rationale)	Modification Type (schedule, approach, new)	Planned Implementation into the Next FY? (Y/N)
Construction Management									
CT-6	Administer a program to oversee implementation of BMPs during the construction phase of Caltrans projects. Includes inspections at an appropriate frequency and enforcement of requirements.	Caltrans complies with the statewide Construction General Permit. The district holds pre-construction meetings for all projects that require a SWPPP.	FY16	Yes	Yes				Yes
CT-7	Provide construction storm water training for District staff.	Continue implementation of the construction storm water classes offered throughout the Caltrans districts by the Division of Construction. Classes updated to reflect latest permit requirements.	FY16	Yes	Yes				Yes
CT-8	Implement a self-audit program to ensure compliance with water quality requirements.	Continue implementation of the Construction Compliance Evaluation Plan. Evaluates contractor's Storm Water Pollution Prevention Plan (SWPPP) or WPCP implementation and assesses compliance with water quality requirements, evaluates storm water contract administration, and incorporates quality control, quality assurance.	FY16	Yes	Yes				Yes
CT-9	Provide maintenance training for employees.	The Division of Maintenance has formal storm water management training sessions for new employees and refresher training for existing staff.	FY16	Yes	Yes				Yes
Maintenance									
Facilities and Areas									
CT-10	Administer a program to require implementation of minimum BMPs for facilities and leased space (air space leases).	Refer to SWMP; Leased space is required to meet current storm water regulations.	FY16	Yes	Yes				Yes
CT-11	Inspection of facilities and leased areas.	The Department will continue to reduce the potential for storm water pollution by the development and implementation of Facility Pollution Prevention Plans (FPPPs).	FY16	Yes	Yes				Yes
CT-12	Implement BMPs targeting reduction of over-irrigation.	Reduce over irrigation by requiring native, drought-tolerant plants and irrigation system improvements.	FY16	Yes	Yes				Yes
CT-13	Proactively monitor for erosion, and complete repair and slope stabilization.	Division of Maintenance conduct inspections on a five-year cycle. Program includes self-imposed goal to annually inspect slopes in each District and includes investigating public complaints and widely understood problem areas (WUPAs).	FY16	Yes	Yes				Yes

Table 3-1 (continued)
Caltrans Jurisdictional Strategies

ID	Strategy	Implementation Approach/ Level of Effort	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as Planned in Current FY (FY 16)?	Completed in Current FY (FY 16)?	Notes	Modification (if modified or cancelled, provide rationale)	Modification Type (schedule, approach, new)	Planned Implementation into the Next FY? (Y/N)
MS4 Infrastructure									
CT-14	Inspect and clean catch basins and conduct source investigations to identify upstream source of materials.	Inspect catch basins annually. If needed, catch basins are cleaned. If a catch basin is cleaned, a source inspection is conducted to identify source of sediment or other material.	FY16	Yes	Yes				Yes
CT-15	Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	Prioritize MS4 repairs. Funding for repairs based on size of project. Districts are able to conduct small repairs immediately, while larger projects are prioritized for repair out of annual budget.	FY16	Yes	Yes				Yes
Roads and Streets									
CT-16	Implement operation and maintenance activities on streets and roadways.	Refer to Work Plan.	FY16	Yes	Yes				Yes
	1. Implement street sweeping.	Refer to Work Plan.	FY16	Yes	Yes				Yes
	2. Perform sweeping of medians on high-volume arterial roadways.	Refer to Work Plan.	FY16	Yes	Yes				Yes
Pesticide, Herbicides, and Fertilizer BMP Program									
CT-17	Implement BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers.	Refer to Vegetation Control Plan. Caltrans is actively reducing fertilizer/pesticide application and only applies to targeted areas. All pesticide use is reported to the California Department of Pesticide Regulation.	FY16	Yes	Yes				Yes
Illicit Connections/Illegal Discharges									
CT-18	Identify and resolve potential illicit connections/illegal discharges (IC/IDs).	Continue maintaining a hotline for reporting of illicit discharges. Majority of calls come from contractors and construction and maintenance staff. Continue coordination with other jurisdictions to address IC/IDs and provide written notification of potential IC/IDs associated with a municipality's jurisdiction.	FY16	Yes	Yes				Yes
CT-19	Identify erosion and slope stabilization issues on private or municipal property and inform the source for repair.	When Caltrans staff or contractors identify erosion or slopes in need of repair, it is treated as an IC/ID and the property owner is notified.	FY16	Yes	Yes				Yes

Table 3-1 (continued)
Caltrans Jurisdictional Strategies

ID	Strategy	Implementation Approach/ Level of Effort	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as Planned in Current FY (FY 16)?	Completed in Current FY (FY 16)?	Notes	Modification (if modified or cancelled, provide rationale)	Modification Type (schedule, approach, new)	Planned Implementation into the Next FY? (Y/N)
Public Education and Participation									
CT-20	Implement a public education and participation program to raise awareness of storm water pollution and prevention on California's freeways and highways.	Continue to implement the "Don't Trash California" Campaign, Adopt-A-Highway program, and the Protect Every Drop program, and partner with local organizations.	FY16	Yes	Yes				Yes
	1. Conduct trash cleanups.	Conduct trash cleanups through local probation and adopt-a-highway programs. Encourage prevention through "Don't Trash California" campaign.	FY16	Yes	Yes				Yes
	2. Target public education and outreach.	Provide outreach to public raising awareness of storm water pollution. Hold bring-your-child-to-work days with watershed model.	FY16	Yes	Yes				Yes
Other Nonstructural Strategies									
CT-21	Provide sanitation and trash management, implement access control in targeted areas.	As necessary, implement methods such as rip-rap, chain link fences, and remove low-lying brush to discourage use of right-of-way areas.	FY16	Yes	Yes				Yes
CT-22	Continue participating in source reduction initiatives.	Continue participation in Brake Pad Partnership through work with California Storm Water Quality Association.	FY16	Yes	Yes				Yes
CT-23	Remove invasive plants.	Remove invasive plants through maintenance and construction programs.	FY16	Yes	Yes				Yes
CT-24	Protect areas that are functioning naturally.	Required as part of the Project Planning and Design Guide (PPDG) and the Natural Environment as Treatment (NEAT) programs, Caltrans minimizes disturbance of exiting vegetation.	TBD	Yes	Yes				Yes
CT-25	Collaborate with RPs on WQIPs.	Voluntarily participate in the development of the WQIP and continue to collaborate with RAs on water quality planning and implementation projects.	FY16	Yes	Yes				Yes
Multiuse Treatment Areas									
Infiltration and Detention Basins									
CT-26	BMP Retrofit (#282401)	Chollas Creek BMP Retrofit Project; Interstate 15 and 94. There are 4 modified infiltration trenches, 1 austin vault sand filter, and 3 biofiltration swales.	2014	Yes	Yes				
CT-27	Construct Lanes and Transit Station) (#2T1301)	Construct BRT Lanes and Transit Station on Interstate 15. Install 2 bioswales and 1 media filter to treat approximately 18 acres.	2014	Yes	Yes				

3.3 MODIFICATIONS TO THE BMP DESIGN MANUAL

The Caltrans BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. The Caltrans updated its BMP Design Manual in accordance with Municipal Permit requirements during FY16; the BMP Design Manual replaced the Standard Urban Storm Water Mitigation Plan (SUSMP). No additional changes to the BMP Design Manual have been made since it went into effect. The Caltrans BMP Design Manual can be accessed via the Project Clean Water website at: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=244&Itemid=212.

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4 CITY OF CHULA VISTA

4.1 ANNUAL REPORT CERTIFICATIONS

City of Chula Vista's signed Statement of Certification and Legal Authority Establishment for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report is included on the following page.

STATEMENT OF CERTIFICATION

SAN DIEGO BAY WATERSHED MANAGEMENT AREA WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

AND

LEGAL AUTHORITY ESTABLISHMENT

I certify under penalty of law that this Water Quality Improvement Plan Annual Report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the City of Chula Vista has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in Section E.1 of the San Diego Regional Water Quality Control Board Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

William S. Valle
Assistant Director of Engineering/ City Engineer

JAN 17, 2017
Date

4.2 ANNUAL REPORT FORM

The City of Chula Vista's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

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JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM
FY 2015-2016

I. COPERMITTEE INFORMATION		
Copermittee Name: City of Chula Vista		
Copermittee Primary Contact Name: Boushra Salem		
Copermittee Primary Contact Information: Address: 1800 Maxwell Road City: Chula Vista County: San Diego State: CA Zip: 91911 Telephone: 619-397-6111 Fax: 619-397-6259 Email: bsalem@chulavistaca.gov		
II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	**YES** [X] **NO** [ ]	
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	**YES** [X] **NO** [ ]	
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	**YES** [X] **NO** [ ]	
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	**YES** [X] **NO** [ ]	
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	**YES** [X] **NO** [ ]	
Number of non-storm water discharges reported by the public	66	*
Number of non-storm water discharges detected by Copermittee staff or contractors	123	
Number of non-storm water discharges investigated by the Copermittee	188	
Number of sources of non-storm water discharges identified	114	
Number of non-storm water discharges eliminated	64	
Number of sources of illicit discharges or connections identified	79	
Number of illicit discharges or connections eliminated	61	
Number of enforcement actions issued	27	
Number of escalated enforcement actions issued	11	
V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	**YES** [X] **NO** [ ]	
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	**YES** [X] **NO** [ ]	
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	**YES** [X] **NO** [ ]	
Number of proposed development projects in review	48	
Number of Priority Development Projects in review	10	
Number of Priority Development Projects approved	26	
Number of approved Priority Development Projects exempt from any BMP requirements	1	
Number of approved Priority Development Projects allowed alternative compliance	0	
Number of Priority Development Projects granted occupancy	651	*
Number of completed Priority Development Projects in inventory	250	
Number of high priority Priority Development Project structural BMP inspections	171	
Number of Priority Development Project structural BMP violations	2	
Number of enforcement actions issued	2	
Number of escalated enforcement actions issued	0	

* Please see Attachment 1

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES [X] NO [ ]

Number of construction sites in inventory	60
Number of active construction sites in inventory	28
Number of inactive construction sites in inventory	2
Number of construction sites closed/completed during reporting period	30
Number of construction site inspections	465
Number of construction site violations	159
Number of enforcement actions issued	6
Number of escalated enforcement actions issued	5

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES [X] NO [ ]

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	87	2,522	125	19
Number of existing development inspections	73	217	45	107
Number of follow-up inspections	4	43	18	2
Number of violations	2	7	5	6
Number of enforcement actions issued	1	7	5	6
Number of escalated enforcement actions issued	0	1	5	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES [X] NO [ ]
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES [X] NO [ ]

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES [X] NO [ ] **

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

William S. Valle (signature) — 11/8/16

Signature — Date

William S. Valle — Assistant Director of Engineering

Print Name — Title

619-409-5976 — wvalle@chulavistaca.gov

Telephone Number — Email

** Please see Attachment 2

CITY OF CHULA VISTA
JRMP ANNUAL REPORT FY 2015-2016
ATTACHMENT 1 TO ANNUAL REPORT FORM

The following explanations are intended to provide clarification on sections of the JRMP Annual Report as noted by an asterisk (*) on the report form.

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

The City proactively seeks to identify sources of non-storm water discharges and when anthropogenic non-storm water discharges are identified, action is taken immediately to address such discharges. Since July 1, 2013, the City has implemented its new field screening program to comply with the requirements of the Municipal Permit.

Number of non-storm water discharges reported by the public:
This is the number of reported potential non-storm water discharges to the City's storm water hotline by citizens (66).

Number of non-storm water discharges detected by Copermittee staff or contractors:
This is the number of reported potential non-storm water discharges to the City's storm water hotline by City employees (23) or the consultant performing MS4 outfall monitoring for the City (100).

Number of non-storm water discharges investigated by the Copermittee:
This is the number of non-storm water discharges that City staff investigated based on reports from the hotline (89 total, 1 cancelled) and by the MS4 outfall monitoring consultant for the City (100).

Number of sources of non-storm water discharges identified:
This is the number of sources of non-storm water discharges investigated where a source was found (60 via hotline calls and 54 via MS4 outfall monitoring).

Number of non-storm water discharges eliminated:
This is the number of non-storm water discharges eliminated based on hotline calls (61) and the consultant's investigation (3).

Number of sources of illicit discharges or connections identified:
This is the number sources of illicit discharges or connections identified based on the investigation of hotline calls (58) and MS4 outfall monitoring (21).

Number of illicit discharges or connections eliminated:
This is the number of illicit discharges or connections eliminated based on hotline calls (58) or MS4 outfall monitoring (3). All illicit discharges or connections were eliminated via the storm drain vactor crew, clean up by the responsible party, enforcement action, or were determined to be transient flow. Minor irrigation runoff was addressed via education. Gross overwaterers receive a letter from the City, and are also reported to the appropriate water district.

V. DEVELOPMENT PLANNING PROGRAM

Number of Priority Development Projects granted occupancy:
The number indicated on the Annual Report Form (651) consists of 637 residential units and 14 non-residential buildings.

Attachment 2

FY 2015-2016 Fiscal Analysis Summary

Jurisdictional Component		Multiple Program	Prior Programs
Administration	$191,586.97		
Development Planning	$62,472.44		
Construction Management	$198,948.22		
Municipal Areas	$1,108,091.28		
Industrial and Commercial Areas	$37,872.04		
Residential Areas	$29,142.76		
Illicit Discharge Detection & Elimination (IDDE)	$403,498.47		
Education	$45,261.96		
Public Participation	$0.00		
Special Studies (Investigations)	$5,592.70		
Non-Emergency Firefighting	$0.00		
Jurisdictional TOTAL	**$2,082,466.82**		

Jurisdictional Component Shared Programs		Multiple Program	Prior Programs
Used Oil Recycling	$11,277.60	x	x
Household Hazardous Waste Management	$277,033.12	x	x
Wastewater Collection Systems Maintenance	$6,372,216.00	x	x
Flood Management Projects and Flood Control Devices	$1,958,329.58	x	x
Jurisdictional Shared Programs Total	**$8,618,856.30**		

Jurisdictional Component Shared Programs For Which Costs Can Not Be Readily Calculated	Multiple Program	Prior Programs
Land Use Planning	x	x
Environmental Review	x	x
Development Project Approval and Verification	x	x
Management of Pesticides, Herbicides, and Fertilizers	x	x
Roads, Streets, Highways, and Parking Facilities	x	x
Parks and Recreational Facilities	x	x

Regional Component Shared Programs		Multiple Program	Prior Programs
Regional Component TOTAL	**$141,137.64**	x	x

Watershed Component Shared Programs		Multiple Program	Prior Programs
Watershed Component TOTAL	**$252,970.42**	x	x

Attachment 2
FY 2015-2016 Fiscal Analysis Summary

Funding Source	Program Element
General Fund	Storm Water Management
	Storm Drain Maintenance
Storm Drain Fee	Storm Water Management
Wastewater Fee	Wastewater Collection System Maintenance
Special Assessment Districts	Storm Drain Maintenance
	Wastewater Collection System Maintenance
Grant Funds	Used Oil Recycling
	Drainage Capital Improvement Projects
Solid Waste Fee	Household Hazardous Waste Management
Developer Deposits and Fees	Environmental Reviews
Transnet	Drainage Capital Improvement Projects

Note: The above fiscal analysis is intended to provide an approximate estimate of program elements costs related to the City's storm water management program. It is not intended to provide a fiscally auditable report of the City's expenditures.

4.3 CITY OF CHULA VISTA STRATEGIES

The City of Chula Vista (Chula Vista) is located within the Sweetwater River and Otay River subwatersheds. The western portion of the City, west of Interstate 805, is characterized by having older infrastructure and is more densely populated. The portion of the City east of Interstate 805, generally has newer development and infrastructure, consisting of more pervious area and permanent BMP implementation, due to this area being developed under more the recent MS4 Permit land development requirements. Although the Focused Priority area is in the western portion of the City, the majority of strategies were implemented City-wide. Jurisdictional strategies target a number of pollutants, however, the focus of most strategies is to target trash.

Chula Vista has a well-rounded education and outreach program, which includes distribution of educational inserts in bimonthly trash bills, coordination of cleanup events with I Love a Clean San Diego, a revamped website that provide easier access to City resources, and updated residential storm water education brochures. The Chula Vista CLEAN Team, which consists of the Conservation, Environmental Services, and Storm Water Management Sections, partner together to provide residents with a cohesive environmental message. The CLEAN Team regularly collaborates on City special events, educational brochures, and environmental programs. In addition, a new City Operations Sustainability Plan, detailing water use, energy use, green purchasing, recycling and waste management, pollution prevention, transportation, green buildings, and green infrastructure, was adopted in June 2014. The City also participates in the Regional Think Blue San Diego educational program.

The WQIP identified general retail and commercial areas, including eating and drinking establishments as a high priority source of trash. In order to address this source, the City enhanced its commercial and industrial facility inspections and updated its inspection forms to collect additional information about the trash enclosures and trash receptacles of these facilities. FY 2016 was the first reporting period that this addition information was collected. The City can use this data to help individual facilities improve on their trash management BMP implementation, and as data is collected over time, it can help the City to identify particular areas where additional efforts are needed, such as targeted education or increased inspection frequency.

Notably, Chula Vista formed a Homeless Outreach Team during the reporting period, which consists of Chula Vista Parks, Police Department, Public Works staff, as well as a variety of non-profit entities that help to provide a holistic approach to tackling homeless issues. The program targets a number of City parks, facilities, and problem areas of the City. Staff visits these areas once per week and can remove over 1,000 pounds of trash per week from the encampments. Funding for additional staff was added during the reporting period, which helps to bolster and strengthen the program.

An important portion of targeting trash in Chula Vista was the initiation of a Baseline Trash Assessment and BMP Feasibility Study. Planning for the study took place in the reporting period, with results of the study coming in the next fiscal year. The goal of the study is to identify the problem trash areas of the City and determine which BMPs are the most appropriate to implement. In addition to aiding the City in achieving its strategies and goals to target trash, it helps to guide the City in compliance with the Statewide Trash Amendments. Results of the study are expected to help inform the City on where program improvements and adjustments are needed, where BMP retrofits and installations are feasible, and how to plan for meeting the WQIP trash goals.

In collaboration with the Port and Imperial Beach, the City also expanded its trash assessment monitoring program to help inform the City in its progress in implementing strategies and meeting goals. The expanded program includes additional source identification data gathering for MS4 Outfalls in the Focused Priority area, as well as paired receiving water and MS4 outfall monitoring.

Although this reporting year was based on only four months of implementation of the WQIP, Chula Vista made several strides in implementing strategies that works towards achieving WQIP goals. Enhanced educational programs in collaboration with the CLEAN Team, the commencement of the Trash Study, and expanded trash inspections and monitoring are a few of the notable activities that took place during the reporting period. Strategies and implementation schedules will be adjusted as necessary over time through the adaptive management process.

Table 4-1
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Additional Information (as needed)	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Core JRMP Strategies (Provisions E.2 – E.7)								
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
CV-1	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	The City contracts out outfall monitoring for more than 125 major outfalls in the City, receives hotline and email complaints, and works to eliminate illegal discharges. Refer to JRMP Section 3.	Prior to FY16	Yes – Continuous-Ongoing	During FY15-16, the City responded to 7 hotline calls about trash or illegal dumping.	NA		Yes
CV-2	Implement program for employee reporting of potential illicit discharges.	Chula Vista NPDES staff trains City employees to report illegal discharges. Refer to JRMP Section 3.	Prior to FY16	Yes – Continuous- As needed	During FY15-16, City staff reported 2 cases regarding trash or illegal dumping.	NA		Yes
CV-3	Utilize "Act Chula Vista" smartphone application and *website notification* to encourage residents to report potential illicit discharges or other storm water violations.	"Act Chula Vista" smartphone application is currently in use. There is also a hotline for employees and the general public.	Prior to FY16	Yes – Continuous-Ongoing	During FY15-16, there were 5 reports to the City's website about trash or illegal dumping.	Yes – to update the strategy	Approach – Residents have additional ability to report storm water violations via the City's website.	Yes
E.3 Development Planning								
All Development Projects								
CV-4	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	All development projects are required to implement minimum BMPs. Refer to Jurisdictional Runoff Management Program (JRMP) Section 4 and the BMP Design Manual.	FY15-16	Yes – Continuous – Ongoing	BMP Manual was updated accordingly.	NA		Yes
CV-5	Amend municipal code and ordinances to facilitate and encourage LID opportunities.	Appropriate City Ordinances have been amended with the JRMP update. Refer to JRMP Appendix A – Chula Vista Municipal Code Chapter 14.20 – Storm Water Management and Discharge Control.	FY15-16	Yes	Municipal code Chapter 14.20 was updated.	NA		No

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Additional Information (as needed)	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CV-6	Train staff on LID regulatory changes and BMP Design Manual.	Storm water staff are in regular contact with Development Services staff regarding development projects. Training is provided as changes occur. Refer to JRMP Sections 4 and 8.	FY15-16	Yes – Continuous – As needed	Staff received training on LID BMPs, hydrology modeling, and model BMP design manual updates.	NA		Yes
Priority Development Projects (PDPs)								
CV-7	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	All PDPs are required to implement and maintain post construction BMPs. Refer to JRMP Section 4.	FY15-16	Yes – Continuous – Ongoing	City intake forms were revised to include new requirements for PDPs.	NA		Yes
	a. Administer self-certification program for treatment control BMP compliance.	Self-certification program and corresponding form are already being utilized by applicable projects. Refer to JRMP Section 4.	Prior to FY16	Yes – Continuous – Ongoing	The City implemented a self-certification program for PDPs.	NA		Yes
CV-8	Amend BMP Design Manual for trash areas. Require the design of trash enclosures to prevent run-on and runoff, away from storm drains, and to provide cover.	Trash enclosure details are included in Chula Vista Municipal Code Chapter 19.58.340, the City's Recycling and Solid Waste Planning Manual, and the BMP Design Manual.	FY15-16	Yes	BMP Manual Section 4 was updated to require that trash enclosures be designed to prevent runon/off and have a solid rooftop enclosure.	NA		Yes – if changes are needed
E.4 Construction Management								
CV-9	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	All construction sites are required to implement minimum BMPs. High priority sites are inspected 2x per month during the rainy season, monthly during the dry season; low priority and inactive sites are inspected monthly during the rainy season, as needed during the dry season. Refer to JRMP Section 5. All Construction projects are required to implement minimum BMPs.	Prior to FY16	Yes – Continuous – Ongoing	Program implemented as scheduled. Over 400 inspections were performed by Construction Inspections staff, with 11 trash BMP corrective actions noted. Storm Water staff provide education and support for projects where escalated enforcement is required.	NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Additional Information (as needed)	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilitates and Areas								
CV-10	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and pollutants generated, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Current inspection program is facilities-based. High priority areas are inspected once per year, and low priority areas are inspected once every five years. Refer to JRMP Section 6 and Appendix C. Staff has been dedicated to complete this task.	FY15-16	Yes – Continuous - Ongoing	Storm water staff completed 217 commercial inspections, 45 industrial, 73 municipal inspections of existing development during the reporting period. Of the commercial inspections, 61 trash BMP corrective actions were noted.	NA		Yes
	a. Update minimum BMPs for existing residential, commercial, and industrial development.	General minimum BMPs for trash include good housekeeping and proper waste disposal, cleaning of storm drains, stenciling and signage, maintenance of trash receptacle areas. Refer to JRMP Appendix C.	FY15-16	Yes – Continuous - Ongoing	BMPs were updated for existing development which included BMPs specific to trash and waste management.	NA		Yes
	b. Design, implement, and enforce mobile business program.	Chula Vista has a mobile business program in effect. Business License Department administers storm water information packet and questionnaire, and businesses must agree to not discharge pollutants into storm drains. Storm Water Section has final approval. Mobile businesses are inspected as needed.	Prior to FY16	Yes – Continuous - Ongoing	Storm water staff approved 135 mobile businesses during the reporting period.	NA		Yes
CV-11	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, and signage and education.	Pet waste bag stations are in available in the majority of City parks. Pet waste stations are maintained by parks staff and/or citizens and volunteer groups.	Prior to FY16	Yes – Continuous - Ongoing	Existing pet waste station were maintained during the reporting period.	NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
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CV-12	Promote and encourage implementation of minimum BMPs at residential areas.	The City's CLEAN education program is geared towards residents and common pollutant generating activities that residents perform such as home and garden maintenance, pool cleaning, and auto maintenance.	FY15-16	Yes – Continuous – Ongoing	Residential minimum BMPs were updated in the JRMP document. Educational brochures for residents were updated to reflect updated BMP requirements and changes to the storm water ordinance.	NA		Yes
	a. Encourage use of compost/soil amendments as opposed to fertilizer to decrease runoff.	The City has classes at the Living Coast Discovery Center to provide information to residents about composting.	FY15-16	Yes – Continuous – Ongoing	Compost education classes were available to residents through the Living Coast Discovery Center. Residents can choose between general composting classes, or take additional courses to become a Master Composter.	NA		Yes
	b. Promote and collaborate with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	Chula Vista works with the San Diego County Water Authority, Otay Water District, and Sweetwater Water Authority to provide classes to residents that encourage water smart landscaping and gardening. Funding secure for FY16.	FY15-16	Yes – Continuous – Ongoing	Efficient landscaping classes offered to residents in partnership with Sweetwater Authority and Otay Water District. A free Garden and Water Friendly Plant Fair sponsored by the SD County Water Authority was hosted in the City during the reporting period.	NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
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CV-13	Prohibit and discourage illegal dumping.	Storm Water staff respond to reports of illegal dumping via hotline calls and inspections programs and enforces property owners and/or businesses to clean up their sites and maintain them clean. Environmental services works with Chula Vista Code Enforcement and the Police Department to discourage illegal dumping in and around trash dumpsters, alley ways, open fields by providing signage, fines, and education. As an additional effort to discourage illegal dumping, Republic Services (the City's franchise waste hauler) provides for bulky item pick up and landfill passes to single and multi-family residents, which is included in their collection service rate. A Household Hazardous Waste Facility is also available on Wednesday and Fridays from 9am to 1pm for residents and businesses of Chula Vista, Imperial Beach, and National City to promote proper disposal of hazardous materials. One-day collection events are also offered twice a year in convenient locations throughout the City.	Prior to FY16	Yes – Continuous – Ongoing	The City continued to implement its various programs and efforts to prohibit and discourage illegal dumping. Environmental Services provided outreach letters that educate residents or businesses that live or operate near areas where illegal dumping occurs. The letters explain the incident and include proper disposal information and program pamphlets.	NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
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MS4 Infrastructure								
CV-14	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.) for water quality improvement.	Chula Vista has an MS4 inspection and maintenance program in place. Storm drain structures are inspected once a year and cleaned where necessary based on inspection results. Storm drain pipes are designed to be self-cleaning and do not typically required scheduled cleaning. Storm drain pipes are video surveyed on an as needed basis. Structures and pipes are repaired as needed based on the results of inspections. Open-channel cleaning is completed on an as needed basis.	Prior to FY16	Yes – Continuous – Ongoing	MS4 cleaning proceeded as scheduled.	NA		Yes
	a. Optimize catch basin cleaning to maximize pollutant removal (prioritize catch basin cleaning based on collected data).	Current catch basin inspection (and cleaning is needed) is once per year. Cleanings are prioritized by amount of trash.	Prior to FY16	Yes – Continuous – Ongoing	Catch basins that are characterized as 'high volume trash' are inspected and cleaned more frequently.	NA		Yes
	b. Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	Chula Vista has an MS4 inspection and maintenance program in place and provides surveys and performs repairs as needed.	Prior to FY16	Yes – Continuous – Ongoing		NA		Yes
CV-15	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	The City inspects, cleans, and maintains a total of 498 miles of sewer main. This includes critical maintenance areas, which are cleaned more than once per year. Chula Vista has a monitoring survey and SSO plan.	Prior to FY16	Yes - Continuous – Ongoing	Sewer system maintenance proceeded as scheduled.	NA		Yes
	a. Identify sewer leaks and areas for sewer pipe replacement prioritization.	Wastewater Section performs repairs.	Prior to FY16	Yes – Continuous – Ongoing		NA		Yes
Roads, Streets, and Parking Lots								
CV-16	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways	Street sweeping is contracted out. Commercial, industrial, and business street segments are swept once per two weeks. Residential, center islands, medians, and center lines street segments and public parking lots are swept once per two months. Republic manages Main Street and areas near landfill. Refer to JRMP Section 6.	Prior to FY16	Yes – Continuous – Ongoing	Streets maintenance activities proceeded as scheduled.	NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

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Pesticides, Herbicides, and Fertilizer BMP Program								
CV-17	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	The City has developed a comprehensive program aimed at preventing or reducing pesticides, herbicides, and fertilizers from entering the storm water system and causing direct or indirect harm on non-target flora and fauna and receiving waters for municipal facilities. Whenever practicable, integrated pest management techniques that rely on nonchemical solutions are implemented. Refer to JRMP Section 6 and Appendix C.	FY16	Yes – Continuous – Ongoing	The City continued to implement its pesticides, herbicides, and fertilizers program.	NA		Yes
Retrofit and Rehabilitation in Areas of Existing Development								
CV-18	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	The City will conduct a Baseline Trash Assessment Study to determine where high volume trash areas are located and if their respective drainage areas can be retrofitted with BMPs, especially those for trash. Retrofits pending study results.	FY16	Yes – Continuous – Ongoing	Planning for the Baseline Trash Assessment Study began in FY16, however identification of these areas for retrofit is not expected until the next FY.	NA		Yes
CV-19	Identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	The City's JRMP Appendix F describes the methods used for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas and facilitating such projects. Rehabilitation project selection will be based upon a variety of factors including addressing the FPWQC of trash, existing stream or habitat degradation, multiple benefits of the project, and feasibility of implementation. Projects can arise as part of the Offsite Alternative Compliance Program. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards. Grant funding can be utilized as available.	FY17	NA		NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
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E.6 Enforcement Response Plan								
CV-20	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	The City has an enforcement program in place, which provides for escalating enforcement. Escalated enforcement actions include issuances of Notices of Violation, Civil Penalties, Notices to Clean and Abate, Notices to Cease and Desist. Refer to the Enforcement Response Plan in the JRMP.	FY15-16	Yes – Continuous – Ongoing	The City continued with implementation of IDDE and enforcement response during the reporting period.	NA		Yes
	a. Increased enforcement on businesses that do not implement trash BMPs.	Based on inspection program and additional information collected based on strategy CV-33. Efforts will rely on education program as well.	FY15-16	Yes – Continuous – Ongoing	The City collected additional trash management BMP information during inspections of industrial and commercial businesses. Trash issues were noted on the inspection form and corrections were brought to the business's attention with a timeframe to complete corrective actions as needed.	NA		Yes
	b. Provide education and enforcement of water-using mobile businesses.	The mobile business program and Enforcement Response Plan are used.	Prior to FY16	Yes – Continuous – Ongoing	The City approved 138 mobile businesses.	NA		Yes
CV-21	Enforce minimum BMPs for existing residential, commercial, and industrial development. Includes power washing at non-residential sites.	Minimum BMPs are required for existing development. Refer to JRMP Section 5 and Appendix C.	FY15-16	Yes – Continuous – Ongoing	The City updated its minimum BMPs for existing development.	NA		Yes
	a. Increased education and enforcement for existing development with trash issues.	Facilities with an identified trash problem will be targeted for increased inspections, education, and enforcement.	FY17	NA	City staff is in the process of collecting additional data from industrial and commercial facilities regarding trash management. This was first year of data collection.	NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
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E.7 Public Education and Participation (B.3.b.(1)(a)(iii))								
CV-22	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	The CLEAN Team (NPDES, Environmental Services Section, and Conservation Section) works together on public outreach programs. Refer to JRMP Section 8.	Prior to FY16	Yes – Continuous –Ongoing		NA		Yes
	a. Improve consistency and content of websites to highlight updated storm water regulations.	The Chula Vista website is currently being updated and will include information for the public on environmental programs. Information can also be sent out in bimonthly trash bill inserts.	Prior to FY16	Yes – Continuous – Ongoing	Storm water pollution prevention information was updated to include additional information about the City's mobile business program, residential BMPs, an online reporting form, and provide access to storm water documents.	NA		Yes
	b. Promote community events and CLEAN Business Program.	The CLEAN team has booths at public festivals and provides information. The CLEAN business program, led by the Environmental Services Section, verifies business as CLEAN via a checklist process, which includes provisions for pollution prevention and storm water BMPs.	Prior to FY16	Yes – Continuous – Ongoing	CLEAN Team had a booth at all major City events during the reporting period; a total of 8 CLEAN businesses were approved during the reporting period, bringing the total to 180 CLEAN businesses.	NA		Yes
CV-23	Provide municipal staff training.	The City primarily educates its municipal staff through workshop training, refresher sessions, staff meetings, and on the job training. Training for municipal personnel is focused on maintenance crews, land development staff, planners, landscape architects, and staff from other departments. Municipal personnel are also notified of regional workshops, and are encouraged to participate in workshops and seminars relevant to their type of work. Refer to JRMP Section 8.	Prior to FY16	Yes – Continuous – As Needed	Staff received training on various topics such as the Statewide Trash Amendments, hydrology modeling, LID BMPs, construction inspection requirements, and model BMP design manual requirements.	NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
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Non-JRMP Strategies (Optional Strategies, Provision B.3.b.(1)(b))								
Nonstructural								
CV-24	Enhance commercial and industrial facility inspections to focus on trash.	Current inspection program is facilities-based and will also inspect per high volume trash areas determined in Baseline Assessment Study (CV-33). High priority areas are inspected once per year, and low priority areas are inspected once every five years. Inspection form was revised to further evaluate trash areas. Refer to JRMP Section 6 and Appendix C. Staff secured for FY16.	FY15-16	Yes – Continuous – Ongoing	Inspection form amended to include additional data collection regarding waste handling/disposal BMPs. As more data is collected through both the Trash Assessment Study and through inspections, the inspection program can be tailored to focus on problem areas.	NA		Yes
CV-25	Continue participating in trash source reduction activities and initiatives.	Participate in initiatives as applicable to FPWQC. Triggers include ability to make City ordinance changes, partnering with applicable stakeholders, funding for staff, budget to obtain a consultant or contractor to assist with enhancements to the existing education program.	Prior to FY16	Yes – Continuous – Ongoing	Environmental Services mails an educational insert in the bi-monthly trash bills (6X per year) to approximately 51,000 single family residences. Topics include: HHW, E-waste, recycling tips, composting information, bulky item pickup.	NA		Yes
	a. Continue implementation of smoking ban.	Smoking is banned at City of Chula Vista parks and in all outdoor dining areas. The smoking ban prevents the littering of these areas with cigarette butts.	Prior to FY16	Yes – Continuous – Ongoing	City maintained no-smoking signage in all City parks.	NA		Yes
	b. Continue and enhance education programs to prevent littering.	The City will implement enhancements to existing programs where possible to improve trash education. This activity will be based on the baseline trash assessment study and identification of high volume trash areas, especially from sources such as commercial areas. Funding is secured for FY16.	FY16-17	NA		NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
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CV-25 (cont)	c. Expand educational outreach to multi-unit family complexes.	Provide educational outreach to HOAs. Mailers with trash information are sent out twice a year via Environmental Services Section, and information on over irrigation, BMPs, and general storm water education with a focus on trash can be included. Triggers based on completion of baseline trash assessment study to determine applicable multi-unit family complexes.	FY16-17	NA		NA		Yes
	d. Develop an outreach and training program for residential property managers responsible for HOAs.	The program will target trash and irrigation reduction. Triggers based on results of baseline trash assessment study, budget approval, and staff to implement.	FY16-17	NA		NA		Yes
	e. Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	Chula Vista plans to conduct surveys and will collaborate with CLEAN team to improve outreach based on survey results. Trigger based on results of baseline trash study and survey data.	*FY 16-17*	No – Planned for next FY		Yes – pending results of Baseline Trash Assessment Study	Schedule – changed to begin in FY16-17	Yes
CV-26	Storm Drain Stenciling	In collaboration with citizen and/or volunteer groups, install storm drain stencils on storm drains within high volume trash areas as needed. Triggers include completion of baseline trash assessment study, and partnerships with volunteer groups.	FY16-17	NA		NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
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CV-27	Enhance and expand trash cleanups and educational events through community-based organizations involving target audiences.	Increase effectiveness and reach of trash/beach cleanups, educational opportunities, and community based efforts. Partnerships and sponsorships with I Love A Clean San Diego and others are recommended to be continued and enhanced. To effectively target stream clean-up efforts, focus on partnerships with community organizations which provide strong engagement with target audiences and communities. Triggers include obtaining data from the baseline trash assessment study and budget availability to contract out enhanced educational activities.	FY15-16	Yes	The City had its annual Beautify Chula Vista event that engaged volunteers to participate in trash pick-up, storm drain stenciling, graffiti removal, and tree planting. The Alliance of Californians for Community Empowerment (ACCE) sponsored two neighborhood clean-up events that engaged volunteers in trash pick-up and graffiti removal.	NA		Yes
CV-28	Enhance street sweeping program based on high volume trash area assessment study.	Increase street sweeping in high volume trash areas, as needed. Funding dependent on results of baseline trash assessment study, established hot spot areas, and budget availability.	FY16-17	NA		NA		Yes
CV-29	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	The City will perform a Baseline Trash Assessment Study (CV-33) to determine where high volume trash areas are located and if their respective drainage areas can be retrofitted with BMPs, especially those for trash. Retrofits pending study results.	FY16+	Yes – ongoing through FY17		NA		Yes
	a. Implement program to retrofit trash enclosures of municipal facilities with an established trash problem. Use as a pilot program to expand to existing commercial areas, with the use of an incentive program.	City's Recycling & Solid Waste Planning Manual and CVMC 19.58.340 requires newly constructed trash enclosures to be designed to exclude rain. Trigger for existing trash retrofits dependent upon funding, Baseline Trash Assessment Study, interim goals being met, and ordinance/policy changes. Consider partnerships with waste hauler and other stakeholders to develop incentive program, if feasible.	FY17-18	NA		NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
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CV-30	Implement stream, channel, and habitat rehabilitation projects as needed.	This strategy may be triggered if 1) Interim goals are not met, 2) Stream or habitat rehabilitation is determined to be a more effective pathway, relative to additional structural or non-structural BMPs to meeting trash goals, 3) Funding and staffing has been secured, 4) Partners, MOUs, and permits required by regulatory agencies are secured, and 5) Recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations, 2) Secure funds in the form of general funds, bonds, or grants, 3) Obtain City Council approval of Capital Improvement Projects budget, 4) Initiate preliminary engineering to narrow project scope, 5) Hire design consultant to develop detailed construction plans and construction cost estimates, 6) Complete construction contractor bid and award process for construction phase, 7) Construct project, 8) Operation and maintenance into perpetuity.	Trigger	NA		NA		Yes, as triggered
CV-31	Conduct additional trash monitoring to target high volume trash areas and determine if BMPs are effective.	Chula Vista will develop a trash monitoring program to increase visual trash monitoring, increase inspections of facilities as needed, and collect additional trash data from commercial/industrial facilities. Funding secured for FY16.	FY15-16	Yes – Continuous- As needed	Trash monitoring program was expanded to collect additional data from the focused priority area as well as paired outfall and receiving water monitoring.	NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

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Structural								
CV-32	Install and maintain partial or full capture treatment control BMPs in high volume trash areas as needed.	City will complete Baseline Trash Study to determine where BMP retrofits can occur. Funding for retrofits is based on interim goals and installed in conjunction with Trash Amendment timeline. 1) Identify project locations 2) Secure funds in the form of general funds, bonds, or grants 3) Obtain City Council approval 4) Initiate preliminary engineering 5) Hire design consultant to develop detailed construction plans and construction cost estimates 6) Complete construction contractor bid and award process for construction phase 7) Construct project 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function will be approval by City Council as part of the City's annual budget. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured.	FY17+	NA		NA		Yes
WMA Strategies (Optional Strategies, B.3.b.(2))								
CV-33	Baseline Trash Assessment Study	The City is participating in a Baseline Trash Assessment Study with WMA Copermittees within the Focused Priority Area. The study will assess targeted geographic areas and include elements such as (1) an assessment of current conditions to provide a baseline to demonstrate progress, (2) identify high-priority areas for targeted strategy implementation, and (3) identification of potentially collaborative efforts with different jurisdictions. Implementation of additional strategies will be based on the results of this study and will be updated in the Annual Report.	FY16+	Yes – Continuous through FY17	The City was in the planning process during the reporting period to get a consultant on board to begin the Baseline Trash Assessment Study. Study will begin in FY16-17.	NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Additional Information (as needed)	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CV-34	Promote and collaborate with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	Chula Vista works with the San Diego County Water Authority, Otay Water District, and Sweetwater Water Authority to provide classes to residents that encourage water smart landscaping and gardening. Funding secure for FY16.	Prior to FY16	Yes – Continuous – Ongoing	The City provides water-saving information and giveaways at community events and farmers markets; the Naturescape Program helps residents implement sustainable landscaping practices through community workshops; and there are partnerships with water districts to help residents implement affordable water saving improvements.	NA		Yes
CV-35	Offsite Alternative Compliance Option (WMAA)	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Funding for future fiscal years is contingent on annual budget approval by City Council.	Planning prior to FY16	TBD - As needed		NA		TBD

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Additional Information (as needed)	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CV-36	Address and clean up pollutants from homeless encampments through *City of Chula Vista* Homeless Outreach Team. ~~If a regional social services effort is established, support workgroup to provide sanitation and trash management for person experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.~~	~~The~~ *A* City *Homeless Outreach Team was formed during the reporting period that* ~~may participates jointly~~ *collaborates* with other agencies as part of a ~~regional~~ *City-wide* program. ~~Support a non-profit or consortium to provide sanitation services associated with hygiene as well as trash management for persons experiencing homelessness.~~ This *strategy serves as* ~~provision has been proposed as~~ a method for preventing surface water usage for sanitation and bathing, *trash reduction and cleanup,* as well as opportunity for outreach and referral by social service agencies. ~~Trash management services will include providing trash bags, trash collection areas, and shower/sanitary facilities at centers which provide daytime shelter or on a mobile-basis for known transit camps. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include City staff to coordinate with the regional effort.~~	*FY 15-16*	Yes – City program implemented in FY15-16 – Continuous, ongoing	A City Homeless Outreach Team was formed during the reporting period that consists of City Parks staff, Chula Vista Police Department, Streets staff, and other entities. The team performs clean ups every week in known homeless encampment areas within the City, which includes City parks and facilities. Trash is removed from these encampments as a part of this effort. It is estimated that approximately 1,100-1,400 pounds of trash is picked up per week. New staff was budgeted for the next FY to support this program.	Yes – update to program	Approach and Schedule – this became a City program that was implemented in FY15-16	Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Additional Information (as needed)	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CV-37	Enhance and expand trash cleanups through community-based organizations involving target audiences.	Chula Vista partners with "I Love a Clean San Diego" on cleanup events, such as Creek to Bay, Coastal Cleanup, and Adopt a Canyon. Chula Vista also has its own cleanup event called Beautify CV Day. Funding secured for FY16. Dependent on budget availability.	Prior to FY16	Yes	The City continued to support the Creek to Bay Cleanup, Coastal Cleanup Day, and Beautify Chula Vista Day. There were also additional community cleanup events sponsored by the Alliance of Californians for Community Empowerment that targeted neighborhoods in need of graffiti removal and trash cleanup.	NA		Yes
CV-38	Enhance school and recreation-based education and outreach.	Chula Vista works with "I Love a Clean San Diego" on a variety of community events a year for the Boys and Girls Club, schools, high school environment clubs, and adult organizations. Triggers include available budget and obtaining a contract to aid in enhancing education programs.	FY16-17	NA		NA		Yes

Table 4-1 (continued)
City of Chula Vista Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))[1]	Implementation or Construction Year	Implementation Status		Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Additional Information (as needed)	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CV-39	Conduct and/or participate in special studies							
	a. Reference watershed study	The San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for "natural sources" to establish the concentrations or loads from streams in a minimally disturbed or "reference" condition. Occurs region-wide. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval.	FY15-16	Yes – Completed		NA		No
	b. San Diego Bay Debris Study	The Trash Study is a comprehensive bay-wide study to help managers understand the current extent and magnitude of plastic-based debris accumulation and takes into account seasonal changes to better understand the plastic debris conditions throughout San Diego Bay and its upland contributing areas. Funding and resources were secured for FY2015.	Prior to FY16	Yes – Report will be available FY16-17.		NA		Yes
CV-40	Collaborate with regional education and outreach efforts.	Participate in regional education and outreach program along with other Copermittees. Triggers include opportunities and funding to participate in activities at a regional level.	FY15-16	Yes – Continuous, ongoing	The City participated in numerous Think Blue Events throughout the reporting year. Staff distributed reusable bags, doggie bones, and educational coloring books.	NA		Yes

4.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The Chula Vista BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. Chula Vista updated its BMP Design Manual in accordance with Municipal Permit requirements during FY16; the BMP Design Manual replaced the Chula Vista Storm Water Manual (2011). No additional changes to the BMP Design Manual have been made since it went into effect. The updated Chula Vista BMP Design Manual can be accessed via the Project Clean Water website at: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=244&Itemid=212.

4.5 MODIFICATIONS TO THE JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM

The current Chula Vista JRMP is posted on the City's website, and the link to this page is listed on Project Clean Water. Modification to the City of Chula Vista's JRMP are as proposed in Table 4-2.

Table 4-2
City of Chula Vista Proposed JRMP Updates January 2017

Section No.	Proposed Changes
Acronym/ Abbreviation	added to the end of the definition the following: & Order No. R9-2015-0100
2.1	Revised Paragraph 4 (page 4) as follows: The City updated its BMP Design Manual (formerly known as the Development Storm Water Manual) which contains the City's regulations and requirements for development and redevelopment projects ~~by~~ on ~~December 2015~~ January 2016
2.1	Reformatted the entire section and added the following after the City Attorney Office paragraph: o City Clerk's Office • Maintain records of Ordinances and Resolutions approved by the City Council and oversee the Ordinances incorporation into the Chula Vista Municipal Code. • Process public records request related to the Municipal Permit and storm water. • Advises and assists Storm Water Management Section with Cease and Desist Orders, Administrative Hearings, and other escalated enforcement action.

Table 4-2 (continued)
City of Chula Vista Proposed JRMP Updates January 2017

Section No.	Proposed Changes
3.2.3	Revised Bullet 4. As follows: Discharges of non-storm water to the MS4 from the following categories are allowed on the condition that the discharge is addressed by the following BMPs, which are also discussed in the City's Minimum BMPs for Residential, Industrial, Commercial, and Municipal Sites/Sources in Appendix C; otherwise, they will be addressed as illicit discharge. ~~must be controlled by the requirements provided below. If the City determines that adequate control measures are not implemented for any of the following categories, then the City may prohibit such discharge on a case by case basis~~.
3.5.1.1	Deleted Table 3-1, it is duplicate of Appendix B.1 Attached to JRMP. Replace table 3-1 reference with Appendix B.1 in said section.
3.5.1.1	Added the following paragraphs to the end of the section: Paired receiving water monitoring sites that will be monitored concurrently with MS4 major outfall monitoring locations in the Focused Priority Condition area locations are presented in Table A3-2 of Attachment A3 of Appendix K of the San Diego Bay WQIP. City continues to assess trash as part of the MS4 Outfall Monitoring Program requirements at other major outfall locations in the Focused Priority Condition area, as presented in Table A3-3.
5.0	Replaced the word CSWMP with CSWPCP throughout the Section
5.2	Revised paragraph 3, page 5-1 as follows: Project applicants whose project disturbs less than one acre of land are required to submit a Construction Storm Water Pollution Control Plan (CSWPCP) or Construction Storm Water Certification Statement (both included in Appendix K of the BMP Design Manual) ~~Management Plan (CSWMP or Form 5504 included in Section 2 of the BMP Design Manual)~~ with their project submittals. The ~~CSWMP~~ CSWPCP is a simplified version of the SWPPP and covers a comprehensive list of BMPs applicable to smaller construction sites. The applicants select from the list all those BMPs that are applicable to their project and sign and certify the form. City staff reviews and approves the completed form before issuing any ~~construction~~ permits
5.2	*Use the paragraph from the BMP manual Appendix K*

Table 4-2 (continued)
City of Chula Vista Proposed JRMP Updates January 2017

Section No.	Proposed Changes
5.6.3	Revised the section as follows: The City requires that temporary or permanent erosion controls be implemented before a construction site has disturbed a total of 50 acres or more. ~~This 50 acre maximum is the current County of San Diego soil disturbance limitation~~. If the site is in compliance with applicable storm water regulations and has adequate control practices implemented to prevent storm water pollution, the City has the option to give the site written authorization to disturb beyond the 50 acre maximum up to 100 acres maximum. The City will require, as necessary, additional controls for construction sites allowed to disturb more than 50 acres, which could include additional BMPs, increased inspection frequency, and/or stronger penalties for non-compliance.
Appendix B.1	Updated Appendix B.1 - Major Outfall Inventory

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5 CITY OF SAN DIEGO

5.1 ANNUAL REPORT CERTIFICATIONS

City of San Diego's signed Statement of Certification and Certification of Adequate Legal Authority for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report are included on the following pages.

STATEMENT OF CERTIFICATION

San Diego Bay Watershed Management Area Water Quality Improvement Plan

2015-2016 Annual Report

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Drew Kleis
Deputy Director
Transportation & Storm Water Department

1/12/17
Date

Transportation & Storm Water Department
9370 Chesapeake Drive, Suite 100, MS 1900 • San Diego, CA 92123
Hotline (619) 235-1000 Fax (858) 541-4350

CITY OF SAN DIEGO

SCOTT CHADWICK
CHIEF OPERATING OFFICER

January 27, 2017

Mr. David W. Gibson, Executive Officer
Regional Water Quality Control Board
San Diego Region
2375 Northside Drive, Suite 100
San Diego, CA 92108

Subject: Certification of Adequate Legal Authority

Dear Mr. Gibson:

Pursuant to San Diego Regional Water Quality Control Board Order No. R9-2013-0001, as amended by Order No. R9-2015-0100 (Municipal Permit or Permit), Provision E.1.b, the City of San Diego, as a Copermittee in the above referenced permit, submits this certification of adequate legal authority with the first Water Quality Improvement Plan Annual Report. The City has adequate legal authority to implement and enforce each requirement contained in 40 C.F.R. section 122.26(d)(2)(i)(A)-(F), and the Municipal Permit (including Provision E.1.a(1)-(10)). The San Diego Municipal Code, including the following provisions, provides the City with adequate legal authority as required by the Municipal Permit:

1. Storm Water Management and Discharge Control, sections 43.0301 through 43.0312. These provisions are being amended, although the current version also complies with the requirements of the Municipal Permit.
2. General Construction Permit Authority and Procedures, sections 129.0101 through 129.0120.
3. Grading Regulations, sections 142.0101 through 142.0150.
4. Storm Water Runoff Control and Drainage Regulations, sections 142.0201 through 142.0230.

The City looks forward to working with you and the Regional Board on storm water management matters. If you have any questions, please contact Senior Planner Jim Harry at (858) 541-4353 or email JHarry@sandiego.gov.

Sincerely,

Scott Chadwick
Chief Operating Officer

AK/jph

cc: Mara Elliott, City Attorney, Office of the City Attorney
Stephen Puetz, Chief of Staff, Office of the Mayor
Stacey LoMedico, Assistant Chief Operating Officer
Mike Hansen, Deputy Chief of Staff and Chief of Policy, Office of the Mayor
Paz Gomez, Deputy Chief Operating Officer, Infrastructure/Public Works
Alejandra Gavaldon, Director of Federal Government Affairs & Water Policy, Office of the Mayor
Kris McFadden, Director, Transportation & Storm Water Department
Drew Kleis, Deputy Director, Transportation & Storm Water Department
Davin Widgerow, Deputy City Attorney, Office of the City Attorney
Clem Brown, Program Manager, Transportation & Storm Water Department
Ruth Kolb, Program Manager, Transportation & Storm Water Department
Jim Harry, Senior Planner, Transportation & Storm Water Department

5.2 ANNUAL REPORT FORM

The City of San Diego's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

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I. COPERMITTEE INFORMATION			
Copermittee Name: **City of San Diego (San Diego Bay WMA)**			
Copermittee Primary Contact Name: **Drew Kleis, Deputy Director, Storm Water Division, Transportation & Storm Water Department**			
Copermittee Primary Contact Information: Address: **9370 Chesapeake Drive, Suite 100**			
City: **San Diego**	County: **San Diego**	State: **CA**	Zip: **92123**
Telephone: **858-541-4320**	Fax: **858-541-4350**	Email: **Akleis@sandiego.gov**	

II. LEGAL AUTHORITY	
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	**YES** ☒ **NO** ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE	
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	**YES**[1] ☒ **NO** ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	**YES** ☒ **NO** ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM[2]	
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
Number of non-storm water discharges reported by the public	**634**
Number of non-storm water discharges detected by Copermittee staff or contractors	**393**
Number of non-storm water discharges investigated by the Copermittee	**1,021**
Number of sources of non-storm water discharges identified	**828**
Number of non-storm water discharges eliminated	**819**
Number of sources of illicit discharges or connections identified	**805**
Number of illicit discharges or connections eliminated	**796**[3]
Number of enforcement actions issued	**819**[3]
Number of escalated enforcement actions issued	**445**
V. DEVELOPMENT PLANNING PROGRAM[2]	
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	**YES** ☒ **NO** ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	**YES**[4] ☒ **NO** ☐
Number of proposed development projects in review	**561**[5]
Number of Priority Development Projects in review	**38**[6]
Number of Priority Development Projects approved	**138**[7]
Number of approved Priority Development Projects exempt from any BMP requirements	**0**
Number of approved Priority Development Projects allowed alternative compliance	**0**
Number of Priority Development Projects granted occupancy	**37**[8]
Number of completed Priority Development Projects in inventory	**213**[9]
Number of high priority Priority Development Project structural BMP inspections	**1**
Number of Priority Development Project structural BMP violations	**1**[10]
Number of enforcement actions issued	**4**[11]
Number of escalated enforcement actions issued	**1**

VI. CONSTRUCTION MANAGEMENT PROGRAM[2]	
Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES[1,12] ☒ NO ☐
Number of construction sites in inventory	3,870
Number of active construction sites in inventory	51
Number of inactive construction sites in inventory	425
Number of construction sites closed/completed during reporting period	518
Number of construction site inspections	18,737
Number of construction site violations	211
Number of enforcement actions issued	187
Number of escalated enforcement actions issued	32

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM[2]				
Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?				YES[1] ☒ NO ☐
	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	197	14,085 (includes mobile)	690	70[13]
Number of existing development inspections	195	3,179	102	5[13]
Number of follow-up inspections	0	270	44	4
Number of violations	23	511	34	709[13]
Number of enforcement actions issued	41	623	44	543[13]
Number of escalated enforcement actions issued	6	217	11	291

VIII. PUBLIC EDUCATION AND PARTICIPATION	
Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐

IX. FISCAL ANALYSIS	
Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES[1,14] ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

[signature]	1/12/17
Signature	Date
Drew Kleis	Deputy Director
Print Name	Title
(858) 541-4320	Akleis@sandiego.gov
Telephone Number	Email

[1] The City of San Diego approved an update to the Jurisdictional Runoff Management Plan (JRMP) in FY 16. The update of the JRMP was done in compliance with Order No. R9-2013-0001.

[2] See the JRMP Annual Report FY 2016 Attachment 1 for a citywide summary of this data.

[3] The number of enforcement actions issued does not equal the number of identified illicit discharges or connections because some discharge complaints in the last quarter of FY 2016 were still under investigation at the end of FY 2016.

[4] The Storm Water Standards Manual (Part 1: BMP Design Manual, and Part 2: Construction BMP Standards) was updated in January 2016.

[5] The number of ongoing Standard and Priority Development Projects in review as of 6/30/16. The Development Services Department processes other types of permits, in addition to those included in the JRMP Annual Report, that are not subject to the requirements of the municipal permit.

[6] The number of ongoing Priority Development Projects in review as of 6/30/16. Only a portion of the projects that the Development Services Department processes qualify as a priority development project.

[7] The number of Priority Development Projects approved in FY 2016.

[8] This number includes the City's Priority Development Projects that received final inspection in FY 2016 as well as certain Priority Development buildings and grading projects that did not require a Certificate of Occupancy, that were completed in FY 2016.

[9] Represents the total number of completed Priority Development Projects in the City's inventory as of the end of FY 2016. These projects include completed projects entered into the inventory in previous years.

[10] The number of Priority Development Project structural BMP violations included Notices of Violation, Notices of Deficient Maintenance, and Administrative Citations issued to public and private entities within the City's jurisdiction in this watershed.

[11] The number of enforcement actions included Notices of Violation and Notices of Deficient Maintenance issued to public and private entities within the City's jurisdiction in this watershed. The City has achieved compliance at 146 of the 150 sites identified in the San Diego RWQCB's Notice of Violation (Order Number R9-2014-0034). The San Diego RWQCB granted the City an extension to achieve compliance at the remaining four sites by May 26, 2017.
During the process of achieving compliance for the aforementioned 150 identified sites, the City has discovered an additional 74 sites which initially appear to be out of compliance due to varying degrees of circumstances. Each of these potential violations consist of post-construction BMP issues. Continuing the same process as outlined in our quarterly reports to the RWQCB, the City is currently researching each case. After initial research to verify non-compliance or not, we will follow our established procedures to have each site be in conformance to the MS4 permit under which it was permitted.

[12] Responses in this report are based on the City's internal data. Potential program deficiencies were identified by the Board in FY 2016, however, the City has taken steps to correct issues identified by the Board as detailed in the JRMP Annual Report FY 2016 Appendix. The City has implemented several improvements that address the Regional Board's concerns. These improvements ranged from procedural changes to creating multi-language brochures for contractors. Several operating and internal procedures have been refined to improve enforcement actions, add clarity to how sites are inspected, and to better define the staff's roles and expectations.

[13] Existing facilities for residential uses are characterized as Residential Management Areas (RMA), which could include hundreds of residences. When all of the residences in an RMA are inspected by City staff that is only counted as one inspection. However, all individual issues noted at each residence during an RMA inspection is counted as a separate violation and/or enforcement action.

[14] See the JRMP Annual Report FY 2016 Appendix for the FY 2016 Fiscal Analysis.

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The City of
SAN DIEGO
Development Services Department
Engineering Division

January 12, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Development Services Department Engineering Division Contributions

Please accept this letter as certification of the City of San Diego Development Services Department Engineering Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Edric Doringo, Program Manager at 619-446-5098 or email edoringo@sandiego.gov.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Development Services Department, Engineering Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

Gregory Hopkins

Gregory Hopkins
Deputy Director, Development Services Department

GH/cmm

Enclosure:
cc: Robert Vacchi, Director, Development Services Department
Drew Kleis, Deputy Director, Transportation and Storm Water Department

1222 First Avenue, M.S. 501
San Diego, CA 92101-4155

T (619) 446-5291

The City of
SAN DIEGO

Development Services Department
Inspection Services Division

January 24, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Development Services Department Inspection Services Division Contributions

Please accept this letter as certification of the City of San Diego Development Services Department Inspection Services Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Senior Inspector Sam Lindsey or Project Manager Xavier Del Valle at (858) 492-5070.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Development Services Department, Inspection Services Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

William Barrañón
Inspection Services Manager

The City of
SAN DIEGO

Public Works Department
Construction Management and Field Services Division

November 3, 2016

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Public Works Department, Construction Management and Field Services Division Contributions

Please accept this letter as certification of the City of San Diego Public Works Department Construction Management and Field Services Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Julie Ballesteros, Senior Civil Engineer, at (858) 573-5012.

I certify under penalty of law that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Public Works Department Field Engineering Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, to the best of my knowledge and belief, is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Myrna M. Dayton, PE, QSP, QSD, DCE
Deputy Director

THE CITY OF SAN DIEGO

January 30, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Public Works Department, Project Implementation Division Contributions

Please accept this letter as certification of the City of San Diego Public Works Department, Project Implementation Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Catherine Dungca, Senior Civil Engineer, at (619) 533-3778.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Public Works Department, Project Implementation Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

Marnell Gibson
Assistant Director
Public Works Department

APPENDIX

1 OPERATIONAL ADAPTIVE MANAGEMENT

In Fiscal Year (FY) 2016 the City of San Diego (City) completed technical and non-technical monitoring, special studies, pilot studies, and various other efforts related to its Storm Water Program. The City gained valuable information that led to effective adaptation of procedures and operations, which ultimately led to more effective implementation of its Storm Water Program and the Jurisdictional Runoff Management Plan (JRMP). The following are operational adaptive management improvements that the City made during FY 2016:

- **Get it Done Application**
  In late FY 2016, the City released the Get it Done Application (App), which provides a modern, efficient method for members of the public to report issues to the City. One of the App's features allows illicit discharges to be reported by taking a photo with a phone that includes Global Positioning System (GPS) coordinates, and uploading it to the App. According to a recent City survey, 83 percent of respondents stated that they did not want to call the City government to report a problem. The new Get It Done App eliminates the need to call the City for various problems, by allowing residents to report issues online, which was the preferred method of 50 percent of survey respondents. The App also allows residents to report problems using their name or anonymously.

- **Phase V Street Sweeping Pilot**
  The City completed the fifth and final pilot study of the Targeted Aggressive Street Sweeping Pilot Program in FY 2016, which tested the effectiveness of posting limited-hour "no parking" signs on traditionally non-posted street sweeping routes. After two years of data collection on two subject routes, the study confirmed the hypothesis that a significant amount of additional debris (48% and 58% over baseline on the subject routes) can be removed from posting no parking signs on traditionally non-posted roadways. Based on this finding, the City will consider posting additional routes if supported by the community.

- **Enhanced Catch Basin Cleaning Optimization**
  Enhanced catch basin cleaning is a strategy to address pollutant removal from the Municipal Separate Storm Sewer System (MS4) in three of the City's six watersheds. While most catch basins are inspected once per year, this strategy involves inspecting catch basins within the specified watersheds between two and four times per year. The optimization study assigned priorities to individual basins and watersheds based on eight years of historic debris removal. This optimization focused efforts by reducing the number of inspections performed per year, while increasing total debris removal from those inspections. This enhancement will allow the City to target high priority drains to maximize pollutant removal while maintaining cost efficiencies. In FY 2016, approximately 2,500 additional catch basin inspections and cleanings (if necessary) were completed in the Chollas Creek area of the San Diego Bay Watershed.

- **Flood Control Pump Stations**
  To help minimize the risk of flooding in flood-prone areas during storm events, the City utilizes a number of pump stations to increase the flow of water through the conveyance network. Considering the pump stations are connected to the electric network, they only

function when power is running. In FY 2016, a 2,400 volt automatic transfer switch and generator were installed at a critical pump station that are capable of pumping 130,000 gallons of water per minute. This significantly decreases the risk of flooding in the related drainage area because the pump station will continue to operate during a storm event. The City also replaced or refurbished 11 other critical pump stations. Additionally, the City modernized operations at 14 pump stations by installing a telemetry system that remotely alerts staff of failures, allowing for a more immediate response.

- **Storm Drain Inspections**
  To help prioritize replacement of corrugated metal piping in the City's conveyance network, the City used closed-circuit televising at 62 locations in FY 2016 to assess pipe conditions. The City assessed the condition of 28,000 linear feet of corrugated metal piping in FY 2016.

- **Property-Based Inspections**
  In FY 2016, the City further committed to implementing property-based inspections to increase the business inspection program's efficiency and effectiveness. A previously conducted pilot study on inspection practices found property-based inspections more effective at identifying and resolving water quality issues (e.g., improper trash disposal practices and irrigation runoff, etc.) associated with commercial and industrial businesses. The inspections are focused on areas and activities associated with businesses that would not otherwise be inspected for storm water compliance. The inspections greatly increase the number of businesses subjected to storm water inspections while focusing on the pollution generating areas and activities without unduly increasing the inspection load of City inspectors. In FY 2016, the City performed 835 property-based inspections that accounted for over 4,700 business inspections.

- **Tiger Team**
  The Tiger Team was established in FY 2016 to identify, locate and eliminate sources of human specific bacteria sources in the MS4. The Transportation & Storm Water Department (TSW) leads this effort in partnership with the Public Utilities Department. After a specific portion of the MS4 with elevated human specific bacteria was identified, the Tiger Team performed escalated enforcement activities through TSW Code Enforcement, MS4 sampling, MS4 sanitary sewer line televising, and MS4 and sanitary sewer cleaning. Over several months during the reporting year, one problem area within the City was investigated extensively and a source of human specific bacteria in the MS4 was identified and abated.

- **Increased Non-Stormwater Discharge Investigations**
  The City received 215 more complaints of non-stormwater discharges in FY 2016. Approximately 81% of the complaints citywide were resolved. A majority of the investigations that were resolved involved irrigation runoff. Cases were unresolved either because the source could not be identified or the source was groundwater.

  The identification and elimination of irrigation efforts in FY 2016 involved the following:
  1) Special irrigation patrols were conducted on a monthly basis. All violating properties were issued notices of violation and/or a citation.
  2) TSW code compliance partnered with the Public Utilities Department. If a complaint of irrigation with runoff was received, a storm water code compliance officer would issue a notice of violation. If the property had multiple complaints,

that property would become part of an irrigation patrol and could result in a citation.

- **Waterways Maintenance Plan**
  The City began development of the Waterways Maintenance Plan in FY 2016, which will replace the Master Storm Water System Maintenance Program, which expires in 2018. The goals of the Plan are to create an overall holistic storm water management strategy with standard mitigation measures and streamlined maintenance approvals. Objectives of the Plan include flood risk reduction, infrastructure sustainability and resource protection and restoration. In addition to technical scoring criteria, the Plan also includes a unique public input metric so that public concerns are given a tangible value. Planning efforts will continue in FY 2017, with implementation beginning in FY 2019.

- **Off-Site Alternative Compliance Program**
  In FY 2016, the City implemented phase I of the Alternative Compliance Program. This gives development projects that would require on-site structural Best Management Practices (BMPs) to comply with pollutant control and hydromodification management the option to propose off-site alternative compliance projects. The development of phase II also began in FY 2016 and includes establishing an in-lieu fee structure and credit system as an alternative to installing on-site stormwater BMPs.

- **Watershed Master Planning**
  To provide the high-resolution data needed to drive systematic and cost-effective implementation of green infrastructure (GI) projects, the City has developed a comprehensive and dynamic Watershed Master Plan (WMP) in the Chollas Creek Watershed that quantifies progress towards water quality goals and incorporates synergies with other municipal programs. The WMP has the capability to dynamically assess the cost-based water quality benefits of specific GI projects against one another and incorporates a robust prioritization logic that realizes the complex nature of implementing retrofit GI facilities within a highly urbanized environment. Ultimately, the output of this project gives the City a project-by-project roadmap that is prioritized to implement high-impact and high-efficiency BMPs first, leaving less desirable projects for later implementation.

- **Bacteria Regrowth Study**
  The bacteria regrowth study currently being completed by the City includes monitoring to characterize the magnitude and extent of potential *Enterococcus* loading due to regrowth within the City's storm drain system. This study will quantify the amount of bacteria in receiving water samples that are harmless to humans and would potentially be used to refine bacteria water quality standards of the Bacteria TMDL as a part of the re-opener process.

- **Los Peñasquitos Lagoon Restoration Project**
  Modeling was completed in FY 2016 to confirm the preferred alternative for the Los Peñasquitos Lagoon Restoration project. The City was identified as the "lead" for the project. The upcoming tasks in FY 2017 include completing the concept design and starting the public outreach process. In coordination with Copermittees, Caltrans and SANDAG completed the environmental and construction phases for various rail and transit, highway, and environmental protection projects.

2 STORMWATER PROGRAM ACCOMPLISHMENTS/NOTABLE UPDATES

The City continued to implement the key elements of the JRMP. The following are stormwater accomplishments and notable updates that occurred during the FY 2016 reporting period.

- ## Water Quality Improvement Plans

In FY 2016, the San Diego Regional Water Quality Control Board (Regional Board) accepted the six Water Quality Improvement Plans (WQIPs) that included City jurisdiction. The goal of the WQIPs is to protect, preserve, enhance, and restore the water quality of receiving water bodies. These WQIPs identify the adaptive planning and management process necessary to address the highest priority water quality conditions within a watershed. The WQIPs also identify strategies to achieve improvements in the quality of discharges from the Responsible Agencies' storm drain systems. The City is the lead on the WQIP for the San Dieguito, Los Penasquitos, and Mission Bay watersheds. The City is also a participating agency in the San Diego River, San Diego Bay, and Tijuana River watersheds.

- ## JRMP Refinements

In FY 2016, the City identified refinements to the JRMP. These refinements were incorporated into the JRMP and will be completed in mid FY 2017. Refinements included minor changes to text to update the discussions of WQIP strategies, updates to the fiscal analysis, updates to the minimum BMPs to address pesticide applications, and updated references to the Storm Water Standards Manual that was adopted in FY 2016. The updated JRMP can be viewed at https://www.sandiego.gov/stormwater/plansreports/jrmp.

- ## General Plan and Community Plan Amendments

Southeastern San Diego and Encanto Neighborhoods Community Plan Updates:

The recently adopted Southeastern San Diego and Encanto Neighborhoods Community Plans incorporate language, policies and recommendations concerning the reduction of urban runoff and storm water quality. Stormwater quality plays a significant role in both of these communities since Chollas Creek is a significant feature within both plan areas lead directly to the San Diego Bay. A primary recommendation in both community plans is the restoration and enhancement of the creek, consistent with the Chollas Creek Enhancement Program, which includes the reduction of pollutants that enter the storm water system from nearby uses (see respective Conservation Elements). Specific stormwater language and policies have been adopted for the newly updated Southeastern San Diego and Encanto Neighborhoods Community Plans (adopted October 2015 by City Council).

The following policies have been adopted and will be used to implement BMPs for new development projects in Encanto as an example:

- PLU-53:
  - Facilitate urban gardening as a strategy for creating local healthy food systems and fighting chronic obesity related illnesses, contributing to stormwater retention, and fostering community interaction;
  - Figure 3-4 in the Southeastern San Diego and Encanto Neighborhoods Community Plan illustrates stormwater treatment for streets;
  - Images on page 4-15 in the Southeastern San Diego Encanto Neighborhoods Community Plan illustrate stormwater treatment images;

- P-UD-88: Utilize permeable paving, bioswales, green alleys and/or other stormwater design features that will manage rain water and irrigation runoff while supporting the heavy load vehicles that would service the loading docks and refuse containers;

- Upgrade infrastructure for water and sewer facilities and institute a program to clean the storm drain system prior to the rainy season.

- Install infrastructure that includes components to capture, minimize, and/or prevent pollutants in urban runoff from reaching San Diego Bay and Chollas Creek. (See also Urban Runoff Management in the Conservation and Sustainability Element.)

- P-RE-20: Require that all stormwater and urban runoff drainage be filtered or treated before entering into open space lands.

Draft North Park Community Plan: The draft North Park Community Plan, scheduled to be adopted by City Council in October 2016, also contains specific Stormwater and BMP language in the Conservation Element of the Community Plan as well as in the appendices. The draft North Park Community Plan incorporates language, policies and recommendations concerning the reduction of urban runoff and storm water quality specifically in relation to tree planting as well as "Green Streets". Specific policies include:

- PF-1.15 Implement water improvements programs so there are systematic improvements and gradual replacement of water and wastewater facilities throughout the community. Also see General Plan PF-F.6 PF-G.2, PFH. 3, and PF-I.1.
  - Implement Green Infrastructure strategies to address storm water runoff throughout North Park.

- SE-3.17 Encourage property owners to design or retrofit landscaped or impervious areas to better capture stormwater runoff.

Draft Uptown and Golden Hill Community Plans: Public review drafts of the community plans for Uptown and Golden Hill plan updates were made available for public review in June 2016. The Conservation Elements of the draft community plans address conservation of the natural resources in each community, including open space, natural habitats, canyon sewer maintenance, and management of water resources and

urban runoff. The Public Facilities, Services and Safety Elements also address water, sewer and stormwater infrastructure. The discussion and policies related to these topics are intended to guide sustainable development practices that will minimize ecological footprints within each community and preserve natural features and resources. The Draft Programmatic Environmental Impact Reports were released in the summer of 2016. Adoption of the community plans are anticipated at the end of 2016.

San Ysidro Community Plan Update: A comprehensive community plan update started in San Ysidro in June of 2010 and aims to reflect the current conditions, improve mobility, include the pedestrian environment, and address quality of life issues. A Community Plan Update Stakeholders Advisory Committee (Advisory Committee) was established as part of the plan update effort and consists of diverse representation from the residents, property owners, various business interests, local community organizations, and not-for-profit groups, and participating public agencies within the plan update boundary. The San Ysidro Community Planning Group, which provides City decision-makers with input and recommendations regarding land use plans and development proposals within the San Ysidro plan boundary, makes up the majority of the Advisory Committee members. The Plan update effort is informed by technical studies and the City's 2008 General Plan which promotes current storm water, urban runoff, and water conservation policies. A discussion draft of the plan was released in June 2014 and a public review draft was released in April 2015 and 2016. The plan includes a Conservation Element as well as a Public Facilities Services and Safety Element, and contains specific policies related to reducing storm water runoff in the San Ysidro Community planning area. The plan is anticipated to be adopted in fall 2016.

- Notices of Violation

Treatment Control BMPs Notice of Violation: The City has achieved compliance at 146 of the 150 sites identified in the Regional Board's Notice of Violation (Order Number R9-2014-0034). The Regional Board granted the City an extension to achieve compliance at the remaining four sites by May 26, 2017.

During the process of achieving compliance for the aforementioned 150 identified sites, the City has discovered an additional 74 sites which initially appear to be out of compliance due to varying degrees of circumstances. Each of these potential violations consist of post-construction BMP issues. The City is continuing the same process outlined in its quarterly reports to the Regional Board, and is researching each case. After initial research to verify non-compliance or not, the City will follow its established procedures to achieve compliance at each site as required by the MS4 permit that it was permitted.

Administrative Civil Liability Complaint: The Regional Board conducted an audit of the City's construction management program during the 2014-2015 rainy season, and issued an Administrative Civil Liability Complaint in July 2016 for several alleged violations involving the City's construction oversight and enforcement practices. The City has worked diligently to address their initial concerns, and will continue to evaluate and implement strategies to ensure long-term success.

Since 2011, there has been a steady increase in the number of construction projects citywide. This surge in activity required the City to respond in a manner that would

enable the staff to keep up with the demand and allow the managers to effectively oversee the growth.

Several substantial improvements have been made, ranging from updating our standard procedures and increasing our outreach efforts to improving the City's escalating enforcement practices and issuing Administrative Citations and Administrative Civil Penalties to repeat offenders. In addition, the City established bi-weekly coordination meetings with the Storm Water teams from Public Works, Development Services and TSW to more effectively share up-to-date project information, discuss various strategies, collaborate on solutions, and coordinate enforcement on a more routine basis so that escalated enforcement is effective.

Another significant improvement involves the development of a unified storm water enforcement database. This will ensure collaboration between Resident Engineers (RE) and storm water inspectors while in the field so they will know the full inspection and enforcement history prior to entering a site. This resource is expected to be available in FY 2017.

Updating the Storm Water Standards Manual is another milestone improvement that was completed during FY 2016. The additional clarity that's now provided in the Construction BMP Standards section (Part 2) gives the responsible party increased guidance to help prevent construction activities from adversely impacting water quality downstream.

The frequency of the citywide storm water training has increased and proven to be a key factor in equipping and empowering our staff to properly address various field challenges and confidently communicate concerns and violations to the responsible parties. Some of the trainings included mandatory annual storm water training for the REs, Inspectors and Code Enforcement Officers, as well as training for our operations staff from the Public Utilities Department and TSW Streets Division.

3 Fiscal Analysis

3.1 General Budget Information

The Storm Water Division is responsible for reporting annually on the jurisdictional, watershed and regional fiscal analyses to the Regional Board in accordance with the regional Fiscal Analysis Method developed by the Copermittees in response to Regional Board Order No. R9-2007-0001 (2007 Permit). During the reporting period, the Storm Water Division collected and analyzed financial information from 23 City departments/divisions through its "Annual Report Form" questionnaire, as well as from within the Storm Water Division. A summary of the findings is included below.

FY 2016 fell within the transitional period, as defined under Regional Board Order No. R9-2013-0001, as amended by Order No. R9-2015-0001 (Municipal Permit). During the transitional period, most of the jurisdictional portions of the City's program continue to follow the requirements of the 2007 Permit, while the JRMP and WQIPs were being developed in response to the current Municipal Permit. The WQIPs were approved by the Regional Board at the end of FY 2016. The expenditures described for FY 2015 therefore reflect costs to comply with the transitional period stormwater requirements in effect during FY 2015, which are a combination of 2007 Permit and current Municipal Permit standards. Since the WQIPs were approved during FY 2016, partial implementation began, but full implementation will commence in FY 2017.

It is expected that the City will begin full implementation of current Municipal Permit requirements during FY 2017. The City will implement the revised JRMP, which updates the City's jurisdictional stormwater program to follow the current Municipal Permit requirements rather than the 2007 Permit requirements. The City's fiscal analysis reporting structure in turn will change, reporting expenditures, and funding sources in the following three main categories: JRMP (jurisdictional), WQIP (watershed), and flood risk management. That structure is consistent with the framework described in the City's Watershed Asset Management Plan (WAMP), the WQIPs to which the City is a party, and the JRMP. FY 2015 is the last year in which JRMP and flood risk management will be lumped together under the heading of "Jurisdictional Component" rather than reported separately.

3.2 Fiscal Analysis Methods

While the City used the format and guidelines included in the Fiscal Analysis Method for reporting purposes, a few modifications were necessary to address how the City tracks accounts internally. Modifications to the expenditure categories are described in the relevant sections below. In many cases, estimated percentages were used to allocate expenditures into the appropriate municipal permit component categories, including watershed and regional.

3.2.1 Fiscal Analysis Results

3.2.1.1 Expenditures

The City's FY 2016 Transitional JRMP Regional Program total expenditures ($75,934,083) for implementing the Municipal Permit requirements are summarized in Table 1.

Table 1: FY 2016 Jurisdictional, Watershed, and Regional Expenditures Summary

Jurisdictional Component	
Administration	$11,179,605
Development Planning (including public and private projects)	$1,897,784
Construction (including public and private projects)	$632,646
Municipal (including Non-emergency Fire Fighting expenditures)	$30,146,109
Storm Water Division Capital Improvements Program (CIP)	$7,929,308
Industrial and Commercial	$2,001,544
Residential, Education, and Public Participation	$2,159,991
Illicit Discharge Detection and Elimination (IDDE)	$11,339,120
Jurisdictional Total	$67,286,108
Watershed Component[1]	
San Dieguito Watershed	$1,105,348
Los Peñasquitos Watershed	$2,061,071
Mission Bay Watershed	$1,242,769
San Diego River Watershed	$680,843
San Diego Bay Watershed	$2,165,456
Tijuana River Watershed	$686,584
Watershed Total	$7,942,071
Regional Component	
Total Copermittee Cost Share for the City of San Diego	$342,001
Additional Regional Costs for education efforts, monitoring, document reviews, regional meeting attendance, and special projects	$363,903
Regional Total	$705,904
Total Costs	$75,934,083

[1] Watershed Component costs do not include Capital Improvements Program (CIP) costs. CIP costs are only included in the Jurisdictional Component's Storm Water Division Capital Improvements Program Category.

Transitional JRMP Expenditures

The City's FY 2016 Citywide expenditures for implementing the jurisdictional Municipal Permit requirements are depicted in Figure 1. Expenditures were provided as actual costs in most cases, and when the actual costs could not be determined, estimates of actual costs were provided. The Storm Water Division used the expenditure categories detailed in the Fiscal Analysis Method for jurisdictional reporting. However, because of implementation overlap with the City's education, public participation, and residential Municipal Permit components, it is difficult to separate out individual component costs. Therefore, the expenditures for residential, education, and public participation are reported as one expenditure category.

A total of $67,286,108 was expended in FY 2016 to implement JRMP activities citywide. This amount includes costs paid by sewer and water rate payers (which are used for sewer and water-related services) and costs reimbursed by project applicants. An overview of the expenditures reflected in this component is described below.

Administration ($11,179,605)

Activities identified in this section represent personnel and non-personnel expenses for administration and contracts, grant management, citywide management, staff training, reporting, and assessment of the Municipal Permit.

Development Planning ($1,897,784)

Activities identified in this section represent personnel and non-personnel expenses for plan check reviews, incorporating BMPs into project designs, BMP Design Manual development, and General Plan updates. This category includes expenses for private and public projects.

Construction ($632,646)

Activities identified in this section represent personnel and non-personnel expenses for plan check review services, field inspections related to grading permits, public improvements, and building activities. This category includes expenses for private and public projects.

Municipal ($30,146,109)

Activities identified in this section represent personnel and non-personnel expenses for street sweeping, storm drain and channel maintenance, BMP implementation, and municipal facility and activity inspections. Additionally, this section includes the expenditures for Fire Department activities not related to emergency firefighting, such as facility inspections, stormwater BMPs, etc.

Capital Improvement Program ($7,929,308)

Activities identified in this section represent personnel and non-personnel expenses for implementation of new construction and planned improvements to existing facilities for storm water management. Projects may include, but are not limited to, the construction, purchase, or major renovation of buildings, utility systems, and other facilities to achieve storm water requirements. In addition, they may also include land acquisitions and roadway projects to install storm water facilities.

Industrial and Commercial ($2,001,544)

Activities identified in this section represent personnel and non-personnel expenses for inspection of industrial and commercial facilities. This also includes personnel and non-personnel expenses for the stormwater components of Food Establishment Wastewater Discharge Program (FEWD) and Industrial Wastewater Control Program (IWCP) inspections.

Residential, Education, and Public Participation ($2,159,991)

Activities identified in this section represent personnel and non-personnel expenses for educational materials, outreach efforts and events, public service announcements (PSAs), household hazardous waste (HHW) and used oil outreach, and community events.

Illicit Discharge Detection and Elimination ($11,339,120)

Activities identified in this section represent personnel and non-personnel expenses for identification and elimination of illicit discharges, enforcing the City's stormwater ordinance and implementation of the administrative civil penalties and citation process, and the urban runoff monitoring program.

Watershed Expenditures

The City's watershed expenditures during FY 2016 for the implementation of the watershed Municipal Permit requirements were provided as actual costs and when the actual costs could not be determined, estimates of actual costs were provided. The Storm Water Division used the expenditure categories (administration, watershed activities, cost share contribution, and other) detailed in the Fiscal Analysis Method for watershed reporting. The watershed expenditures included in this report only capture City expenditures and do not account for any expenditure disbursed by other Copermittees within the watershed(s).

In total, $7,942,071 was expended in FY 2016 for the implementation of citywide watershed activities. This amount includes costs for the implementation of applicable TMDLs along with special studies.

Regional Expenditures

The City's FY 2016 regional expenditures ($705,904) for the implementation of the regional Municipal Permit requirements are primarily the City's share of regional Copermittee stormwater program costs. Additional costs include estimated staff time to attend regional meetings and other related administration costs. The Storm Water Division used the expenditure categories (administration, cost share contribution, regional activities, and other) detailed in the Fiscal Analysis Method for regional reporting. The regional expenditures included in this report only capture City expenditures, and do not account for any expenditure disbursed by other Copermittees in the region.

3.2.1.2 Grant Funding for Special Studies

In addition to resources identified for Municipal Permit requirements, the City actively seeks grants, and other funding sources, for special studies and Capital Improvement Projects. For the most part, funding for these projects may be limited to the projects specified and the City may restrict funding reallocation to other projects. Therefore, these resources are currently not incorporated in calculations for total Municipal Permit requirements expenditures detailed in Section 2.2.1.4 above. Table 2 lists projects that were initiated and/or in progress during FY 2016. It is important to note that the projects span multiple years and the amounts listed below are not just representative of FY 2016.

Table 2: Funding for Special Projects

Funding Source	Project	Amount	Matching Fund Amount	Total Amount[2]
San Diego County Water Authority (SDCWA)	Memorial Park Infiltration Basin Construction	$255,651.00	$295,904.00	$551,555.00
State Water Resources Control Board (SWRCB)	43rd & Logan Monitoring & Assessment	$689,300.00	$85,362.00	$774,662.00
SDCWA	Bannock Avenue Infiltration Construction	$630,500.00	$893,300.00	$1,523,800.00
SWRCB	Southcrest Park Infiltration Project	$1,880,070.00	$777,970.00	$2,658,040.00
Total Grant Funding		$3.5 million	$2.0 million	$5.5 million

2 Amounts span multiple years and not just FY 2016

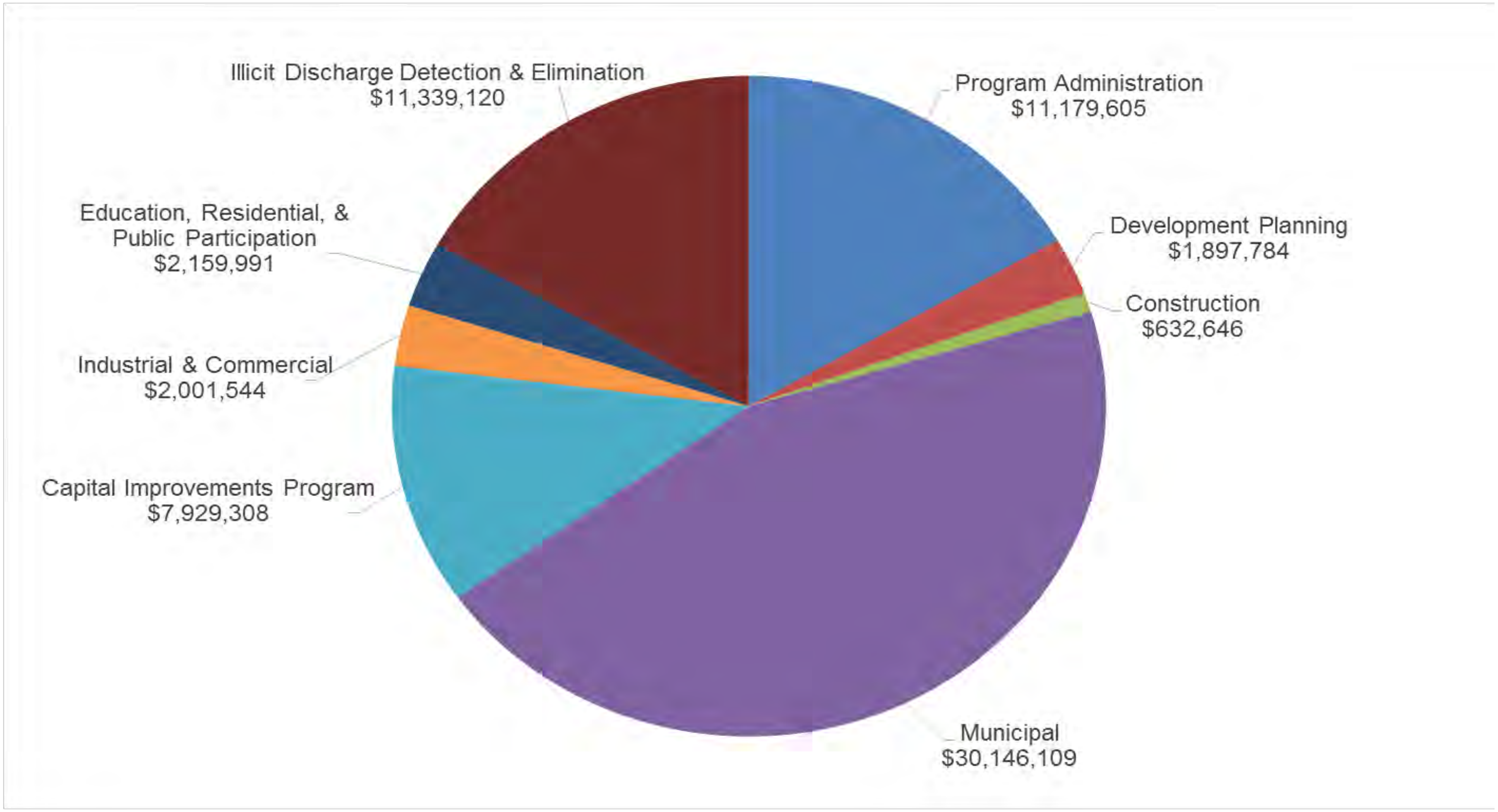

Figure 1: FY 2016 Citywide JRMP Expenditures by Permit Area

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3.2.2 Funding Sources

Citywide implementation of Municipal Permit requirements is funded through four main types of governmental funds: the General Fund, Special Revenue Funds, Enterprise Funds, and Internal Service Funds.

3.2.2.1.1 General Fund

The General Fund is the main fund for the City and is supported by major revenue sources, including property tax, sales tax, transient occupancy tax, and franchise fees. Departments funded by the General Fund provide core community services.

3.2.2.1.2 Special Revenue Funds

Special Revenue Funds account for revenues received for specifically identified purposes. Some of the larger funds that fall under this category include TransNet, Gas Tax, and Special Promotion programs.

3.2.2.1.3 Enterprise Funds

Enterprise Funds are initiated for specific purposes and funded through fees for services. This funding type is designated for the operations, management, maintenance, and development of the department providing the service. For implementation of citywide JRMP activities, activities are funded through the following enterprise funds:

- Airports Fund
- Development Services Enterprise Fund
- Golf Course Enterprise Fund
- Recycling Fund
- Refuse Disposal Fund
- Sewer Revenue Funds
- Water Utility Fund

3.2.2.1.4 Internal Service Funds

Internal Service Funds are comprised of fees for services provided by one City department to another City department or division. For implementation of citywide JRMP activities, activities are funded through the following internal service funds:

- Engineering and Capital Projects Fund
- Equipment Division Funds

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City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 1: Summary of Watershed Specific Data from the IDDE Program

JRMP Annual Report Form – Section IV. Illicit Discharge Detection and Elimination Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of non-storm water discharges reported by the public	119	353	541	368	634	47	**2,062**
Number of non-storm water discharges detected by Copermittee staff or contractors	60	172	317	314	393	50	**1,306**
Number of non-storm water discharges investigated by the Copermittee	171	518	845	683	1,021	97	**3,335**
Number of sources of non-storm water discharges identified	143	442	736	559	828	94	**2,802**
Number of non-storm water discharges eliminated	141	434	697	553	819	92	**2,736**
Number of sources of illicit discharges or connections identified	142	437	715	551	805	94	**2,744**
Number of illicit discharges or connections eliminated	140	429	676	545	796	92	**2,678**
Number of enforcement actions issued	141	436	709	553	819	93	**2,751**
Number of escalated enforcement actions issued	69	197	351	349	445	61	**1,472**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 2: Summary of Watershed Specific Data from the Development Planning Program

JRMP Annual Report Form – Section V. Development Planning Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/ La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of proposed development projects in review	70	241	332	233	561	60	**1,497**
Number of Priority Development Projects in review	5	32	15	21	38	8	**119**
Number of Priority Development Projects approved	88	110	76	61	138	27	**500**
Number of approved Priority Development Projects exempt from any BMP requirements	0	0	0	0	0	0	**0**
Number of approved Priority Development Projects allowed alternative compliance	0	0	0	0	0	0	**0**
Number of Priority Development Projects granted occupancy	75	63	7	30	40	9	**224**
Number of completed Priority Development Projects in inventory	118	178	141	113	213	89	**852**
Number of high priority Priority Development Project structural BMP inspections	1	9	0	1	1	5	**17**
Number of Priority development project structural violations	1	8	0	1	1	5	**16**
Number of enforcement actions issued	1	15	0	3	4	12	**35**
Number of escalated enforcement actions issued	0	3	0	1	1	1	**6**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 3: Summary of Watershed Specific Data from the Construction Managment Program

JRMP Annual Report Form – Section VI. Construction Management Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/ La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of construction sites in inventory	1,364	4,300	2,091	1,830	3,870	448	**13,903**
Number of active construction sites in inventory	26	47	37	38	51	8	**207**
Number of inactive construction sites in inventory	12	112	216	188	425	36	**989**
Number of construction sites closed/completed during reporting period	23	169	276	258	518	44	**1,288**
Number of construction site inspections	10,074	27,037	9,404	8,875	18,737	2,801	**76,928**
Number of construction site violations	169	270	195	78	211	154	**1,077**
Number of enforcement actions issued	114	164	183	51	187	150	**849**
Number of escalated enforcement actions issued	65	91	16	25	32	6	**235**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 4: Summary of Watershed Specific Data from the Existing Development Managment Program

JRMP Annual Report Form – Section VII. Existing Development Management Program	San Dieguito Watershed				Los Peñasquitos Watershed				Mission Bay/La Jolla Watershed				San Diego River Watershed				San Diego Bay Watershed				Tijuana River Watershed				Total Citywide			
	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES
Number of facilities or areas in inventory	23	1,542	81	12	123	8,282	915	27	218	8,911	464	32	121	10,175	513	33	197	14,085	690	70	20	2,075	369	6	702	45,070	3,032	180
Number of existing development inspections	22	308	6	1	117	1,533	140	4	159	4,801	186	5	114	2,573	99	5	195	3,197	102	5	19	233	41	2	626	12,645	574	22
Number of follow-up inspections	0	14	0	0	0	263	13	0	0	166	4	3	0	193	5	4	0	270	44	4	0	31	7	0	0	937	73	11
Number of violations	3	49	0	109	18	388	37	375	34	413	6	424	10	420	11	481	23	511	34	709	1	60	19	69	89	1,841	107	1,819
Number of enforcement actions issued	4	58	0	107	22	490	48	285	46	462	9	407	16	514	13	365	41	623	44	543	1	65	21	62	130	2,212	135	1,790
Number of escalated enforcement actions issued	0	23	0	50	2	148	8	134	0	205	3	182	0	172	0	236	6	217	11	291	0	26	13	36	8	791	35	884

MUN Municipal
COM Commercial
IND Industrial
RES Residential

5.3 CITY OF SAN DIEGO STRATEGIES

The City of San Diego is proposing the following administrative changes to the San Diego Bay Quality Improvement Plan outlined in Table 5-1. The proposed administrative changes include clarifications, corrections to errors and typos, and other minor edits that only apply to the City of San Diego. Changes to individual strategies, with respect to the WQIP September 2015 submittal, are shown in ~~strikeouts~~ and red text in the City's strategy reporting table later in this section (Table 5-2 to 5-5).

Table 5-1
Administrative Changes to the WQIP – City of San Diego

	WQIP Section	Administrative Changes
1	Section 4.3.3.2.3 Alternative BMP Implementation Scenario for Refinement of Water Quality Regulations	Included the following text: "Cost comparison between the Primary and Alternative Scenario presented in this section are a snapshot in time and are based on the best information available at the time they were prepared. As program implementation progresses, updates to estimated funding needs are likely to change. For the most recent estimate of funding needs, refer to the WAMP available at the Storm Water Division website, www.sandiego.gov/storm water/plansreports.
2	Appendix I – Jurisdictional Strategies and Schedules; Section I.4.2 Funding Needs for the City of San Diego	Included the following text: "Funding needs presented in this section are a snapshot in time and are based on the best information available at the time they were prepared. As program implementation progresses, updates to estimated funding needs are likely to change. For the most recent estimate of funding needs, refer to the WAMP available at the Storm Water Division website, www.sandiego.gov/storm water/plansreports.
3	Appendix I – Jurisdictional Strategies and Schedules; Table I-4-2 City of San Diego Jurisdictional Strategies	Refined the text (shown as track changes in red text in Appendix 2) to provide greater clarity and/or to correct errors and typos.
4	Appendix I – Jurisdictional Strategies and Schedules; Table I-4-2 City of San Diego Jurisdictional Strategies	Changed strategy identification numbering system (See Appendix 2).

Table 5-1 (continued)
Administrative Changes to the WQIP – City of San Diego

	WQIP Section	Administrative Changes
5	Appendix I – Jurisdictional Strategies and Schedules; Table I-4-2 City of San Diego Jurisdictional Strategies	Structural Strategies, Priority Development Project (PDP) BMPs: All PDP BMPs have been combined into a single strategy for ease of viewing. A table with an updated list of PDP BMPs is included in the WQIP Annual Report (See Appendix 2).
6	Appendix I – Jurisdictional Strategies and Schedules; Table I-4-2 City of San Diego Jurisdictional Strategies	Structural Strategies, Multi Use Treatment Areas (MUTAs): Planned MUTAs that are not yet built have been combined into a single strategy for ease of viewing. The total sum of drainage area treated (level of commitment) has not changed. A table with all structural strategies (MUTAs, Green Infrastructure, Green Streets, etc.) is included in the WQIP Annual Report (See Appendix 2).

Table 5-2
City of San Diego Jurisdictional Strategies for San Diego Bay WMA

~~Strikeouts~~ and red text are text edits that have been made up to the current date since the WQIP September 2015 submittal.

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Jurisdictional Strategies								
Note: Strategy IDs with an asterisk indicate those strategies that are considered "jurisdictional" in the MS4 Permit, but are considered enhancements to the JRMP to target highest priority water quality conditions.								
JRMP (E.2-E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
CSD-JRMP-01	Establish guidelines and standards for all development projects; provide technical support related to implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area or implement easements to protect water quality, where applicable and feasible le. Includes internal coordination and collaboration between City departments (DSD, PWD, and Engineering) to improve success and long-term benefits of BMPs.	Refer to JRMP Section 4. ~~All high priority projects will be inspected annually prior to the rainy season. 20 percent of all projects will be inspected annually. Maintenance inspections include examination of all structural BMPs at a project to verify that each structural BMP is working, being maintained properly, and is in compliance with all applicable City ordinances and permits.~~ May include providing technical support and consultation for other City departments that review project submittals for compliance with Storm Water Standards Manual requirements. May also include review of City projects for compliance with Storm Water Standards Manual requirements.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Revised Storm Water Standards Manual went into effect on February 16, 2016. FY17 Notes: The Storm Water Standards will be revised to include Critical Coarse Sediment Yield Area mitigation measures that were developed through a TAC process, along with other minor clarifications.
CSD-JRMP-02	Develop Design Standards for Public LID BMPs.	Improve quality of design to ensure efficiency and reliability in public designs.	FY14-FY15	Continuous- As needed	Yes	No Change	Yes	FY16 Notes: Draft Green Infrastructure standard drawings and specifications are currently in the review process. FY17 Notes: Plan to develop more standard drawings and specifications for other green infrastructure components.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-JRMP-03	Outreach to impacted ~~industry~~ commercial, industrial, municipal, and residential development regarding minimum BMP requirement updates.	~~Affects commercial, industrial, and residential development.~~ May include onsite education at the time of inspections, city staff training, and mailers to business owners and prospective business owners.	FY15	Continuous- As needed	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Sent out monthly business Tax License renewal mass mailings, which included information about storm water BMPs. Violation location information from the Residential Patrol Program is used to target outreach.
CSD-JRMP-04*	Train staff on LID regulatory changes and LID practices.	Formal training is required for all staff involved in development plan review to increase knowledge of LID BMPs. Goal of training associated with LID practices and regulations is to promote LID implementation and to avoid adverse conditions such as trees planted within swales, or planned drainage patterns which obstruct or inhibit LID performance.	FY16	Continuous- As needed	Yes	No Change	Yes	FY16 Notes: Presented at a PWD training to discuss the revised Storm Water Standards Manual. Provided a plan check training for plan reviewers at DSD and PWD staff in May 2016.
CSD-JRMP-05*	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities to support compliance with the MS4 Permit and TMDLs in a reasonable manner. Ensure consistency with the City of San Diego's BMP Design Manual. Update the Storm Water Standards Manual accordingly.	Municipal codes and ordinances will be brought to City Council for consideration to encourage LID implementation (e.g., runoff detention and filtration using natural filters and storm water retention for reuse). LID storm water management will be encouraged in proposed codes and ordinances associated with development and redevelopment projects, which are brought to City Council for consideration.	FY15	Continuous- As needed	Yes	No Change	No	None
CSD-JRMP-06	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	Technical education and outreach to the development community includes outreach on design standards, City design manuals, and the WMAA.	Prior to FY16	Continuous- Ongoing	Yes	No Change	Yes	FY16 Notes: Presented the revised draft Storm Water Standards at two public workshops in September 2016.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Priority Development Projects (PDPs)								
CSD-JRMP-07	For PDPs, administer a program and provide technical support to other City departments to ensure implementation of on-site structural BMPs to control pollutants and manage hydromodification by developing City wide storm water development standards and design guidelines.	Administer a program in coordination with other City departments to promote and confirm a thorough understanding of requirements for implementing structural BMPs that control pollutants and manage hydromodification. Includes requirements to confirm proper design and construction through processes controlled by other City departments. Please see Attachment 1 for details on PDP related BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City enhanced the Storm Water Quality Management Plan (SWQMP) template that was developed as a Copermittee effort for developers to use.
CSD-JRMP-08	Institute a program to verify and enforce maintenance and performance of treatment control BMPs.	Refer to JRMP Section 4.5. The Storm Water Division is responsible for annually verifying that all structural BMPs within its inventory are being properly maintained. The Storm Water Division performs verification through an Annual Maintenance Verification mailing and a direct maintenance inspection program. Parties responsible for maintenance of structural BMPs are required to complete and sign the Annual Maintenance Verification, certifying that the structural BMPs are being properly maintained. Direct maintenance inspections will be performed at all projects for which an Annual Maintenance Verification Form was not completed. All high priority projects will be inspected annually prior to the rainy season. 20 percent of all projects will be inspected annually. Inspect additional BMPs as needed. Medium and low priority projects will not require inspection if they have completed their Annual Maintenance Verification form, unless they are part of the 20 percent of projects that are annually inspected.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY17 Notes: For porous pavement BMPs, staff plan to use an infiltrometer to measure BMP effectiveness.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-09	Update ~~BMP Design Manual procedures~~ Storm Water Standards Manual to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP Section 4. Storm Water Standards Manual will be updated in accordance with the Permit and made available on the City's website.	FY15	Continuous every 5 years/ permit cycle	Yes	Revised to clarify strategy.	Yes	FY17 Notes: The Storm Water Standards will be revised to include Critical Coarse Sediment Yield Area mitigation measures that were developed through a TAC process, along with other minor clarifications.
CSD-JRMP-10*	Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	Amend BMP Design Manual and zoning standards/requirements which address reduction of pollutants for common areas of trash build-up (e.g. restaurants, supermarkets, "big box" retail stores with food, pet stores). Most effective method for source control of bacteria and trash is to employ four-sized trash enclosures with a cover over trash areas.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on trash enclosures (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-11*	Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, groomers, and pet care stores.	Amend BMP Design Manual and zoning requirements (including retrofits) to provide supplemental standards for animal facilities (including animal shelters, dog daycares, veterinary clinics, groomers, pet car stores, and breeding, boarding, and training facilities). Supplemental standards may include requiring covered trash enclosures, identification of landscaped relief areas on site plans, ensuring drainage connections and treatment swales for areas that will not drain to the sanitary sewer, as well as inspection of grading, drainage, and landscaping for outdoor exercise areas.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on animal facilities (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-12*	Amend BMP Design Manual for nurseries and garden centers.	Amend BMP Design Manual to provide supplemental standards for plant nurseries and garden centers. Standards will focus on reducing irrigation runoff, and loading of sediment, pesticides, and nutrients. Measures may include: covered outdoor storage, green waste management BMPs, improved irrigation efficiency to reduce dry-weather runoff, and containment of runoff from impervious areas where plants and materials are stored.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on nurseries (See Part 1, Appendix E of the Storm Water Standards).

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-13*	Amend BMP Design Manual for auto-related uses.	Amend BMP Design Manual to provide supplemental standards for automotive-related uses to reduce loading of metals, oils, grease, and trash. Measures may include: four-sized covered trash enclosures, and careful review of auto-related usage areas (e.g. garage bays at repair shops) for grading, drainage, and drain connections to sanitary sewer systems.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on auto-related facilities (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-14*	~~Develop and administer an alternative compliance program for on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects). Refer to Section 4.2.5.~~ Offsite Alternative Compliance Option	Refer to JRMP Section 4.2.3.1. WMAA and Water Quality Equivalency Study completed in FY15. Phase I, applicant implemented projects, is anticipated to be in effect by the end of FY16 contingent on Regional Board's approval of the WQIPs. Phase II, the expansion of the program to include other alternative compliance options, is expected to begin in FY16.	FY15	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Phase 1 of the Alternative Compliance Program (ACP) went into effect on 2/16/16. Development on Phase 2 of the ACP, including public involvement via Technical Advisory Committee (TAC) meetings, began during FY16. FY17 Notes: Continue developing Phase 2 of ACP. Topics to discuss include: environmental permitting, long-term facility maintenance, legal agreements and credit tracking, maintenance and permitting rules, and credit tracking and legal rules. Public involvement via TAC meetings will continue.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
E.4 Construction Management								
CSD-JRMP-15	Administer a program to oversee implementation of temporary BMPs that control sediment and other pollutants during the construction phase of projects. Includes requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other City departments.	Refer to JRMP Section 5. Inspections performed by the City or City staff provide verification that each site is in conformance with the Construction Storm Water BMP Performance Standards in the Storm Water Standards Manual. Inspections are tracked to ensure that they meet the minimum inspection frequencies. High priority active and inactive sites are inspected bi-weekly during the rainy season. Medium priority sites are inspected monthly during the rainy season. Low priority sites are inspected as-needed during the rainy season. All sites are inspected as-needed during the dry season. Please see Attachment 1 for details on construction BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
CSD-JRMP-17	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP Sections 6, 7, and 8. All industrial and commercial areas are inspected once within ~~the Permit term~~ ~~(~~five years~~)~~. At a minimum, 20 percent of industrial and commercial areas receive onsite inspections every year. Municipal facilities are inspected twice annually, once prior to the rainy season, and once during the rainy season. Residential management areas (RMAs) within the City are to be inspected once within five years ~~the Permit term~~, at a minimum. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: The City began patrols of residential management areas in FY16. See the City's JRMP Annual Report form, also included in Appendix 2, for numbers of inspections, violations, and enforcement actions for all types of existing development.
CSD-JRMP-18	Update minimum BMPs for existing residential, commercial, and industrial development. Specific updates to BMPs include required street sweeping, catch basin cleaning, and maintenance of private roads and parking lots in targeted areas.	Refer to JRMP Appendix IX. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY15	Continuous every 5 years/ permit cycle	Yes	No Change	Completed	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-19	Outreach to property managers and trash haulers to elevate the emphasis of power washing as a pollutant source.	Emphasis will be placed on non-compliant washing as an enforceable violation. Will occur city-wide in residential, commercial, and industrial areas.	FY15	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: City staff utilized a new fact sheet consistent with updated permit conditions to inform non-compliant power-washing operators of BMP requirements. The fact sheet was also provided to the San Diego Downtown Partnership as part of the City's education and outreach effort for downtown businesses. FY17 Notes: The City anticipates distributing a comprehensive BMP guidebook to businesses and business district leaders in areas with regular power-washing activities
CSD-JRMP-20	Implement property based inspections.	Property-based inspections increase awareness and responsibility for individual properties to tackle issues associated with trash, landscapes, and parking areas. Expanding beyond the business-level inspections will achieve different and more effective opportunities for education, outreach, inspection, and enforcement to encourage water conservation strategies. Inspection frequency dependent on type of facility. See CSD-9 for inspection frequency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Inventoried properties have been mapped in GIS. The City's inspection data management system has also been set up to track and map the properties inspected each fiscal year and over the Permit cycle.
CSD-JRMP-21	Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	Verify and bring to City Council for consideration an update (as needed) for the City's Municipal Code (43.0301) to meet new permit requirements for swimming pool discharges.	FY15	Continuous- As needed	Yes	No Change	Completed	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-22*	Promote and encourage implementation of designated BMPs for residential and non-residential areas.	Landscape-based rebates are a "gateway" for adoption of other beneficial practices and are one of the nonstructural methods which address impacts from single-family residential areas (City of San Diego 2011 program development background study). Residential incentives can include: education and training ~~(neighborhood watershed field days)~~, and aggressive subsidies or rebates for grass replacement and rainwater harvesting. Existing programs will be expanded overall, and ~~also have targeted expansion within specific subwatershed, particularly with highest water quality priority conditions. W~~will occur city-wide in residential, commercial, and industrial areas.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
MS4 Infrastructure								
CSD-JRMP-23	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels as allowed by resource agencies, detention basins, pump stations, etc.) for water quality improvement and for flood control risk management.	Refer to JRMP Section 7. Storm drain inlets are inspected ~~at least once a year~~ generally annually, and cleaned when accumulated materials are present. Other MS4 and related structures are inspected as needed.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: 11,047 storm drain inspections were completed in the WMA, and 842.2 tons of sediment, trash, and debris were removed during storm drain cleaning. In addition to routine maintenance of the MS4, across its entire jurisdiction the City repaired or replaced 12 pump stations and modernized another 14 pump stations, televised 28,000 linear feet of pipe in 62 locations, and began the development of the Waterways Maintenance Plan and Channel Maintenance Prioritization Plan. Removed 7.55 tons of trash from routine open channel trash cleaning and approximately 725 tons each of sediment and trash from channel maintenance activities that required resource agency permits.
CSD-JRMP-24*	Enhanced catch basin cleaning to increase pollutant removal (up to 4 times per year) in the rainy season.	To increase pollutant load removal, catch basins will be cleaned up to four times per year in the rainy season. The City of San Diego's pilot study found that major pollutants may vary from neighborhood to neighborhood (yard waste versus trash and sediment). Implementation may be adapted based on catch basin record keeping and cleaning optimization. Increase in frequency will be phased over 4 Fiscal Years.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: In FY16 a total of 2,856 enhanced catch basin inspections and cleanings were performed in the Chollas Watershed

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
~~CSD-JRMP-26~~	~~Increased frequency of catch basin inspection and as-needed cleaning.~~	~~For every segment of channel that is cleared, the City will conduct an inspection and as-needed cleaning of every catch basin within 100 feet of the cleared segment of channel. Additional inspection and as-needed cleaning will occur every three months for one year after the segment of channel is cleared.~~	~~FY13~~	~~Completed within schedule in 5 years (ends FY18)~~	NA	Incorporated into CSD-JRMP-27	NA	NA
CSD-JRMP-27	Implement additional BMPs in coordination with Master Maintenance Plan Enhancements	For each channel segment, City will either 1) implement landscape retrofits on one residential property, 2) increase street sweeping frequency by prioritizing high traffic commercial routes adjacent to maintained channel, 3) construct and maintain a storm water management BMP (e.g. biofiltration system, permeable pavement, vegetated swale, restored wetlands), or 4) increase frequency of catch basin inspection and as-needed cleaning for one year after maintenance.	FY13	Completed within schedule in 5 years (ends FY18)	Yes	Strategies CSD-JRMP-26 and CSD-JRMP-36 were combined into one strategy, CSD-JRMP-27, to streamline recordkeeping.	Yes	FY16 Notes: Quarterly catch basin inspections were performed for channel clearing performed in the Chollas Watershed FY17 Notes: If channel maintenance activities occur in this watershed during FY17, this mitigation approach may be used in FY17.
CSD-JRMP-28	Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	In order to limit inflow of pollutants and reduce pollutant loads, proactive measures will be taken to improve, repair, and replace MS4 components. The City of San Diego will start a multi-year program of repairing and replacing storm drain pipes to reduce sediment loading to the MS4. Development of an assessment management program and bond issues will be addressed. Exploration of daylighting pipes will take place where feasible and appropriate.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-JRMP-29	Replacement of hard assets.	Includes needed replacement of storm drains and structures.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-30	Coordinate with other City departments (PUD) to implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	Refer to JRMP Section 7.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The Tiger Team was established in FY16 as a joint effort between TSW & PUD to identify and eliminate exfiltration sources from the sanitary sewer system to the MS4. Since the team was created, it has successfully eliminated one major source. FY17 Notes: For FY17, the team is focusing on two sites within the City and are identifying more.
CSD-JRMP-31*	Identify sewer leaks and areas for sewer pipe replacement prioritization.	Risk assessment to include identifying targeted areas (age, location, proximity to MS4), coming up with methodology, pilot, desktop exercise/analysis.	FY16	Continuous- As needed	Yes	No Change	Yes	None
Roads, Streets, and Parking Lots								
CSD-JRMP-32	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP Section 7.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: 26,974 curb miles were swept in the San Diego Bay watershed management area.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-JRMP-33	Outreach to street sweeping enhancement-targeted areas.	Division staff will conduct a thorough education and outreach effort beginning months in advance of the expansion of sweeping routes. Staff will work with the affected Council offices, community stakeholders, non-governmental organizations and community groups to build community awareness and acceptance of the enhanced sweeping program.	FY16	Continuous- As needed	Yes	No Change	Yes	FY16 Notes: Developed targeted communication materials for lead commercial property managers that covered various topics, including enhanced street sweeping
CSD-JRMP-34*	Enhance street sweeping through equipment replacement (replace mechanical sweepers with regenerative air sweepers) and route optimization (sweep all routes twice per month) in targeted areas.	Following outreach and posting, street sweeping efforts will be increased in target areas (those with sediment or metals as a highest priority water quality conditions). Replacement of street sweeping equipment with high-efficiency regenerative air and vacuum-assisted sweepers over time is expected to further increase load reductions (even if current routes and frequencies remain unchanged).	FY17	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: City purchased five vacuum sweepers. Began sweeping a route in Chollas with regenerative air sweeper. Also began sweeping various routes on an individual basis to assess sweeper function.
CSD-JRMP-35*	Initiate sweeping of medians on high-volume arterial roadways.	Medians of roadways are also a potential source of pollutants. Consider implementing or increasing sweeping of medians. Consider mechanical and hand sweeping techniques.	FY17	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Median sweeping began in FY16. A total of 4,315 median miles were swept in FY16 City-wide.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

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~~CSD-JRMP-36~~	~~Implement additional street sweeping (Settlement Agreement).~~	~~City shall increase street sweeping frequency by prioritizing high traffic commercial routes adjacent to maintained channel with vacuum-assisted sweeper for every 400 linear feet of vegetation that is removed (except for removal of invasive species, e.g., Arundo) within a drainage area. Sweeping shall be conducted in median areas that are not subject to regular sweeping routes, and shall occur at a frequency of at least once per quarter for one calendar year after maintenance. Funding and resources were secured for FY2013. Funding for future fiscal years is contingent on annual budget approval by City Council.~~	~~FY13~~	~~Completed within schedule in 5 years (ends FY18)~~	NA	Incorporated into CSD-JRMP-27	NA	NA
Pesticides, Herbicides, and Fertilizer BMP Program								
CSD-JRMP-37	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education.~~ permits, and certifications.~~	Refer to JRMP Sections 7, 8, and 9.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
Retrofit and Rehabilitation in Areas of Existing Development								
CSD-JRMP-38	Development of a strategy and identification of candidate areas of existing development necessary for implementing retrofit projects and facilitate the implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program will include methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to high priority water quality conditions, potential pollutant load removal effectiveness, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards. Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

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CSD-JRMP-39	Development of a strategy and identification of candidate areas necessary to implement stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program ~~(Section 4.2.5.4 and Appendix P)~~ will include methods for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas. Rehabilitation project selection will be based upon a variety of factors including existing stream or habitat degradation, potential future cumulative stream or habitat impacts, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy.	NA, Not scheduled to be implemented in FY17	None
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
CSD-JRMP-40	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP Section 3. ~~The City must visually inspect at least 500 identified and prioritized major MS4 outfalls at least annually during dry weather conditions.~~ Inspections of major MS4 outfalls conducted in response to public reports and staff or contractor reports and notifications may count toward the required visual inspections of MS4 outfall discharge monitoring stations. Please see Attachment 1 for details on how the IDDE Program will address sources causing or contributing to the HPWQC.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: 1,021 cases were investigated, including 634 reported by the public; 819 illicit discharges or illicit connections were eliminated; and 819 enforcement actions and 445 escalated enforcement actions were issued in the WMA. City-wide, the number of discharges investigated has almost tripled since FY14 (1,186 in FY14 to 3,335 in FY16). The increase is believed to be mainly due to increased reports of irrigation runoff discharges from the public and from PUD.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

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E.7 Public Education and Participation (B.3.b(1)(a)(iii))								
CSD-JRMP-42	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Section 9.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City continued its extensive education and outreach effort across each of the six watershed areas in the City. This included regular attendance at community events in order to share education materials and the continuing sponsorship of community clean-up and pollution prevention education events with the City's Non-Governmental Organization partners, including I Love A Clean San Diego and San Diego Coastkeeper.
CSD-JRMP-43	Continue implementation of a Pet Waste Program.	Pet Waste Program includes outreach on "Scoop the poop", installation of posts for dispensers, distribution of lawn signs, and attendance at dog-related community activities.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Printed and distributed more pet waste signage. FY17 Notes: New bag dispensers will be installed and there will be outreach at community events. More signage will be installed.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

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CSD-JRMP-44	Promote and encourage implementation of designated BMPs in commercial and industrial areas.	Provide education and outreach on BMPs for commercial businesses and industrial facilities. Will occur city-wide in non-residential areas.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City continued its mandated commercial and industrial facility inspection effort sharing industry specific education materials with business and property owners when BMP deficiencies were discovered. FY17 Notes: The City will continue its inspection and education effort while also introducing alternative compliance strategies for new developments and sharing the updated Storm Water Standards Manual with target audiences.
CSD-JRMP-45*	Expand outreach to homeowners' association (HOA) common lands and HOA incentives.	Approaches to consider include: offering incentives to HOAs and maintenance districts to adopt water-conserving/efficiency and storm water-reduction changes to their landscapes, irrigation, and maintenance; conducting workshops with property managers; providing supplemental standards, inspection, or enforcement for HOA-managed properties.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Finalized updated code compliance fact sheets applicable to common lands activities. Coordinated water conservation pollution prevention incentive programming with PUD.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

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CSD-JRMP-46*	Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	Approaches to engage HOAs and property managers include: conducting workshops with property managers, providing supplemental standards, inspections or enforcement around HOA properties, and offering incentives to HOAs and maintenance districts to adopt changes to landscapes, irrigation, or maintenance which promote water conservation or storm water reduction. Property managers are also a target for enhanced outreach.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

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CSD-JRMP-48	Enhance school and recreation-based education and outreach.	Develop curriculum and establish distribution in public schools. Includes education on water conservation.	FY15	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City worked with its NGO partners to expand the number of children reached through school-aged education programs. The City updated curriculum materials for Project Swell in conjunction with San Diego Coastkeeper and provided printed education materials to leaders with the Ocean Discovery Institute in hope of establishing new partnerships with that organization. FY17 Notes: The City will be expanding the Blue Brigade Middle and High School program sponsored with I Love A Clean San Diego. The City will also distribute written education materials through the newly completed Ocean Discovery Institute headquarters.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

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CSD-JRMP-49	Develop education and outreach to reduce irrigation runoff.	Example approaches to reduce or eliminate irrigation runoff may include: education and outreach, prohibition, enhanced enforcement of existing prohibitions, and pilot projects such as the City of Del Mar's pilot door hanger project.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City used communication materials designed to address potential threats from El Nino rains as a new vehicle for educating the public about the need to eliminate irrigation runoff. FY17 Notes: The City is working with partner agencies and other City operations to develop new education and outreach efforts targeting urban runoff.
CSD-JRMP-50*	Develop and distribute regional training materials for water-using mobile businesses.	Consider development of supplemental standards for mobile businesses including: covered trash enclosures, careful review of washing areas (grading, drainage, landscaping, sanitary sewer system connectivity), and appropriate signage (either through zoning for retrofits or "best fix" approaches, or through BMP Design Manual standards). Businesses may include carpet cleaners, tile installers, plumbers, etc.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: The City updated its suite of fact sheets related to mobile business activities to bring them up-to-date with current permit requirements.

Table 5-2 (continued)
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CSD-JRMP-51*	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	Use effectiveness surveys to enhance existing education and outreach programs while proactively keeping up with and incorporating changing regulatory requirements.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City annually conducts thousands or event-based surveys gathering information about public understanding of pollution prevention and about the City's storm water management efforts. The survey effort continued in FY16 and allowed the City to update its education materials and strategies based on current findings about public awareness. FY17 Notes: The City will contract with a new public opinion research firm to perform a statistically valid assessment of general public awareness. The finding from that effort will be combined with the discoveries of the ongoing event survey effort to drive future outreach priorities.
CSD-JRMP-52	Continue to promote and encourage implementation of Integrated Pest Management (IPM) for residents and businesses.	The City will continue to provide education on IPM techniques during presentations and on the City's Think Blue website.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table 5-2 (continued)
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CSD-JRMP-53*	Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	Websites will be updated to provide a user-friendly format and clarity for storm water violations, conditions which citizens can and should report, and how to make such reports. Examples of reports for common incidents will be developed and posted which may vary locally and regionally. Photographs of allowable practices as well as illegal practices should be shown for utmost clarity. Displaying hotline numbers prominently on the website and near the photographs of illegal practices will ensure that those seeking to report will be able to do so easily. Also ensure hotline number and website are searchable and can be retrieved by simple internet searches.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City completely revamped its website improving public access and availability of web-based resources including the storm water management and pollution prevention materials developed and posted by the City. The City also brought forward the environmental response documents associated with its channel maintenance efforts. These documents include descriptions of water quality protections undertaken by the City allowing the public to view our agency's watershed protection strategies. FY17 Notes: The City will review and renew the entire portfolio of education materials available for public downloading from the City's website.

Table 5-2 (continued)
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E.6 Enforcement Response Plan								
CSD-JRMP-54	Continue to implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Storm Water Code Enforcement Unit's Standard Operating Procedures (SOPs) - Enforcement Response Plan.	Refer to JRMP Appendix XIII.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-JRMP-55*	~~Increase~~ Focused enforcement of irrigation runoff.	~~Increased~~ Focused enforcement policies against irrigation runoff will be established in tandem with the education and outreach programs on how these actions lead to pollutant loading. By shifting to property-based inspections irrigation runoff can be handled as enforceable violations once the public is well-informed.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Performed irrigation patrols and Residential Management Area Patrols throughout FY16. Also receive referrals from Water Conservation at PUD for over irrigation cases that have runoff entering the curb and gutter.
CSD-JRMP-56*	~~Increase~~ Focused enforcement of water-using mobile businesses.	In addition to education, pollution associated with mobile business sources can be handled through policy, code development, inspections of business practices, and enforcement.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Performed early morning patrols to find mobile sources and over-irrigation to the MS4.
CSD-JRMP-57*	~~Increase~~ Focused enforcement of all minimum BMPs for existing residential, commercial, and industrial development.	~~Increased~~ Focused enforcement of existing development minimum BMPs.	FY16	Continuous- As needed	Yes	Revised to clarify strategy.	Yes	None
CSD-JRMP-58*	~~Increase~~ Focused enforcement associated with property-based inspections.	Shifting inspections from businesses-specific to property-based will increase effectiveness and sense of responsibility and ownership. Education and outreach must be followed up with inspection and enforcement of regulations to encourage proper landscape and water conservation strategies.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None

Table 5-2 (continued)
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CSD-JRMP-59*	~~Increase~~ Focused enforcement of sweeping and maintenance of private roads and parking lots in targeted areas.	Refer to Minimum BMPs in JRMP (Appendix IX).	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-JRMP-60*	~~Increase~~ Focused identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	Eroding and unstable slope areas on private property (excluding construction sites) will be identified as potential sediment loading sources and subject to enforcement. In the short term, this will target enhanced inspection and enforcement programs to ensure inspectors address erosion and slope instability for the purpose of education.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: City staff completed patrols of construction sites that included sediment discharges. They also began the Residential Patrol Program, which notes and addresses sediment discharges in residential areas.
Non-JRMP Strategies (Optional Strategies, B.3.b(1)(b))								
Nonstructural Strategies								
CSD-NS-02	Investigation and research of emerging BMP technology.	Annually the Construction & Development Standards Group identifies new tasks to conduct literature review, communication with researchers outside of the City, physical testing and experimentation of new or emerging technologies, and other research with the goal of updating tools available for reducing pollutant loads from development and redevelopment sites. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous- As needed	Yes	No Change	Yes	FY16 Notes: Continued monitoring and assessment of the biofiltration basin and curbside filtration units at 43rd and Logan.
CSD-NS-03	Approve and implement a green infrastructure policy.	The City will begin developing a policy in FY16 that will increase the green infrastructure requirements for City CIP projects. This policy will be coordinated with ongoing efforts to update City design manuals and LID design standards for public LID BMPs. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous- As needed	Yes	No Change	Yes	None

Table 5-2 (continued)
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CSD-NS-04	Create a manual that outlines right-of-way design standards.	Create a manual that includes flood control performance standards, permanent BMP elements design standards, design standards for green streets and other BMPs, and maintenance access. Provides drainage and streets design standards. Opportunity to merge various existing manuals and provide consistency. Funding and resources were secured for FY2015.	FY15	Completed within schedule	Yes	No Change	Yes	FY17 Notes: Will be published in FY17.
CSD-NS-05	Create a fund that allows habitat acquisition, protection enhancement, and restoration in conjunction with other cooperating entities including community groups, academic institutions, state county, and federal agencies, etc.	This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired or restored lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. It is anticipated that a minimum of 1 FTE will be needed to implement the program. Once initiated, the time frame for planning to initial implementation is expected to be 3 years. Implementation is in perpetuity as long as funding is retained.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None
CSD-NS-06	Residential and Commercial BMP: Rain Barrel	The existing PUD rebate program will continue for residential properties and expand for commercial properties for water collection, conservation, and reuse with rain barrels. Will occur city-wide in residential areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates for rain barrels were issued to capture 772,740 gallons of rainwater City-wide

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CSD-NS-07	Residential and Commercial BMP: Grass Replacement	The existing PUD grass replacement cash rebate program will continue and expand for residential and commercial properties. Program encourages a reduction in water use through the conversion of non-artificial grass to water wise plant material, while maintaining a high level of living landscape to benefit the environment. Program does not allow for conversion to artificial turf. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates were issued to convert 106,041 sq. ft. of turf in the WMA.
CSD-NS-08	Residential and Commercial BMP: Downspout Disconnect	Disconnecting downspouts provide alternate runoff pathways from rooftops, sidewalks, driveways, and roads. Disconnecting downspouts from residential areas to pervious land can allow for depression storage and infiltration. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Completed downspout redirect guidelines in collaboration with PUD.
CSD-NS-09	Residential and Commercial BMP: Microirrigation	The existing PUD micro-irrigation rebate program will continue and increase for residential and commercial properties. Application of microirrigation aims to improve the efficiency of landscape irrigation through the precise application of water. Will occur city-wide in residential areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates were issued for installing microirrigation for 5,160 sq. ft. of landscaping in the WMA.

Table 5-2 (continued)
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CSD-NS-10	Provide Onsite Water Conservation Surveys.	Provide free onsite water conservation surveys to commercial and residential customers to reduce overirrigation and to encourage water conservation. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-NS-11	Enhance and expand trash cleanups through community-based organizations involving target audiences.	Increase effectiveness and reach of trash/beach cleanups and community based efforts by engaging community groups to self-define and carry-out trash clean-ups. Longstanding partnerships and sponsorships with I Love A Clean San Diego and others are recommended to be continued and enhanced. To effectively target stream clean-up efforts, focus on partnerships with community organizations which provide strong engagement with target audiences and communities. Cleanups target trash, however a reduction in trash also reduces other pollutants such as bacteria and nutrients that can attach to food waste wrappers and yard waste. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	<u>FY 16 Notes:</u> The City partnered with I Love a Clean San Diego on four clean-ups, which resulted in the removal of 14,732 pounds of trash and debris.

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						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-NS-13	Coordinate with Parks and Recreation Department on ~~T~~trash mitigation in the western portion of the Otay River HU.	Longstanding partnerships and sponsorships with I Love A Clean San Diego and Otay Valley Regional Park (OVRP) will be continued and enhanced. The City of San Diego has a Joint Exercise Powers Agreement with the City of Chula Vista and the County of San Diego to manage the OVRP. City of San Diego park rangers perform regular maintenance of the Western OVRP including, but not limited to: overseeing all contract services; patrolling the Park and keeping it as clean and safe as possible; providing educational opportunities for visitors; providing consistent public outreach; maintaining the grounds and facilities; and coordinating with various agencies, public utilities, and other organizations. The park rangers work with WildCoast to educate the local community, and WildCoast supports OVRP's educational programs, such as brochure development and public outreach events like OVRP Day, I Love A Clean San Diego cleanups, and various other events throughout the year. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: One clean up event with I Love A Clean San Diego and WildCoast which was on April 16, 2016 at the Saturn Blvd. Staging Area in the Otay Valley Regional Park (OVRP). There were 30 volunteers who helped clean up 600 lbs. of trash and 200 lbs. of recyclables. Also coordinated with WildCoast on two other clean-up events also held at the western portion of OVRP on May 9 and June 18, 2016. Hosted over 40 volunteers who cleaned up approximately 500 lbs. of trash and debris and 150 lbs. of recyclables for those two days.
CSD-NS-16	Conduct a Comprehensive Benefits Analysis to identify benefits other than water quality that are applicable to each of the specific WQIP strategies.	The analysis identifies which other benefits apply to each strategy, and documents the assumptions making those linkages. The delineation of other benefits to strategies includes a general description of each benefit, and a listing of the assumptions that were made to link those benefits to strategies. In addition, the other benefits are characterized with respect to who is directly affected: the city, local residents, local businesses, or visitors. This analysis may be used as part of the adaptive management process to modify future strategies. Funding and resources were secured for FY2015.	FY15	Completed within schedule	Yes	No Change	No	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-17	Address and clean up trash from transient encampments with collaboration from the Environmental Services Department, which consults with the Homeless Outreach Team.	Coordinate with the Environmental Services Department, in conjunction with the Homeless Outreach Team, to respond to transient encampment trash complaints. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-NS-18	Continue participating in source reduction initiatives.	Source reduction initiatives are ultimately the most effective measure to remove pollutants from surface waters, where feasible. Bans or progressive phase-outs that may be considered include: leaf blowers, plastic bags, architectural copper (generally a legacy issue), as well as prohibiting or more aggressively regulating vehicle washing. Additional source reduction initiatives to consider include pesticide sales at hardware stores and irrigation supply stores. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	<u>FY16 Notes:</u> The City began development of plastic bag ban ordinance. <u>FY17 Notes:</u> Pursuit of City-specific plastic bag ban ordinance will depend on whether Statewide plastic bag ban ballot initiative passes.
CSD-NS-19	Coordinate with Fleet Services to replace City-owned vehicle brake pads with copper-free brake pads as they become commercially available.	Consider legislative mandate and cooperative implementation of copper-free brake pads on city-owned vehicle to reduce pollutant deposition. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-NS-20	Develop and implement a Zinc Reduction Program.	Develop and implement zinc reduction program. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include a coordinator or project manager. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, the time frame for planning, implementation, and assessment is expected to be 7 years. If effective, continued implementation will be considered.	Must be triggered	Continuous if effective and as funding allows	Not Triggered	No Change	If Triggered	None
CSD-NS-21	Develop and implement targeted roof replacement incentive program for Chollas Creek Watershed.	If determined feasible and effective upon completion of development of Zinc Reduction Program, rebates or other incentive programs to replace metal roofs will be considered. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, implementation and assessment is expected in 7 years. If effective, continued implementation will be considered.	Must be triggered	Continuous if effective and as funding allows	Not Triggered	No Change	If Triggered	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-22	~~Proactively~~ Coordinate with appropriate City Departments that monitor for erosion, and complete minor repair and slope stabilization on municipal property.	~~Actively~~ Coordinate with Streets Division and other appropriate City Departments that identify and repair eroding slopes that may be contributing to sediment loading. Prepare an inventory and assessment of eroding areas and their risk to surface waters. Follow assessment with a schedule for ongoing inspection and stabilization (potentially based on a number or percentage of sites annually). Consider Caltrans program as a template. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-NS-23	Conduct special studies.	Special studies will be conducted to gather data to identify pollutant sources, appropriate targets, or other information. Includes collaboration with universities. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: San Diego Regional Reference Streams and Beaches, San Diego Bay Debris Study, Pueblo HU Refuse Assessment Program, Chollas Jurisdictional Boundary Study, Regional Beach Water Quality (AB411), Riparian Area Selenium Study
CSD-NS-26	Participate in Reference Watershed Study.	The San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for "natural sources" to establish the concentrations or loads from streams in a minimally disturbed or "reference" condition. Refer to Section 5.1 for further details. Will occur region-wide. Funding and resources were previously secured.	Prior to FY16	Completed within schedule	Yes	No Change	Completed	FY16 Notes: See Section 5.2 in Appendix C for more information

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-32	Conduct a Storm Water Fee Study~~Cost of Service Study~~.	Conduct a Storm Water Fee Study~~Cost of Service Study~~ that will examine the full cost of flood control and storm water strategies needed to comply with storm water regulations for the City of San Diego. The City of San Diego's Watershed Asset Management Plan will be used as the basis for the study. Funding and resources have been secured for FY2016.	FY16	Completed within schedule	Yes	No Change	Yes	FY16 Notes: Significant progress was made on the fee study; it will be finalized and posted on the City website in FY17. FY17 Notes: Study results to be posted in FY17
CSD-NS-33	Conduct Sustainable Return on Investment (SROI) analysis to estimate strategies' co-benefits and impacts to the public and the private sector on a common scale.	SROI is an economics-based framework for evaluating quantitative and qualitative performance metrics and monetizing them, if possible, along a triple bottom line (i.e. financial, societal, and environmental). This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated one-time cost to implement is $115,000. Once initiated, the analysis is expected to be complete in 1 year.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-NS-34	Collaborate with the County, if a County-led regional social services effort is established, to provide sanitation and trash management for individuals experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	Support a non-profit or consortium to provide sanitation services associated with hygiene as well as trash management for persons experiencing homelessness. Rented or purchased shower/sanitary trailers providing mobile showers may be organized at specifically scheduled locations and times. This provision has been proposed as a method for preventing surface water usage for sanitation and bathing, as well as opportunity for outreach and referral by social service agencies. The trash management services will include providing trash bags, trash collection areas, and shower/sanitary facilities at centers which provide daytime shelter to their clients, or on a mobile-basis for known transit camps. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy includes an initial first year planning cost of $30,000 and implementation is expected to cost $10,000 annually thereafter. Once initiated, development of the program is expected in 1 year. Implementation is in perpetuity as long as funding is available.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-37	Participate in an assessment to determine if implementation of an urban tree canopy (UTC) program would benefit water quality and other City goals, where feasible.	Perform a feasibility study to determine if implementing an UTC program would be beneficial to the City's goals. UTC intercepts rainfall through increased coverage of leaves, branches, and stems and reduces runoff from the storm drainage system. Benefits associated with enhancing an UTC include reducing heat island effects and air pollution in addition to aesthetics and community benefits. Where feasible, native trees will be utilized to prevent invasive trees from migrating to open spaces and to conserve water. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, implementation and assessment is expected in 2 years.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-38	Conduct a feasibility study to test Permeable Friction Course (PFC), a porous asphalt that overlays impermeable asphalt.	Perform an assessment to determine the feasibility of implementing PFC on City streets. PFC, an overlay of porous asphalt, is an innovative roadway material that improves driving conditions in wet weather and water quality. Placed in a layer 25-50mm thick on top of regular impermeable pavement, PFC allows rainfall to drain within the porous layer rather than on top of the pavement. PFC has also been shown to reduce concentrations of pollutants commonly observed in highway runoff. PFC incorporates storm water treatment into the roadway surface and does not require additional right-of-way. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy is $50,000. Once initiated, implementation and assessment is expected in 2 years.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-NS-39	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas, creating permanent open space protections on undeveloped city-owned land, and accepting privately-owned undeveloped open areas.	This strategy may be implemented if there is interest in participation by the public or private entity with current control of the land. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) identification of partners, if needed (public, private, non-profit), 2) identification of costs and potential sources of funding, 3) final agreement by public or private entity with current control of the land, 4) final agreement by all other participating partners including acceptance by intended land- or asset-owning City department, and 5) funding in place. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The time frame for implementation will vary by project. Implementation is in perpetuity as long as funding is available.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None
CSD-NS-44	Participate in a watershed council or group if one is established.	This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) partners have been identified and formal MOUs have been developed and 2) consensus and community support has been achieved. Resources necessary to implement this strategy include a coordinator or project manager. Projected funding needs may be met through award of a grant, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, development of the program is expected in 2 years. Implementation would be in perpetuity as long as funding is retained.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-NS-47	Coordinate with Development Services Department to ~~P~~prohibit introduction of invasive plants in new development and redevelopment projects.	Coordinate with the City's Development Services Department to continue to prohibit introduction of invasive species such as *Arundo donax* and *Cortaderia selloana* for new development or redevelopment projects as specified in the City's municipal code for landscape. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-NS-51	Collaboration with the Regional Board.	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit, 2) enforcement of the Ag Waiver, 3) enforcement of other non-MS4 dischargers, and 4) Bacteria TMDL updates, as appropriate for each WMA. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	<u>FY16 Notes:</u> Provided written comments to the Regional Board, State Water Board, and US Environmental Protection Agency (EPA) regarding proposed rules and regulations.
CSD-NS-52	Collaborate with Metals TMDL RPs and the Regional Board to Adopt Site Specific Objectives	Collaborate with the Metals TMDL RPs, the Regional Board, and water stakeholders to determine site-specific water-effect ratios (WERs) for copper and zinc. The collaborative effort will continue through adoption of the site-specific WERs for Chollas Creek. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	<u>FY16 Notes:</u> Coordinated with the Regional Board to initiate Basin Plan amendment and peer review for basin plan update. <u>FY17 Notes:</u> Will continue.
Structural Strategies								
CSD-STRUCT-01	Restoration of natural areas to allow water percolation, and installation of site appropriate drainage devices to protect Sunset Cliffs Natural Park from soil erosion	A feasibility study is being conducted to assess the potential to restore natural areas in Sunset Cliffs Natural Park from erosion. I	FY22	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Green Infrastructure								
CSD-GI-10	43rd and Logan Roadway Improvement - Project ID 1387 (bioretention to treat a drainage area of 0.73 acre)	The City has implemented a bioretention BMP on the northeast corner of the intersection of 43rd and Logan Avenue to treat storm water runoff from the northerly half of Logan Avenue from Dominion Street to 43rd Street (drainage area of about 0.73 acre). In addition, there are three sets of curbside filters installed along the southeast corner of 43rd Street and Logan Avenue. Storm water from Logan Avenue flows through a curb opening into a pretreatment device to filter out gross solids and some sediment, and then flows into 12 filtration units connected in series. The curbside filtration units treat 5.76 acres (See Proprietary BMP Strategies). The City has received grant funding to conduct BMP effectiveness monitoring for hydrologic performance and pollutant removal over a two-year period.	FY14	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Construction has been completed; BMP is maintained on a regular schedule. FY17 Notes: The installed BMP will continue to be maintained. See Table 5-3 for a current list of completed and planned Structural Projects.
CSD-GI-11	Green lot in Southcrest Park.	Green lot on Newton Ave. west of 43rd to treat a drainage area of 36 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	See Table 5-3 for a current list of completed and planned Structural Projects.
CSD-GI-12	Central Region Public Health Center replacement of impervious pavement with rubberized porous asphalt.	Central Region Public Health Center replaced 6,250 square feet of impervious pavement with rubberized porous asphalt. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Completed	FY16 Notes: Completed County project; City not responsible for maintenance
CSD-GI-13	Southeast Family Resource Center bio-filtration planters	Southeast Family Resource Center constructed four bio-filtration planters in the parking lot and adjacent to the building to filter runoff from the roof and parking surface. They also installed porous pavers at the entrance and exit of the parking lot. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Completed	FY16 Notes: Completed County project; City not responsible for maintenance

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

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CSD-GI-16	~~10.31~~ 8.3 acres of bioretention and 2 acres of permeable pavement have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 298.12 acres (total drainage area of 462 ac) with a total storage volume with 13.56 acre-feet.	To meet the Chollas watershed numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. Staggered construction, operation, and maintenance of ~~10.31~~ 8.3 acres of bioretention and 2 acres of permeable pavement to treat an impervious drainage area of 298.12 acres (total drainage area of 462 ac) with a total storage volume of 13.56 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy.	NA, Not scheduled to be implemented in FY17	See Table 5-3 for a current list of completed and planned Structural Projects.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Green Streets								
CSD-GS-04	Beta Street	Operation and maintenance of a 0.063 acre (footprint) green street project at Beta Street and 37th to treat a drainage area of 2.1 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY17	Continuous-Ongoing	Yes	No Change	Yes	FY17 Notes: Construction starting in FY17. See Table 5-3 for a current list of completed and planned Structural Projects.
CSD-GS-09	25.52 acres of green streets (12.76 acres of bioretention and 12.76 acres of permeable pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 7,260.34 acres with a total storage volume of 39.66 acre-feet.	To meet the Chollas watershed numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. Staggered construction, operation and maintenance of 25.52 acres of green streets (12.76 acres of bioretention and 12.76 acres of permeable pavement) to treat a total drainage area of 7,260.34 acres with a total storage volume of 39.66 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report. 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy.	NA, Not scheduled to be implemented in FY17	See Table 5-3 for a current list of completed and planned Structural Projects.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Multiuse Treatment Areas								
Infiltration and Detention Basins								
CSD-MUTA-06	Multiuse Treatment Area BMPs in the Chollas Watershed.	To meet the Chollas watershed numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. Modeled MUTA BMPs with a total footprint of 6.2 acres to treat a total drainage area of 441 acres. These can be wetland, infiltration, retention and/or detentions systems. An updated inventory of MUTA projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Multiple similar strategies were compiled into this new strategy listing to simplify recordkeeping and reporting.	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table 5-3.

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-MUTA-07	Memorial Park: An infiltration basin has been constructed from the parking on the west side of Memorial Park to treat a drainage area of 1.4 acres.	A 0.10 acre infiltration basin has been constructed to treat runoff from the parking on the west side of Memorial Park that has been diverted from the existing storm drain system (drainage area of 1.4 acres) . Before entering the basin, the runoff passes through a hydrodynamic separator that removes pollutants that settle out or float. Runoff then enters the basin where it infiltrates into the underlying soils. Runoff in excess of the 5-year storm bypasses the BMP via an overflow pipe and returns to the regular storm drain system. Funding and resources were secured for FY2014. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY14	Continuous-Ongoing	Yes	No Change	Yes	FY17 Notes: Increase inspection & cleaning to a minimum of 2 annually. See Table 5-3 for a current list of completed and planned Structural Projects.
CSD-MUTA-15	If interim load reduction goals are not met and additional multiuse treatment areas are required, an infiltration basin(s) may be considered on publicly owned open spaces in canyon areas on a case-by-case basis when no other opportunities for load reductions exist.	Construction, operation, and maintenance of infiltration basin(s) in canyon areas. Nine potential canyon sites, owned by City of San Diego, have been identified in Chollas watershed that provide up to 30 acres of available space (83 total parcel acreage). This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, 4) partners have been identified and formal MOUs have been developed, and 5) permits required by regulatory agencies are secured.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None
Stream, Channel and Habitat Rehabilitation Projects (B.3.b.(1)(b)(iii))								
CSD-MUTA-20	If interim load reduction goals are not met and additional stream, channel, and habitat rehabilitation projects are required, implement as needed.	This strategy may be triggered as 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, 4) permits required by regulatory agencies are secured, and 5) recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Water Quality Improvement BMPs								
Priority Development Projects (PDPs)								
CSD-PDP-03	Priority Development Project BMPs in San Diego Bay WMA.	Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. Funding and resources have been secured for PDPs implemented prior to FY16. Funding for PDP BMPs constructed in future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	Multiple similar strategies were compiled into this new strategy listing to simplify recordkeeping and reporting.	Yes	See Table 5-4 for a current list of PDP BMPs.
Proprietary BMPs								
CSD-WQBMP-02	43rd and Logan Roadway Improvement - Project ID 1387 (filtration units treat 5.76 acres)	Three curbside filtration units were installed along S 43rd street and Logan Avenue The curbside filtration units treat a total of 5.76 acres. Funding and resources were secured for FY2014. Funding for future fiscal years is contingent on annual budget approval by City Council. A bioretention BMP is also implemented on this site (See GI strategies).	FY14	Continuous-Ongoing	Yes	No Change	Yes	<u>FY17 Notes:</u> Increase inspection & cleaning to a minimum of 4 annually. See Table 5-3 for a current list of completed and planned Structural Projects.
Dry Weather Flow Separation and Treatment Projects								
CSD-WQBMP-09	If interim load reduction goals are not met and additional dry weather flow separation and treatment projects are required, implement as needed.	Construction of dry weather flow separation and treatment projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
Trash Segregation								
CSD-WQBMP-10	If interim load reduction goals are not met and additional trash segregation projects are required, implement as needed.	Construction of trash segregation (Trash Guards, etc.) projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in high loading areas city-wide.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None
WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-5	Collaboration with the Regional Board.	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit and 2) enforcement of other non-MS4 dischargers. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Working with Regional Board to include non-Phase I MS4s in general permits, waivers, and Waste Discharge Requirements (WDRs).

Table 5-2 (continued)
City of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
WMA-6	Offsite Alternative Compliance Option ~~(WMAA)~~	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, ~~anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015,~~ which was submitted and approved in FY 2016. Following this approval, jurisdictions can formally implement an optional Alternative Compliance Program by ~~December 2015~~ February 2016 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Phase 1 of the Alternative Compliance Program (ACP) went into effect on 2/16/16. FY17 Notes: Proposed Water Quality Equivalency (WQE) guideline development for stream restoration.
WMA-11	Collaborate with Metals TMDL RPs and the Regional Board to Adopt Site Specific Objectives	Studies to develop site-specific water quality objectives (SSOs) for Chollas Creek in accordance with the Metals TMDL are currently underway. The TMDL RPs will continue to work collaboratively with the Regional Board and watershed stakeholders to determine site-specific water-effect ratios (WERs) for copper and zinc. The collaborative effort will continue through adoption of the site-specific WERs for Chollas Creek. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Coordinated with the Regional Board to initiate Basin Plan amendment and peer review for basin plan update providing a site specific objective for dissolved copper and zinc. FY17 Notes: Will continue working with the Regional Board for the adoption of a Basin Plan amendment.

* Strategy IDs with an asterisk indicate those strategies that are considered "jurisdictional" in the MS4 Permit, but are considered enhancements to the JRMP to target highest priority water quality conditions.

Table 5-3
City of San Diego Structural BMP Implementation Status for San Diego Bay WMA

Strategy Number	Strategy	Implementation Approach	Total Drainage Area (Ac)	Implementation Year*	Status	Permit Term Goal**
Green Infrastructure		Total Acres Treated Required for Green Infrastructure:	498.73			
CSD-GI-10	43rd and Logan Roadway Improvement - Project ID 1387 (bioretention to treat a drainage area of 0.73 acre)	The City has implemented a bioretention BMP on the northeast corner of the intersection of 43rd and Logan Avenue to treat storm water runoff form the northerly half of Logan Avenue from Dominion Street to 43rd Street (drainage area of about 0.73 acre). In addition, there are three sets of curbside filters installed along the southeast corner of 43rd Street and Logan Avenue. Storm water from Logan Avenue flows through a curb opening into a pretreatment device to filter out gross solids and some sediment, and then flows into 12 filtration units connected in series. The curbside filtration units treat 5.76 acres (See Proprietary BMP Strategies). The City has received grant funding to conduct BMP effectiveness monitoring for hydrologic performance and pollutant removal over a two-year period.	0.73	FY14	Completed	✓
CSD-GI-11	Green lot in Southcrest Park.	Green lot on Newton Ave. west of 43rd to treat a drainage area of 36 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	36	Prior to FY16	Design	✓
CSD-GI-16	8.3 acres of bioretention and 2 acres of permeable pavement have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 298.12 acres (total drainage area of 462 ac) with a total storage volume with 13.56 acre-feet.	To meet the Chollas watershed numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. Staggered construction, operation, and maintenance of 8.3 acres of bioretention and 2 acres of permeable pavement to treat an impervious drainage area of 298.12 acres (total drainage area of 462 ac) with a total storage volume of 13.56 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report.	462	FY18	Varies, see below	Varies, see below
	Project Name	Project Description	Total Drainage Area (Ac)	Implementation Year	Status	Permit Term Goal
	El Cerrito & Rolando Park	Green infrastructure - North of University	25	FY19	Design	
	Jamacha Lomita GI	Meadowbrook Dr. south of Jamacha Road, Beacon Dr. south of Jamacha Road	231	FY 20	Design	
	Oak Park SD & GI	Chollas Station Rd., Quince St. & Chollas Pkwy, College Avenue & College Grove Dr.	46	FY 20	Design	
	South Crest GI	Acacia Grove Way, 39th & Boston St., Z St., Alpha St.	86	FY 20	Design	
Green Streets		Total Acres Treated Required for Green Streets:	7,263.04			
CSD-GS-04	Beta Street	Operation and maintenance of a 0.063 acre (footprint) green street project at Beta Street and 37th to treat a drainage area of 2.1 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	2.1	FY17	Construction	✓
CSD-GS-09	25.52 acres of green streets (12.76 acres of bioretention and 12.76 acres of permeable pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 7,260.34 acres with a total storage volume of 39.66 acre-feet.	To meet the Chollas watershed numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. Staggered construction, operation and maintenance of 25.52 acres of green streets (12.76 acres of bioretention and 12.76 acres of permeable pavement) to treat a total drainage area of 7,260.34 acres with a total storage volume of 39.66 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report.	7,260.34	FY18	Varies, see below	Varies, see below

Table 5-3 (continued)
City of San Diego Structural BMP Implementation Status for San Diego Bay WMA

Strategy Number	Strategy	Implementation Approach	Total Drainage Area (Ac)	Implementation Year*	Status	Permit Term Goal**
	Project Name	Project Description	Total Drainage Area (Ac)	Implementation Year	Status	Permit Term Goal
	Alamo, Salvation, & 68th	Green street - University & Alamo Dr to University & 68th	25	FY18	Design	✓
	Cherokee Point NBHD SD & GI	Landis & 35th St to Landis St & Wilson Ave	10	FY20	Design	
	Chollas Creek (S)	Chollas Parkway & Salta Pl to Chollas Parkway & Mina St	20	FY19	Design	
	Group Job 1012	Logan Ave & S 37th St	25	FY 20	Design	
	Group Job 1014	Bioretention/green street - Polk Ave between Chamoune & Menlo	28	FY 19	Design	
	Group Job 1024	Dominion St & T St	40	FY 19	Design	
	Group Job 1027	Common Wealth Ave & Petra Pl	10	FY 19	Design	
	Logan Heights	Newton Ave between S 29th and 33rd St	unknown	FY 19	Design	
	Skyline NW GI	Madrone & 68th St/Jamacha Rd & 69th St	75	FY 19	Design	
Multiuse Treatment Areas		Total Acres Treated Required for MUTAs:	442.4			
CSD-MUTA-07	Memorial Park: An infiltration basin has been constructed from the parking on the west side of Memorial Park to treat a drainage area of 1.4 acres.	A 0.10 acre infiltration basin has been constructed to treat runoff from the parking on the west side of Memorial Park that has been diverted from the existing storm drain system (drainage area of 1.4 acres) . Before entering the basin, the runoff passes through a hydrodynamic separator that removes pollutants that settle out or float. Runoff then enters the basin where it infiltrates into the underlying soils. Runoff in excess of the 5-year storm bypasses the BMP via an overflow pipe and returns to the regular storm drain system. Funding and resources were secured for FY2014. Funding for future fiscal years is contingent on annual budget approval by City Council.	1.4	FY14	Completed	✓
CSD-MUTA-06	Multiuse Treatment Area BMPs in the Chollas Watershed.	To meet the Chollas watershed numeric goals and schedules presented in Section 4, the City of San Diego will implement the following structural strategies. Modeled MUTA BMPs with a total footprint of 6.2 acres to treat a total drainage area of 441 acres. These can be wetland, infiltration, retention and/or detentions systems. An updated inventory of MUTA projects will be maintained in the WQIP Annual Report.	441	FY18	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	Project Description	Total Drainage Area (Ac)	Implementation Year	Status	Permit Term Goal
	(Projects will be added as they reach the design stage)					
Water Quality Improvement BMPs		Total Acres Treated Required for WQI BMPs:	5.76			
CSD-WQBMP-02	43rd and Logan Roadway Improvement - Project ID 1387 (filtration units treat 5.76 acres)	Three curbside filtration units were installed along S 43rd street and Logan Avenue The curbside filtration units treat a total of 5.76 acres. Funding and resources were secured for FY2014. Funding for future fiscal years is contingent on annual budget approval by City Council. A bioretention BMP is also implemented on this site (See GI strategies).	5.76	FY14	Completed	✓

*For additional details, please see the schedule following the City's strategy table in the WQIP.
** Projects with a check in the "Permit Term Goal" column are counted toward the green infrastructure installation goal applicable to the current Permit term. See Table 5-5 for a summary.

Table 5-4
City of San Diego Priority Development Project Implementation Status for San Diego Bay WMA

San Diego Bay PDP BMP Ledger (CSD-PDP-03)					
Project Name	Project Description	Total Drainage Area (Ac)	Implementation Year	Status	Permit Term Goal*
North 252 Corridor Park Phase I (Dorothy Petway Park) - Project ID 1002	2 vegetated filter strips and one vegetated swale was implemented at I-5 and Rigel Street. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY16	Completed	
Memorial Skateboard Park- Addition of detention vault to treat a drainage area of 0.69 acre.	A subsurface detention vault is proposed to be installed in line with the existing 12-inch PVC pipe to capture the runoff generated by the 85th percentile storm. Detained runoff is proposed to be reused to irrigate the athletic fields at Memorial Park. Runoff volume in excess of the detention vault capacity is proposed to overflow into an adjacent subsurface infiltration gallery for additional volume reduction and treatment. This project was initially constructed prior to the 2007 Municipal Storm Water Permit, so implementation of the BMP retrofit recommendations exceeds applicable treatment requirements by treating runoff from 0.69 acre of impervious surface to the 85th percentile storm. Funding and resources were secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by City Council.	17.25	FY15	Completed	✓
N Chollas Community Park Phase 1B - Project ID 855	4 drainage inserts were installed in Chollas Lake Park near College Grove Drive and Caminito Chollas. Funding and resources were secured for FY2014. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY14	Completed	
Lisbon Street Roadway and Utility Improvements - Project ID 858	2 drainage inserts were installed at Imperial Avenue and Lisbon Street. Funding and resources were secured for FY2014. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY14	Completed	
Fire Station #12 - Project ID 989	1 downspout filter and 10 drainage inserts were installed at Willie James Jones Avenue and Imperial Avenue. Funding and resources were secured for FY2014. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY14	Completed	
Rigel St Bridge Replacement - Project ID 1008	5 drainage inserts were installed at Rigel Street and Main Street. Funding and resources were secured for FY2014. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY14	Completed	
1 Priority Development Project BMP at Otay Mesa/ Nestor Library in Otay River HU.	Because of the limited space available at the site and geotechnical issues associated with the proximity to steep slopes, it is recommended that a Filterra type or approved equivalent treatment unit be retrofitted to treat flows from the 85th percentile storm. The retrofit exceeds applicable regulatory requirements by treating runoff from 11,800 more square feet of impervious surface than the initial site design and by treating flows from the 85th percentile storm. Funding and resources were secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	FY15	Completed	
Charles Lewis III Memorial Park	Public PDP project that included a TCBMP	unknown	FY16	Completed	

* Projects with a check in the "Permit Term Goal" column are counted toward the green infrastructure installation goal applicable to the current Permit term. See Table 5-5 for a summary.

Table 5-5
Summary of City of San Diego Priority Structural BMP Implementation Status for San Diego Bay WMA

Permit Term Goal FY2018	Total Drainage Area (Ac)
Structural BMP Total Acres Treated Required by FY 18	44.60 (Required by FY 18)
Total Completed/Planned BMPs	70.99
Total Completed/Planned PDP BMPs	17.25
Remaining to Goal	-43.64 (Goal Met/Exceeded)
Final Goals FY2031*	**Total Drainage Area (Ac)**
Green Infrastructure Total Acres Treated Required	498.73
Total Completed/Planned	424.73
Remaining to Final Amount of Acres Treated	74.00
Green Streets Total Acres Treated Required	7,263.04
Total Completed/Planned	235.10
Remaining to Final Amount of Acres Treated	7,027.94
MUTA Total Acres Treated Required	442.40
Total Completed/Planned	1.40
Remaining to Final Amount of Acres Treated	441.00
WQI BMP Total Acres Treated Required	5.76
Total Completed/Planned	5.76
Remaining to Final Amount of Acres Treated	0.00

*Based on the “MS4 Discharges: Implement Accepted WQIP” compliance pathway. Final compliance is implementation of BMPs based on modeling analysis results. Strategies within the Chollas subwatershed will be implemented on a schedule designed to meet the metals final Goal of FY 29

5.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

In FY16 the City, along with other government agencies, professional engineers and members of the local development community, developed a new Regional Best Management Practices (BMP) Design Manual that conforms to the 2013 Municipal Storm Water Permit (Order No. R9-2013-0001, as amended by R9-2015-0001 and R9-2015-0100). The Manual supersedes the San Diego County-wide Model Standard Urban Runoff Storm Water Management Plan (SUSMP) and provides technical guidance and regional standards for pollutant and flow control requirements for new development and significant redevelopment. The City of San Diego's local version of the BMP Design Manual, the Storm Water Standards Manual, became effective on February 16, 2016.

5.5 MODIFICATIONS TO THE JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM

The City of San Diego is proposing the following administrative changes to its JRMP. The updated JRMP can be viewed at:

https://www.sandiego.gov/stormwater/plansreports/jrmp.

Table 5-6
Proposed Administrative Changes to City of San Diego's JRMP

	JRMP Section / Appendix	JRMP Update
1	Executive Summary	Strategy categories and definitions were modified to align with the categories and definitions in the Municipal Storm Water Permit and San Diego Water Board's approved Water Quality Improvement Plans (WQIPs).
2	Section 2.3	In accordance with the Municipal Storm Water Permit, Section 2.3 was updated to state that JRMP updates can be proposed/submitted as part of the WQIP Annual Reports.
3	Section 7.3.13-8	Updated BMP #16 to provide greater clarity.
4	Section 7.3.14	Updated section to include new BMPs for herbicide application.

Table 5-6 (continued)
Proposed Administrative Changes to City of San Diego's JRMP

	JRMP Section / Appendix	JRMP Update
5	Section 10	Strategy categories and definitions were modified to align with the categories and definitions in the Municipal Storm Water Permit and San Diego Water Board's approved WQIPs. Updated tables, graphs, charts, and text to reflect funding needs to meet the goals and schedules identified in the WQIPs. Added language stating "Estimates of funding needs presented were based on the best information available at the time they were prepared."
6	Sections 7.3.1, 7.3.2, and 7.3.4-15	Updated Minimum BMP language to reflect changes to Appendix IX.
7	Section 3, Section 4, Section 5, Section 6, Section 7, Section 8, Section 9	Based on updates made to the categories and definitions of strategies noted above, the "JRMP Strategies Identified in the WQIPs" tables and "Additional Public Education and Participation Program WQIP Strategies" tables for these sections have been updated for consistency. The strategy identification numbering system and text was updated to reflect administrative changes included in the WQIP Annual Reports.
8	Appendix VI- Residential Management Areas and Patrol Protocols	Updated the residential management areas maps and included newly developed patrol protocols.
9	Appendix IX - Minimum BMPs for Residential, Industrial, Commercial, and Municipal Sites/Sources	Updated references to ordinance sections, changed the "Think Blue" references to the Storm Water Division, and made minor changes to some BMP and description wording for clarification.
10	Appendix XIV- Certificate of Adequate Legal Authority	Signed Certificate of Adequate Legal Authority was added.

Table 5-6 (continued)
Proposed Administrative Changes to City of San Diego's JRMP

	JRMP Section / Appendix	JRMP Update
11	Appendix XX- Water Quality Improvement Plan Strategies	Updated strategies to reflect the administrative changes made to strategies in the Fiscal Year 2016 WQIP Annual Reports.
12	Appendix XXII- Storm Water Division Projected Funding Needs, 2016-2035	Updated Appendix XX to reflect the funding needs to meet the goals and schedules identified in the WQIPs.

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6 CITY OF CORONADO

6.1 ANNUAL REPORT CERTIFICATIONS

The City of Coronado's signed Statement of Certification and Legal Authority letter for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report and Certification of Legal Authority are included on the following pages.

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CITY OF CORONADO
PUBLIC SERVICES & ENGINEERING

1825 STRAND WAY
CORONADO, CA 92118-3005

TEL: (619) 522-7383
FAX: (619) 522-2408

SAN DIEGO BAY WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

STATEMENT OF CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

Executed on the 24TH day of January, 2017, at the City of Coronado.

Clifford M. Maurer, PE, CEM
Director of Public Services & Engineering

CITY OF CORONADO
PUBLIC SERVICES & ENGINEERING

1825 STRAND WAY
CORONADO, CA 92118-3005

TEL: (619) 522-7383
FAX: (619) 522-2408

I certify that the City of Coronado has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-0001 as amended by Orders R9-2015-0001 and R9-2015-0100. Legal authority is established and maintained as authorized by City Council on February 2, 2016 with the following:

- Updated Coronado Municipal Code (CMC) 61.04 Storm Water and Runoff Management Program
- Updated CMC 61.08 Discharge Regulations and Requirements
- Updated CMC 61.12 Inspection and Enforcement

In addition, the following CMC Chapters support implementation and enforcement activities:

- CMC 1.08 – Enforcement of Provisions of Municipal Code
- CMC 1.10 – Code Enforcement Administrative Fines
- CMC 1.12 – Appeal Hearings

Signed: ______________________ Date: 12-12-2016

Clifford M. Maurer, PE, CEM
Director of Public Services and Engineering

6.2 ANNUAL REPORT FORM

The City of Coronado's JRMP under the Municipal Permit per Order No. R9-2013-0001 was first prepared in June 2015. Subsequent amendments to the Municipal Permit by Orders No. R9-2015-0001 and R9-2015-0100 included modifications that made necessary some updates to the JRMP to provide accurate references (e.g., order sections and page numbers, definitions, additional information). None of the modifications to the Municipal Permit required modifications to the City of Coronado's programs or overall compliance plans.

The updates to the City of Coronado's JRMP were completed in June 2016 and a new version published and made available on the City's website in July 2016.

The City Council approved revisions to the Coronado Municipal Code relevant to storm water management on February 2, 2016, providing the revisions necessary to update the codes and requirements and provide the updated legal authority to implement the JRMP and Municipal Permit requirements. The City of Coronado's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM

FY 2015-16

I. COPERMITTEE INFORMATION

Copermittee Name: CITY OF CORONADO

Copermittee Primary Contact Name: KIM GODBY

Copermittee Primary Contact Information:
Address: 101 B Avenue
City: Coronado County: San Diego State: CA Zip: 92118
Telephone: 619-522-7387 Fax: 619-435-4479 Email: kgodby@coronado.ca.us

II. LEGAL AUTHORITY

Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	X 	1
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	X 	

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	X 	2
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	X 	

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES NO	X 	

Number of non-storm water discharges reported by the public	40	
Number of non-storm water discharges detected by Copermittee staff or contractors	9	
Number of non-storm water discharges investigated by the Copermittee	48	
Number of sources of non-storm water discharges identified	48	
Number of non-storm water discharges eliminated	48	
Number of sources of illicit discharges or connections identified	15	
Number of illicit discharges or connections eliminated	14	
Number of enforcement actions issued	1	3
Number of escalated enforcement actions issued	1	

V. DEVELOPMENT PLANNING PROGRAM

Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	X 	
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	X 	4
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	X 	

Number of proposed development projects in review	59	
Number of Priority Development Projects in review	2	
Number of Priority Development Projects approved	3	
Number of approved Priority Development Projects exempt from any BMP requirements	0	
Number of approved Priority Development Projects allowed alternative compliance	0	
Number of Priority Development Projects granted occupancy	3	

Number of completed Priority Development Projects in inventory	19	
Number of high priority Priority Development Project structural BMP inspections	1	5
Number of Priority Development Project structural BMP violations	0	
Number of enforcement actions issued	0	
Number of escalated enforcement actions issued	0	

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-16

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES	[x]
	NO	[ ]

Number of construction sites in inventory	184
Number of active construction sites in inventory	119
Number of inactive construction sites in inventory	2
Number of construction sites closed/completed during reporting period	63
Number of construction site inspections	302
Number of construction site violations	0
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES	[x]
	NO	[ ]

	Municipal	Commercial	Industrial	Residential	
Number of facilities or areas in inventory	91	100	0	3	6
Number of existing development inspections	2054	85	NA	22	7
Number of follow-up inspections	4	0	NA	5	
Number of violations	0	0	NA	0	
Number of enforcement actions issued	0	0	NA	0	
Number of escalated enforcement actions issued	0	0	NA	0	

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES	[x]
	NO	[ ]
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES	[x]
	NO	[ ]

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES	[x]
	NO	[ ]

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ■ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

	10-27-2016
Signature	Date
Clifford M. Maurer, PE, CEM	Director, Public Services & Engineering
Print Name	Title
619-522-2652	cmaurer@coronado.ca.us
Telephone Number	Email

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM - SUPPLEMENT
FY 2015-16

Entry No.	Comments or Explanation
1	The City's revised ordinances were adopted by the City Council on February 2, 2016. The legal authority certification required by the Permit is provided with this annual report.
2	The City completed minor revisions to the JRMP at the end of June 2016 to include revised Permit page numbers and other references as result of amendments R9-2015-0001 and R9-2015-0100, refined procedures, and jurisdictional strategies finalized in the San Diego Bay WQIP.
3	The illicit discharge not eliminated is for a permanent groundwater dewatering operation identified to have been in existence since the early 1990s. The City has referred this case for permitting to the San Diego RWQCB that has jurisdiction over discharges to San Diego Bay and an existing general permit for groundwater NPDES No. CAG929003, Order No. R9-2015-0013. The site was issued City permits in the early 1980's and may be grandfathered into the general permit pursuant to Order 90-31.
4	The City's BMP Design Manual was adapted to meet the final requirements and recommendations issued by the San Diego Water Board for the Copermittee's Regional or Model BMP Design Manual. The modification where completed and implemented during the FY as required.
5	The City conducted inspections in the winter of 2014 and has scheduled conducting them in the fall for FY 2016-17. Therefore, inspections are not logged for this reporting year. For consistency, inspections will be conducted late summer to early fall every year.
6	The City's municipal facility inspection program as noted in the City's JRMP has a goal of annual inspection of the facilities in the inventory. The Permit requires a minimum of once every five years and 20% of the facilities every year.
7	The City's commercial facility inspection program as noted in the City's JRMP has a goal of annual inspection of the facilities in the inventory. In addition, thirteen facilities were inspected between July 1-12, 2016 and will be included in the FY 2016-17 annual report. The Permit requires inspections at a minimum of once every five years and 20% of the facilities every year. Municipal facility inspections include MS4 operation and maintenance inspections.

Date: 10/25/2016

<table>
<tr><th>FISCAL ANALYSIS QUESTION</th><th>EVALUATION</th><th>CONCLUSION</th><th>NEXT STEP</th></tr>
<tr><td>Part A</td><td colspan="3">Permit Provision E.8.a</td></tr>
<tr><td>Does the City have the resources[1] necessary to meet the requirements of the Permit?</td><td>Were all requirements for each JRMP component met as shown in the JRMP Annual Report Form?</td><td>Check:
√ Yes
☐ No</td><td>If yes, City has necessary resources. Go to Part B.

If no, provide explanation below</td></tr>
<tr><td colspan="4">a) Were resources temporarily not available? Check: ☐ Yes √No
Explain:</td></tr>
<tr><td colspan="4">b) Are resources adequate for next fiscal year? Check: √ Yes ☐ No
If no, explain:</td></tr>
<tr><td>Part B</td><td colspan="3">Permit Provision E.8.b.(1)</td></tr>
<tr><td>Have any of the identified expenditures categories listed in JRMP Section 8.3.2 changed?</td><td>Has the comparison yielded any changes in the expenditure categories when compared to the current budget?</td><td>Check:
☐ Yes
√ No</td><td>If no, status quo. Go to Part C.

If yes, provide explanation below</td></tr>
<tr><td colspan="4">a) List any new or revised expenditure categories and provide an explanation of the changes:</td></tr>
<tr><td>Part C</td><td colspan="3">Permit Provision E.8.b.(2)</td></tr>
<tr><td>Does the City have the staff resources[2] necessary to meet the requirements of the Permit?</td><td>Were all requirement for each JRMP component met as shown in the JRMP Annual Report Form?</td><td>Check:
√ Yes
☐ No</td><td>If yes, City has necessary staff resources.
Go to Part D and E.

If no, provide explanation below</td></tr>
<tr><td colspan="4">a) Were staff resources temporarily not available? Check: ☐ Yes √No
Explain: Not applicable</td></tr>
<tr><td colspan="4">b) Are staff resources adequate for next fiscal year? Check: √ Yes ☐ No</td></tr>
</table>

[1] Resources are considered to be the total budget needed to cover planned expenditures to comply with the Permit.
[2] Staff resources are considered to be the total labor and contract personnel needed to comply with the Permit.

If no, explain:	

Part D	Permit Provision E.8.b.(3)
Provide an estimate of the expenditures for current fiscal year[3] in the categories listed	
Expenditures by Category for all departments - Storm Water Program (JRMP Section 8.3.2.2)	**FY 2015-16**
Personnel Services	$ 254,263
Services and Supplies	$ 451,990
Property (vehicle)	$ 10,907
Contingency	$ 0
Debt Service	$ 301,476
Other: CIP Projects (various)	$ 61,060
Other:	$ 0
Total:	**$1,079,696**

Part E	Permit Provision E.8.b.(4)		
Have the source(s) of funds listed in JRMP Section 8.3.2.5 significantly changed and how do they affect planned expenditures?	Has the comparison yielded any significant changes in funding sources that affected the expenditures listed in Part D? Will the changes affect expenditures planned for next fiscal year?	Check: ☐ Yes √ No ☐ Yes √ No	If no, status quo. Go to next question. If yes, provide explanation below
a) List any new or revised funds or funding sources and provide an explanation of the changes:			
Have the legal restrictions on the source(s) of funds as noted in JRMP Section 8.3.2.5 significantly changed?	Has the comparison yielded any significant changes in funding sources restrictions?	Check: ☐ Yes √ No	If no, status quo. Annual fiscal analysis is complete. If yes, provide explanation below
a) List any new or revised legal restrictions on the funds or funding sources and provide an explanation of the changes: Not applicable.			

[3] The Permit lists "current fiscal year" interpreted to mean the reporting year corresponding to the annual report being submitted. The "next fiscal year" is interpreted to mean the year already underway when the report is being prepared.

Additional Notes or Comments:

CIP PROJECTS FOR FY 2015-16:
Pine and North Beach Outfall
Storm Drain Inlet Improvements

	Actuals		Actuals		Actuals
	Storm Drain	Balance	NPDES	Balance	Total
	530030	530030	530031	530031	
Personnel Services					
Salaries	$ 25,262.67	$ 1,978.81	$ 209,939.05	$ (1,026.10)	$ 235,201.72
Social Security	$ 2,319.94	$ (165.97)	$ 13,042.50	$ 1,035.66	$ 15,362.44
Medicare	$ 547.34	$ (43.59)	$ 3,151.65	$ 231.66	$ 3,698.99
Subtotal: Salaries	$ 28,129.95	$ 1,769.25	$ 226,133.20	$ 241.22	$ 254,263.15
Services and Supplies					
(8030) Contract Services	$ 33,440.64	$ 38,561.91	$ 283,317.35	$ 236,063.02	$ 316,757.99
(8065) Professional Servcies	$ -	$ -	$ -	$ -	$ -
(8075) Storm Drain Litigation BMP	$ -	$ -		$ 6,000.00	$ -
(8235) Utilities - Electricity	$ 29,833.31	$ (7,833.31)	$ -	$ -	$ 29,833.31
(8236) Utilities - Gas	$ 193.87	$ (83.87)	$ -	$ -	$ 193.87
(8237) Utilities - Water	$ 1,053.35	$ (1,053.35)	$ -	$ -	$ 1,053.35
(8241) Rental-Equipment	$ -	$ -	$ -	$ 1,000.00	$ -
(8250) Repair and Maint. Equipt	$ 2,181.44	$ 9,618.56	$ -	$ -	$ 2,181.44
(8251) Repair and Maint. Office Equipt	$ 46.02	$ (46.02)	$ -	$ -	$ 46.02
(8255) Repair and Maint. Outside	$ 60,965.75	$ 4,034.25	$ 13,802.40	$ 8,397.60	$ 74,768.15
(8260) Sewage & Transport Treatment	$ -	$ -	$ -	$ -	$ -
(8320) Communications	$ 4,962.77	$ (2,462.77)	$ -	$ -	$ 4,962.77
(8415) Training, memberships	$ 205.00	$ 4,675.00	$ 81.00	$ 4,919.00	$ 286.00
(8530) Fuels & Lubricants	$ 1,528.43	$ (1,528.43)	$ -	$ -	$ 1,528.43
(8535) Materials	$ 2,624.55	$ (1,624.55)	$ 7.54	$ 4,992.46	$ 2,632.09
(8555) Small Tools & Instruments	$ 3,976.93	$ (476.93)	$ 6,878.41	$ 121.59	$ 10,855.34
(8560) Misc Supplies	$ 2,136.20	$ (436.20)	$ 4,755.41	$ 3,444.59	$ 6,891.61
Subtotal: Services and Supplies	$ 143,148.26	$ 41,344.29	$ 308,842.11	$ 264,938.26	$ 451,990.37
Property					
(9040) Office/computer equipment	$ -	$ -	$ 9,000.00	$ 21,000.00	$ 9,000.00
(9045) Other fixed assets			$ 1,906.60	$ 4,493.40	$ 1,906.60
(9055) Shop tools					$ -
(9080) Vehicle/Equipt.					$ -
Unit 6-0731 2016 Chevrolet Colorado					
Subtotal: Property	$ -	$ -	$ 10,906.60	$ 25,493.40	$ 10,906.60
Contingency					$ -
Debt Service					
(9315) Interest Expense	$ 89,993.00	$ 485,930.00	$ -	$ -	$ 89,993.00
(9325) Retirement of Principal	$ 211,483.00	$ 2,679,553.00	$ -	$ -	$ 211,483.00
Other(s)					
Subtotal: Debt Service					$ 301,476.00
Subtotal: Service/Supplies, Property, Contigency, Debt	$ 444,624.26	$ 3,206,827.29	$ 319,748.71	$ 290,431.66	$ 764,372.97
Total: Salaries and Service/Supplies	$ 472,754.21	$ 3,208,596.54	$ 545,881.91	$ 290,672.88	$ 1,018,636.12
CIP Projects:	**Expenses end of FY 15-16**	**Balance**			
Pine and North Beach Outfall	$ 11,320.00	$ 88,680.00			
Storm Drain Inlet Improvements	$ 49,740.00	$ 260.00			
Total:	$ 61,060.00	$ 88,940.00			
					$ 1,079,696.12

6.3 CITY OF CORONADO STRATEGIES

The City of Coronado (Coronado) is a small beach community located on an island connected to the mainland via a tombolo, the Silver Strand. Coronado has identified strategies to address the Focused Priority Condition for swimmable waters and implement jurisdictional programs citywide. Maintaining Coronado's streets, sanitary sewer system, storm drain system, and other infrastructure is a high priority for the City. All streets in Coronado are swept once a week, regardless of type. Special events are highly scrutinized, permitted, and conditioned, and Coronado provides extra trash receptacles and traffic control. Since 2005, all newly constructed municipal buildings have been certified LEED Silver. Coronado has also implemented permeable paving, downspout disconnects, and other BMPs on City projects. Coronado also coordinates with the Navy for beach cleanups on the Silver Strand. Strategies and implementation schedules, presented in Table 2-6, were including in the 2016 San Diego Bay WQIP and identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of these (jurisdictional) strategies as conditions, opportunities or constraints are identified. As strategies are modified, the San Diego Bay WQIP is updated. The implementation of each strategy is contingent upon annual budget approvals and funding availability

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Table 6-1
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
JRMP (E.2 – E.7) Strategies (E.3.b.(1)(a))									
E.3 Development Planning									
All Development Projects									
CO-1	Review projects for potential sources of bacteria and require additional source control BMPs as applicable for persistent problems or areas. Also see Public Education and Participation (CO-27).	-	-	-	-	-	-	-	-
	1. Commercial projects. Require additional source control BMPs as applicable for persistent problem or areas. BMPs may address trash enclosures, outdoor areas/facilities/uses, cleaning SOPs, employee training, and others as identified or applicable.	As projects are submitted for permitting. Funding: Storm Drain Enterprise (fees).	FY15-16	Yes	Continuous	None	NA	NA	Yes
	2. Residential and medium risk sources: Review projects for potential sources of bacteria and require additional source control BMPs as applicable. BMPs may include landscaping modifications, impervious area maintenance, and trash storage areas design/location.	As projects are submitted for permitting. May be initiated per findings or in conjunction with CO-4 and CO-39. Funding: Storm Drain Enterprise (fees). Optional strategy trigger: interim or final goal not being met or at risk of not being met as determined by assessment plan.	Triggered by Goal Assessment	Not Triggered	NA	First year of implementation and assessment of goal to trigger implementation would be in FY17	NA	NA	Yes
CO-2	Implement additional requirements for development projects, as specified in the City's version of the BMP Design Manual and JRMP, to target sources of bacteria.	As projects are submitted for permitting. Funding: Storm Drain Enterprise (fees).	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-3	Require projects within the WQSA to implement LID and source control BMPs with focus on potential bacteria sources. BMP examples include: source locations away from water's edge, pervious areas enhanced, design features for sources (e.g., trash enclosures, landscaping)	As projects are submitted for permitting. Funding: Storm Drain Enterprise (fees).	FY15-16	Yes	Continuous	None	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Priority Development Projects (PDPs)									
CO-4	Include in the BMP Design Manual BMP requirements for development projects that have a higher potential to contribute to the Priority Conditions (bacteria).	-	-	-	-	-	-	-	-
	1. Amend BMP Design Manual for trash areas. Require full four-sided and/or covered enclosure, away from storm drains.	As projects are submitted for permitting. Funding: Storm Drain Enterprise (fees).	FY15-16	Yes	Yes	Modifications to BMP Design Manual completed and now being implemented	NA	NA	Yes
	2. Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, and pet care stores to address sources in outdoor areas, activities, storage, and other as applicable.	As projects are submitted for permitting. Funding: Storm Drain Enterprise (fees).	FY15-16	Yes	Yes	Modifications to BMP Design Manual completed and now being implemented	NA	NA	Yes
	3. Amend Coronado Municipal Code (CMC) to support additional requirements in the BMP Design Manual targeting Priority Conditions as identified through plan review and field inspections.	As projects are submitted for permitting. Funding: Storm Drain Enterprise. Optional strategy trigger: interim or final goal not being met or at risk of not being met as determined by assessment plan.	Triggered by Goal Assessment	Not Triggered	NA	First year of implementation and assessment of goal to trigger implementation would be in FY17. Note: CMC was modified in FY16 to update it to the 2013 Municipal Permit	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Construction Management									
CO-5	Target permitting and inspection program to identify bacteria sources, and require construction projects within the WQSA to be identified as High Threat to water quality and implement appropriate BMPs for bacteria sources (e.g. location of portable toilets). Note: majority of construction in WQSA is residential or eating and drinking establishments. See Attachment 1 for minimum BMPs.	As projects are submitted for permitting and inspected. Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
Existing Development									
Commercial and Residential Facilities and Areas									
CO-7	Implement inspections for identified high priority sources of bacteria (compared to annual inspection core program frequency) within specific drainage basins (e.g., Tidelands), as applicable. Require implementation of BMPs in Attachment 1 as applicable.	Additional targeted, biannual inspections for specific sources and drainage basins as identified through routine annual inspections Funding: Storm Drain Enterprise	FY15-16	Yes	Continuous	The City conducted core inspections with the Port of San Diego as a new activity for commercial facilities. Tidelands Basin inspections were planned and implementation initiated this FY. The program continues into FY17.	NA	NA	Yes
CO-8	Evaluate sweeping and maintenance of private roads and parking lots in targeted areas to identify and require additional BMPs (case-by-case basis): sweeping frequency, type of sweeper, inlet protection. Consider adding private roads to City sweeping program, based on funding availability.	Based on residential inspection results assessment. Funding: Storm Drain Enterprise, if available may require City Council approval. Optional Triggers: 1) residential inspection results; 2) interim or final goal not being met or at risk of not being met as determined by assessment plan.	Triggered by inspection results and goal assessment	Not Triggered	NA	First year of implementation and assessment of goal to trigger implementation would be in FY17.	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CO-9	Implement program that will require sources to retrofit trash enclosures when identified to be persistent and problematic sources through annual or complaint inspections (when public education, employee training, etc. are insufficient solutions) Also see CO-37.	As needed, through annual, routine inspections Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-10	1. Maintain existing pet waste program. Including new installation and maintenance of pet waste bag dispensers and trash bins (as BMPs) to enhance legal disposal in targeted areas based on inspection results. Also see CO-36.2.	Continuous. Funding: Storm Drain Enterprise. Triggers: based on park and beach facility inspection results and continued non-compliance or new areas/sources.	FY15-16	Yes	Continuous	None	NA	NA	Yes
	2. Enhanced or new signage and education (see CO-27 and CO-29), promoting physical removal of pet waste by pet owners.	Based on inspection assessment. Funding: Storm Drain Enterprise (fees). Optional Triggers: 1) park and beach facility inspection results and continued non-compliance; 2) interim or final goal not being met or at risk of not being met as determined by assessment plan.	Triggered by inspection results and goal assessment	Not Triggered	NA	First year of implementation and assessment of goal to trigger implementation would be in FY17.	NA	NA	Yes
CO-11	Promote with water purveyor, as available, residential source control program [BMPs for over-irrigation (smart controllers), rainwater harvesting, and turf conversion] that may include a rebate programs in target areas. Also see CO-43.	As needed and available. Funding: Storm Drain Enterprise and General Fund	FY15-16	Yes	Continuous	Program implemented to replace landscaping at entrance and medians in the Cays with drought tolerant plants, upgraded drip irrigation system.	NA	NA	Yes
CO-12	Implement inspections of City Marina land based areas under City jurisdiction - inlets, pump station and trash areas. Require BMPs as applicable per Attachment 1.	Additional targeted, bi-annual inspections for specific sources as identified. Funding: Storm Drain Enterprise	FY15-16	Yes	Continuous	Some inspections conducted jointly with the Port of San Diego.	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Municipal Facilities and Areas									
CO-13	1. Conduct enhanced beach maintenance activities to remove trash and debris, additional trash cans during peak periods, and replenish dog bag dispensers.	Continuous with daily patrols Funding: Storm Drain Enterprise and General Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-13	2. Implement inspection and preventative maintenance (PM) program to prevent sewer system backups and spills in from municipal/public restrooms.	Continuous with inspections twice weekly. Funding: Storm Drain Enterprise, Wastewater Enterprise Fund, and General Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-13	3. Implement beach patrols for trash, debris, and pet waste removal.	Continuous with daily patrols Funding: General Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-14	Identify Focused Priority Conditions in municipal facilities and areas to identified specific BMPs to reduce sources (e.g., special events). BMPs included in Attachment 1.	Based on pre-planning/permitting meeting and municipal inspection assessment during each event. Funding: Storm Drain Enterprise (fees). Optional Triggers: 1) park and beach facility inspection results and continued non-compliance, other municipal facilities and operations, special events; 2) interim or final goal not being met or at risk of not being met as determined by assessment plan.	Triggered by inspection results and goal assessment	Not Triggered	NA	First year of implementation and assessment of goal to trigger implementation would be in FY17.	NA	NA	Yes
CO-6	Implement park restroom inspection and cleaning to prevent sewer spill discharges to the MS4 and remove trash/waste.	Continuous with daily inspections and cleaning. Funding: General Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
MS4 Infrastructure									
CO-15	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, diversion structures, etc.) for optimum water quality. BMPs in Attachment 1 implemented as applicable.	Jurisdictional programs are for City staff and include SOPs, forms, schedules found in JRMP Section 6.5.6 and the Storm Water Standards Manual Sections 6-A and 6-B.	-	-	-	-	-	-	-
	1. Perform MS4 inspection and cleaning at higher frequency (instead of annually) for high debris areas.	Continuous with monthly inspections Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
	2. Evaluate MS4 inspection and cleaning locations and adjust high frequency to target new/modified high debris areas.	Continuous, at minimum biannually. Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
	3. Proactively repair and replace MS4 components to maintain proper operation and function.	Continuous. Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	MS4 infiltration elimination project (lining) was initiated this reporting year. Design and bid docs completed. Project construction slated to start Jan. 2017.	NA	NA	Yes
	4. Proactively operate, maintain, repair, and replace urban runoff diverters to sanitary sewer.	Continuous. Funding: Storm Drain Enterprise and/or Wastewater Enterprise Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes
	5. Proactively repair and replace corrugated metal pipe (CMP) MS4 components to provide source control from MS4 infrastructure (mitigate groundwater infiltration and reduce diversion flow to sewer system).	Continuous. Funding: Storm Drain Enterprise.	FY15-16	No	No	Evaluation of the MS4 inventory revealed that there are no remaining corrugated CMP components in the system. Eliminating the need for a CIP specifically targeting MS4 improvements to replace CMP.	Yes. Deleted in June 2016.	Others in place	No
CO-16	Implement operation and maintenance activities (inspection and cleaning) for Sanitary Sewer System and related structures for optimum operation.	Continuous. Monthly in priority areas and entire system annually (phased). Funding: Wastewater Enterprise Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CO-17	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	Continuous. Funding: Wastewater Enterprise Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-18	Identify sewer leaks and areas for sewer pipe replacement prioritization and timely repair. Sewerage infrastructure overflow prevention.	Continuous. Funding: Wastewater Enterprise Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes
Roads, Streets, Parking Lots									
CO-19	Perform sweeping of high-volume streets and hardscape cleaning at enhanced frequency. Indirect, positive impact in commercial area including eating and drinking establishments. See Attachment 1 for BMPs.	Continuous with weekly frequency in high volume areas. Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-21	Implement maintenance of bike lanes by proactively monitoring for erosion and completing minor repair and slope stabilization. See Attachment 1 for BMPs.	Continuous. Funding: General Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes
Illicit Discharge, Detection, and Elimination (IDDE) Program									
CO-23	Conduct inspections in targeted areas designated as high priority for IDDEs. Follow-up with outreach/education (see CO-22, CO-25 and CO-26) as applicable. Also see CO-37. BMPs listed in Attachment 1.	Continuous. IDDE summer-dry weather residential and commercial inspections. Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-24	Conduct "off-hours" inspections to identify and eliminate illicit discharges. See BMPs in Attachment 1.	Continuous. Summer-dry weather residential and commercial inspections/patrols twice during the period. Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Public Education and Participation									
CO-20	Implement street sweeping public education, temporary posting, and towing as needed to accomplish sweeping goals. Also see CO-37.	Continuous. Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-22	Promote and maintain website to encourage residents to report potential illicit discharges, overirrigation/runoff or other storm water violations.	Continuous. Funding: General Fund and Storm Drain Enterprise Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-25	Implement targeted public education and participation program to promote existing and new programs, BMPs (see Attachment 1), and behaviors that reduce the discharge of pollutants in storm water from high-risk behaviors, pollutants of concern, and target audiences.	Based on inspection assessment. Funding: Storm Drain Enterprise (fees). Optional Triggers: 1) commercial facility and residential areas inspection results and continued non-compliance; 2) interim or final goal not being met or at risk of not being met as determined by assessment plan.	Triggered by inspection results and goal assessment	Not Triggered	NA	First year of implementation and assessment of goal to trigger implementation would be in FY17.	NA	NA	Yes
CO-26	Develop an outreach and training program for property managers responsible for HOAs targeting sources of bacteria and illegal discharges (e.g., impervious area wash down, trash management, pet waste, over-irrigation runoff) through specific BMPs (Attachment 1) for site conditions, design, etc. Assess "turnover" of property managers.	Continuous. Initial outreach (one-time), repeat as needed based on residential area inspection/drive-by results in following years. Funding source: Storm Drain Enterprise	FY16-17	NA	NA	Scheduled for FY17	NA	NA	Yes
CO-27	Support trash and pet waste cleanups through community-based organizations involving target audiences. North Beach (Dog Beach) location.	Continuous. Funding source: General Fund	FY16-17	Yes	Continuous	Implemented in FY16 although originally not planned until FY17. A grant was secured to fund daily clean-up of beach areas.	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CO-2.1	Include staff training to target identification of bacteria pollutant sources during development and building project permitting. Staff training will be conducted, tailored to job duties. See BMP Design Manual.	Training will occur prior to BMP Design Manual implementation, within 3 months of the start of implementation if needed, and annually thereafter. Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-28	Improve consistency and content of Coronado HA websites to highlight enforceable conditions and reporting methods for source of bacteria.	Continuous. Initial effort (one-time) Funding source: Storm Drain Enterprise Trigger for as needed: interim or final goal not being met or at risk of not being met as determined by assessment plan.	FY16-17	NA	NA	Scheduled for FY17	NA	NA	Yes
CO-29	Target education toward activities and human behavior (e.g. signage) in beaches/parks and other public areas including trash reduction, bacteria sources (pet waste removal) or other high impact behavior to habitat, wildlife, and water quality (e.g., no feeding of wildlife).	Continuous. Initial effort (one-time) Funding source: Storm Drain Enterprise, General Fund Trigger for as needed: interim or final goal not being met or at risk of not being met as determined by assessment plan.	FY16-17	NA	NA	Scheduled for FY17	NA	NA	Yes
CO-30	Engage with the Main Street Association to promote BMPs - activities and good housekeeping practices -associated with bacteria sources (impervious area cleaning SOPs, outdoor dining areas, trash areas). See Attachment 1 for BMPs.	Continuous. Initial effort (one-time) Funding source: Storm Drain Enterprise, General Fund Trigger for as needed: interim or final goal not being met or at risk of not being met as determined by assessment plan.	FY16-17	NA	NA	Scheduled for FY17	NA	NA	Yes
CO-31	Collaborate with regional, watershed or sub-watershed education and outreach efforts that targets bacteria, including educational/outreach opportunities associated with regional efforts for bacteria TMDL, as applicable.	Funding source: Storm Drain Enterprise Trigger for optional: interim or final goal not being met or at risk of not being met as determined by assessment plan.	Triggered by goal assessment	Not Triggered	NA	First year of implementation and assessment of goal to trigger implementation would be in FY17.	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CO-32	Develop and/or distribute existing materials (from other agencies/groups) education and outreach to reduce over-irrigation/runoff. Assess effectiveness in pilot/target area(s).	Continuous. Initial outreach (one-time), repeat as needed based on residential area inspection/drive-by results in following years. Funding source: Storm Drain Enterprise	FY15-16	Yes	Continuous	Example: City website updates on drought conditions posted and street median signage promoting water conservation by City.	NA	NA	Yes
CO-33	Provide municipal staff training to select groups based on job duties and activities with emphasis on Focused Priority Conditions (bacteria).	Continuous. Initial outreach (one-time), repeat as needed based on municipal facility and other inspections in following years. Funding source: Storm Drain Enterprise	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-34	Conduct public surveys related to swimmable waters. Tailor education and outreach based on results of surveys.	Continuous. Initial survey (one-time), repeat as needed based on need. Tailor outreach as needed. Funding source: Storm Drain Enterprise	FY17-18	NA	NA	Scheduled for FY18	NA	NA	NA
CO-35	Provide technical education and outreach to the development community on the design and implementation requirements with an emphasis on Focused Priority Conditions (bacteria).	Continuous. Initial outreach (one-time), repeat as needed based on development permit submittal and inspections in following years. Funding source: Storm Drain Enterprise	FY15-16	Yes	Continuous	None	NA	NA	Yes
Incentive Programs									
CO-43	Incentive programs or opportunities. Includes programs with water purveyor for water conservation/over-irrigation, runoff (see CO-11). Other incentive programs as they become available.	As needed and available. Funding: Storm Drain Enterprise, General Fund	FY15-16	Yes	Continuous	Program implemented to replace landscaping at entrance and medians in the Cays with drought tolerant plants, upgraded drip irrigation system.	NA	NA	Yes
CO-44	Provide pet waste bags to owners at dog-friendly facilities (dog beach and dog runs).	As needed. Continuous. Funding: General Fund	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-46	Evaluate street infrastructure replacement or repairs for retrofit opportunities	Projects may include green streets and similar retrofit opportunities (e.g., porous pavement), as capital improvement plans are updated and implemented. Funding: General Fund, Grants and Others	FY16-17	NA	NA	Scheduled for FY17. May include in list for Prop. 1 Grant Funding.	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CO-47	Implement a strategy to include incentives or programs to retrofit existing development, and identify candidate areas or projects	Offsite Alternative Compliance Program, when available, will include incentives and projects to encourage or implement projects to retrofit existing development sites in the City. Incentives may include public and/or private projects or sites. Existing development retrofit project selection will be based upon a variety of factors including project size, project location, pollutant reduction potential (compared to existing conditions), cost, funding, cost-benefit analysis, public perception and acceptance (especially for public sites/projects) and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards. Refer to JRMP Storm Water Standards Manual, Section 4.D Funding: Storm Drain Enterprise and General Fund	Project List FY16-17. Policy and Procedures FYs 16-17 and 17-18 (upon availability of regional guidance)	NA	NA	Scheduled for FY17. May include in list for Prop. 1 Grant Funding.	NA	NA	Yes
CO-48	Proactively repair, replace, and retrofit MS4 components to maintain proper operation and function for reduction of infiltration.	As needed and available. Funding: Storm Drain Enterprise and General Fund	Triggered by infrastructure assessment or other determination	Yes	Continuous	A CIP project to line several sections of the MS4 to reduce groundwater infiltration was designed and bid preparation initiated. Project construction slated for FY17	NA	NA	Yes
CO-49	Promote with water purveyor, as available, residential retrofit to reduce irrigation and over-irrigation runoff (smart controllers), rainwater harvesting, and turf conversion that may include a rebate programs in target areas.	As needed and available. Funding: Storm Drain Enterprise and General Fund	FY15-16	Yes	Continuous	Installation of drip irrigation and improved system at the Cays at entrance and medians.	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CO-50	Implement program that will require sources to retrofit trash enclosures when identified to be persistent and problematic sources through annual or complaint inspections (when public education, employee training, etc. are insufficient solutions)	As needed, through annual, routine inspections Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-51	Commercial redevelopment projects. Require additional source control BMPs as applicable for persistent problem or areas. May include retrofit of trash enclosures, outdoor areas/facilities/uses to address pollutants of concern (including bacteria).	As projects are submitted for permitting. Funding: Storm Drain Enterprise (fees).	FY 15-16	Yes	Continuous	None	NA	NA	Yes
CO-52	Residential and medium risk sources: Review projects for potential sources of bacteria and require retrofit of areas, if appropriate, Retrofits may include landscaping modifications, impervious area retrofit, trash storage areas design/location or retrofit.	As projects are submitted for permitting or identified through inspection as persistent and problematic. Funding: Storm Drain Enterprise (fees). Optional strategy trigger: interim or final goal not being met or at risk of not being met as determined by assessment plan.	Triggered by Goal Assessment	NA	NA	First year of implementation and assessment of goal to trigger implementation would be in FY17.	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Enforcement Response Plan									
CO-36	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan. Implement additional strategies such as:	As needed. Continuous. Funding: General Fund, Storm Drain Enterprise Fund	FY 15-16	Yes	Continuous	None	NA	NA	Yes
	1. Increase enforcement and patrols of over-irrigation/runoff.	Continuous. Summer-dry weather residential and commercial inspections/patrols twice during period. Funding: Storm Drain Enterprise Funding: General Fund, Storm Drain Enterprise Fund	FY 15-16	Yes	Continuous	None	NA	NA	Yes
	2. Focus locally on patrols and enforcement of water-using mobile businesses.	Continuous. Summer-dry weather residential and commercial inspections/patrols twice monthly. Funding: Storm Drain Enterprise Funding: General Fund, Storm Drain Enterprise Fund	FY 15-16	Yes	Continuous	None	NA	NA	Yes
	3. Issue NOVs for private property sanitary sewer overflows.	As applicable. Continuous. Funding: General Fund, Storm Drain Enterprise Fund	FY 15-16	Yes	Continuous	None	NA	NA	Yes
	4. Police patrols (code enforcement) targeting dog owners using unauthorized parks for pets as approved by City (signage posted and no dog waste dispersers are available).	As needed. Continuous. Funding: General Fund, Storm Drain Enterprise Fund	FY 15-16	Yes	Continuous	None	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CO-37	Enforce minimum BMPs for existing residential and commercial development as identified in strategies and JRMP. Includes retrofit of trash enclosures (CO-9), no parking on street sweeping days (CO-20), IDDE summer-dry weather inspections (CO-23), eating and drinking establishments (dry sweeping/mop impervious areas/spills within right of way). See BMPs in Attach.1.	Continuous. Funding: Storm Drain Enterprise.	FY15-16	Yes	Continuous	None	NA	NA	Yes
Additional Nonstructural Strategies									
CO-38	Address and clean up homeless encampments to eliminate bacteria sources.	Continuous. Funding: General Fund, Storm Drain Enterprise	FY15-16	Yes	Continuous	None	NA	NA	Yes
CO-39	Conduct special studies related to bacteria sources and reduction measures, as applicable.	-	-	-	-	-	-	-	-
	1. Conduct a reference watershed study.	Funding: Storm Drain Enterprise Trigger for optional: interim or final goal not being met or at risk of not being met as determined by assessment plan.	TBD-Optional	Yes	No. Continues next FY	Regional Trash Generation Rate for Priority Land Use Study was organized and funded. Implementation in FY 16-17.	NA	NA	Yes
	2. Evaluate Tidelands Park data and delisting.	Continuous. Funding: Storm Drain Enterprise	FY15-16	Yes	Continuous	In collaboration with Port of San Diego, in progress	NA	NA	Yes
	3. Evaluate Tidelands Park outfall drainage basin for sources of bacteria, IDDE (including over irrigation), animal waste (birds, pets).	Continuous. Funding: Storm Drain Enterprise	FY15-16	Yes	Continuous	In collaboration with Port of San Diego, in progress	NA	NA	Yes
	4. Evaluate drainage system including condition of MS4 pipes draining to Tidelands Park outfall.	Continuous. Funding: Storm Drain Enterprise	FY15-16	Yes	Continuous	In collaboration with Port of San Diego, in progress	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
CO-39 (cont)	5. Develop work plan and/or revised strategies to address sources and conditions at Tidelands Park outfall based on finding (2-4 above).	Continuous. Funding: Storm Drain Enterprise	FY15-16	No	Continuous	In collaboration with Port of San Diego, in progress. To be implemented when 2-4 are completed.	NA	NA	Yes
CO-39	6. Evaluate with POSD conditions and sources in the drainage basin to Tidelands Park outfall, as applicable.	Continuous. Funding: Storm Drain Enterprise	FY15-16	No	Continuous	In collaboration with Port of San Diego, in progress. To be implemented when 2-4 are completed.	NA	NA	Yes
	7. Evaluate data gaps and monitoring plan options for delisting of Tidelands Park.	Continuous. Funding: Storm Drain Enterprise	FY15-16	No	Continuous	In collaboration with Port of San Diego, in progress. To be implemented when 2-4 are completed.	NA	NA	Yes
CO-40	Implement, as applicable, programs or BMPs with the Navy on water quality-related issues to benefit targeted sources, including bacteria. See Attachment 1 for BMPs.	Continuous. Funding: Storm Drain Enterprise	FY15-16	NA	Continuous	No opportunities arose and no issues were identified during the reporting year.			
CO-41	Implement, as applicable, with the Caltrans on water quality-related issues to benefit water quality, including bacteria.	Continuous. Funding: Storm Drain Enterprise	FY15-16	NA	Continuous	No opportunities arose and no issues were identified during the reporting year.			
CO-42	If invasive plant and pest removal is necessary in key locations, implement remedial measures.	Continuous. Funding: Storm Drain Enterprise	FY15-16	Yes	Continuous	Bark beetle infestation along Margarita Ave. mitigated with the removal of 11 trees to prevent further spread and disease of other trees. Funding for this project was from Parks Budget			
CO-45	Collaborate, as applicable, with the Regional Board on water quality-related issues to benefit water quality, including bacteria.	Continuous. Funding: Storm Drain Enterprise	FY15-16	Yes	Continuous	None	NA	NA	Yes

Table 6-1 (continued)
City of Coronado Jurisdictional Strategies

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Non-JRMP Strategies (Optional Strategies, Provision B.3.b.(1)(b)									
CO-53	Implement stream, channel, and habitat rehabilitation projects as needed.	This strategy may be triggered if: 1) Interim goals are not met, 2) Stream or habitat rehabilitation is determined to be a more effective pathway, relative to additional structural or non-structural BMPs to meeting bacterial indicator goals, 3) Funding and staffing has been secured, 4) Partners, MOUs, and permits required by regulatory agencies are secured, and 5) Recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations and feasibility of property or land acquisition, 2) Secure funds in the form of general funds, bonds, or grants, 3) Obtain City Council approval of Capital Improvement Project budget, 4) Initiate preliminary engineering to narrow project scope and demonstrate effectiveness and feasibility, 5) Hire design consultant to develop detailed construction plans and construction cost estimates, including land acquisition, if applicable, 6) Complete construction contractor bid and award process for construction phase, 7) Construct project, 8) Operation and maintenance into perpetuity.	Triggered as noted in Implementation Approach	NA	NA	First year of implementation and assessment of goal to trigger implementation would be in FY17.	NA	NA	Yes

6.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The City of Coronado BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. The City of Coronado updated its BMP Design Manual in accordance with Municipal Permit requirements during FY16; the BMP Design Manual replaced the Standard Urban Stormwater Mitigation Plan (SUSMP). No additional changes to the BMP Design Manual have been made since it went into effect. The City of Coronado BMP Design Manual can be accessed via the Project Clean Water website or at the City of Coronado's Main website located at: https://www.coronado.ca.us/government/departments_divisions/public_services_and_engineering/storm_water_operations/

6.5 MODIFICATIONS TO THE JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM

The City of Coronado completed minor revisions and updates to the Construction Management component in Section 5 of the JRMP. The updates were completed per Municipal Permit section F.2.a.(3). The updates include:

1. Provide criteria that allow for modifications in inspection frequency based on site conditions, BMPs, and compliance status and history of the project site.
2. Clarification that the default inspection frequency for sites determine to be a high threat is biweekly.
3. Updates required inspection content.
4. Clarifies information managed in the TrackIt system used for permitting and inspection management by the City.

The revised JRMP will be posted on the City's website, and may also be accessed through the Copermittee's Regional Clearinghouse on the Project Clean Water website.

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7 COUNTY OF SAN DIEGO

7.1 ANNUAL REPORT CERTIFICATIONS

The County of San Diego's signed Statement of Certification and Legal Authority Establishment for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report is included on the following page.

County of San Diego

SARAH E. AGHASSI
DEPUTY CHIEF ADMINISTRATIVE OFFICER

LAND USE AND ENVIRONMENT GROUP
1600 PACIFIC HIGHWAY, ROOM 212, SAN DIEGO, CA 92101
(619) 531-6256 • Fax (619) 531-5476
www.sdcounty.ca.gov/lueg

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT SAN DIEGO BAY WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the County of San Diego has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 6th day of January, 2017, at the County of San Diego.

Sarah Ag

SARAH E. AGHASSI
Deputy Chief Administrative Officer

1/6/17
Date

7.2 ANNUAL REPORT FORM

The County of San Diego's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM

FY 2015-2016

I. COPERMITTEE INFORMATION		
I.A Copermittee Name: County of San Diego (PIN 255223)		
I.B Copermittee Primary Contact Name: Todd Snyder		
I.C Copermittee Primary Contact Information: Address: 5510 Overland Avenue, Suite 410 City: San Diego County: San Diego State: California Zip: 92123 Telephone: (858) 694-3672 Fax: (858) 495-5623 Email: Todd.Snyder@sdcounty.ca.gov		
II. LEGAL AUTHORITY		
II.A Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
II.B A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☒ ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
III.A Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☒ ☐
III.B If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☒ ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
IV.A Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
IV.B.1 Number of non-storm water discharges reported by the public		286
IV.B.2 Number of non-storm water discharges detected by Copermittee staff or contractors		95
IV.B.3 Number of non-storm water discharges investigated by the Copermittee		375
IV.B.4 Number of sources of non-storm water discharges identified		115
IV.B.5 Number of non-storm water discharges eliminated		112
IV.B.6 Number of sources of illicit discharges or connections identified		85
IV.B.7 Number of illicit discharges or connections eliminated		84
IV.B.8 Number of enforcement actions issued		93
IV.B.9 Number of escalated enforcement actions issued		1
V. DEVELOPMENT PLANNING PROGRAM		
V.A Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
V.B Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	☒ ☐
V.C If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☒ ☐
V.D.1 Number of proposed development projects in review		925
V.D.2 Number of Priority Development Projects in review		237
V.D.3 Number of Priority Development Projects approved		96
V.D.4 Number of approved Priority Development Projects exempt from any BMP requirements		0
V.D.5 Number of approved Priority Development Projects allowed alternative compliance		0
V.D.6 Number of Priority Development Projects granted occupancy		62
V.E.1 Number of completed Priority Development Projects in inventory		410
V.E.2 Number of high priority Priority Development Project structural BMP inspections		691
V.E.3 Number of Priority Development Project structural BMP violations		170
V.E.4 Number of enforcement actions issued		170
V.E.5 Number of escalated enforcement actions issued		0

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM

VI. A Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒	NO ☐

VI.B.1 Number of construction sites in inventory	2,748
VI.B.2 Number of active construction sites in inventory	2,684
VI.B.3 Number of inactive construction sites in inventory	0
VI.B.4 Number of construction sites closed/completed during reporting period	1,124
VI.B.5 Number of construction site inspections	18,858
VI.B.6 Number of construction site violations	416
VI.B.7 Number of enforcement actions issued	590
VI.B.8 Number of escalated enforcement actions issued	38

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

VII.A Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES ☒	NO ☐

	Municipal	Commercial	Industrial	Residential
VII.B.1 Number of facilities or areas in inventory	a. 263	b. 1,779	c. 150	d.110
VII.B.2 Number of existing development inspections	a. 1,885	b. 974	c. 38	d.468
VII.B.3 Number of follow-up inspections	a. 23	b. 131	c. 12	d.165
VII.B.4 Number of violations	a. 46	b. 279	c. 31	d.346
VII.B.5 Number of enforcement actions issued	a. 28	b. 130	c. 10	d.0
VII.B.6 Number of escalated enforcement actions issued	a.0	b.1	c.0	d.0

VIII. PUBLIC EDUCATION AND PARTICIPATION

VIII.A Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES ☒	NO ☐
VIII.B Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES ☒	NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES ☒	NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Sarah Aghassi
Signature

10/26/16
Date

SARAH E. AGHASSI
Print Name

LAND USE AND ENVIRONMENT GROUP
DEPUTY CHIEF ADMINISTRATIVE OFFICER
Title

(619) 531-5451
Telephone Number

SARAH.AGHASSI@SDCOUNTY.CA.GOV
Email

ATTACHMENT D.1

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM BY WATERSHED

JRMP ANNUAL REPORT ATTACHMENT D.1 by WATERSHED

Fiscal Year 2015-2016

			SANTA MARGARITA	SAN LUIS REY	CARLSBAD	SAN DIEGUITO	PENASQUITOS	SAN DIEGO RIVER	SAN DIEGO BAY	TIJUANA RIVER	JURISDICTION TOTALS
			*(902.00)	*(903.00)	*(904.00)	*(905.00)	*(906.00)	*(907.00)	*(908.00, 909.00, 910.00)	*(911.00)	
IV.	**ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM**										
IV.B.1	Number of non-storm water discharges reported by the public		12	46	30	40	2	78	72	6	286
IV.B.2	Number of non-storm water discharges detected by Copermittee staff or contractors		9	11	7	14	1	28	24	1	95
IV.B.3	Number of non-storm water discharges investigated by the Copermittee		15	57	37	51	3	106	99	7	375
IV.B.4	Number of sources of non-storm water discharges identified		4	22	17	11	1	30	28	2	115
IV.B.5	Number of non-storm water discharges eliminated		4	21	16	10	1	30	28	2	112
IV.B.6	Number of sources of illicit discharges or connections identified		4	14	16	8	0	18	23	2	85
IV.B.7	Number of illicit discharges or connections eliminated		4	14	15	8	0	18	23	2	84
IV.B.8	Number of enforcement actions issued		4	21	17	9	1	23	16	2	93
IV.B.9	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	1	1
V.	**DEVELOPMENT PLANNING PROGRAM**										
V.D.1	Number of proposed development projects in review		27	219	109	189	0	158	183	40	925
V.D.2	Number of Priority Development Projects in review		2	53	30	53	0	43	50	6	237
V.D.3	Number of Priority Development Projects approved		4	23	11	21	0	20	11	6	96
V.D.4	Number of approved Priority Development Projects exempt from any BMP requirements		0	0	0	0	0	0	0	0	0
V.D.5	Number of approved Priority Development Projects allowed alternative compliance		0	0	0	0	0	0	0	0	0
V.D.6	Number of Priority Development Projects granted occupancy		2	16	5	8	0	18	12	1	62
V.E.1	Number of completed Priority Development Projects in inventory		12	89	54	85	0	66	93	11	410
V.E.2	Number of high priority Priority Development Project structural BMP inspections		1	100	70	273	0	110	82	55	691
V.E.3	Number of Priority Development Project structural BMP violations		1	43	31	53	0	24	8	10	170
V.E.4	Number of enforcement actions issued		1	43	31	53	0	24	8	10	170
V.E.5	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	0	0
VI.	**CONSTRUCTION MANAGEMENT PROGRAM**										
VI.B.1	Number of construction sites in inventory		63	637	397	636	2	438	513	62	2748
VI.B.2	Number of active construction sites in inventory		60	622	393	627	2	424	496	60	2684
VI.B.3	Number of inactive construction sites in inventory		0	0	0	0	0	0	0	0	0
VI.B.4	Number of construction sites closed/completed during reporting period		20	314	137	235	1	175	219	23	1124
VI.B.5	Number of construction site inspections		245	3655	4473	3934	3	2868	3361	319	18858
VI.B.6	Number of construction site violations		1	50	55	38	0	64	205	3	416
VI.B.7	Number of enforcement actions issued		1	66	64	66	0	104	286	3	590
VI.B.8	Number of escalated enforcement actions issued		1	6	8	9	0	3	9	2	38
VII.	**EXISTING DEVELOPMENT MANAGEMENT PROGRAM**										
VII.B.1	Number of facilities or areas in inventory	a. Municipal	8	23	27	34	4	63	82	22	263
		b. Commercial	154	315	196	210	2	466	410	26	1779
		c. Industrial	15	4	5	22	0	67	36	1	150
		d. Residential	12	11	11	22	1	15	21	17	110
VII.B.2	Number of existing development inspections	a. Municipal	48	181	239	244	41	421	561	150	1885
		b. Commercial	106	155	115	102	0	180	309	7	974
		c. Industrial	1	5	5	12	0	2	13	0	38
		d. Residential	17	55	67	107	2	109	77	34	468
VII.B.3	Number of follow-up inspections	a. Municipal	0	3	0	0	0	2	14	4	23
		b. Commercial	7	10	10	13	0	22	65	4	131
		c. Industrial	1	3	0	2	0	0	6	0	12
		d. Residential	3	22	30	43	0	34	24	9	165
VII.B.4	Number of violations	a. Municipal	0	7	0	1	0	5	26	7	46
		b. Commercial	15	21	25	16	0	51	140	11	279
		c. Industrial	0	7	0	4	0	0	20	0	31
		d. Residential	4	47	59	85	0	70	50	31	346
VII.B.5	Number of enforcement actions issued	a. Municipal	0	2	0	0	0	3	19	4	28
		b. Commercial	10	13	11	7	0	21	65	3	130
		c. Industrial	0	2	0	2	0	0	6	0	10
		d. Residential	0	0	0	0	0	0	0	0	0
VII.B.6	Number of escalated enforcement actions issued	a. Municipal	0	0	0	0	0	0	0	0	0
		b. Commercial	0	0	0	0	0	0	0	1	1
		c. Industrial	0	0	0	0	0	0	0	0	0
		d. Residential	0	0	0	0	0	0	0	0	0

ATTACHMENT D.2

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FISCAL ANALYSIS

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FISCAL ANALYSIS COMPONENT

1.1. Introduction

This section presents an estimated annual budget for the County's runoff management programs for FY 2015-16.

1.2. Fiscal Analysis Methods

This section continues to utilize the methodologies and standards established in *Fiscal Analysis Method* submitted by the Copermittees in January 2009.

1.3. Fiscal Analysis Results

As shown the County estimated its total FY 2015-16 expenditures at $27,414,216. This fiscal analysis addresses each of the County's Runoff Management Program elements (jurisdictional, watershed, and regional activities) for the current reporting period (FY 2015-16). Expenditures are described by department and major program area. They represent an estimate of the expenditures that the County incurred in meeting its compliance obligations for FY 2015-16. They should not be interpreted as either budgeted or actual expenditures. Because stormwater program expenditures are distributed throughout a considerable number of County programs, a single consolidated "budget" does not exist for the program as a whole. As such, these figures should be considered best estimates of stormwater-related expenditures.

1.3.1 Expenditures

1.3.1.1. Jurisdictional

Table 1.1 presents the County's estimated jurisdictional expenditures for FY 2015-16.

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
1	**ADMINISTRATION**	**$6,840,583**	These costs correspond to the DPW WPP development, administrative oversight, and assessment of the County's stormwater programs. The WPP is responsible for the development of new and augmented County stormwater programs, regulatory reporting, and program assessment. Some administrative costs are associated with other specific functions shown below, but are included here because they could not be separated out.
2	**DEVELOPMENT PLANNING**	**$1,109,654**	
A	**Land Use Planning**	$0	Expenditures not reported for FY 2015-16; included in other elements.
B	**Environmental Review**	$0	Expenditures not reported for FY 2015-16; included in other elements.
C	**Development Project Approval and Verification**	**$1,109,654**	
C1	**Public Projects (CIP)**	$824,219	
	Project Planning and Engineering	$570,229	Costs include: preparing and reviewing plans and specifications for stormwater BMPs, and SWPPP/WPCP review. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$15,000	
	BMP Implementation	$238,990	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
C2	**Private Projects**	$285,435	
	Permitting and Licensing	$285,435	This cost covers PDS plan reviews at permitted sites. Total costs are estimated as fixed percentages of annual plan-checking fees.
3	**CONSTRUCTION**	**$4,500,593**	
A	**Public Projects (CIP)**	$2,886,893	Costs include: BMP compliance inspections during construction, and implementation of construction phase BMPs. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$1,613,880	
	BMP Implementation	$1,273,013	
B	**Private Projects**	$1,613,700	
	Compliance Inspection and Enforcement	$1,613,700	This cost primarily covers DPW and PDS construction inspections at permitted sites. Total costs are estimated as fixed percentages of inspection program fees.
4	**MUNICIPAL**	**$7,572,297**	
A	**Administration**	$267,805	Expenditures associated with the administrative oversight of the stormwater programs, regulatory reporting, and program assessment of municipal facilities by the DPW - Watershed Protection Program.
B	**Streets, Roads, and Highways Element**	$2,256,091	
	Administration	$291,160	Founded road operations activities include: culvert inspections and cleaning;

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

Jurisdictional Worksheet Component			Explanation/Notes
	Maintenance Inspections	$1,890,813	increased culvert waste disposal costs, street sweeping, installation and maintenance of BMPs and road structures, and the placement of additional controls. 10% of the Maintenance and Inspections and BMP Implementation is reported as Administration cost.
	BMP Implementation	$74,118	
	Other	$0	
C	**MS4 Element**	<u>$1,530,000</u>	
	Administration	$191,000	The combined costs shown here apply across (1) DPW Flood Control -- conversion of existing concrete lined channels to natural bottom channels, updating flood control master plans, increased maintenance of flood control systems, and construction and maintenance of regional treatment BMPs; and (2) DPW Flood Control MS4 Operation & Maintenance -- maintenance on flood control facilities throughout the unincorporated areas of the County, exclusive of facilities within road rights-of-way (included in 4.B above). Other includes the cost of disposal of debris removed from MS4.
	Maintenance Inspections	$1,046,900	
	BMP Implementation	$290,500	
	Other	$2,500	
D	**Solid Waste Facilities Element**	<u>$406,618</u>	
	Administration	$35,047	Costs include Regional Board stormwater permit fees, consultant costs associated with stormwater upgrade and repair projects, and office staff time.
	Maintenance Inspections	$16,922	Costs include staff time to perform site inspections.
	BMP Implementation	$79,149	Costs include stormwater consultant site inspections, sampling/testing and BMP materials.
	Other (construction)	$275,500	Drainage improvement projects and BMP site maintenance projects.
E	**Wastewater Facilities Element**	<u>$187,000</u>	
	Administration	$10,000	This includes costs associated with JRMP report, the sanitary sewer system and facilities including: pump stations, sewage treatment plants and Spring Valley Operations facility. Also includes the cost of BMP design, acquisition,
	Maintenance Inspections	$127,000	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$50,000	maintenance and monitoring, for wastewater Capital Improvement Projects, and Major maintenance projects, and at various wastewater facilities.
	Other	$0	
F	**Road Stations Element**	$919,867	
	Administration	$83,624	This includes DPW road station operations related to Permit compliance. The Administration cost is determined as 10% of the total costs of maintenance and Inspections and BMP Implementation as reported by the DPW Roads Divisions.
	Maintenance Inspections	$799,414	
	BMP Implementation	$36,829	
	Other	$0	
G	**Fleet Maintenance Element**	$11,722	
	Administration	$1,036	This includes costs associated with operation of the County's fleet maintenance and fueling facilities.
	Maintenance Inspections	$7,392	
	BMP Implementation	$3,294	
	Other	$0	
H	**Municipal Airfields Element**	$338,110	These costs involve site inspections, annual reporting, and maintenance of BMPs at airports, including oversight of tenant operations. The BMP implementation item includes Palomar asphalt cap repairs.
	Administration	$12,737	
	Maintenance Inspections	$0	
	Compliance Inspection and Enforcement	$0	
	BMP Implementation	$300,623	
	Other (sampling and analysis)	$24,750	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
I	**Parks & Recreational Facilities Element**	$1,214,562	
	Administration	$121,362	This includes: coordinating all training requirements, preparing and reviewing reports, and overseeing the overall implementation of the stormwater program for DPR.
	BMP Implementation	$991,603	This includes costs associated with implementation of BMPs at County parks.
	Compliance Inspection and Enforcement	$101,597	Costs are for DPR enforcement of stormwater requirements at County parks.
	Other	$0	
J	**Office Buildings & Other Municipal Facilities Element**	$297,867	
	Administration	$0	DGS conducts a variety of storm water activities including: inspections and clean-up of County-owned, occupied, and leased facilities and vacant lands; maintenance and signage of storm drain inlet inserts and trash dumpsters; placement of inlet filters; maintenance of coverage and containment improvements for on-site supplies and materials; parking lot sweeping and controlled parking lot power washing; and application of erosion and sediment control measures. These costs are exclusive of fleet maintenance and fueling operations.
	Maintenance Inspections	$99,808	
	BMP Implementation	$198,059	
	Other	$0	
	Management of Pesticides, Herbicides, & Fertilizers	$142,656	
	Administration	$142,656	Integrated Pest Control Program within the Department of Agriculture, Weights and Measures (AWM) performs eradication and control of invasive weeds. This program also provides weed control on roadsides, airports, flood control channels,
	Maintenance Inspections	$0	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$0	sewage treatment plants and inactive landfills. It also provides structural pest control to facilities owned and operated by the county.
	Other	$0	
5	**INDUSTRIAL and COMMERCIAL**	**$1,575,635**	
	Administration	$253,047	DPW and AWM conduct inspections of a variety of businesses in the unincorporated County, provide regulatory oversight of mobile businesses, and conduct follow-up and enforcement of stormwater violations.
	Compliance Inspection and Enforcement	$1,245,279	
	Educational Outreach	$77,309	
	Other expenditures	$0	
6	**RESIDENTIAL**	**$1,205,386**	
	Compliance Inspection and Enforcement	$688,453	DPW conducts complaint investigations for residential sources in the unincorporated County, and conduct follow-up and enforcement of stormwater violations. DPW also operates a regional hotline.
	Educational Outreach	$516,933	Several County departments coordinate and provide outreach to the residential sector and schoolchildren in support of Permit Section D.5 requirements. Costs reported here correspond to DPW only. Funded activities include developing pollution prevention content and providing direct outreach to various target audiences within the general residential and schoolchildren target audiences.
7	**IDDE**	**$321,523**	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

Jurisdictional Worksheet Component			Explanation/Notes
		$321,523	DPW conducts monitoring programs, assesses scientific data, and provides technical and scientific support to other County program staff. They also provide support for all technical and scientific aspects of JRMP development and implementation. These costs are exclusive of the regional monitoring program which is addressed separately under regional costs.
8	**EDUCATION**	**$0**	Education costs are included in other sections as applicable.
9	**PUBLIC PARTICIPATION**	**$0**	Public participation costs are included in other sections as applicable.
10	**SPECIAL INVESTIGATIONS**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.
11	**NON-EMERGENCY FIREFIGHTING**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.
		$23,125,671	

1.3.1.2 Watershed

Table 1.2 presents the County's estimated watershed expenditures for FY 2015-16.

Table 1.2 – Estimated Watershed Expenditures for FY 2015-16

	Santa Margarita WMA	San Luis Rey WMA	Carlsbad WMA	San Dieguito WMA	Peñasquitos WMA	San Diego River WMA	San Diego Bay WMA	Tijuana WMA
Administration	$37,583	$201,492	$82,653	$113,035	$75,309	$105,117	$37,583	$75,309
Cost Share Contribution	$0	$62,494	$46,204	$8,885	$1,062	$68,970	$6,659	$2,346
Watershed Activities	$626,917	$119,390	$14,860	$171,640	$26,423	$125,705	$111,491	$80,300
Other	$0	$0	$0	$0	$0	$0	$0	$0
Total Estimated Watershed Costs	**$664,500**	**$383,376**	**$143,717**	**$293,560**	**$102,794**	**$299,792**	**$155,733**	**$157,955**

1.3.1.3 Regional

Table 1.3 presents the County's estimated regional expenditures for FY 2015-16. This includes only those expenditures associated with the Copermittees' adopted Regional Budget and Work Plan. Other costs associated with regional participation (meeting attendance, etc.) are included within the jurisdictional expenditures presented above.

Table 1.3 – Estimated Regional Expenditures for FY 2015-16

Regional Programs	County Costs
Administration	$0
Cost Share Contribution	$2,087,118
Regional Activities	$0
Other	$0
Total Estimated Regional Costs	**$2,087,118**

1.3.1.4 Total Expenditures

Table 1.4 presents the County's total estimated expenditures for FY 2015-16 (jurisdictional, watershed, and regional).

Table 1.4 – Total Estimated County Expenditures for FY 2015-16

Component / Sub-component	Estimated Expenditures
Jurisdictional	
Administration	$6,840,583
Development Planning	$1,109,654
Construction	$4,500,593
Municipal	$7,572,297
Industrial And Commercial	$1,575,635
Residential	$1,205,386
IDDE	$321,523
Education	$0
Public Participation	$0
Special Investigations	$0
Non-emergency Firefighting	$0
Jurisdictional Total	**$23,125,671**
Watershed	
Santa Margarita WMA	$664,500
San Luis Rey WMA	$383,376
Carlsbad WMA	$143,717
San Dieguito WMA	$293,560
Peñasquitos WMA	$102,794
San Diego River WMA	$299,792
San Diego Bay WMA	$155,733
Tijuana WMA	$157,955
Watershed Total	**$2,201,427**
Regional	**$2,087,118**

Total Estimated County Costs ***$27,414,216***

1.3.2 Funding Source

Table 1.5 shows the major sources of funding for the County's urban runoff management programs in FY 2015-16, and describes the legal restrictions applicable to the use of each.

Table 1.5 – Legal Restrictions on the Use of Program Funding

Funding Source	Legal Restrictions
General Fund	There are no restrictions on the use of general fund for County water quality programs and activities except that they must be used only for the purposes for which they are budgeted and allocated by the County Board of Supervisors.
Flood Control District Fees	Revenue generated from these fees must be expended for activities related to flood and storm management.
Developer Deposits / Permit Fees	Deposits / fees may be used only to fund activities related to the work for which the permits are issued.
Gas Tax	Gas Tax is collected by the state and allocated to local government for transportation-related work including maintenance of existing transportation systems and construction of new transportation facilities. These funds may not be used for other purposes.
Sanitary District Fees	Sanitary District Fees are used for work related to the maintenance of sewer lines, pump stations, force mains, and several treatment plants that serve the unincorporated areas. They may be used only for such maintenance-related purposes within the respective sewer district for which they are collected.
Other Funding Sources	Other funding sources collectively account for a relatively small portion of ongoing expenditures. However, all funding for the County's stormwater compliance programs is expended within applicable legal restrictions and limitations.

1.4. Conclusions and Recommendations

The figures presented here are an estimate of the expenditures that the County incurred to meet its compliance obligations for FY 2015-16. For the reasons explained above, they should be considered only best estimates of stormwater-related expenditures.

7.3 COUNTY OF SAN DIEGO STRATEGIES

The County of San Diego's (County's) jurisdictional strategies, found in Table 7-1, and optional strategies, found in Table 7-2, were chosen because they best suit the characteristics of its jurisdiction within the Chollas Creek HA. WMA strategies are presented in Table 7-3. Potential dry weather flows are evaluated through inspection of MS4 outfalls and education and outreach. To treat potential runoff from County facilities, retrofit projects utilizing LID approaches in conjunction with drainage and parking improvements were completed at the Southeast Family Resource Center and Central Regional Public Health Center. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules identified provide that numeric goals are met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis is updated as needed to provide assurance that numeric goals are met.

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Table 7-1
County of San Diego Jurisdictional Strategies

ID	Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Status		Proposed Modifications		
		Implemented in FY16? *(No/Partially/Yes)*	Comments on Implementation (# events, # attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
Illicit Discharge, Detection, and Elimination (IDDE) Program						
CoSD-34	Maintain storm water conveyance system map to facilitate IDDE program	Yes	Updated as needed	N	N/A	Y
CoSD-35	Utilize municipal personnel and contractors to identify and report Illicit Connections and Discharges	Yes	IDDE Program	N	N/A	Y
CoSD-36	*Updated focused training for County field staff*	Yes	Updated training for BMP Design Manual and Storm Water Implementers	N	N/A	Y
CoSD-37	Collect effluent on the ground (EOG), sanitary sewer overflow (SSO) data	Yes	Approximately 87 EOG complaints related to septic systems and 14 SSO events recorded and responded to.	N	N/A	Y
CoSD-38	*Address septic system failures where observed*	Yes	Suspected septic discharges are reported to DEH HIRT Response line when they occur after hours and DEH Land and Water Quality Division during normal hours. All complaints resolved during 15-16	N	N/A	Y
CoSD-39	Facilitate public reporting of ICID via telephone and email	Yes	Bilingual hotline, dedicated e-mail address, and multiple online reporting tools	N	N/A	Y
CoSD-40	*Refer homeless issue complaints to Sheriff or appropriate jurisdictions*	Yes	Collaborate with multi-departmental group to address homeless encampments	N	N/A	Y
CoSD-41	*Bilingual hotline answered by a live operator (I Love a Clean San Diego) to provide better customer service*	Yes	Bilingual hotline operated by ILACSD	N	N/A	Y
CoSD-42	Implement practices and procedures to address spills with the potential to enter the storm drain system	Yes	NOV issued by DEH for failing septic systems when effluent could reach the storm drain. Prompt follow up and mitigation is implemented. Such cases are rare; <5 in 15-16	N	N/A	Y
CoSD-43	*Coordinate spill response with responsible sewer agencies*	Yes	Major DEH role is to inform the public of risks associated with sewer spills, conducting sampling, reporting, posting signs, etc.	N	N/A	Y
CoSD-44	Implement practices and procedures to prevent/limit infiltration of seepage from sanitary sewers	Yes	If illicit connections are identified as part of an IDDE investigation, investigation will be conducted to define and eliminate the source.	N	N/A	Y

Table 7-1 (continued)
County of San Diego Jurisdictional Strategies

ID	Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Status		Proposed Modifications		
		Implemented in FY16? *(No/Partially/Yes)*	Comments on Implementation (# events, # attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
CoSD-45	Coordinate with upstream entities to prevent illicit discharges from upstream sources entering into the storm drain system	Yes	If illicit connections are identified as part of an IDDE investigation, investigation will be conducted to define and eliminate the source. If determined to be from an upstream entity coordination will occur	N	N/A	Y
CoSD-46	Utilize municipal personnel and Contractors to monitor storm water outfalls for discharges of potential ICIDs	Yes	This is part of the IDDE Program	N	N/A	Y
CoSD-47	Develop and implement a strategy for investigating and addressing ICIDs.	Yes	Focused, collaborative investigations with Planning and Science staff of high priority outfalls.	N	N/A	Y
Development Planning						
CoSD-1	Require implementation of source control and Low Impact Development (LID) BMPs for all development projects.	Yes	The County BMP DM requires all projects regardless of size and location to implement SC and SD BMPs. These requirements are captured in the WPO and County's BMP DM.	N	N/A	Y
CoSD-2	Update BMP Design Manual procedures to specify storm water requirements applicable to development and redevelopment projects, identify and design appropriate BMPs, establish maintenance criteria, and establish where implemented alternative compliance options.	Yes, Partially	Updated to reflect the Regional Model BMP DM with additional changes to incorporate County implementation practices. BMP DM became effective on February 26, 2015. Rene can provide details on the differences between CoSD BMP DM and Model BMP DM.	N	N/A	N
CoSD-3	*Conduct internal (staff) training on the updated BMP Manual*	Yes	The JRMP requires the County to conduct internal training every fiscal year and after release of new guidance documents	N	N/A	N
CoSD-4	*Hold external land development workshops targeting the development community*	Yes	The County conducts external training regularly and after release of new guidance documents	N	N/A	N

Table 7-1 (continued)
County of San Diego Jurisdictional Strategies

ID	Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Status		Proposed Modifications		
		Implemented in FY16? *(No/Partially/Yes)*	Comments on Implementation (# events, # attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
CoSD-5	Implement a program that ensures that all structural and Low Impact Development (LID) BMPs are designed, constructed and maintained on Priority Development and Redevelopment Projects.	Yes	Structural BMPs and LID BMPs are designed and constructed per the BMP Design Manual. In addition, Structural BMPs are tracked for maintenance through inspections and self-verification letters. LID BMPs that are installed as a result of implementation of the BMP Design Manual are proposed to be inspected	N	N/A	Y
CoSD-7	Impose legal authority to ensure all development and redevelopment projects are in compliance with all post construction requirements.	Yes	The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated permit and the inclusion of applicant-implement offsite alternative compliance.	N	N/A	Y
CoSD-8	*Update County codes, ordinances, and storm water design standards consistent with the permit and the updated BMP Manual*	Yes	The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated permit and the inclusion of applicant-implement offsite alternative compliance. WPO update became effective on February 26, 2016.	N	N/A	N
CoSD-9	Priority Development Projects: In addition to requirement for all development projects, implement or require implementation of onsite structural BMPs to control pollutants and manage hydromodification for PDPs.	Yes	The County BMP DM requires all PDPs to implement PC and HMP BMPs. These requirements are captured in the WPO and County's BMP DM.	N	N/A	Y
Construction Management						
CoSD-10	Maintain, update and prioritize a watershed based inventory of all projects issued local permits that allow soil disturbing activities.	Yes	Projects that are issued local permits that allow soil disturbance activities are part of the inventory that is watershed-based.	N	N/A	Y
CoSD-11	Require implementation of BMPs that are site specific, seasonally appropriate and appropriate to the construction phase, year round.	Yes	Every project requires implementation of site specific construction BMPs, seasonably appropriate and appropriate to the construction phase.	N	N/A	Y

Table 7-1 (continued)
County of San Diego Jurisdictional Strategies

ID	Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Status		Proposed Modifications		
		Implemented in FY16? *(No/Partially/Yes)*	Comments on Implementation (# events, # attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
CoSD-12	Impose legal authority to ensure inventoried construction projects are in compliance with all requirements.	Yes	The Watershed Protection Ordinance is the current legal authority to insure inventoried construction projects are in compliance with all requirements.	N	N/A	Y
CoSD-13	*Make updates to County ordinances related to construction; reference to existing grading ordinance*	Yes	County ordinances are updated with subsequent Construction General Permit updates; the Watershed Protection Ordinance will be updated as necessary as a result of the future Grading Ordinance Update.	N	N/A	N
CoSD-14	Provide internal staff training related to construction storm water management.	Yes	The County conducts construction storm water training annually and it targets construction inspectors in DPW-PDCI, PDS-Building, and CIP Inspectors in DPW and DGS.	N	N/A	Y
Existing Development						
CoSD-15	Maintain and update a watershed-based inventory of existing development (i.e. commercial, industrial, municipal and residential areas).	Yes	Inventory is tracked in Accela Automation	Y	Database is continually updated to increase accuracy and efficiency	Y
CoSD-16	*Improve the tracking of watershed based inventories via consolidated database*	Yes	Inventory is tracked in Accela Automation	Y	Database is continually updated to increase accuracy and efficiency	Y
CoSD-17	Designate a minimum set of BMPs required for all existing development inventories, including special event venues. The designated minimum BMPs must be specific to facility or area types and pollutant generating activities, as appropriate.	Yes	JRMP establishes minimum BMPs for all land use types.	N	N/A	Y
CoSD-18	*Create an Equestrian BMP Handbook*	No	Handbook created in FY2014-15	Y	Handbook will be revised in FY2016-17 to encompass additional BMPs and be more user friendly.	Y

Table 7-1 (continued)
County of San Diego Jurisdictional Strategies

ID	Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Status		Proposed Modifications		
		Implemented in FY16? *(No/Partially/Yes)*	Comments on Implementation (# events, # attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
CoSD-19	Require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types and pollutant generating activities, as appropriate.	Yes	JRMP establishes minimum BMPs for all land use types.	N	N/A	Y
CoSD-20	*Pet waste management and outreach in County Parks.*	Yes	Mutt-mitt dispensers are installed and maintained in many County parks, providing people who are walking their dogs with waste disposal bags to use to pick up after their pets.	N	N/A	Y
CoSD-21	Promote and encourage implementation of designated BMPs in residential areas.	Yes	Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas. All Residential Management Areas were inspected in FY15-16	N	N/A	Y
CoSD-22	Conduct inspections of inventoried existing development to ensure compliance	Yes	Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas.	N	N/A	Y
CoSD-23	*Conduct focused residential inspections based on strategic assessments.*	Yes	Focused, collaborative investigations with Planning and Science staff of high priority outfalls.	N	N/A	Y
CoSD-24	*Develop a residential inspections tracking program via mobile platform - miles, violations, etc.*	Yes	In pilot testing phase	Y	Modifications based on pilot testing phase to increase effectiveness	Y
CoSD-25	*Improve inspections data tracking through mobile phone applications*	Yes	In pilot testing phase	Y	Modifications based on pilot testing phase to increase effectiveness	Y
CoSD-26	Enforce legal authority established for all inventoried existing development to achieve compliance	Yes	see JRMP	N	N/A	Y
CoSD-27	*Update county ordinance related to existing development; reference to existing guidance documents*	Yes	Watershed Protection Ordinance and BMP Design Manuals were updated.	N	N/A	N

Table 7-1 (continued)
County of San Diego Jurisdictional Strategies

ID	Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Status		Proposed Modifications		
		Implemented in FY16? *(No/Partially/Yes)*	Comments on Implementation (# events, # attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
CoSD-28	Implement a schedule or operation and maintenance activities for the storm water conveyance system and related structures.	Yes	Storm Water maintenance is referred to appropriate departments when needed.	N	N/A	Y
CoSD-29	Implement a schedule of operation and maintenance for County paved and unpaved roads.	Yes	County Road Crews employ a schedule for maintenance of County Roads.	N	N/A	Y
CoSD-30	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Yes	1. 450 Facilities received the Agricultural Water Quality Best Management Practices for Pesticides through annual registration notifications. 2. Inspections were conducted at 83 Commercial Ag Facilities	N	N/A	Y
CoSD-31	Promote incentive program for BMP retrofits (e.g. water smart irrigation controllers, turf replacements programs, residential landscape evaluation program).	Yes	The County continues to collaborate with and promote the efforts of partner agencies incentive programs.	N	N/A	N
CoSD-32	*Collaborate with partner agencies and groups to promote non-County sponsored incentive programs for BMP retrofits, including rain barrels, smart controllers, soil sensors, turf replacement, etc.*	Yes	The County continues to collaborate with and promote the efforts of partner agencies incentive programs.	N	N/A	Y
CoSD-33	Identify candidate areas of existing development for stream, channel, and/or habitat rehabilitation projects and facilitate implementation of such projects.	No	N/A	N	N/A	N

Table 7-1 (continued)
County of San Diego Jurisdictional Strategies

ID	Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Status		Proposed Modifications		
		Implemented in FY16? *(No/Partially/Yes)*	Comments on Implementation (# events, # attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
Outreach and Public Participation						
CoSD-48	Implement a public education and participation program to promote and encourage development of programs, management practices and behaviors that reduce the discharge of pollutants in storm water prioritized by high risk behaviors, pollutants of concern, and target audiences.	Yes	The County completes numerous education and public participation programs for a diverse target audiences. See JRMP.	N	N/A	Y
CoSD-49	*Develop, improve, and distribute outreach materials.*	Yes	Improved outreach materials through a focused Community-based Social Marketing approach.	Y	Continual improvement of existing materials, including translation into Spanish	Y
CoSD-50	*Give outreach presentations to elementary, middle, and high school students*	Yes	Offer presentations to elementary, middle, and high schools serving unincorporated communities.	N	N/A	Y
CoSD-53	*Outreach to mobile landscaping service providers*	Yes	Pesticide Regulation Program collaboration with the California Department of Pesticide Regulation on a pilot program to offer workshops for maintenance gardeners. Two workshops were held where attendees were provided training materials and concluded with a pesticide certification exam. Attendees at both workshops had high success rates for the exam.	N	N/A	Y
CoSD-55	*Expand Homeowners Associations Outreach and Coordination based on the pilot project within San Luis Rey, San Dieguito, or San Diego River as needed and as funding is identified*	No	Additional development may occur based on pilot study in FY2016-17	N	N/A	N
CoSD-56	Collaborate with watershed partners to develop consistent messaging to targeted audiences such as commercial, residents to conserve water and reduce dry weather flows	Yes	Collaboration between the Regional Education Workgroup and Think Blue San Diego Region to develop and distribute educational materials such as the "Be the Solution to Pollution" booklet which includes irrigation and runoff reduction measures. Other items developed under this included posters, calendars and coloring books	N	N/A	y

Table 7-1 (continued)
County of San Diego Jurisdictional Strategies

ID	Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Status		Proposed Modifications		
		Implemented in FY16? *(No/Partially/Yes)*	Comments on Implementation (# events, # attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
CoSD-57	*Sponsor Trash Collection Events through public outreach and participation*	Yes	The County sponsors ILACSD to establish cleanup sites at the Coastal Cleanup Day and Creek to Bay events.	N	N/A	Y
CoSD-58	*Educational Workshops on Integrated Pest Management, manure management and others as needed*	Yes	Various workshops presented throughout the year by County staff including UCCE, FHA and contractors.	N	N/A	Y
CoSD-59	Partner with Master Gardeners Programs to provide education opportunities on water use and practices for gardening	Yes	Various workshops presented throughout the year by County staff including UCCE, FHA and contractors.	N	N/A	Y
CoSD-60	*Conduct Effectiveness Survey's on Education & Outreach programs*	Yes	Surveys to determine the efficacy of watershed education to unincorporated elementary, middle, and high schools serving unincorporated communities	N	N/A	Y
Enforcement Response Plan						
CoSD-61	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Yes	County implemented the ERP as described in the JRMP.	N	N/A	Y
CoSD-62	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) within five (5) calendar days of issuing escalated enforcement to a construction site that poses a significant threat to water quality as a result of violations or other noncompliance	Yes	County implemented the ERP as described in the JRMP.	N	N/A	Y

Table 7-1 (continued)
County of San Diego Jurisdictional Strategies

ID	Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Status		Proposed Modifications		
		Implemented in FY16? *(No/Partially/Yes)*	Comments on Implementation (# events, # attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
CoSD-63	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) any persons required to obtain coverage under the statewide Industrial General Permit and Construction General Permit and failing to do so, within five (5) calendar days from the time the Copermittee become aware of the circumstances.	Yes	County implemented the ERP as described in the JRMP.	N	N/A	Y

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Table 7-2
County of San Diego Optional Strategies

ID	Optional Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Timeframe	Triggers	Resources	Implementation Status			Proposed Modifications		
					Triggered?	Implemented in FY16?	Comments on Implementation	Proposed Modifications?	Modification Type & Rationale	Planned Implementation into next FY?
CoSD-Opt1	Implement Sustainable Landscapes Program to encourage landscape retrofits.	FY 2016-17; Continuous until grant funding and incentives are depleted	Implementation of this strategy may be triggered if (1) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (2) all of the necessary resources have been secured. Continue implementation when the funding and incentives items are secured.	Staff resources, Grant funding, Incentive items, Partnerships	No	Partially	N/A	N	N/A	Y
CoSD-Opt 2	Implement an incentive program for BMP Retrofits (Public-Private Partnerships - a County sponsored program to offer incentives for rain barrel installation, downspout disconnects from the storm water system, etc.)	FY 2015-16 Continuous, as resources allow	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Incentive items, Partnerships	No	Partially	N/A	N	N/A	Y
CoSD-Opt 3	Implement a program that provides rebates or incentives for pumping septic systems, with a focus in high risk areas adjacent to waterways (within 600 feet).	Once triggered, Pilot program 1 -2 years, as needed thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Incentive items	No	No	Funding source not identified. All 4 triggers have not been met.	No	N/A	No

Table 7-2 (continued)
County of San Diego Optional Strategies

ID	Optional Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Timeframe	Triggers	Resources	Implementation Status			Proposed Modifications		
					Triggered?	Implemented in FY16?	Comments on Implementation	Proposed Modifications?	Modification Type & Rationale	Planned Implementation into next FY?
CoSD-Opt 4	Identify where sewer and storm water infrastructure are in close proximity and subsequently, confirm the absence of flow at nearby storm water MS4 outfall during dry weather.	Once triggered, 2-3 years; one-time	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	No	N/A	No	N/A	N
CoSD-Opt 5	Implement a program for on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	Once triggered, 2-3 years	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) septic systems have been determined to be a pollutant sources to the MS4; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	Partially	Under the Local Area Management Plan (LAMP) for onsite wastewater treatment systems the treatment systems with supplemental treatment are required to be permitted annually. The annual operating permit will define the monitoring and maintenance requirements as specified by the manufacturer and/or qualified professional who designed the system. The LAMP ordinance can be found at: http://www.sandiegocounty.gov/content/dam/sdc/deh/lwqd/RWQCB%20Approved%20LAMP%20Final%202-24-15.pdf	N	N/A	Y

Table 7-2 (continued)
County of San Diego Optional Strategies

ID	Optional Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Timeframe	Triggers	Resources	Implementation Status			Proposed Modifications		
					Triggered?	Implemented in FY16?	Comments on Implementation	Proposed Modifications?	Modification Type & Rationale	Planned Implementation into next FY?
CoSD-Opt 6	Divert persistent dry weather flows from storm drains to sewer	Once triggered, 3-6 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) permission is granted from sewer agency; and (4) ground water or permitted discharges have been ruled out; and (5) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Engineering design, Environmental review, Permits, Ongoing funding for operation/maintenance	No	No	Diversions are a last resort strategy and will be reviewed for outfalls that are persistently flowing after all other implementation strategies have been exhausted.	N	N/A	N
CoSD-Opt 7	Implement trash capture program (e.g., retrofit storm drain intakes with trash capture devices)	Baseline study 2-3 years; FY 15-16 implementation as needed and as resources allow	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) baseline study completion and success; and (4) focus areas identification; and (5) detailed inlet inventory of focus areas; and (6) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Equipment, Permits, Ongoing funding for operation/maintenance	No	Partially	The County of San Diego is in process of conducting several studies to develop Baseline Trash Generation Rates.	N	N/A	Y

Table 7-2 (continued)
County of San Diego Optional Strategies

ID	Optional Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Timeframe	Triggers	Resources	Implementation Status			Proposed Modifications		
					Triggered?	Implemented in FY16?	Comments on Implementation	Proposed Modifications?	Modification Type & Rationale	Planned Implementation into next FY?
CoSD-Opt 8	Implement a Green Streets Retrofits Program	Once triggered, 3-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered on a project-by-project basis if (1) a specified interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Each green street retrofit project is preliminary estimated to cost an average of $5,500,000 per linear mile of retrofit for construction. Resources include: Staff resources, Grant funding or alternative source, Contractor funding, Engineering or landscaping design, Permits, Environmental review, Right of way acquisition, Ongoing funding for operation/maintenance	No	Partially	Design standards and specifications have been developed. Green streets are now being used to meet compliance for all retrofit and/or redeveloped road projects that in the Capital Improvement Projects plan. Pursuing Grant Funding	N	N/A	Y
CoSD-Opt 9	Construct Treatment Control BMPs (retrofits projects)	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Engineering or landscaping design, Permits, Environmental review, Ongoing funding for operation/maintenance	No	No	N/A	N	N/A	N

Table 7-2 (continued)
County of San Diego Optional Strategies

ID	Optional Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Timeframe	Triggers	Resources	Implementation Status			Proposed Modifications		
					Triggered?	Implemented in FY16?	Comments on Implementation	Proposed Modifications?	Modification Type & Rationale	Planned Implementation into next FY?
CoSD-Opt 10	Implement an alternative compliance program to enable "offsite" compliance for new and redevelopment projects.	Once triggered, 3-6 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Engineering design , Permits, Environmental review, Right of way acquisition (if needed), Ongoing funding for operation/maintenance	No	Partially	Currently applicant implemented offsite alternative compliance is available for use by the development community. The Water Quality Equivalency (WQE) provides the currency for structural BMPs and some natural system management practices (NSMPs). Additional work on the WQE will be conducted during FY17. The County is not currently pursuing a credit system but is participating as a stakeholder on the City of San Diego TAC and as a member of the Western Riverside Coalition of Governments (WRCOG) discussion on offsite alternative compliance.	N	N/A	Y
CoSD-Opt 11	Flood Control Channel Rehabilitation Projects (e.g., removal of impervious lining in flood control channel and replacement with earthen or vegetated surface)	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (4) engineering design, monitoring, and outreach plans are approved; and (5) all of the necessary resources have been secured.	Project costs vary by size and complexity. Resources include: Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Engineering design, Permits, Environmental review, Right of way acquisition (if needed), Ongoing funding for operation/maintenance	No	Partially	N/A	N	N/A	Y

Table 7-2 (continued)
County of San Diego Optional Strategies

ID	Optional Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Timeframe	Triggers	Resources	Implementation Status			Proposed Modifications		
					Triggered?	Implemented in FY16?	Comments on Implementation	Proposed Modifications?	Modification Type & Rationale	Planned Implementation into next FY?
CoSD-Opt 12	Implement a program to remove invasive non-native plants (i.e. Arundo) upstream areas rivers or tributaries.	Once triggered, 1-2 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) community support and partnerships established; and (4) it has been determined that invasive plants have been found to have an impact on water quality; and (5) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	No	The County has developed several Habitat Restoration Plans and Non-Native Plant Removal Guidelines including for the Otay Valley Regional Park. Implementation of projects resulting from these guidelines requires acquisition of land and funding. No projects were completed during this reporting period.	N	N/A	N
CoSD-Opt 13	Habitat Restoration and rehabilitation projects in County Parks	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Restoration / Rehabilitation Designs Approved, Environmental Permits issued, CEQA / NEPA Environmental review, Ongoing funding for maintenance and monitoring	No	Partially	Habitat restoration and rehabilitation has occurred in the Tijuana River Valley Regional Park and will continue for an additional 3-5 years. Additionally habitat restoration and rehabilitation has been initiated for the Sweetwater Loop Trail Phase I and Phase III however additional funding is necessary to complete Phase I. Phase III will beginning in Fall 2016.	N	N/A	Y

Table 7-3
County of San Diego WMA Strategies

ID	WMA Strategy	Implementation Timeframe	Triggers	Resources	Implementation Status		
					Pollutants Addressed/Physical and Biological Benefits	Responsible Groups/Collaborating Entities	Comments
San Diego Bay							
SDB1	Offsite Alternative Compliance Option (WMAA)	Prior to FY 2016; Continuous - ongoing	This strategy may be implemented at the Authority's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) consensus and community support has been achieved, and 4) interim/final goals are not met. Funding for future fiscal years is contingent on budget approval by Authority Board.		Bacteria, Nutrients, Metals, Trash, Sediment, Flow, Habitat/Wildlife	EAD/FDD, Copermittees	
SDB2	Participate in Reference Watershed Study	Prior to FY 2016; Continuous - ongoing			Bacteria, Nutrients, Metals, Trash, Sediment, Flow, Habitat/Wildlife	EAD, Copermittees	

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7.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The County BMP Design Manual provides guidance for land development and public improvement projects to comply with the 2013 Municipal Separate Storm Sewer System (MS4) Permit (Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100). This Manual replaces County Standard Urban Storm Water Mitigation Plan (SUSMP). It is focused on project design requirements and related post-construction requirements, not on the construction process itself. No modifications to the BMP DM have been made since its publication on February 2016. The BMP DM is available online on the County of San Diego's website: http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/DevelopmentandConstruction/BMP_Design_Manual.html.

7.5 MODIFICATIONS TO THE JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM

No modifications to the County of San Diego JRMP have been made since the WQIP was approved. The current County of San Diego JRMP is posted on the County website, and the link to this page is listed on Project Clean Water.

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8 CITY OF IMPERIAL BEACH

8.1 ANNUAL REPORT CERTIFICATIONS

The City of Imperial Beach's signed Statement of Certification and Legal Authority letter for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report are included on the following pages.

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City of Imperial Beach, California

PUBLIC WORKS DEPARTMENT

825 Imperial Beach Blvd., Imperial Beach, CA 91932 Tel: (619) 423-8311 Fax: (619) 429-4861

January 9, 2017

SAN DIEGO BAY WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

STATEMENT OF CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

Hank Levien

Hank Levien
Director Public Works
City of Imperial Beach

City of Imperial Beach, California

OFFICE OF THE CITY MANAGER

825 Imperial Beach Blvd., Imperial Beach, CA 91932 Tel: (619) 423-8303 Fax: (619) 628-1395

I certify that the City of Imperial Beach has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-0001 as amended by Orders R9-2015-0001 and R9-2015-0100. Legal authority is established and maintained by the following:

- Updated BMC Chapter 8.30 for Urban Runoff Management and Discharge Control, Ordinance Number 2016-1158 authorized by City Council on November 2, 2016
- Imperial Beach Jurisdictional Runoff Management Plan authorized through Resolution 2015-7588, authorized by City Council on June 3, 2015
- San Diego Bay Water Quality Improvement Plan authorized through Resolution 2015-7589, authorized by City Council on June 3, 2015
- Tijuana River Water Quality Improvement Plan authorized through Resolution 2015-7590, authorized by City Council on June 3, 2015
- Imperial Beach BMP Design Manual authorized through Resolution 2015-7636, authorized by City Council on October 21, 2015

Signed: Andy Hall 11-16-16

Andy Hall Date

City Manager

8.2 ANNUAL REPORT FORM

The City of Imperial Beach's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

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SAN DIEGO BAY WATERSHED
JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM

FY 2015-16

I. COPERMITTEE INFORMATION

Copermittee Name: Imperial Beach

Copermittee Primary Contact Name: Chris Helmer

Copermittee Primary Contact Information:
Address: 825 Imperial Beach Blvd
City: Imperial Beach County: San Diego State: CA Zip: 91932
Telephone: 619-628-1370 Fax: 619-429-4861 Email: chelmer@imperialbeachca.gov

II. LEGAL AUTHORITY

Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES ☒ NO ☐	
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES ☒ NO ☐	

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES ☐ NO ☒
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES ☐ NO ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

Number of non-storm water discharges reported by the public	14
Number of non-storm water discharges detected by Copermittee staff or contractors	53
Number of non-storm water discharges investigated by the Copermittee	67
Number of sources of non-storm water discharges identified	53
Number of non-storm water discharges eliminated	53
Number of sources of illicit discharges or connections identified	53
Number of illicit discharges or connections eliminated	53
Number of enforcement actions issued	47
Number of escalated enforcement actions issued	10

V. DEVELOPMENT PLANNING PROGRAM

Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES ☒ NO ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES ☒ NO ☐

Number of proposed development projects in review	16
Number of Priority Development Projects in review	1
Number of Priority Development Projects approved	0
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	0

Number of completed Priority Development Projects in inventory	5
Number of priority Priority Development Project structural BMP inspections	5
Number of Priority Development Project structural BMP violations	0
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

FY 2015-16

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Number of construction sites in inventory	42
Number of active construction sites in inventory	25
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	17
Number of construction site inspections (includes CIP Projects)	301
Number of construction site violations	4
Number of enforcement actions issued	4
Number of escalated enforcement actions issued	4

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

	Municipal*	Commercial	Industrial	Residential*
Number of facilities or areas in inventory	26	52	0	6
Number of existing development inspections	26	76	0	12
Number of follow-up inspections	0	24	0	0
Number of violations	0	0	0	0
Number of enforcement actions issued	0	0	0	0
Number of escalated enforcement actions issued	0	0	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Hank Levien
Signature

Nov. 14, 2016
Date

HANK LEVIEN
Print Name

PUBLIC WORKS DIRECTOR
Title

619-423-8311
Telephone Number

HLEVIEN@CITYOFIMPERIALBEACHCA.GOV
Email

*Municipal and *Residential inventories include both San Diego Bay and Tijuana River watersheds because many facilities cross watershed boundaries.

Fiscal Analysis Report

During this past fiscal year the City continued to implement its Jurisdictional Runoff Management Program (JRMP) that is available on the City's website (www.imperialbeachca.gov/environment). Part of the City's JRMP includes a storm water cost analysis study with Mikhail Engineer to establish a consistent methodology for calculating storm water program costs (Appendix E of JRMP). The Mikhail fiscal analysis study identifies the various categories of expenditures necessary to implement the requirements of the Storm Water Permit and includes a description of expenditures, staff resources, and funding sources.

The Environmental Programs Division of the Department of Public Works and the Finance Deportment is responsible for compiling the annual fiscal analysis of the storm water program. This current fiscal analysis represents the best estimate for the costs and effort required by the City of Imperial Beach to implement the storm water management program under Permit R9-2013-0001. Implementation expenditures for the JRMP were approximately $1,354,408 during the FY 2015-16 reporting period and primarily funded through the general fund sources. In addition, during the reporting period the City was the lead agency on the San Diego Bay and Tijuana River Water Quality Improvement Plans and managed the implementation of these consultant contracts in the amount of $420,000.

The expenditures for implementation of capital improvement program (CIP) projects get accounted separately. The City had 27 CIP projects either under design or construction during FY 2016 with expenditures made towards the project. All CIP projects include some element of storm water work for the design, construction, and construction management. In addition, the City implemented seven specific CIP projects that had approximately $1,700,000 in expenditures directly related to storm water.

Category of Expenditures

The expenditures for FY 2016 are summarized below in Table 1. The fiscal analysis method does not exactly correspond to the line item budget maintained by the City. The expenditures are therefore an extrapolation that best correspond to the itemized categories as outlined in the Permit. The expenditures for the Tijuana River and San Diego Bay WQIP costs and CIP projects are called out separately. Supporting documentation is also provided in Attachment 1 and Attachment 2.

Table 1 Expenditures on JRMP for FY 2015-16

Administration Tasks	$ 121,342
Development Planning and Construction Management	$ 73,152
Existing Development Management and O&M	$ 1,144,913
Public Education and Participation	$ 15,000
Total	**$ 1,354,408**

*** CIP Expenditures tracked separately from storm water budget.**
FY 2016 expenditures was $1,716,753

- (P15402) Sports Park Tot-Lot (Design): **$1,295**
  The City is including a storm water dry well in the design for the replacement of the Sports Park tot-lot. The rubber playground matting and surface material will drain to a storm water infiltration drywell and infiltrate all storm water onsite. (Funding source from Parks budget)
- (S11106) Bikeway Village Project: **$206,142**
  Public private partnership to rehabilitate old industrial buildings for visitor serving accommodations. Is considered a priority development project and Includes new storm water bioswale. (Funding source from CIP 2010 Bond and ATP Grant)
- (S13309) Elm Ave Street Improvements: **$60,740**
  Street and sidewalk improvements for Mar Vista High School and IB Elementary. Includes a green street element that infiltrates storm water with the use of drywells that capture street runoff from the curb and gutter. (Funding source includes Gas Tax, ATP Grant, transnet, and Sewer Enterprise)
- (S14104) Alley Paving Project Phase 1 and (S16901) Alley Paving Project Phase 2: **$1,375,830**
  The City completed construction of the first phase of dirt alley improvements of over 1 mile of green alleys and initiated the design of the second phase of the project to improve the remaining dirt alleys in the City. (Funding source CIP 2010 Bond)
- (P16302) Bicentennial Triangle Xeriscape: **$4,482**
  Incentive program with Cal American Water for turf removal. (Funding sources include CalAmerican grant and RTCIP)
- (SP1408) Imperial Beach Sea Level Rise Study: **$68,266**
  Completed a Sea Level Rise and adaptation study for the City that includes a hydrologic assessment of the City's storm drain infrastructure and its vulnerability to sea level changes. (Funding sources includes Coastal Conservancy, San Diego Foundation, and General Fund)

FY 2016 Water Quality Improvement Plan Expenditures

- (SP1503) San Diego Bay WQIP: **$131,550**
- (SP1503) Tijuana River WQIP: **$288,283**

Attachment 1
Expenditures by Division for FY 2016

City of Imperial Beach

Storm Water Actual (FY2016)

	Factor	Actual	Budget
Public Works Administration	5%	$ 14,135	$ 14,245
Streets	24%	$ 191,439	$ 197,774
Tidelands	34%	$ 296,204	$ 296,636
Parks	14%	$ 48,378	$ 49,363
Facilities	2%	$ 5,871	$ 6,393
Solid Waste	50%	$ 23,676	$ 24,001
Storm Water	100%	$ 209,211	$ 213,569
Wastewater	10%	$ 379,139	$ 397,433
		$ 1,168,053	$ 1,199,414
Council/Mayor	6%	$ 7,275	$ 7,227
City Manager	6%	$ 27,508	$ 27,917
City Clerk	6%	$ 18,725	$ 19,743
Human Resources	5%	$ 12,541	$ 12,747
City Attorney	6%	$ 8,334	$ 8,309
		$ 74,382	$ 75,943
Planning & Building	10%	$ 73,152	$ 75,945
Code Enforcement	5%	$ 5,995	$ 6,053
City Engineering	included		
		$ 79,147	$ 81,998
Finance	5%	$ 32,825	$ 32,858
		$ 1,354,408	$ 1,390,213

Attachment 2
CIP Project Expenditures for FY 2016

FY2016 CIP Projects Storm Water	Budget	Actual	Storm Water Factor	Total
P15402 : SPORTS PARK TOT-LOT	$ 12,852	$ 12,952	0.1	$ 1,295.19
P16302 : TRIANGLE PARK XERISCAPE L	$ 8,964	$ 8,965	0.5	$ 4,482.38
S13309 : RTIP FY 13-14 ELM AVE ASP	$ 239,090	$ 242,955	0.25	$ 60,738.67
S14104 : ALLEY IMPROV. FY 13-14	$ 1,227,630	$ 1,299,516	1	$ 1,299,516.16
S15702 : BIKEWAY VILLAGE	$ 1,347,108	$ 1,374,280	0.15	$ 206,141.96
S16901 : EIGHT ALLEY PAVING PROJEC	$ 76,313	$ 76,313	1	$ 76,312.91
SP1408 : IB SEA LEVEL RISE STUDY	$ 240,000	$ 273,065	0.25	$ 68,266.37
				$ 1,716,753.63
Water Quality Improvement Plans				
SP1404 : TIJUANA RIVER WQIP	$ 344,350	$ 339,008	1	$ 288,283.00
SP1503 : SD BAY WQIP FY 16	$ 278,834	$ 131,551	1	$ 131,550.74
				$ 419,833.74

8.3 CITY OF IMPERIAL BEACH STRATEGIES

The City of Imperial Beach (Imperial Beach) is the southernmost jurisdiction in the San Diego Bay WMA. Long term planning for Imperial Beach includes integration of LID and green street concepts into capital improvement projects (CIPs) and other opportunities as they become available. In addition, Imperial Beach requires source control and LID BMPs as conditions on standard development projects greater than $50,000.

Low flow and first flush diversions have been installed within Imperial Beach's MS4 that capture trash and dry weather flows. Imperial Beach's Environmental Division incorporates the underserved community in most education activities, which is particularly important to the City because of the large Spanish-speaking community. Imperial Beach maintains ongoing collaboration with the Fish and Wildlife Service on the cleaning and maintenance of MS4 outfall locations along San Diego Bay. In addition, Imperial Beach collaborates with the Navy on annual inspections and operation and maintenance for the portion of the City's MS4 that drains to a detention basin on Navy property. Imperial Beach also actively participates and partners with multiple agencies and stakeholders in the restoration of South San Diego Bay.

Strategies and implementation schedules, presented in Table 2-8-1, were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP is updated. The implementation of each strategy is contingent upon annual budget approvals and funding availability.

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Table 8-1
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
JRMP Strategies (E.3.b.(1)(a))								
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
IB-01	Imperial Beach Illicit Discharge Detection and Elimination Program	Refer to JRMP Section 4. This is an ongoing and budgeted JRMP activity. Frequency of implementation is continuous with initial response time by City staff under 1 hour for most IDDE cases. Investigate and eliminate dry weather discharges and illegal connections to the MS4 as reported to the City or identified by staff. Utilize appropriate enforcement actions to achieve compliance. Minimum BMPs provided in Attachment 1 and Attachment 3.	Prior to FY16	YES		NO		YES
IB-04	Dry weather field screening of major MS4 outfalls	Refer to JRMP Section 4. This is an ongoing and budgeted JRMP activity. Perform visual assessment of major MS4 outfalls twice per year to support IDDE efforts and to identify maintenance needs. Minimum BMPs include cleanup of any trash and debris at outfall location post field screening. The TRNERR performs annual maintenance and cleanup at the City's major outfall at 5th and Grove.	Prior to FY16	YES	An additional form was added in FY 15-16 to indicate information addressing the trash data collected at the different outfalls	NO		YES
IB-04a	Persistent dry weather flow monitoring	Refer to JRMP Section 4. This is a new and ongoing budgeted JRMP activity. The Env Division will perform dry weather field screening monitoring at major outfalls with persistent dry weather flows, which is defined as 3 consecutive non-storm water discharges as observed through IB-04. Monitoring results will support IDDE efforts and WQIP priorities.	FY16	YES	No persistent flows in our City	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
E.3 Development Planning								
Non-Priority Development Projects								
IB-05	Provide storm water BMP conditions during the development review phase for non-Priority Development Projects	Refer to JRMP Section 5. This is an ongoing and budgeted JRMP activity. Administer a program to ensure implementation of source control BMPs to minimize pollutant generation through project design and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible and in accordance to the Imperial Beach BMP Design Manual (IB-07). BMPs are required as conditions of project approval. BMPs include the protection of trash storage areas. Enhanced BMPs are also conditioned through IB-05a for medium sized projects.	FY16	YES		NO		YES
Priority Development Projects (PDPs)								
IB-06	Provide storm water BMP conditions during the development review phase for Priority Development Projects.	Refer to JRMP Section 5. This is an ongoing and budgeted JRMP activity. Priority Development Projects as defined by IBMC requires BMP certification by the City Engineer to meet treatment and retention standards in the Imperial Beach BMP Design Manual (IB-07). Structural BMPs are required as conditions of project approval.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-07	City of Imperial Beach BMP Design Manual	Refer to JRMP Section 5 and IBMC. This is an update to an ongoing JRMP activity. Implement the new BMP design standards applicable to all development and redevelopment projects. PDPs must meet updated treatment and retention standards. The effective date for the new minimum BMP standards for development planning projects is currently scheduled for 12/24/15 and requires an update to the IBMC. Effective date may change pending approval of RWQCB Tentative Order R9-2015-0100. The Imperial Beach BMP Design Manual will be the guiding policy document for minimum BMPs for development and redevelopment projects.	FY16	YES		NO		YES
IB-08	Long-term Structural BMP Maintenance Agreement	Refer to JRMP Section 5. This is an ongoing and budgeted JRMP activity. Frequency is continuous for each applicable development project. Implement a legal agreement, covenant, CEQA mitigation requirement, and/or conditional use permit to ensure long-term maintenance of structural BMPs.	Prior to FY16	YES		NO		YES
IB-10	Structural BMP Maintenance Verification, Database Management, and Inspection	Refer to JRMP Section 5. This is an ongoing and budgeted JRMP activity. The Environmental Division verifies through inspections the long-term maintenance of structural treatment control BMPs at completed PDPs. Frequency of inspections is once per year for BMPs designated as high priority and no less than once per permit cycle for all inventoried BMPs. BMPs are verified for continues operation and maintenance and site inspection include verification of appropriate source control BMPs, which help address the property pollutants of trash and sediment.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
E.4 Construction Management								
IB-14	Approval of a Storm Water Management Plan or equivalent plan for private development projects	Refer to JRMP Section 6. This is an ongoing and budgeted JRMP activity. Private development project applicants must submit and receive approval of a Storm Water Management Plan (or for Construction General Permit a Storm Water Pollution Prevention Plan) prior to receiving a building, grading, or demolition permit. The plan must demonstrate how each project will implement minimum BMPs for the following categories: project planning; housekeeping; non-storm water management; erosion control; sediment control; run-on and run-off control; and active or passive sediment treatment systems. Minimum BMPs provided in Attachment 3.	FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-14a	Inspect and verify implementation of construction management BMPs and maintain a continuous inventory of construction sites and enforcement actions for private development projects	Refer to JRMP Section 6. This is an ongoing and budgeted JRMP activity. The City considers all construction activity a potential high threat to water quality and verifies implementation of minimum BMPs through inspections for the following categories: project planning; housekeeping; non-storm water management; erosion control; sediment control; run-on and run-off control; and active or passive sediment treatment systems. Minimum BMPs provided in Attachment 3. The frequency of inspections at a minimum includes one monthly site inspection. Inspection frequencies also include one initial site inspection at the start of grading or construction activities, drive-by inspections of all active construction sites prior to forecast rain events, and verification of site BMPs during any subsequent building inspection at the project site. The Community Development Department maintains a continuous inventory on the City's HTE database system of active construction sites and notes on enforcement actions.	FY16	YES		NO		YES
IB-15	Approval of a Storm Water Management Plan or equivalent plan for public capital projects	Refer to JRMP Section 6. This is an ongoing and budgeted JRMP activity. Contractors for public development (CIP) projects must submit and receive approval of a Storm Water Management Plan (or for Construction General Permit a Storm Water Pollution Prevention Plan) prior to receiving a notice to proceed. The plan must demonstrate how each project will implement minimum BMPs for the following categories: project planning; housekeeping; non-storm water management; erosion control; sediment control; run-on and run-off control; and active or passive sediment treatment systems. Minimum BMPs provided in Attachment 3.	FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-15a	Inspect and verify implementation of construction management BMPs and maintain a continuous inventory of construction sites and enforcement actions for public development (CIP) projects	Refer to JRMP Section 6. This is an ongoing and budgeted JRMP activity. The City considers all construction activity a potential high threat to water quality and verifies implementation of minimum BMPs through inspections for the following categories: project planning; housekeeping; non-storm water management; erosion control; sediment control; run-on and run-off control; and active or passive sediment treatment systems. Minimum BMPs provided in Attachment 3. The frequency of inspections for implementation occurs daily by the Public Works Inspector that is designated to each project. The Public Works Inspector maintains a continuous inventory of active construction activity and maintains Daily Inspection Reports of enforcement actions.	FY16	YES	City staff performs daily inspections on every active construction sites and a database is maintained for record keeping	NO		YES
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilitates and Areas								
IB-17	Administer a program that requires implementation of minimum BMPs at existing development that covers pollutant generating activities from commercial, residential, and municipal areas (no industrial areas in the City).	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. Frequency of inspections is described below for each category of development. The City currently does not have any industrial areas. The Environmental Division administers this JRMP activity and maintains an annual watershed based inventory of existing development and inspections. Minimum BMPs provided in Attachment 1 and Attachment 2.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-19	Inspect and verify implementation of minimum BMPs for municipal areas and activities	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. The responsibility to implement and maintain various municipal BMPs is a task shared by every employee in the Public Works Department. The Environmental Division performs annual training to review minimum BMPs and verifies the implementation of BMPs through an onsite annual inspection at every City owned facility or park. Minimum BMPs provided in Attachment 1.	Prior to FY16	YES		NO		YES
IB-20	Inspect and verify implementation of minimum BMPs for residential areas and commercial facilities	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. The Environmental Division performs at a minimum one onsite inspection of each commercial business at least once per permit cycle with no less than 20% of inventoried sites inspected each year. Residential areas receive ongoing JRMP baseline inspections through the IDDE program. Residential and commercial areas also benefit from the enhanced targeted Neighborhood Inspection Program (IB-21), weekly illegal dumping collection (IB-25), annual home front cleanup event (IB-26), and pet waste bag program (IB-27). Minimum BMPs provided in Attachment 2.	Prior to FY16	YES		NO		YES
IB-29	Sewer System Management Program (SSMP)	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. The operation and maintenance of the sewer collection system is a top priority and managed in accordance with the City's SSMP. The City jets 100% of its entire sewer collection system annual and inspects and maintains 11 sewer pump stations daily. The City budgets on average $400,000 in sewer CIPs a year. All Public Works staff receives annual training on how to identify and respond to a SSO.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-30	Special Events Permit	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. The City provides storm water BMP conditions on every special event permit or conditional use permit. Applicable special event BMPs are the same as Commercial BMPs provided in Attachment 2 and evaluated for each event separately. Examples of special event BMP conditions include prevention of illegal discharges, protection of cooking area, trash and recycling containers, and proper waste management and disposal.	Prior to FY16	YES		NO		YES
IB-31	Residential household hazardous waste program (Incentive Program and Multi-Jurisdiction Program)	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. The City partners with the City of Chula Vista and other cities in South Bay to offer free disposal options of HHW for residents. Options include convenient drop off locations, special event drop off, and disabled resident home collection. By incentivizing easy collection of HHW then less material ends up being illegally discharged.	Prior to FY16	YES		NO		YES
MS4 Infrastructure								
IB-32	Catch basin, MS4 line, open channels, and outfalls operation and maintenance	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. The City at a minimum inspects and cleans 100% of the City's 92 catch basins, 5-miles of MS4 lines, open channels, and outfalls with a frequency of at least once per year prior to the start of the rainy season. Post rain event inspections may require more frequent cleaning at known areas in the system. Preventative maintenance prevents debris from reaching the receiving waters and ensures full conveyance of storm water system during storm events.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Roads, Streets, and Parking Lots								
IB-24	Street sweeping program	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. The City implements an aggressive street sweeping program to target trash, sediment, and debris that collects on the street. The City sweeps a total of 130 curb miles per month, which provides 100% coverage of the entire City at the following sweeping frequencies: Weekly: Commercial areas including open stripped and raised curb medians, Ocean Lane, and parking lots; Twice per month: Beachfront posted residential areas; Monthly: Non-beachfront residential areas and paved alleys;	Prior to FY16	YES		NO		YES
Pesticides, Herbicides, and Fertilizer BMP Program								
IB-28	Pesticide, herbicide, and fertilizer management	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. The City and its contractors are required to implement an integrated pest management (IPM) program to address application, storage, disposal, and use of chemical applications. City Council Policy 611 minimizes the use of chemical treatment through IPM strategies. The City also maintains a Unified Program Facility Permit through the County of San Diego. Minimum BMPs provided in Attachment 1.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Retrofit and Rehabilitation in Areas of Existing Development								
IB-34	Perform inspections and provide maintenance to LID BMP facilities installed throughout the City	This is an ongoing and budgeted JRMP activity to maintain various LID BMPs installed by the City. The City or its contractors provide annual maintenance of municipal areas that get retrofit with LID facilities to treat or infiltrate storm water runoff. Maintenance varies according to the select BMP. The following include the list of major retrofit projects in the City: • Bikeway Access Bioswale (February 2014) • Sports Park Crosswalk LID (August 2014) • Palm Ave Eco Bikeway LIDs (December 2013) • Skate Park Bioswale and Infiltration Trench (January 2011) • Alley Infiltration Area (800 block between 10th and 11th) (May 2007) • Emory and Essex storm water retention basin (September 2006) • Beachfront Sidewalk and Street End Permeable Pavers (Multiple) • Baseball Field Permeable Concrete (2003)	Prior to FY16	YES		NO		YES
IB-34b	10th Street Bikeway Access Project (Storm water bioswale and habitat restoration)	The City completed the Bikeway Access project in February 2014 that converted 2.86 acres storage yard for the Public Works Department to a bikeway access spur and trail staging areas to the Bay Shore Bikeway. The project included a bioswale to treat storm water from the Public Works facility and treat flow from the surrounding residential neighborhood. The project also included over 1 acre of native habitat restoration. The City will continue to maintain this new facility in partnership with the FWS who are also completing the adjacent Birder's Point project (IB-54).	Prior to FY16	YES	Provided maintenance to bioswale and native habitat. FWS completed construction on the Birder's Point project.	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-35	Perform inspections and provide maintenance for storm drain inlet filters	This is an ongoing and budgeted JRMP activity to maintain 10 storm drain inlet filters at municipal locations and high trash generating areas. The filters receive quarterly maintenance by a contract company.	Prior to FY16	YES		NO		YES
IB-37	Perform inspection and provide maintenance for the low flow and first flush storm water diverters at Palm Ave and Date Ave and vehicle and equipment washing diverters	This is an ongoing and budgeted JRMP activity. The City maintains 2 major storm water diverters along the beachfront at Palm Ave (installed January 2009) and Date Ave (installed 2004 and refurbished October 2014) that captures and diverts 137 acres of low flow and first flush storm water. The City also maintains 3 vehicle and equipment washing areas (Public Works, Fire Station, and Lifeguards) that are connected to the sanitary sewer. Maintenance frequency is monthly.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-38	Integrate LID retrofits where feasible into CIP rehabilitation projects and partner with local, state and federal agencies to retrofit non-jurisdictional areas	Refer to JRMP Section 7. This is an ongoing and budgeted JRMP activity. The City integrates LIDs into the design phase of CIP projects as discussed in optional strategy IB-13. The City also has a strong working relationship with the US Fish and Wildlife (FWS), Naval Base Coronado, Tijuana River National Estuarine Research Reserve, CA State Parks, Port of San Diego, County of San Diego, South Bay Union School District, and Sweetwater School District, all of which who share jurisdictional authority within the City limit. Successful partnerships among these agencies have resulted in both major and minor retrofit projects that provide significant water quality benefit and enhance wildlife habitat. These projects include: • Napalitano property restoration IB-34a (2002) • 220 acre salt pond restoration in south San Diego Bay (2011) • Mar Vista High School drainage enhancement by Public Works to disconnect impervious drainage channel (2009) • TRNERR bioswale at 3rd and Caspian (2014) • Designation of Pond 20 as mitigation bank (2015) • 55 acre Otay River Flood Plan restoration with River Partners (underway) • 70 acres Otay River Estuary Restoration project (underway)	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-40	Implement LID retrofits in residential and commercial areas where feasible for non-PDP redevelopment projects	Refer to JRMP Section 7 and Section 5. This is an ongoing and budgeted JRMP activity. During the plan check phase the City evaluates non-PDP redevelopment projects for public improvement enhancements, which includes conditions to treat storm water. See strategy IB-05a.	Prior to FY16	YES		NO		YES
E.6 Enforcement Response Plan								
IB-42	Storm water code enforcement	Refer to JRMP Section 8 Enforcement Response Plan. This is an ongoing and budgeted JRMP activity. The City continues to implement escalating enforcement responses to compel with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in accordance with the City's Enforcement Response Plan. The City implements a three level approach for escalating enforcement of storm water violations that include Level 1: Verbal or Written Warnings; Level 2: Administrative Citations; and Level 3: Civil or Criminal Prosecutions.	FY16	YES		NO		YES
E.7 Public Education and Participation (B.3.b.(1)(a)(iii))								
IB-43	Implement a public education and participation program.	Refer to JRMP Section 9. This is an ongoing and budgeted JRMP activity that implements a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and targeted audiences. Specific targeted education BMP activities are described below and in detail in JRMP Section 9.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-44	Provide education opportunities to development community	Refer to JRMP Section 9. This is an ongoing and budgeted JRMP activity that targets the development community. Contractors and developers receive multiple opportunities on storm water education through face-to-face meetings with the Community Development and Public Works Departments during the permitting process, through onsite inspections, and through investigations of illegal discharges. Education brochures are used during the permitting process and during enforcement actions, and web resources are available. The use of LID features in the design of projects is a key water quality improvement strategy that the City encourages for every project. Contracts are also constantly reminded of their responsibility to provide erosion and sediment control on the project site and preventing the discharge of any liquid or material.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-45	Provide education opportunities to municipal departments and personnel	Refer to JRMP Section 9. This is an ongoing and budgeted JRMP activity that targets education of City staff. The Environmental Division provides multiple education opportunities to train municipal staff on the various elements of the storm water management program. Every City employee is trained to identify and report illegal storm water discharges and to implement the proper storm water BMPs during work activities. City staff is also expected to provide superior customer service to the public, which includes providing education on storm water issues. Annual training is provided to the Public Works department to review BMPs and changes to the storm water management program. Storm water management is also a standing issue that gets discussed through multiple interdepartmental meetings which include: monthly code enforcement meetings, weekly development planning meetings, weekly staff meetings, and part of every new employee orientation program.	Prior to FY16	YES		NO		YES
IB-46	Provide education opportunities to commercial businesses	Refer to JRMP Section 9. This is an ongoing and budgeted JRMP activity to target the Imperial Beach businesses community on storm water management. The City provides multiple education opportunities to the local business community which includes: providing a commercial business BMP education brochures during the business license application and annual license renewal, providing education through onsite commercial inspections (IB-20), providing education through IDDE enforcement cases (IB-42), and proving storm water presentations to community groups that include Kiwanis Club and Imperial Beach Chamber of Commerce.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-47	Provide education opportunities to residents, general public, and school children	Refer to JRMP Section 9. This is an ongoing and budgeted JRMP activity to provide storm water education to residents, general public, and school children. Educational information on storm water BMPs is provided on the City's website, through the EDCO quarterly newsletter mailed to residents, printed materials provided at City offices, through community presentations, community events, regional events, through partnerships with NGOs, and various other methods.	Prior to FY16	YES		NO		YES
IB-47a	Support ILACSD watershed presentations to school children as part of the San Diego Bay WMA educational activity	This is a new and ongoing activity that the City is participating in with the San Diego Bay Copermittees in partnership with ILACSD to target annual storm water education presentations to school children. Educational messaging is reviewed annually with ILACSD and customized for the target age group and priority condition and pollutant.	FY16	YES	Amendments were made to the agreement to include database updates of WasteFreeSD.org	NO		YES
IB-47c	Support public participation through community cleanup events	This is a new and ongoing activity to partner in region wide cleanup events to support WMA collaboration. The City supports the annual Creek to Bay and Coastal Cleanup Day. The City also hosts the annual Home Front Cleanup event (IB-26) for Imperial Beach residents. These events raise public awareness on watershed issues and help activate the public to cleanup illegally dumped trash.	FY16	YES		NO		YES
IB-47d	Support the Education and Residential Sources workgroup activities with the San Diego Copermittees	This is an ongoing activity with the San Diego Copermittees to implement a regional education program to more effectively provide regional messaging on priority pollutants. Efforts include community based social marking surveys, targeted messaging through various media, and storm water education at community events. Bacteria, trash, and eliminating dry weather flow are the priority target pollutants.	FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-48	Provide education opportunities to the underserved community	Refer to JRMP Section 9. This is an ongoing and budgeted JRMP activity that ensures educational opportunities are available for both Spanish speaking and lower income residents. The Environmental Division incorporates the underserved community in most educational activities, which is particularly important to the lower income and Spanish speaking community in Imperial Beach. Preventing the discharge of trash and sediment and eliminating dry weather flows are important messages that are shared to the underserved community through community events, in partnerships with NGOs, through school presentations, and a focus of enforcement actions.	Prior to FY16	YES		NO		YES
Non-JRMP Strategies (Optional Strategies, B.3.b.(1)(b))								
Nonstructural								
IB-02	Proactive enforcement of storm water violations and WQIP priority pollutants that enhance baseline IDDE Program efforts	This is a new and budgeted JRMP activity to target WQIP priorities. This activity involves the proactive identification of storm water violations with an emphasis on WQIP priorities of sediment and trash through targeted monthly neighborhood inspections outlined in IB-21. Frequency includes once per week dry-by inspections that cover all sources in each neighborhood section. Minimum BMPs are provided in Attachment 2 and Attachment 3 with specific attention made to priority sources.	FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-04b	MS4 outfall inspection and maintenance program (non-major non-jurisdictional outfalls)	This is a new and budgeted JRMP activity to visually inspect all MS4 outfalls annually (including non-major MS4 outfalls, Caltrans, Navy, and TRNERR) to support IDDE efforts and to identify maintenance needs. Frequency of inspection and any maintenance work is once per year for each outfall. Minimum BMPs include cleanup of any trash and debris at outfall locations post field screening and schedule appropriate follow up maintenance for any scour pond, sedimentation, or vegetation removal. All maintenance activities adjacent to TJ Estuary or SD Bay must be coordinated with FWS and/or TRNERR and performed outside of bird nesting season. Inspections and maintenance activity on Navy property must be coordinated through Navy Public Affairs Liaison.	FY16	YES		NO		YES
IB-13	Implement retrofit of impervious areas, LIDs, and EPA Green Streets guidance in the design phase for Capital Improvement Projects	This is a new and budgeted JRMP activity to consider the retrofit of imperious areas during the initial design phase of CIPs. The City will consider retrofit of impervious areas, LIDs, and EPA Green Streets guidance with the City Engineer in the design phase for all CIPs where feasible, supported by City Council, or required by Priority Development status.	FY16	YES	Completed phase 1 of Green Alleys (IB-53) and received authorization from Council to design Phase 2.	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-21	Neighborhood inspection program	This is a new and budgeted JRMP activity to that allows for focused and targeted inspections by the Environmental Division that are informed by WQIP priorities. Frequency includes once per week dry-by inspections that cover all sources in each neighborhood (residential areas, commercial facilities, and active construction). The City is divided into 6 neighborhoods areas that rotate in priority each month as identified in JRMP Section 7. Minimum BMPs are provided in Attachment 2 and Attachment 3 with specific attention made to the highest priority pollutant of trash and sediment. Program will be evaluated at the end of Permit term for effectiveness.	FY16	YES	Weekly inspections through all the City	NO		YES
IB-25	Collection of illegally dumped material in alleys and public right-of-way	This is an enhanced and budgeted JRMP activity that allows for focused and targeted collection of trash generated by illegal dumping in the public right-of-way and City alleys. Illegally dumped materials observed by City staff or reported by the public in City alleys get inventoried and cleaned up weekly every Thursday by EDCO. Illegally dumped material observed or reported in the public right-of-way get collected at the end of the day by Public Works crew.	FY16	YES	A weekly list is sent out to EDCO to remove illegally dump items in the alleys	NO		YES
IB-26	Home front cleanup event (Incentive Program)	This is an ongoing and budgeted JRMP activity. This free event is an incentive for IB residents and provides a convenient opportunity to dispose or recycle large bulky items or green waste. The City partners with EDCO for this important community activity that also provides an opportunity to dispose e-waste, shred important documents, pickup free mulch for ground cover, and provide education materials. The event occurs annually on the first Saturday in May.	Prior to FY16	YES	159.48 Total Tons collected and 42.91Total Tons diverted	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-27	Pet waste bag program (Incentive Program)	This is an ongoing and budgeted JRMP activity. The City currently maintains 10 pet waste bag dispensers twice per week. The City would like a local community group or non-profit to manage the pet waste bag program, which was previously run by a local group form 1999-2013 and supported through the City's community grant program. The City will continue to implement the pet waste bag program until a community group is identified to take back over the program. The pet waste bag program is important to residents and also helps control a known bacterial source.	Prior to FY16	YES	One pet waste bag dispenser added during FY 15-16 on Seacoast Drive. Also, a second location will be added at Teeple Park on Florida St.	NO		YES
IB-62	EDCO Community Grant Program (Incentive Program)	This is an ongoing and budgeted activity. The City partners with EDCO to provide $5,000 in local community grants per year to local organizations to help improve the community. Examples of include support for a community let pet waste bag program, support for education and outreach through local NGOs, and programs that encourage community involvement. City Council review grant applications and present the grant awards.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-64	Cal American Water Rebate Programs (Incentive Program)	Cal American provides drinking water to the City and also offers rebate programs for water conservation efforts including turf replacements and LID gardens for residents. The City also partners with Cal American and independently funds local community groups (Boy Scouts Eagle Projects) to install local turf replacement projects on City property. Recent projects include: • City Hall xeriscape (2010) • Marina Vista Center (2010) • Sewer Pump Station 8 (2011) • Elm Ave Planters (2013) • Safety Center Planters (2013) • Public Works xeriscape (2015) • Sports Park planters (2015) • Sheriff's Station City Hall (2015) • Triangle Park (2015- under design)	Prior to FY16	YES	Triangle Park (Bicentennial Triangle) project completed concept designs and received Council approval to complete engineering and landscape plans.	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Structural								
Green Infrastructure								
IB-53	Implement improvements to dirt alleys in the City	This is a new and partially budgeted activity to make improvements to the approximate 2 miles of unimproved dirt alleys in the City that contribute sediment and other storm water pollutants during rain events. The City budgeted for FY 16 to complete the design and construction for the first phase of alley improvements for 14 alley segments (over 1 mile of dirt alleys) that target the highest priority areas in the City. These new alleys will include permeable pavers and storm water retention to provide additional water quality benefit. The second phase of the alley improvements to pave the last remaining dirt alleys is unfunded but is considered a priority by the community. The availability of future grant funds, the establishment of an assessment district, or similar funding mechanisms could trigger the second phase of this project to occur sooner. Otherwise the improvement of the remaining dirt alleys will be improved incrementally over time as funding becomes available. This activity specifically targets the highest priority pollutant of sediment during wet weather in the Tijuana River WMA. This project also targets trash in the San Diego Bay WMA because the City takes over ownership and maintenance of the alleys (IB-24, IB-25) once an alley is improved.	FY16-FY28	YES	Phase one of the project started during FY15-16 with a retrofit of 1 mile of green alleys. The retrofit includes permeable concrete, storm water retention, and dry wells that provide multiple water quality benefits.	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-58	Implement the Bikeway Village redevelopment project on 13th Street and Bayshore Bikeway	This is a new and budgeted public private partnership to redevelop existing industrial warehouses adjacent to the Bayshore Bikeway on 13th Street. This project includes a new storm water bioswale and wildlife habitat restoration as part of the new development. In addition, the City is providing bikeway and pedestrian improvements along 13th Street. The City is providing funds towards biking and pedestrian improvements and supporting the Bikeway Village redevelopment project. The project is already designed and the City has dedicated funding for its share of the project. Triggers include meeting Coastal Commission conditions, securing permitting for project, implementing a successful partnership with the developer, and phasing of multiple elements of this project. The benefits of the project include increasing public access to the Bayshore Bikeway, enhanced wildlife viewing of south San Diego Bay, improved storm water treatment from older industrial warehouses, and improved biking and pedestrian safety on 13th Street.	FY16 – FY22	YES	Construction on the Bikeway Village Redevelopment project started during FY 15-16.	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-61	Palm Ave (Hwy 75) Master Plan	This is a new and partially budgeted activity to redevelop the Hwy 75 commercial corridor along Palm Ave. The City has funded with the support of a grant the first phase of the project to hold a series of community and city council workshops and develop design options. The grant includes preliminary designs sufficient for environmental review. Goals of the project are to enhance safety and to encourage new commercial redevelopment in the area. The project also proposes LID facilities similar to the Eco Bike Route. Potential triggers on the project include design limitations from Caltrans and the possible relinquishment of Hwy 75, community and council support, availability of grant funds for the next project phase, and regional support for the project. If successful, the project will implement green streets along Palm Ave and provide a water quality benefit to the San Diego Bay WMA. A secondary benefit would also come from the redevelopment of the older commercial buildings along Hwy 75.	FY16 – FY26+	YES	City completed the 30% designs for the Palm Ave Master Plan Project with grant support through SANDAG Smart Growth Incentive Program. The City also received a second Smart Growth Incentive grant to complete the 100% designs for the western section of the Palm Ave Master Plan project, which will include significant green street elements in the design.	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-65	Imperial Beach Green Streets Program	This is a new and budgeted activity in the City's JRMP program to implement EPA Green Streets guidance and LIDs into the design of CIP projects where feasible. See Strategy IB-13. The City Engineer will consider the retrofit of existing impervious areas through the CIP program and consider options to include LIDs and EPA Green Street guidance into the initial design of projects. Green streets and pollutant source control measures will be included into new CIP projects where feasible given the following triggers: the availability of funds, support from the community, support from City council, where it fits within the scope of the CIP project, and where otherwise required to meet WQIP goals. The City is committed to implementing water quality improvement BMPs for CIP projects that achieve multiple benefits.	FY16-FY28+	YES	Green street elements were included in the Palm Ave Master Plan (IB-61) and Alley Improvements Phase 1 (IB-53)	NO		YES
Multiuse Treatment Area								
Stream, Channel and Habitat Rehabilitation Projects (B.3.b.(1)(b)(iii))								
IB-69	Implementation of stream channel and habitat rehabilitation projects	This is an ongoing and budgeted activity for the following strategies: IB-12, IB-34b, IB-38, IB-54, and IB-58. The City actively seeks projects to retrofit the MS4 system to provide natural treatment of storm water and provide rehabilitation of native habitat. Additional stream channel and habitat restoration projects are contingent upon existing partnerships in the watershed moving specific projects forward based on priorities in the region including triggers for not meeting WQIP priority conditions. The City also partners with local, state, and federal agencies on wetland restoration projects for south San Diego Bay.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Water Quality Improvement BMPs								
Source Control and LID BMPs								
IB-05a	Provide enhanced storm water BMP conditions for non-PDP (Standard Development Projects) with improvement valuation greater than $50,000	This is an ongoing and budgeted activity that provides a 2-step review process to provide enhanced storm water BMP conditions for Standard Development Projects with an improvement valuation greater than $50,000. Applicable projects require an additional review by the Public Works Department for public improvements that include specific project conditions for storm water. BMP conditions typically include at a minimum the disconnection of impervious areas, 12-inches of loamy soil improvement for landscaped areas, designated trash storage area, and LIDs where feasible.	Prior to FY16	YES		NO		YES
IB-39	Eliminate residential and commercial curb cuts	This is an ongoing and budgeted JRMP activity to eliminate curb cuts from residential and commercial areas from older development projects. Curb cuts are eliminated through either permit conditions on new development or when the City has a designated street improvement CIP adjacent to the property. Storm water is required to be directed to landscaped areas.	Prior to FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-63	Implement full trash capture or equivalent for H-outfall drainage basin	This is an ongoing and partially budgeted activity to provide full trash capture for the H-outfall drainage basin that discharges to the San Diego Bay WMA. H-outfall is the City's primary drainage basin to the San Diego Bay WMA and includes commercial areas, residential land uses, and runoff from Hwy 75. Triggers include completion of a Trash Capture Study to determine the most effective BMPs to implement that both prevents the discharge of trash and mitigates flooding issues for low laying areas. Funds are budgeted for FY16 to complete an initial feasibility study.	FY16 – FY28	YES	Multiple studies were completed to evaluate options for full trash capture.	NO		YES (If funds are available)
WMA Strategies (Optional Strategies, B.3.b.(2))								
IB-12	Offsite Alternative Compliance Program and Watershed Management Area Analysis (WMAA)	This is a new and ongoing activity that the City is participating in with the Regional Copermittees and in each WMA. Funding and resources are budgeted to develop of a regional WMAA and an alternative compliance program framework that needs to be approved by the RWQCB. The implantation of an offsite alternative compliance program at a jurisdictional, watershed, or regional level will be evaluated as the program develops and supported by City Council. The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and hydromodification management criteria for new development projects.	FY16	YES		NO		YES
IB-43b	San Diego Bay Watershed Education Programs	This is an ongoing collaborative activity that the City is participating with other Copermittees to support the efforts to address trash, sediment, and water quality issues in the San Diego Bay WMA through education activities. See strategies IB-47a, IB-47c, and IB-47d.	FY16	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-54	Implement wetland restoration, habitat restoration, and public access improvements along San Diego Bay to support multiple benefits in the San Diego Bay WMA through public private-partnerships and partnerships with other state, federal, and local agencies	This is an ongoing and partially budgeted activity that includes multiple development projects and restoration projects along San Diego Bay. The City's Bikeway Access Project (IB-34b) is the City's portion of the larger FWS Birder's Point project to build a walking trail and overlook observation decks to view the recently completed Salt Pond wetland restoration projects. The City is also supportive of the ongoing and planned restoration projects in San Diego Bay and the Otay River flood channel (IB-38). The City's public-private partnership with the Bikeway Village Project at the end of 13th Street (IB-58) also builds upon the successful restoration efforts along San Diego Bay for eco-tourism. The Port of San Diego's recent decision in 2015 to turn Pond 20 into a new wetland mitigation bank also provides a new opportunity for collaborate that will evolve over the Permit term. The successful implementation of projects from partnerships in San Diego Bay WMA will likely result in additional water quality improvement strategies being added to this list.	FY16	YES	FWS Birder's Point started construction	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-56	Update the SCCOOS Tijuana River Plume Tracking model	This is an ongoing collaborative activity that the City is partnering with Scripps and other agencies to better understand the science on how pollution transport from Mexico is impacting beach water quality from Imperial Beach to Coronado. Scripps will be performing a pollution transport study in Fall 2015 to track the northward mixing of near shore and offshore currents that can then be used to update the existing SCCOOS plume tracking model currently used by the IB Lifeguards and County DEH to protect public health. Funding is still needed to update the plume tracking model with the pending results of the 2015 Scripps study. Understanding the transport of pollution from the known point sources of the Tijuana River, IBWC ocean outfall, Punta Bandera, and other sources in Mexico will allow the County DEH to more effectively respond to water quality conditions and help prioritize actions that will support the collaborative efforts in IB-55.	FY16	YES	Scripps successfully completed 3 dye release events. Preliminary results highlight the need to update the Plume Tracking Model. The City met with RWQCB, EPA, and IBWC to seek funding to update the plume tracker. Funding is still needed.	NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-60	Support development of rapid bacteria testing for beach water quality monitoring	This is a new and ongoing collaborative activity in the region to develop rapid beach water quality testing to allow for more accurate and effective response to protect beach water quality. The development of rapid monitoring methods are currently being developed by SCCWRP and evaluated by the County DEH for implementation along San Diego County beaches. Imperial Beach is an ideal location to test pilot rapid qPCR bacteria monitoring if the method proves successful. Triggers include development of qPCR method, availability of funding, and support form County DEH. Rapid response to beach water quality could allow for quicker response to water quality issues along imperial Beach and also raise public awareness on the complex cross border water quality issues.	FY16	YES	County DEH completed an assessment of qPCR along the Imperial Beach shoreline. The City and IB Lifeguards continue to work closely with County DEH on the use of qPCR. More funding is necessary for the County DEH to fully implement qPCR.	NO		YES
IB-66	San Diego Bay Trash Study	The City of Imperial Beach is participating in the San Diego Bay Trash Study with WMA Copermittees. The study will assess targeted geographic areas and include (1) an assessment of current conditions to provide a baseline to demonstrate progress, (2) identify high-priority areas for targeted strategy implementation, and (3) identification of potentially collaborative efforts with different jurisdictions.	Prior to FY16 – FY19	YES		NO		YES
IB-67	Special Study: Participation in the San Diego Regional Reference Stream Study	This is an ongoing and budgeted collaborative activity with the San Diego Copermittees to develop numeric targets for minimally disturbed or "reference" condition for bacteria and other pollutants.	Prior to FY16 – FY17	YES		NO		YES

Table 8-1 (continued)
City of Imperial Beach's Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Proposed Modifications				
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
IB-68	Support regional effort to address trash and other water quality issues from homeless encampments	This activity is currently not developed or funded. If a regional social services effort is established then the City will support the effort to provide sanitation and trash management for persons experiencing homelessness and determine if the program is suitable and appropriate for Imperial Beach. Triggers include the establishment of a regional effort to address homelessness, city council support, availability of funds or staff resources, and community support.	Must be Triggered	Not triggered during current FY		NO		Must be triggered

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8.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The Imperial Beach BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. The Imperial Beach updated its BMP Design Manual in accordance with Municipal Permit requirements during FY16; the BMP Design Manual replaced the Standard Urban Storm Water Mitigation Plan (SUSMP). No additional changes to the BMP Design Manual have been made since it went into effect. The Imperial Beach BMP Design Manual can be accessed via the Project Clean Water website at: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=244&Itemid=212.

8.5 MODIFICATIONS TO THE JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM

No modifications to the Imperial Beach JRMP have been made since the WQIP was approved in spring 2016. The current City of Imperial Beach JRMP is posted on the City's website, and the link to this page is listed on Project Clean Water.

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9 CITY OF LA MESA

9.1 ANNUAL REPORT CERTIFICATIONS

The City of La Mesa's signed Statement of Certification and Legal Authority Establishment for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report is included on the following page.

CITY OF
LA MESA
JEWEL of the HILLS

PUBLIC WORKS DEPARTMENT

SAN DIEGO BAY WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the City of La Mesa has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 3rd day of January 2017, at the City of La Mesa.

Leon Firsht
Acting Director of Public Works/City Engineer
City of La Mesa

1/3/17
Date

9.2 ANNUAL REPORT FORM

The City of La Mesa has modified the industrial commercial inspection program in order to increase efficiency and maximize the number of businesses inspected during the program year. The new format allows inspectors to conduct more inspections in a faster manner, resulting in more frequent compliance checks.

The City's BMP Manual and municipal code have been updated to reflect the required changes in development regulations as related to storm water.

The City of Imperial Beach's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016 SAN DIEGO BAY WATERSHED

I. COPERMITTEE INFORMATION			
Copermittee Name: City of La Mesa			
Copermittee Primary Contact Name: Joe Kuhn, Storm Water Program Manager			
Copermittee Primary Contact Information:			
Address: 8130 Allison Ave.			
City: La Mesa	County: San Diego	State: CA	Zip: 91942
Telephone: 619.667.1340	Fax: 619.667.1380	Email: jkuhn@ci.la-mesa.ca.us	

II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES	[X]
	NO	[ ]
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES	[X]
	NO	[ ]
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES	[X]
	NO	[ ]
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES	[X]
	NO	[ ]
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES	[X]
	NO	[ ]

Number of non-storm water discharges reported by the public	9
Number of non-storm water discharges detected by Copermittee staff or contractors	4
Number of non-storm water discharges investigated by the Copermittee	12
Number of sources of non-storm water discharges identified	12
Number of non-storm water discharges eliminated	7
Number of sources of illicit discharges or connections identified	4
Number of illicit discharges or connections eliminated	3
Number of enforcement actions issued	3
Number of escalated enforcement actions issued	0

V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES	[X]
	NO	[ ]
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES	[X]
	NO	[ ]
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES	[X]
	NO	[ ]

Number of proposed development projects in review	4
Number of Priority Development Projects in review	4
Number of Priority Development Projects approved	1
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	1

Number of completed Priority Development Projects in inventory	14
Number of high priority Priority Development Project structural BMP inspections	14
Number of Priority Development Project structural BMP violations	0
Number of enforcement actions issued (For not returning form by deadline)	4
Number of escalated enforcement actions issued	0

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2014-2015

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001? YES [X] NO [ ]

Number of construction sites in inventory	15
Number of active construction sites in inventory	15
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	6
Number of construction site inspections	28
Number of construction site violations	4
Number of enforcement actions issued	4
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES [X] NO [ ]

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	32	133	1	0
Number of existing development inspections	9	133	1	0
Number of follow-up inspections	0	5	0	0
Number of violations *Includes corrective actions	0	2	0	0
Number of enforcement actions issued	0	2	0	0
Number of escalated enforcement actions issued	0	0	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES [X] NO [ ]

Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES [X] NO [ ]

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES [X] NO [ ]

X. CERTIFICATION

I [[ ] Principal Executive Officer [ ] Ranking Elected Official [X] Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature: [signature]　　Date: 10/5/16

Print Name: Gregory P. Humora　　Title: Director of Public Works/City Engineer

Telephone Number: 619.667.1146　　Email: ghumora@ci.la-mesa.ca.us

FISCAL ANALYSIS

The City's Sanitation Fund provides most of the funding for the Storm Water Program. There have not been any changes to this funding mechanism during this reporting period. During 2009/2010, a fiscal analysis reporting template was developed collectively by the Copermittees. The City has used this template to report the 2015/2016 expenditures and funding sources in this JURMP Annual Report.

San Diego County Copermittees Fiscal Analysis Report
for Urban Runoff Management Programs

EXPENDITURE SUMMARY

JURISDICTIONAL COMPONENTS	
Administration	$64,159
Development Planning	$14,393
Construction	$30,342
Municipal	$3,892
Industrial and Commercial	$71,155
Residential	$957
IDDE	$45,038
Education/Public Participation	$8,793
Special Investigations	$0
Non-Emergency Firefighting	$0
Jurisdictional Total	**$238,733**

WATERSHED	
Watershed 1 – San Diego River	$52.533
Watershed 2 – San Diego Bay	$49,171
Watershed Total	**$101,705**

REGIONAL	
Annual Permit Fee to Regional Board	$17,171
Copermittee Cost Share of Regional Budget	$29,308
Regional Total	**$46,479**

TOTAL COSTS	$386,917

FUND SUMMARY

FUNDING BY SOURCE	
General Fund	$7,474
Storm Water Fee	$0
Permit Fees	$0
Developer Deposits and Fees	$23,285
Registration and Inspection Fees	$18,550
Flood Control Fees	$0
Franchise Fees	$0
Gas Tax	$0
Utility Tax	$0
Road Fund	$0
Enterprise Funds	$252,308
Trust Funds	$0
Special Assessment Districts	$0
State Appropriated Funds	$0
Grant Funds	$0
Other	$0
Total	**$301,617**

ONE-TIME FUNDING	
Grants	$0
Donations	$0
Total	**$0**

TOTAL FUNDING	$301,617

Watershed Program

	Watershed 1 – San Diego River	Watershed 2 – San Diego Bay
Administration (1)	$4,786	$14,358
Cost Share	$47,947	$34,813
Watershed Activities	$0	$0
Other	$0	$0
TOTAL	$52,733	$49,171

(1) Administration – includes Watershed strategic planning, management, mapping, assessment, and reporting

Permit Requirements for Fiscal Analysis

1. Identification of the various categories of expenditures necessary to implement the requirements of this Order; including a description of the specific capital, operation and maintenance, and other expenditures items to be accounted for in each category of expenditures.

See page 1 of fiscal analysis. Watershed costs include costs for development of required submittal.

2. The staff resources needed and allocated to meet the requirements of this Order, including any development, implementation, and enforcement activities required.

Staff resources include:

(1) Storm Water Program Manager and (1) Engineering Technician II dedicated to the storm water protection program. These two employees complete the vast majority of the work associated with the Order. The City also has two local consulting firms who specialize in storm water management under As-Needed contract.

The City also has (1) Engineering Project Manager, and (1) Public Works Inspector II who is part time desiccated to storm water protection. Other City staff including (1) Associate Engineers, (1) Engineering Technician II, (1) Code Compliance Officer and several field public works operation staff may be utilized on an as needed basis for storm water tasks.

3. The estimated expenditures for Provisions E.8.b (1) and E.8.b (2) for the current fiscal year,

See expenditure summary on Page 1. Costs are anticipated to increase over the future fiscal years, and funding estimates will coincide with the development of the WQIP for the City's Watersheds, and the development of the City's new JURMP.

4. The sources of funds that are provided to meet the necessary expenditures described in Provisions E.8.b.(1) and E.8.b.(2), including legal restrictions on the use of such funds, for the current fiscal year and next fiscal year.

See funding summary on Page 2. Funding source is projected to remain similar next fiscal year.

9.3 CITY OF LA MESA STRATEGIES

The City of La Mesa (La Mesa) is located in the hills of San Diego County with walkable, tree-lined neighborhoods and retail and commercial areas. La Mesa has received funding to implement green infrastructure along a busy corridor of University Avenue. Other strategies to improve water quality include enhancing MS4 infrastructure maintenance and promoting water efficient landscape BMPs. Strategies and implementation schedules, presented in Table 2-9-1, were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules identified demonstrate that numeric goals are met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis is updated as needed to provide assurance that numeric goals are met.

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Table 9-1
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Jurisdictional Strategies									
Development Planning									
All Development Projects									
LM-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Triggered upon pulling of building permit.	Prior to FY16	Yes	Yes	Completed within 2016 La Mesa BMP Manual Update	None	N/A	Yes
LM-2	Amend municipal code and ordinances to require LID implementation.	La Mesa has amended ordinances for dry weather component and per new BMP Manual.	FY15	Yes	Yes	Code Updated, Ord. 2015-2840	None	N/A	Yes
LM-3	Train staff on LID regulatory changes and LID Design Manual.	The City shall perform training related to water quality design for CIPs in Q4 2015.	FY15	Yes	Yes	Training Event Completed March 4, 2016	None	N/A	Yes
Priority Development Projects (PDPs)									
LM-4	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Trigger is private project application and PDP status.	Prior to FY16	Yes	Yes	Completed within 2016 La Mesa BMP Manual Update	None	N/A	Yes
	1. Administer self-certification program for treatment control BMP compliance.	La Mesa has a program in place. Continue to add projects as they are constructed.	Prior to FY16	Yes	Yes	Program continues to add projects each year.	None	N/A	Yes
LM-5	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	The City will update its BMP Design Manual to comply with approved Regional Manual, and MS4 Permit.	Prior to FY16	Yes	Yes	Completed, with Ord. Update 2015-2840	None	N/A	Yes
	1. Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	La Mesa will amend the BMP Design Manual for trash areas, and implement where feasible.	FY16	Yes	Yes	Amended within 2016 BMP Manual Update	None	N/A	Yes

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
LM-5 (cont)	2. Amend BMP Design Manual for mobile businesses.	Businesses are required to read and sign a storm water affidavit and comply with rules in order to receive a permit.	Prior to FY16	Yes	Yes	Any mobile detailing business which wants to obtain a business license shall complete the storm water affidavit.	No	N/A	Yes
LM-6	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	The City will implement an alternative compliance program to meet City and Developer needs and to fund city CIP restoration style/LID projects.	FY18	N/A	N/A	N/A	No	N/A	N/A
Construction Management									
LM-7	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	The City currently implements this program. During wet season, high priority areas are inspected every two weeks, medium areas are inspected monthly, and low priority areas are inspected once per rainy season.	Prior to FY16	Yes	Yes	The construction inspection program is ongoing and is outlined in the City's JURMP.	No	N/A	Yes
Existing Development									
Commercial, Industrial, Municipal, and Residential Facilities and Areas									
LM-8	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	All facilities are inspected at least annually. Many areas are inspected several times per year.	Prior to FY16	Yes	Yes	Commercial/Industrial, Municipal, and Industrial program was developed and is administered per the City's JURMP.	No	N/A	Yes
	1. Update minimum BMPs for existing residential, commercial, and industrial development.	The City will update minimum BMPs during JRMP update to include a new residential program. In addition, outdoor exposure will trigger action for BMPs.	Prior to FY16	Yes	Yes	BMPs were updated as part of Ordinance Revision 2015-2840	No	N/A	Yes
	2. Design, implement, and enforce property based inspections.	La Mesa has implemented property based inspections. Each business will be inspected at least once a year, and high priority areas will be inspected more than once.	FY15	Yes	Yes	Property based inspections were implemented as part of the City's JURMP Update in 2015.	No	N/A	Yes

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
LM-8 (cont)	3. Increase inspection for highest pollutant potential businesses.	The City will increase inspections based on effectiveness of new program. It currently has FOG inspections for restaurants and will prioritize auto-related facilities within Chollas. Every business is inspected every year.	FY15	Yes	Yes	No update.	No	N/A	Yes
	4. Provide BMP factsheet to water-using mobile businesses when business license is granted, and require minimum BMPs for mobile businesses.	Trigger is the application for a business license.	Prior to FY16	Yes	Yes	Any mobile detailing business which wants to obtain a business license shall complete the storm water affidavit, and will receive factsheet.	No	N/A	Yes
	5. Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	La Mesa will update swimming pool items per changes in code.	FY15						
	6. Require sweeping and maintenance of private roads and parking lots in targeted areas based on inspection results and follow up.	Optional.	Trigger (upon need)	No	No		Yes. Re-worded strategy to clarify that this pertains to the inspection process.	No	No
	7. Implement Water Efficient Landscape Ordinance.	The City already has a State mandated landscape ordinance.	Prior to FY16	Yes	Yes	Completed prior to 2015.	No	N/A	Yes
LM-9	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, signage and education, and physical removal of pet waste.	La Mesa has a preexisting pet waste program.	Prior to FY16	Yes	Yes	Pet waste bags are stationed in La Mesa Parks	No	N/A	Yes

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
LM-10	Promote and encourage implementation of designated BMPs at residential areas.		Prior to FY16						
	1. Expand residential BMP programs to multi-family housing in target areas.	La Mesa will potentially collaborate with HOAs for rebates, inspection reduction programs, and more.	Prior to FY16	No	No	Not administered in FY 16.	Yes. Re-worded.	None	Unknown
	2. Promote and collaborate with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	La Mesa will collaborate with Helix Water District on rebate programs, via promotion on website.	Prior to FY16	Yes	Yes	Helix water coordinates the programs.	No	N/A	Yes
	3. Implement Residential BMP: Rain Barrel	The City already has been implementing rain barrels via Helix Water.	Prior to FY16	Yes	Yes	The work is done by Helix Water.	No	N/A	Yes
LM-11	Promote and encourage implementation of designated BMPs in non-residential areas.	La Mesa will work with Helix Water District. There will be dry weather benefits.	Prior to FY16	Yes	Yes	City promotes BMPs during the development process for non-residential areas.	No	N/A	Yes
LM-12	Implement program to investigate illegal grading on private property.	The City investigates illegal grading based on reports to code compliance and Public Works.	Prior to FY16	Yes	Yes	The City's Public Works Dept. actively investigated illegal grading consistently throughout the City.	No	N/A	Yes

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
MS4 Infrastructure									
LM-13	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.) for water quality improvement and flood control.	At least once annually, and high priority areas with added frequency.	Prior to FY16	Yes	Yes	Maintained at least annually.	No	N/A	Yes
	1. Optimize catch basin cleaning to maximize pollutant removal.	La Mesa has 455 catch basins in the Chollas Creek watershed. Current frequency is at least once per year per year. The City is transitioning to Cartagraph Software to optimize the cleaning schedules.	FY18	Yes	Yes		Yes. Approach re-worded.	No	No
	2. Repair MS4 components to provide source control from MS4 infrastructure.	The City repairs MS4 components as needed based on condition assessment and prioritization process.	Prior to FY16	Yes	Yes	The City continuously programs CIP projects to repair storm drain infrastructure.	No	N/A	Yes
LM-14	Identify sewer leaks and areas for sewer pipe replacement prioritization.	La Mesa replaces as needed based on sewer condition assessment and long-term prioritization.	Prior to FY16	Yes	Yes	The City continuously programs CIP projects to repair wastewater infrastructure.	No	N/A	Yes
	1. Replace pipes as needed in Chollas watershed.	La Mesa currently is performing trunk main pipe replacements. One project is occurring at University and Massachusetts Avenues.	FY17	Yes	No	The project has completed the design/permitting phase and is slated for completion in FY 2016-2017.	No	No	Yes

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Roads, Street, and Parking Lots									
LM-15	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways	The City has a preexisting street sweeping schedule that is prioritized by area.	Prior to FY16	Yes	Yes	Ongoing	No	N/A	Yes
	1. Perform street sweeping in roads, parking lots, and medians on high-volume arterial roadways.	High traffic and arterial areas are swept once a week, other arterial areas are swept every other week, and residential areas are swept once a month. Parking lots and medians are included in street sweeping program.	Prior to FY16	Yes	Yes	Ongoing	No	N/A	Yes
	2. Enhance street sweeping through equipment replacement (replace every 4 years) and route optimization (sweep commercial routes bi-weekly and residential every other month)	Street sweeping is contracted out, and the contractor uses Regen Air sweepers. The City plans to increase frequency in high traffic areas in Chollas to two times a week.	FY18	N/A	N/A	N/A	No	N/A	No
Pesticide, Herbicides, and Fertilizer BMP Program									
LM-16	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, and municipal properties. Includes education, permits, and certifications.	The City does not have authority over application of pesticides but will implement BMPs. Industrial and commercial inspections cover requirement, and Parks and Rec implement municipal program.	Prior to FY16	Yes	Yes	Ongoing Program	No	N/A	Yes
Retrofit and Rehabilitation in Areas of Existing Development									
LM-17	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	La Mesa will target municipal areas.	FY16	Yes	Yes	Areas have been identified for retrofit, and projects are in construction.	No	N/A	Yes

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
LM-18	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Potential stream, channel, or habitat rehabilitation projects will be selected based upon a variety of factors including the reasonable access of a project (right of way, hydrologic factors), areas existing stream or habitat degradation, multiple benefits of the project, and feasibility of implementation. Projects can arise as part of the Offsite Alternative Compliance Program. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards. Grant funding can be utilized as available.	Various	Continuous – Ongoing	Yes	Ongoing	No	N/A	Yes
Illicit Discharge, Detection, and Elimination (IDDE) Program									
LM-19	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.		Prior to FY16	Yes	Yes	Ongoing	No	N/A	Yes
	1. Develop and implement approaches to address the impacts of septic systems within the watershed	City shall maintain a map of septic locations, and forward all concerns to the appropriate agency.	FY 16	No	No		Yes. Re-warded for clarity.	Unknown	Unknown
	2. Develop and implement approaches to address the impacts of homeless activities within the watershed.	Addresses Bacteria caused by homeless.	FY 17	N/A	N/A	Not addressed yet.	No	N/A	Unknown

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Public Education and Participation									
LM-20	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.		Prior to FY16	Yes	Yes	Ongoing	No	N/A	Yes
	1. Conduct trash cleanups through community-based organizations involving target audiences.	La Mesa works with "I Love a Clean San Diego" and holds two major cleanups in each watershed per year. The City will possibly work with Groundworks Chollas or other NGOs. Private cleanups are conducted through code enforcement.	Prior to FY16	Yes	Yes	City conducts cleanups at least biannually.	No	N/A	Yes
	2. Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions.	The City will update the website to include new permit information, such as for irrigation.	FY15	Yes	Yes	The City has updated the website with new JURMP and BMP information.	No	N/A	Yes
	3. Target human behavior in parks and other public areas including trash reduction or other high impact behavior to habitat, wildlife, and water quality.	Six kiosks have been built in parks in collaboration with Eagle Scouts and other community groups. Information on trash and other public issues can be included in these kiosks. La Mesa plans to build more storm water kiosks as partners are available.	Prior to FY16	Yes	Yes	Kiosks are maintained periodically.	No	N/A	Yes
	4. Enhance school and recreation-based education and outreach.	"I Love a Clean San Diego" presents in schools.	Prior to FY16	Yes	Yes	City contracts high school presentations every year through Helix High School.	No	N/A	Yes

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
LM-20 (cont)	5. Continue to support the Environmental Sustainability Commission (ESC), a committee of local residents and business owners working to preserve La Mesa's environment.	The ESC manages the Environmental Awareness Festival, serves as an advisory body to the City Council on how actions and policies of the City may preserve and enhance the quality of La Mesa's environment, and addresses the effects of climate change and assists in the identification of measures that will improve environmental sustainability in La Mesa and the region.	Prior to FY16	Yes	Yes		No	N/A	Yes
	6. Collaborate with regional education and outreach efforts.	La Mesa collaborates on regional efforts conducted by the Education Workgroup.	Prior to FY16	Yes	Yes	City continuously collaborates with other jurisdictions on regional outreach efforts.	No	N/A	Yes
	7. Develop education and outreach to reduce over-irrigation.	If over irrigation is reported, contact is made via a compliance letter.	FY16	Yes	Yes	Done through Helix Water District	No	N/A	Yes
LM-21	Provide technical education and outreach to the development community on the design and implementation requirements of the Municipal Permit and WQIP requirements.	This will be done regionally and as needed or requested within the City.	FY14	Yes	Yes	Completed.	No	N/A	N/A
Enforcement Response Plan									
LM-22	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Enforcement program consists of warning, NOV, and citation.	Prior to FY16	Yes	Yes	Enforcement plan is complete.	No	N/A	Yes

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Additional Nonstructural Strategies									
LM-23	Continue participating in source reduction initiatives.	La Mesa will continue to participate in source reduction initiatives.	Prior to FY16	Yes	Yes	City continues to participate in source reduction activities.	No	N/A	Yes
	1. Replace City-owned vehicle brake pads with copper-free brake pads as they become commercially available.	Optional. Upon availability.	Trigger (upon availability of technology)	No	No	City shall replace upon availability.	No	N/A	Yes
	2. Continue implementation of cigarette ban in parks and commercial areas.	La Mesa will continue the cigarette ban and maintain existing cigarette ash cans.	Prior to FY16	Yes	Yes	Implementation continues	No	N/A	Yes
	3. Enhance program to address and capture trash and debris.	The City will install additional capture/trash guards.	FY18	No	No	Future	No	N/A	Unknown
LM-24	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	Upon report and funding allocation for the project.	FY16	Yes	No	No work in FY 2015-2016 required	No	N/A	Yes
LM-25	Conduct special studies.								
	1. Reference watershed study.	The City will continue to contribute to the study.	Prior to FY16	Yes	Yes	Study completed.	No	N/A	No
LM-26	Proactively repair and replace corrugated metal pipe (CMP) MS4 components to provide source control from MS4 infrastructure.	La Mesa is trying to get rid of CMP as part of the prioritized replacement program.	Prior to FY16	Yes	Yes	The City continuously programs capital projects to address CMP failure.	No	N/A	Yes
LM-27	If a regional social services effort is established, support workgroup to provide sanitation and trash management for person experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	La Mesa does not have a homeless outreach team. Police and property owners enforce cleanups of encampments. If there is a regional effort, La Mesa will participate.	Trigger (upon regional effort)	No	No	Not established	N/A	N/A	N/A

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Green Infrastructure									
LM-28	Implement stream, channel, and habitat rehabilitation projects as needed.	This strategy may be triggered if 1) Interim goals are not met, 2) Stream or habitat rehabilitation is determined to be a more effective pathway, relative to additional structural or non-structural BMPs to meeting goals, 3) Funding and staffing has been secured, 4) Partners, MOUs, and permits required by regulatory agencies are secured, and 5) Recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations, 2) Secure funds in the form of general funds, bonds, or grants, 3) Obtain City Council approval of Capital Improvement Projects budget, 4) Initiate preliminary engineering to narrow project scope, 5) Hire design consultant to develop detailed construction plans and construction cost estimates, 6) Complete construction contractor bid and award process for construction phase, 7) Construct project, 8) Operation and maintenance into perpetuity.	Various	No	No	Not completed in FY 15-16.	No	N/A	Unknown
LM-29	Identify any planned or potential green infrastructure projects to be constructed.	The City is still considering GI and multi-use project opportunities.	FY25	Yes	Yes	University Ave. Water Quality Medians Project In Construction	No	N/A	Yes

Table 9-1 (continued)
City of La Mesa Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year	Implementation Status			Proposed Modifications		
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Water Quality Improvement BMPs									
Proprietary BMPs									
LM-30	Identify any planned or potential proprietary BMP projects to be constructed.		FY18-20	N/A	No	Not completed in FY 15-16.			
	1. Planned- A city park is proposed to be built in a parcel of barren land along Waite Drive. This area can be included for long-term centralized planning.	City Council funding and final design for the project.	FY 18-20	No	No	No progress	No	N/A	Unknown
	2. Planned- A BMP is proposed to be installed in the Future Rehabilitation Project of Vista La Mesa Park.	City Council funding and final design for the project.	FY 18-20	No	No	No progress	No	N/A	Unknown
	3. University Ave. Median Improvement Project.	Water quality median project within existing arterial roadway.	FY 16	Yes	Ongoing	In Construction	Added	N/A	Yes

9.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

La Mesa BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. La Mesa updated its BMP Design Manual in accordance with Municipal Permit requirements in February 2016; the BMP Design Manual replaced the Standard Urban Storm Water Mitigation Plan (SUSMP). No additional changes to the BMP Design Manual have been made since it went into effect in February 2016. La Mesa BMP Design Manual can be accessed at www.cityoflamesa.com/index.aspx?NID=988.

9.5 MODIFICATIONS TO THE JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM

No changes were made to the City's JRMP during FY 2016.

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10 CITY OF LEMON GROVE

10.1 ANNUAL REPORT CERTIFICATIONS

The City of Lemon Grove's signed Statement of Certification and Legal Authority Establishment for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report is included on the following page.

SAN DIEGO BAY WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT

I certify under penalty of law that this document and all attachments, EXCEPT REPORTS FOR STUDIES PREPARED FOR OTHER AGENCIES AND TO WHICH THE CITY WAS NOT A PARTY, were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the City of Lemon Grove has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 10th day of January, 2017 at the City of Lemon Grove.

Lydia Romero
City Manager

10.2 ANNUAL REPORT FORM

The City of Lemon Grove's completed JRMP Annual Report form and fiscal analysis for FY 2016 are included on the following pages.

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JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015/2016

I. COPERMITTEE INFORMATION			
Copermittee Name: City of Lemon Grove			
Copermittee Primary Contact Name: Malik Tamimi			
Copermittee Primary Contact Information: Address: 3232 Main Street			
City: Lemon Grove	County: San Diego	State: CA	Zip: 91945
Telephone: (619) 825-3827	Fax: (619) 825-3818	Email: mtamimi@lemongrove.ca.gov	

II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☒ ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☐ ☒
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☐ ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐

Number of non-storm water discharges reported by the public	2
Number of non-storm water discharges detected by Copermittee staff or contractors	7
Number of non-storm water discharges investigated by the Copermittee	9
Number of sources of non-storm water discharges identified	7
Number of non-storm water discharges eliminated	7
Number of sources of illicit discharges or connections identified	8
Number of illicit discharges or connections eliminated	8
Number of enforcement actions issued	7
Number of escalated enforcement actions issued	1

V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	☒ ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☒ ☐

Number of proposed development projects in review	30
Number of Priority Development Projects in review	13
Number of Priority Development Projects approved	7
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	2

Number of completed Priority Development Projects in inventory	13
Number of high priority Priority Development Project structural BMP inspections	5
Number of Priority Development Project structural BMP violations	3
Number of enforcement actions issued	3
Number of escalated enforcement actions issued	0

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015/2016

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Number of construction sites in inventory	9
Number of active construction sites in inventory	9
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	3
Number of construction site inspections	108
Number of construction site violations	53
Number of enforcement actions issued	64
Number of escalated enforcement actions issued	4

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	13	309	29	9
Number of existing development inspections	3	110	28	4
Number of follow-up inspections	0	16	2	0
Number of violations	0	38	5	0
Number of enforcement actions issued	0	43	5	0
Number of escalated enforcement actions issued	0	1	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES ☒ NO ☐

X. CERTIFICATION

I [☑ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature

NOVEMBER 8, 2016
Date

LYDIA ROMERO
Print Name

CITY MANAGER
Title

(619) 825-3800
Telephone Number

LROMERO@LEMONGROVE.CA.GOV
Email

FISCAL ANALYSIS

Fiscal information for 2015/2016 is reported in the tables on the following page. The tables are based largely on the standard templates used by the Copermittees in previous fiscal years, but with a distinction between routine operations, including operation and maintenance, and capital expenditures.

Municipal Permit (Order No. R9-2013-0001 as amended by Order Nos. R9-2015-0001 and R9-2015-0100) Section E.8.b.(1) discusses capital, operation and maintenance, and other expenditures. Most of the total for the municipal component of the 2015/2016 costs is devoted to operation and maintenance expenses, both done by City staff and through outside contracts. The City's costs for 2015/2016 do not include significant capital expenditures. The remainder of the expenditures listed in Table 1 are comprised of staff and contract staff resources, as discussed in Municipal Permit Section E.8.b.(2).

Regional programs include Copermittee shared costs for education, preparing regional model requirements for development projects, and other regional expenses, as well as City staff time to participate in regional meetings. Watershed costs include meeting participation and the City's portion of the San Diego Bay watershed cost share, including water quality monitoring and reporting.

The City anticipates using the same funding sources as shown in Table 2 for 2015/2016 program funding needs. Permit fees are contingent on the number of development projects in the City, and the fees are used for reviews and similar services provided for those development projects. The City also seeks grant funding where feasible to augment standard funding sources shown in Table 2.

Table 1: Program Implementation Expenditures, 2015/2016

Expenditure Type[1]	Day to Day Operations[2]	CIP[3]	Total
Annual Municipal Permit Fee to RWQCB	$11,448.00	--	$11,448.00
Administration	$103,556.55	--	$103,556.55
Development Planning	$48,928.08	--	$48,928.08
Construction	$40,507.49	--	$40,507.49
Municipal	$131,356.26	--	$131,356.26
Industrial and Commercial	$31,860.40	--	$31,860.40
Residential	$6,776.50	--	$6,776.50
IDDE	$5,806.35	--	$5,806.35
Education	$8,501.46	--	$8,501.46
Public Participation	$1,348.12	--	$1,348.12
Special Investigations	$0.00	--	$0.00
Non-Emergency Firefighting	$0.00	--	$0.00
Activities Implemented through Cost Share Agreements with Other Agencies			
San Diego Bay Watershed WQIP Cost Share & Admin	$14,216.18	--	$14,216.18
Chollas Creek TMDL Cost Share & Admin	$23,644.90	--	$23,644.90
Regional Stormwater Program Cost Share & Admin	$17,450.71	--	$17,450.71
Total Expenditures	**$445,401.00**	--	**$445,401.00**

Notes

CIP - Capital Improvement Project, RWQCB - Regional Water Quality Control Board, IDDE - Illicit Discharge Detection and Elimination, WQIP - Water Quality Improvement Plan, TMDL - Total Maximum Daily Load

1. Expenditures include implementation of WQIP strategies, where applicable.
2. Day to day operations mainly relate to day to day program activities, such as storm drain cleaning, reviewing plan submittals for development projects, and enforcing compliance with the stormwater requirements in the Municipal Code. This category incudes expenditures for staffing, contracts other than CIP contracts, and operation and maintenance.
3. CIP expenditures include construction of stormwater specific projects, such as BMP retrofits or stream rehabilitation. No stormwater CIPs were initiated during the fiscal year, although the City did pursue grant funding for such projects.

Table 2: Program Funding Summary by Source, 2015/2016

Funding Source	Amount
General Fund	$219,701.05
Commercial Fee	$49,713.25
Building Permit Cost Recovery	$20,810.59
Engineering Permits	$77,540.07
Used Oil Payment Program	$7,201.68
AB 939 Fee	$9,230.36
TransNet	$61,204.00
Total Funding	**$445,401.00**

10.3 CITY OF LEMON GROVE STRATEGIES

The strategies that the City of Lemon Grove included in the final San Diego Bay WQIP are included in Table 2-10-1. The implementation status of each strategy during FY 16 and plans for implementation in FY17 are included in the table. Modifications to strategies, where applicable, are also noted and explained in the table.

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Table 10-1
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
JRMP (Provisions E.2-E.7) Strategies (B.3.b.(1)(a))							
Development Planning (Provision E.3)							
All Development Projects							
LG-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	BMPs are required through the permitting process. Examples of BMPs that may be implemented include directing runoff to pervious areas and protecting trash and material storage areas from rain. Additional BMPs are required for Priority Development Projects (PDPs), as described in the PDP strategies below. For more detail on the City's storm water requirements for development projects, see Section 4 of the City's JRMP.	FY16	Yes	None		Yes
LG-2	Update BMP Design Manual and municipal code to require LID site design and source control BMPs.	A new BMP Design Manual is scheduled to go into effect in FY 16. The BMP Design Manual requires development projects to implement LID site design BMPs, which reduce runoff, and source control BMPs, which prevent pollutants from being introduced to runoff.	FY16	Yes	Implemented updated BMP Design Manual		If changes to the regional model BMP Design Manual are made, the City will make those updates in its local manual.
LG-3	Develop and distribute brochure to encourage downspout disconnection in residential areas.	Lemon Grove will develop and distribute informational brochures to project proponents who come to City Hall to apply for permits.	FY16	Yes	None		Yes
LG-4	Require downspout disconnection and/or other runoff reduction measures, where feasible, for non-Priority Projects.	Required through the building permitting process. Downspout disconnection reduces runoff volumes.	FY16	Yes	Incorporated into required plan notes for standard (non-Priority) projects.		Yes
LG-5	Trash area standards for new development and redevelopment projects with trash enclosures: require full four-sided enclosure, siting away from storm drains, and structural overhead cover.	Required through the permitting process for new development and redevelopment.	FY16	Yes	Incorporated into required plan notes for standard projects; also required for Priority Projects.		Yes

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
LG-6	Implement Water Efficient Landscape Ordinance.	Lemon Grove will implement through the permitting process for development projects. These requirements include using efficient irrigation systems and lower water use plants. This strategy helps prevent irrigation runoff.	FY16	Yes	Ordinance also includes language about downspout disconnects.		Yes
LG-7	Train staff on new BMP Design Manual requirements for development projects.	Staff will be trained on new requirements that apply to development projects, including PDPs, as a result of adopting the new BMP Design Manual. The goal of the training is to result in more effective implementation of the new requirements, including LID implementation.	FY16	Yes	Training focused on counter staff and use of intake form to determine requirements. Plan reviews are completed by a consultant.		Yes, as needed
Priority Development Projects (PDPs)							
LG-8	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Structural BMPs that reduce pollutants and manage hydromodification are required. These BMPs reduce pollutants from sources of bacteria, like trash areas or animal facilities, and metals, like auto repair facilities, industrial businesses, and parking lots. BMPs are required through the permitting process and are required to be shown on the project's plans. Installation is verified in the field prior to project completion. Refer to JRMP Section 4 for additional details.	FY16	Yes	None		Yes
LG-8.1	Administer a program to require structural BMP maintenance.	Parties responsible for maintenance of structural BMPs at completed PDPs are required to complete and sign a form certifying that the structural BMPs are being properly maintained. Direct maintenance inspections will be performed at all high priority projects annually prior to the rainy season. All other projects that do not return a completed annual maintenance verification form will also be inspected.	FY16	Yes	None		Yes
LG-9	As part of the BMP Design Manual update, update procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	As part of the BMP Design Manual update, the City will require source control BMPs, such as overhead coverage, to reduce the potential for pollutant transport from trash enclosures at businesses and residential developments and from material storage and work areas at animal facilities, nurseries and garden centers, industrial businesses, and auto-related facilities. BMPs to prevent dry weather discharges from activities such as car washing and landscape irrigation will also be required. These areas or activities have been identified as sources of bacteria and/or metals.	FY16	Yes	None		No, completed as part of BMP Design Manual update

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Construction (Provision E.4)							
LG-10	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Prior to beginning work, projects are required to document proposed BMPs through erosion control plans. Grading permits are not issued and work cannot begin until the submitted grading plan, which includes the erosion control plan, is approved. The City inspects projects during construction to verify that each site is in conformance with the required BMPs. Where deficiencies are noted, the City requires corrections in accordance with its Enforcement Response Plan (See Provision E.6 strategies). During the rainy season, high priority sites are inspected twice per month, medium priority sites are inspected monthly, and low priority sites are inspected as needed. During the dry season, all sites are inspected as needed. All construction sites are required to implement erosion control and sediment control BMPs, which reduce discharges of sediment. Construction sites are also required to properly dispose of trash and debris, which reduces discharges of trash and bacteria, and to maintain secondary containment for portable toilets, which reduces discharges of bacteria. Metal materials are required to be covered and protected from run-on. Refer to JRMP Section 5 and the Storm Water BMP Manual for additional information about the City's construction management program.	FY16	Yes	None		Yes
Existing Development (Provision E.5)							
Commercial, Industrial, Municipal, and Residential Facilities and Areas							
LG-11	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development.	20 percent of industrial and commercial facilities are inspected each year, and all industrial and commercial facilities are inspected at least once every five years. Municipal facility inspection frequencies are the same as the industrial and commercial frequency. Residential management areas are inspected at least once every five years. BMP deficiencies discovered during any of these inspection programs are required to be corrected, in accordance with the procedures in the City's enforcement response plan. BMPs targeted at HPWQCs include waste management (trash, animal waste, used cooking oil, etc.), preventing irrigation runoff, catch basin cleaning, and proper storage of materials containing metals (e.g., at industrial sites and auto shops).	FY16	Yes	None		Yes

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
LG-12	Update minimum BMPs for existing residential, commercial, and industrial development.	Revised BMP requirements are included in the City's Storm Water BMP Manual (JRMP Appendix B). BMPs targeted at HPWQCs include waste management (trash, animal waste, used cooking oil, etc.), preventing irrigation runoff, and proper storage of materials containing metals (e.g., at industrial sites and auto shops).	FY16	Yes	Completed as part of JRMP update		No, completed
LG-13	Analyze and encourage sweeping of parking lots.	The City will gather more information about existing sweeping frequency for larger commercial parking lots and contact property owners or managers to determine existing sweeping frequencies. If investigation determines that parking lots and private roads are not swept, the City may require sweeping, likely through conditional use permits.	FY16	Yes	Based on the analysis, almost all of the largest parking lots in the City (shopping centers, auto dealers, and EDCO) are swept daily. Of the two that are not swept daily, one is swept four times a week and the other is swept three times a week.		No, completed; sweeping frequencies are high enough that the City will not need to require additional sweeping.
LG-14	Require cooking oil storage BMPs for food service establishments.	Lemon Grove will work with grease rendering services to educate businesses on availability and benefits of indoor grease storage containers. Used cooking oil will be required to be stored indoors or in covered, contained areas for businesses for which outreach efforts were not successful in achieving outcome of having used cooking oil stored in a covered, contained area and at which poor used cooking oil storage BMPs have been observed.	FY16	Yes	None		Yes
LG-15	Residential shared outdoor trash storage areas: require full four-sided enclosure, siting away from storm drains, and structural overhead cover when triggered by a building permit application.	Lemon Grove will require retrofit of trash areas at existing multi-family facilities when a building permit is applied for at the same property.	FY16	Yes	None		Yes
LG-16	Industrial and commercial outdoor trash storage areas: require full four-sided enclosure, siting away from storm drains, and structural overhead cover when triggered by a building permit application.	Lemon Grove will require retrofit of trash areas at existing facilities when a building permit is applied for at the same property.	FY16	Yes	None		Yes

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
LG-17	Work with Regional Board to ensure industrial businesses subject to the Industrial General Permit obtain coverage and implement BMPs to address discharges of pollutants associated with TMDLs.	The City will share inspection results with Regional Board staff and notify of non-filers or potential non-compliance with other IGP requirements, especially requirements specifically related to discharges of HPWQCs.	FY16	Yes	Non-filers reported to Regional Board		Yes
LG-18	Pet waste control program.	Lemon Grove will provide pet waste bags via dispensers in City parks.	FY16	Yes	None		Yes
LG-19	Work with water utility (Helix) to publicize incentives for rain barrel installation and turf conversion and/or sprinkler system upgrades (e.g., rain shutoff systems) in residential areas.	The City will collaborate with Helix Water District to educate the public about the requirement to eliminate irrigation runoff and to promote incentives and rebates for landscape or irrigation system retrofits. Preventing irrigation runoff also can prevent the transport of metals and trash deposited along curb gutters and in storm drains, allowing those pollutants to be removed by routine sweeping and catch basin cleaning.	FY16	Yes	None		Yes
LG-20	Publicize and market any existing outreach and training programs that the water utility (Helix) provides for property managers responsible for homeowner associations (HOAs), multi-family housing developments, and commercial properties. Main focus would be on irrigation runoff reduction.	The City will collaborate with Helix Water District to educate property managers about the requirement to eliminate irrigation runoff and to promote incentives and rebates for landscape or irrigation system retrofits. Preventing irrigation runoff also can prevent the transport of metals and trash deposited along curb gutters and in storm drains, allowing those pollutants to be removed by routine sweeping and catch basin cleaning.	FY16	Yes	None		Yes
LG-21	Install smart irrigation controllers at City facilities and convert median landscaping to drip irrigation.	The City has installed 7 Cal-Sense irrigation control systems Citywide and continues to make the transition from area sprinklers to drip irrigation along its medians. The City anticipates installing at least one Cal-Sense system more by 2018. The current locations of the systems are Berry Street Park, Lemon Grove Park, Civic Center Park, City Hall, Kunkel Park, Lemon Grove Avenue median (near Mt. Vernon), and Lemon Grove Avenue median (near Broadway). Preventing irrigation runoff also can prevent the transport of metals and trash deposited along curb gutters and in storm drains, allowing those pollutants to be removed by routine sweeping and catch basin cleaning.	FY18	Yes	Current systems maintained		Yes

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
MS4 Infrastructure							
LG-22	Implement operation and maintenance activities for MS4 and related structures for water quality improvement: perform catch basin cleaning.	Catch basins and inlets are inspected at least annually and cleaned if accumulated debris is found. Open channels are also inspected, and trash is removed from open channels where necessary. The City also responds to reports by citizens or municipal staff regarding MS4 facilities that require inspection/cleaning that is beyond regular maintenance activities.	FY16	Yes	None		Yes
LG-23	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers: identify sewer leaks and areas for sewer pipe replacement prioritization.	The City will repair and replace per standard maintenance schedule and where leaks are identified. In addition to routine maintenance, capital projects to replace or upgrade infrastructure are undertaken. The City's Sewer System Management Plan contains more details on these programs and procedures.	FY16	Yes	None		Yes
Roads, Street, and Parking Lots							
LG-24	Enhance street sweeping through alternating mechanical and vacuum sweepers and route optimization	The City sweeps downtown commercial areas once a week, main arterials and business areas once every two weeks, and residential areas once every four weeks. Sweeping is completed by City contractor (note that only streets with curb and gutter can be swept in the City).	FY16	Yes	None		Yes
LG-25	Sweep medians in downtown commercial areas, main arterials, and business areas.	Downtown commercial medians ~~are swept once a week,~~ and medians along main arterials and in business areas are swept once every two weeks. Sweeping is completed by City contractor.	FY16	Yes, with modification (see modification note)	None	Strategy description was not completely accurate due to internal miscommunication. While downtown commercial streets are swept every week, the medians are swept once every two weeks. This is due to slower accumulation of material on medians than on the streets themselves.	Yes

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Pesticide, Herbicides, and Fertilizer BMP Program							
LG-26	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Pesticide application and storage requirements are described in the Storm Water BMP Manual. Pesticide applicators are also subject to a State certification process, and all municipal pesticide application is done by certified individuals.	FY16	Yes	None		Yes
Retrofit and Rehabilitation in Areas of Existing Development							
LG-27	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	The retrofit and rehabilitation appendix to the City's JRMP (Appendix E) describes methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to high priority water quality conditions, potential pollutant load removal effectiveness, and feasibility of implementation. Grants are the most likely funding mechanism. It is also possible that projects could be built as part of an alternative compliance program.	FY16	Yes	Retrofit and channel rehabilitation projects along Main Street have been identified. Also see project list added for strategy LG-47.		Yes
LG-28	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	The retrofit and rehabilitation appendix to the City's JRMP (Appendix E) describes methods for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas. Rehabilitation project selection will be based upon a variety of factors including existing stream or habitat degradation, potential future cumulative stream or habitat impacts, and feasibility of implementation. Grants are the most likely funding mechanism. It is also possible that projects could be built as part of an alternative compliance program.	FY16	Yes	See note for strategy LG-27 and project list added for strategy LG-46.		Yes

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Illicit Discharge, Detection, and Elimination (IDDE) Program (Provision E.2)							
LG-29	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	The City's Municipal Code prohibits illicit discharges and illicit connections (IC/ID). All IC/IDs are sources of non-storm water flow and can serve as transport mechanisms for pollutants, including bacteria. IC/IDs can also be direct sources of pollutants. Examples of IC/IDs include the following types of discharges to the MS4: irrigation runoff, power washing, commercial vehicle washing, mop water, wet cleaning of trash enclosures or dumpsters, washing activities as animal facilities, washing off construction equipment, and indoor drains connected to the storm drain system. To identify IC/IDs, the City inspects all its major MS4 outfalls twice per year and operates a public hotline to receive reports from the public and City staff and contractors. The City also identifies IC/IDs during its inspections of existing development (see Provision E.5 strategies) and construction sites (see Provision E.4 strategies). IC/IDs identified through any of these pathways are required to be eliminated per the City's Enforcement Response Plan (see Provision E.6 strategies). Trash accumulation in the MS4 discovered through these programs is removed through infrastructure cleaning (see Provision E.4 strategies). Refer to JRMP Section 3 for additional information about the City's IDDE program.	FY16	Yes	None		Yes

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Public Education and Participation (Provisions E.7, B.3.b(1)(a)(iii))							
LG-30	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Direct education is provided through interaction with the public through inspections, hotline call response investigations, and plan review comments. Educational materials on a variety of storm water topics are also made available on the City's website. Targeted educational content on HPWQCs, such as messages about used cooking oil storage for eating and drinking establishments (bacteria), is provided. The City also educates residents and businesses about sources of HPWQCs, including waste management, metals storage, and discharge prevention, during inspections (see Provision E.5 strategies) and hotline call response investigations (see Provision E.2 strategy).	FY16	Yes	None		Yes
LG-31	Conduct trash cleanups through community-based organizations involving target audiences.	Lemon Grove collaborates with I Love a Clean San Diego (ILACSD) on trash cleanups.	FY16	Yes	Creek to Bay Cleanup		Yes
LG-32	Collaborate with regional education and outreach efforts.	The City contributes to regional education programs run collectively by the Copermittees through a cost-share agreement.	FY16	Yes	None		Yes
LG-33	Municipal staff training.	Staff are trained on BMP requirements and implementation. Key internal target audiences include Public Works field staff, construction inspectors, and plan reviewers. Training covers BMPs to reduce discharges of HPWQCs, such as proper material storage for metals, waste management BMPs for trash, pet waste management, and catch basin cleaning. Plan review training emphasizes the importance of LID, which is effective for all pollutants.	FY16	Yes	Public Works staff trained on BMP implementation and discharge elimination. The City has transitioned to using a consultant for construction inspections and storm water (construction and post-construction BMPs) plan review.		Yes

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status: Implemented as planned in current FY (FY16)?	Implementation Status: Notes	Proposed Modifications: Modification (If modified or canceled, provide rationale)	Proposed Modifications: Planned Implementation into the next FY? (Y/N)
Enforcement Response Plan (Provision E.6)							
LG-34	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	The City has established the legal authority to require BMP implementation, including preventing illicit discharges, through the Municipal Code. Examples of how enforcement is used to bring about compliance with BMPs that reduce discharges of HPWQCs include preventing illicit discharges (metals, bacteria), requiring proper management of trash areas (bacteria), requiring proper management of metals stored in areas potential exposed to runoff (metals), and requiring maintenance to ensure proper functioning of structural BMPs (bacteria, metals). When noncompliance is noted, the City follows an escalated enforcement process to bring about correction. For example, the City has the authority to issue fines and stop work orders. More details about the City's enforcement process are provided in the enforcement response plan section of the City's Storm Water BMP Manual (JRMP Appendix B).	FY16	Yes	None		Yes
Non-JRMP Strategies (Optional Strategies, B.3.b(1)(b))							
Nonstructural							
LG-35	Increase inspection frequency for highest pollutant potential businesses.	High priority facilities are inspected more than once every five years. The typical inspection frequency is annual. High priority facilities are sites that have been identified as having the potential to be significant sources of HPWQCs (bacteria and/or metals) based on past inspections. Prioritization is based on site-specific evaluation of pollutant discharge potential. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Yes	High priority businesses were all inspected in FY16.		Yes
LG-36	Enhance street sweeping through use of vacuum street sweeping equipment.	Vacuum street sweepers are used every other sweeping to enhance removal of fine particulates and associated metals and bacteria. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Yes	None		Yes
LG-37	Participate in regional bacteria reference study.	The San Diego Regional Reference Stream Study is currently being conducted by the Southern California Coastal Water Research Project and is funded by all Copermittees, including the City of Lemon Grove. The study is designed to develop numeric targets that account for natural sources to establish the concentrations or loads from streams in a minimally disturbed or “reference” condition. This special study is	FY16	Yes	None		Yes, until study completion

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
		discussed in more detail in the Monitoring and Assessment Plan. Funding and resources have been secured.					
LG-38	Support partnership effort by social service providers to provide sanitation and trash management for homeless persons.	Support a non-profit or consortium to provide sanitation services associated with hygiene as well as trash management for persons experiencing homelessness. Rented or purchased shower/sanitary trailers providing mobile showers may be organized at specifically scheduled locations and times. This provision has been proposed as a method for preventing surface water usage for sanitation and bathing, as well as opportunity for outreach and referral by social service agencies. The trash management services will include providing trash bags, trash collection areas, and shower/sanitary facilities at centers which provide daytime shelter to their clients, or on a mobile-basis for known transit camps. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) homeless communities are identified as sources of bacteria to the City's MS4 2) funding to address MS4 discharges is identified and secured through a public process, 3) staff resources necessary to coordinate with a regional group are identified and secured, and 4) partners have been identified and formal MOUs have been developed. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy is approximately $10,000 to $50,000 per year. Once initiated, program development is expected to take at least one year, with implementation following development on a continuous basis as long as funding is available.	If Triggered	Not triggered during current FY	None		If triggered

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Structural							
LG-39	Develop and administer an alternative compliance program to onsite structural BMP implementation.	An alternative compliance program allows development projects to use offsite BMPs or rehabilitation projects to comply with storm water requirements. The City, along with other Copermittees, has funded a Watershed Management Area Analysis and a water quality equivalency standards development process, which are necessary initial steps if an alternative compliance program is to be developed. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) The Copermittees finalize water quality equivalency standards and submit it to the Regional Board for approval, 2) the Regional Board approves the water quality equivalency standards, 3) an acceptable framework for allocating credits for offsite BMPs is developed by the Copermittees and approved by the City, 4) the program does not require the City to take on unfunded long-term maintenance responsibility for BMPs used as a means of compliance by private projects, and 5) adequate staffing resources have been obtained. Staffing resources are needed to develop and administer the program. The level of staff administration needed will depend on the number of projects that propose to comply via offsite alternative compliance and the complexity of tracking offsite BMP maintenance. Staffing resources to develop the program are estimated at 0.5 to 1.0 FTE to develop the program initially and 0.25 FTE to administer the program on an ongoing basis. Following the finalization of water quality equivalency and crediting systems on a regional basis, it is anticipated that another one to two years would be needed to develop and implement the program within the City of Lemon Grove.	If Triggered	Not triggered during current FY	None		If triggered

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
LG-40	Industrial and commercial outdoor trash storage areas retrofits within the Chollas Creek hydrologic area	Trash area retrofits, which typically include installing overhead coverage and a four-sided enclosure or other mechanism to prevent run-on, are intended to prevent trash, bacteria, and other pollutants from being transported by runoff. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) the facility has shown a history of consistent non-compliance for trash area management BMPs and has failed to take appropriate corrective actions, 2) the trash area can be retrofitted in a manner that complies with other requirements (building, planning, fire, etc.), and 3) jurisdictional boundary monitoring shows bacteria exceedances. Resources to complete this strategy include staff time to work with the responsible property owner or manager to see that the additional BMPs are implemented. Once triggered, this strategy could be implemented within approximately one year.	If Triggered	Not triggered during current FY	None		If triggered
LG-41	Develop pilot project to identify and carry out directing runoff from existing parking lots or other hardscape to landscaping.	Lemon Grove will complete field work to identify where existing grades would allow parking lots to be directed to landscaping, and the most suitable site(s) will be selected for retrofit. This program focuses on sites in the Chollas Creek hydrologic area. Resources to evaluate sites have been secured based on a preliminary assessment of level of effort needed. It is expected Public Works staff will be able to complete retrofit of suitable site(s) no later than FY17.	FY16	Yes	Identified a suitable location in part of City Hall parking lot. Will complete retrofit in FY17.		Yes
LG-42	Develop pilot project to identify and carry out site downspout disconnections for targeted City facilities.	Lemon Grove will complete field work to identify where downspouts exist and could be directed to landscaping. The most suitable site(s) will be selected for retrofit. This program focuses on sites in the Chollas Creek hydrologic area. Resources to evaluate sites have been secured based on a preliminary assessment of level of effort needed. It is expected Public Works staff will be able to complete retrofit of suitable site(s) no later than FY17.	FY16	Yes	Initial analysis completed as part of municipal inspections, which include a component to evaluate potential for downspout disconnects.		Yes

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
LG-43	Retrofit curb and gutter in selected portions of City to capture and infiltrate or evapotranspire small dry weather flows within the Chollas Creek hydrologic area.	Curb and gutter retrofits, such as curb cuts that allow flows to be directed to landscaping, can help reduce dry weather flows. Preventing irrigation runoff also can prevent the transport of metals and trash deposited along curb gutters and in storm drains, allowing those pollutants to be removed by routine sweeping and catch basin cleaning. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) persistent flows are observed at outfalls downstream of the potential retrofit location(s), 2) regular dry weather flow has also been observed at the potential retrofit location(s) and is believed to contribute to the persistent flow at the downstream outfall, 3) enforcement has not been successful at eliminating the source(s) of flow, 4) retrofit is technically feasible at the potential location(s), and 5) funding has been identified to complete the retrofit(s). Each retrofit is expected to cost $15,000 to $100,000, depending on the size and technical specifications. Potential funding sources include grants and the City's General Fund. Once triggered, this strategy could be implemented within approximately one year.	If Triggered	Not triggered during current FY	None		If triggered
LG-44	Require material storage retrofits/stricter operational controls for sources of metals (copper or zinc) within the Chollas Creek hydrologic area.	Additional BMPs, such as building berms around storage areas and implementing overhead coverage, will be required. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) the facility has shown a history of consistent non-compliance with metal storage BMPs and has failed to take appropriate corrective actions, 2) metals stored are likely to be sources of copper or zinc (e.g., galvanized metal), 3) the metals storage area can be retrofitted in a manner that complies with other requirements (building, planning, fire, etc.), and 4) jurisdictional boundary monitoring shows repeated copper or zinc exceedances. City resources to complete this strategy include staff time to work with the responsible property owner or manager to see that the additional BMPs are implemented. Once triggered, this strategy could be implemented within approximately one year.	If Triggered	Not triggered during current FY	None		If triggered

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
LG-45	Require parking lot retrofits/stricter operational controls at industrial, commercial, or multi-family residential properties within the Chollas Creek hydrologic area.	Additional BMPs, such as directing runoff to landscaping or filtration systems or using higher efficiency sweeping equipment, will be required for large parking lots. The City has identified the largest parking lots in the City, which are believed to have the highest potential to be sources of metals if BMPs are not implemented. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) the facility's parking lot has been identified as a significant source of copper or zinc, despite implementing frequent sweeping (at least twice per month during the wet season) with standard (not vacuum) sweeping equipment, and 2) jurisdictional boundary monitoring shows repeated copper or zinc exceedances. City resources to complete this strategy include staff time to work with the responsible property owner or manager to see that the additional BMPs are implemented. Sampling to assess whether the site is a significant source of copper or zinc may also be necessary. This would require staff time to collect samples and approximately $50-$100 per sample for laboratory analyses. Once triggered, this strategy could be implemented within approximately one year.	If Triggered	Not triggered during current FY	None		If triggered

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
LG-46	Implement stream, channel, or habitat rehabilitation projects	This strategy may be triggered if 1) interim goals are not met, 2) stream or habitat rehabilitation is determined to be a more effective pathway, relative to additional structural or non-structural BMPs, to meeting the applicable numeric goals, 3) funding and staff resources for the rehabilitation project has been identified and secured, 4) partners have been identified and formal MOUs have been executed, if necessary, 5) permits required by regulatory agencies have been secured, and 6) recommendations from the community have been identified and consensus and community support has been achieved. Will occur in areas identified by local stakeholders or City staff and found to be feasible rehabilitation locations. This could include multi-jurisdictional efforts, such as Chollas Creek Regional Park. Potential projects identified to date include the following: Bakersfield Street and San Altos Channel Restoration, Federal Boulevard Channel Restoration, Main Street Promenade Extension. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) identify project locations (3-6 months), 2) secure funds in the form of general funds, bonds, and/or grants (6 months-2 years), 3) obtain City Council approval of project budget (occurs annually), 4) initiate preliminary engineering to narrow project scope (6 months; approximately $30,000 per CIP project), 5) hire design consultant to develop detailed construction plans and construction cost estimates (2 years; approximately $500,000 per CIP project), 6) complete construction contractor bid and award process for construction phase (6 months), 7) Construct project (4 months-1 year; project construction costs are TBD and are based on size of the project), 8) secure resources and funding for long-term operation and maintenance costs (ongoing, continuous; cost TBD based on size and nature of the project). Funds and staff resources for this strategy require approval by City Council as part of the City's annual budget.	If Triggered	Not triggered during current FY	Identified a list of potential projects and entered the projects into the San Diego Region IRWM online database.	Added a list of potential projects that have been identified to date.	If triggered

Table 10-1 (continued)
City of Lemon Grove Jurisdictional Strategies

ID	Strategy	Implementation Approach *Frequency of Inspections*, B.3.b.(1)(a)(iv) *Funds/Resources*, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii) *Triggers*, B.3.b.(1)(b)(v) *Inventory BMPs*, B.3.b.(1)(a)(ii)	Implementation or Construction Year B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii	Implementation Status		Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
LG-47	Implement green streets projects	This strategy may be triggered if 1) interim goals are not met, 2) green streets are determined to be a more effective pathway, relative to additional structural or non-structural BMPs, to meeting the applicable numeric goals, 3) funding and staff resources for the rehabilitation project has been identified and secured, 4) partners have been identified and formal MOUs have been executed, if necessary, 5) permits required by regulatory agencies have been secured, and 6) recommendations from the community have been identified and consensus and community support has been achieved. Will occur in areas identified by local stakeholders or City staff and found to be feasible green street locations. Potential projects identified to date include the following: Main Street Promenade Extension, 69th Street Green Street, Broadway/Federal Boulevard Green Street, Canton Drive Green Street, Central Avenue Green Street, Golden Avenue Green Street, Lemon Grove Avenue Green Street, Lincoln Street Green Street, Madera Street Green Street, Massachusetts Boulevard Green Street, Mt. Vernon Street Green Street, North Avenue and Grove Street Green Street, Palm Street Green Street, San Miguel Green Street, Skyline Drive/Kempf Street Green Street, Sweetwater Road Green Street The following resources, funds, and steps are needed to implement this strategy: 1) Secure funds for the project; grants are the most likely funding source. 2) Obtain City Council approval of project budgets 3) Initiate preliminary engineering to narrow project scope (6 months; approximately $30K per CIP project) 4) Hire design consultant to develop detailed construction plans and construction cost estimates (2 years; approximately $500K per CIP project) 5) Complete construction contractor bid and award process for construction phase (6 months) 6) Construct project (4 months- 1 year; project construction costs are TBD and are based on size of the project). 7) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	If Triggered	Not triggered during current FY	Identified a list of potential projects and entered the projects into the San Diego Region IRWM online database.	New strategy added; green streets have been identified as a potential strategy to meet TMDL requirements for Chollas Creek.	If triggered

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10.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The Lemon Grove BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. The BMP Design Manual became effective in January 2016 and replaced the City's Standard Urban Storm Water Mitigation Plan (SUSMP). No modifications to the City's BMP Design Manual have been made since February 2016. The BMP Design Manual, applicability checklists for project applicants, and a City-specific Storm Water Quality Management Plan template are available on the City's website: http://www.lemongrove.ca.gov/departments/development-services/storm water/2015-model-bmp-design-manual

10.5 MODIFICATIONS TO THE JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM

No modifications to the Lemon Grove JRMP have been made since the WQIP was approved in spring 2016. The current Lemon Grove JRMP is posted on the City's website, and the link to this page is listed on Project Clean Water.

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11 CITY OF NATIONAL CITY

11.1 ANNUAL REPORT CERTIFICATIONS

The City of National City's signed Statement of Certification and Legal Authority Establishment for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report is included on the following page.

SAN DIEGO BAY WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the City of National City has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 9th day of January, 2017, at the City of National City.

Kuna Muthusamy, P.E.
Asst. Director of Engineering & Public Works
City of National City

11.2 ANNUAL REPORT FORM

The City of National City's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM

FY 2015-2016

I. COPERMITTEE INFORMATION			
Copermittee Name: **City of National City**			
Copermittee Primary Contact Name: **Kuna Muthusamy**			
Copermittee Primary Contact Information: Address: **1243 National City Boulevard**			
City: **National City**	County: **San Diego**	State: **CA**	Zip: **91950**
Telephone: **(619) 336-4383**	Fax: **(619) 336-4397**	Email:**kmuthusamy@nationalcityca.gov**	

II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	**YES** **NO**	☒ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	**YES** **NO**	☒ ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	**YES** **NO**	☐ ☒
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	**YES** **NO**	☐ ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	**YES** **NO**	☒ ☐

Number of non-storm water discharges reported by the public	**3**
Number of non-storm water discharges detected by Copermittee staff or contractors	**38**
Number of non-storm water discharges investigated by the Copermittee	**41**
Number of sources of non-storm water discharges identified	**39**
Number of non-storm water discharges eliminated	**39**
Number of sources of illicit discharges or connections identified	**33**
Number of illicit discharges or connections eliminated	**31**
Number of enforcement actions issued	**37**
Number of escalated enforcement actions issued	**5**

V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	**YES** **NO**	☒ ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	**YES** **NO**	☐ ☒
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	**YES** **NO**	☐ ☐

Number of proposed development projects in review	**51**
Number of Priority Development Projects in review	**12**
Number of Priority Development Projects approved	**8**
Number of approved Priority Development Projects exempt from any BMP requirements	**0**
Number of approved Priority Development Projects allowed alternative compliance	**0**
Number of Priority Development Projects granted occupancy	**3**

Number of completed Priority Development Projects in inventory	**48**
Number of high priority Priority Development Project structural BMP inspections	**12**
Number of Priority Development Project structural BMP violations	**9**
Number of enforcement actions issued	**7**
Number of escalated enforcement actions issued	**0**

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VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

Number of construction sites in inventory	30
Number of active construction sites in inventory	30
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	19
Number of construction site inspections	63
Number of construction site violations	54
Number of enforcement actions issued	54
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	29	714	141	34
Number of existing development inspections	11	192	13	17
Number of follow-up inspections	0	1	0	0
Number of violations	1	100	3	3
Number of enforcement actions issued	1	109	3	3
Number of escalated enforcement actions issued	0	3	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
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X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Kuna Muthusamy	10-31-2016
Signature	Date
Kuna Muthusamy, P.E.	Assistant Director of Engineering/Public Works
Print Name	Title
(619) 336-4383	kmuthusamy@nationalcityca.gov
Telephone Number	Email

FISCAL ANALYSIS

Fiscal information for 2015/2016 is reported in the tables below. The tables are based largely on the standard templates used by the Copermittees in previous fiscal years, but with a distinction between labor costs and other expenses (materials, contracts, etc.) as requested in the current Municipal Permit (Order No. R9-2013-0001 as amended by R9-2015-0001).

With respect to costs discussed in Municipal Permit Section E.8.b.(1), less than half of the total for the municipal component of the 2015/2016 costs is devoted to labor costs for City staff. The City's costs for 2015/2016 included significant capital expenditures for equipment. The remainder of the expenditures listed in Table 1 are comprised of staff and contract staff resources, as discussed in Municipal Permit Section E.8.b.(2).

Watershed costs include San Diego Bay Water Quality Improvement Plan development and implementation costs, additional park cleaning, and additional street sweeping. Approximately ninety percent of the operation and maintenance costs for street sweeping activities have been included as expenses in the watershed programs total.

In 2015/2016, the City continued construction of the A Avenue Green Street project which is funded by Proposition 84, as well as the Proposition 84 Kimball Park LID/Paradise Creek Restoration project. The development expenses for these two projects are also included in the Watershed costs.

Regional program costs include Copermittee shared costs for monitoring, education, and other regional expenses, as well as the SWRCB annual permit fee.

All program costs are funded by the City's General Fund.

Table 1: 2015/2016 Expenditure Summary

Jurisdictional Components	Labor	Expenses	Total
Administration and Permit Fee	$4,102	$12,095	$16,197
Development Planning	$16,881	$36,615	$53,496
Construction	$10,451	$52,441	$62,892
Municipal	$347,187	$584,818	$932,005
Industrial and Commercial	$2,492	$43,249	$45,741
Residential	$1,912	$7,460	$9,371
IDDE	$2,202	$24,864	$27,066
Education	$1,785	$11,946	$13,731
Public Participation	$1,494	$11,946	$13,441
Special Investigations	$417	$4,100	$4,517
Jurisdictional Total	**$388,925**	**$789,534**	**$1,178,458**
Watershed Programs	**$34,051**	**$1,646,423**	**$1,680,474**
Regional Programs	**$1,658**	**$119,966**	**$121,624**
Total Costs	**$424,634**	**$2,555,923**	**$2,980,557**

Table 2: 2014/2015 Funding Source Summary

Funding by Source	Amount
General Fund	$1,598,597
Proposition 84 Grant	$1,381,960
Total Funding	**$2,980,557**

11.3 CITY OF NATIONAL CITY STRATEGIES

The City of National City (National City) is the second oldest city within San Diego County. National City includes diverse land uses from the San Diego Bay inland. Core jurisdictional programs target the entire National City jurisdiction. National City continues to focus on restoration activities within the small Paradise Creek drainage area to improve water quality. A section of the concrete lined channel in Paradise Creek is to be removed and a buffer area around the channel restored to improve riparian habitat. Additionally, upstream of the targeted area, storm water treatment BMPs are intended to improve and sustain improvement of water and riparian habitat quality. Strategies and implementation schedules, presented in Table 11-1, were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP is updated. The implementation of each strategy is contingent upon annual budget approvals and funding availability.

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Table 11-1
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
JRMP (Provisions E.2-E.7) Strategies (B.3.b.(1)(a))								
Development Planning (Provision E.3)								
All Development Projects								
NC-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	BMPs are required through the permitting process. Examples of BMPs that may be implemented include directing runoff to pervious areas and protecting trash areas from rain. Additional BMPs are required for Priority Development Projects (PDPs), as described in the PDP strategies below. For more detail on the City's storm water requirements for development projects, see Section 4 of the City's JRMP.	FY16	Yes	Yes	Implemented updated BMP Design Manual		Yes
NC-2	Implement Water Efficient Landscape Ordinance.	The City will implement through permitting process for development projects.	FY15	Yes	Yes	None		Yes
NC-3	Trash area standards for new development and redevelopment: require full four-sided enclosure, siting away from storm drains, and structural overhead cover.	New development and redevelopment projects will be required to provide protection for trash areas through the permitting process. Protection of trash areas will minimize the exposure of trash, debris, and leaks (trash, bacteria). Trash enclosures will be inspected upon project development completion and during routine compliance inspections.	FY16	Yes	Yes	None		Yes
NC-4	Train staff on LID regulatory changes and LID Design Manual.	Staff are trained on BMP requirements and implementation. Key internal target audiences include Public Works field staff, construction inspectors, and plan reviewers. Training covers BMPs to reduce pollutants, such as proper material storage, waste management BMPs for trash, pet waste management, and catch basin cleaning. Plan review training emphasizes the importance of LID, which is effective for all pollutants. An initial staff training will take place in FY16. Additional refresher trainings will be provided as needed.	FY16	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Priority Development Projects (PDPs)								
NC-5	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Structural BMPs that reduce pollutants and manage hydromodification are required. These BMPs reduce pollutants from sources of bacteria, like trash areas or animal facilities, and trash, like commercial businesses or parking lots. BMPs are required through the permitting process and are required to be shown on the project's plans. Structural BMPs using LID techniques like bioretention, infiltration, and rainwater harvesting will be required of PDPs. Installation is verified in the field prior to project completion. Refer to JRMP Section 4 for additional details.	FY16	Yes	Yes	None		Yes
NC-6	Administer self-certification program for treatment control BMP compliance.	Responsible parties are annually required to submit verification that BMPs have been maintained. Inspections are completed at high priority projects and projects that do not return proof of maintenance. When deficiencies are noted, corrective maintenance is required. See JRMP Section 4 for more details.	FY16	Yes	Yes	None		Yes
NC-7	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	As part of the BMP Design Manual update, the City will require source control BMPs, such as overhead coverage, to reduce the potential for pollutant transport from trash enclosures at businesses and residential developments. BMPs to prevent dry weather discharges from activities such as landscape irrigation will also be required. These areas or activities have been identified as pollutant sources of bacteria, trash, and sediment.	FY16	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Construction Management (Provision E.4)								
NC-8	Administer a program to require implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Prior to beginning work, projects are required to document proposed BMPs through erosion control plans. Grading permits are not issued and work cannot begin until the submitted grading plan, which includes the erosion control plan, is approved. The City inspects projects during construction to verify that each site is in conformance with the required BMPs. Where deficiencies are noted, the City requires corrections in accordance with its Enforcement Response Plan (See Provision E.6 strategies). During the rainy season, high priority sites are inspected twice per month, medium priority sites are inspected monthly, and low priority sites are inspected as needed. During the dry season, all sites are inspected as needed. All construction sites are required to implement erosion control and sediment control BMPs, which reduce discharges of sediment. Construction sites are also required to properly dispose of trash and debris, which reduces discharges of trash and bacteria, and to maintain secondary containment for portable toilets, which reduces discharges of bacteria. Refer to JRMP Section 5 and the Storm Water BMP Manual for additional information about the City's construction management program.	FY16	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Existing Development (Provision E.5)								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
NC-9	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	20 percent of industrial and commercial facilities are inspected each year, and all industrial and commercial facilities are inspected at least once every five years. Municipal facility inspection frequencies are the same as the industrial and commercial frequency. Residential management areas are inspected at least once every five years. BMP deficiencies discovered during any of these inspection programs are required to be corrected, in accordance with the procedures in the City's Enforcement Response Plan. BMPs targeted at FPWQCs include waste management (trash, animal waste, used cooking oil, etc.), preventing irrigation runoff, and catch basin cleaning. For example, all businesses and municipal facilities will be required to clean their disposal areas as necessary to prevent trash and debris from entering the storm drain system. Additionally, stored trash and other wastes must be protected from contact with storm water. Parking lots will be required to be swept. Residents will also be required to cover their trash bins and keep their areas free of trash and debris.	FY16	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
NC-10	Require minimum BMPs for mobile businesses.	Mobile businesses are subject to the same prohibitions and enforcement mechanisms as stationary industrial and commercial facilities. Mobile businesses will be inspected on an as-needed basis and will be in response to incident reports received via the Storm Water Hotline and direct visual observations by City staff. The City will be able to identify "mobile water users" such as mobile detailers, power washers, window cleaners, or similar businesses that use water in their regular business activities who have the potential of discharging pollutants to the storm drain system. Typical activities performed by mobile water users are power washing of trash enclosures, detailing vehicles, and rinsing surfaces of accumulated dirt, which are potential sources of bacteria and sediment. All wash water from these activities will be required to be contained, captured and reused, or disposed of to the sanitary sewer, an appropriate waste hauler, or to landscaping or other pervious surfaces.	FY16	Yes	Yes	None		Yes
NC-11	Implement pet waste program.	The City will provide pet waste bags via dispensers in City parks.	FY15	Yes	Yes	None		Yes
NC-12	Require used cooking oil to be either stored indoors or under a structural canopy.	The City's minimum BMPs for industrial and commercial businesses (JRMP Appendix B) requires that food service establishments must store their used cooking oil containers in a manner that prevents any discharge of fats, oils, or grease. National City also will educate businesses on availability and benefits of indoor grease storage containers. This will reduce the potential of bacteria discharges to the storm drain system.	FY16	Yes	Yes	None		Yes

**Table 11-1 (continued)
City of National City Jurisdictional Strategies**

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
NC-13	Notify Regional Board of industrial businesses subject to the Industrial General Permit so that the businesses may obtain coverage as required.	National City will share inspection results with Regional Board staff and notify of non-filers or potential non-compliance with other IGP requirements, especially requirements specifically related to discharges of bacteria, nutrients, trash, and sediment.	FY15	Yes	Yes	None		Yes
NC-14	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels, detention basins, etc.) for water quality improvement.	Channels and creeks will be cleaned once per month. Trash will be removed from channels by hand. Catch basins will be cleaned to remove trash and debris once per year. Drains with filter inserts (19th Street & Harding, 12th Street & A Avenue, R Avenue between 7th Street & 8th Street, National City Library, Bay Marina Way & Marina Way north & south of the street) will be cleaned four times per year. The City also responds to reports by citizens or municipal staff regarding MS4 facilities that require inspection/cleaning that is beyond regular maintenance activities.	FY16	Yes	Yes	Additional MS4 cleaning was completed in preparation for El Niño conditions.		Yes
NC-15	Install structural BMPs to prevent unauthorized persons from entering the MS4 and to control trash.	Grates will be placed over the entrances to six box culvert locations along Lower Paradise Creek to prevent unauthorized persons from entering and occupying the drainage ways; these grates will also help trap trash. Inspection and maintenance will be conducted by City staff and will be ongoing once installed.	FY16	Yes	Yes	None		Yes
NC-16	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	The City will repair and replace per standard maintenance schedule and where leaks are identified. In addition to routine maintenance, capital projects to replace or upgrade infrastructure are undertaken. The City's Sewer System Management Plan contains more details on these programs and procedures.	FY15	Yes	Yes	None		Yes
NC-17	Identify sewer leaks and areas for sewer pipe replacement prioritization.	National City will repair and replace per standard maintenance schedule and where leaks are identified. The City's Sewer System Management Plan contains more details on these programs and procedures.	FY15	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Roads, Street, and Parking Lots								
NC-18	Sweep City streets.	Major arterials are swept daily during the work week. All other streets are swept once per week. The City uses both mechanical and vacuum sweepers. Street sweeping personnel are also trained to report and identify obvious illegal connections/discharges to the storm drain system and provides the City with further means to observe, respond to, and potentially prevent illegal connections/discharges.	FY15	Yes	Yes	None		Yes
Pesticide, Herbicides, and Fertilizer BMP Program								
NC-19	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Commercial and industrial businesses and residents are subject to application and storage requirements as described in the City's Storm Water BMP Manual (see JRMP Appendix B). These are required through inspections, as described in JRMP Section 6. Municipal BMPs (JRMP Appendix B) are implemented directly by City staff, while pesticide application is done by certified individuals, as described in JRMP Section 8. Users shall apply pesticides and fertilizers in strict accordance with the manufacturer's label, as authorized by the U.S. EPA to minimize the introduction of pollutants to the storm drain system. Chemicals will also be required to be stored in covered and contained areas.	FY16	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Retrofit and Rehabilitation in Areas of Existing Development								
NC-20	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	See multiple retrofit projects described later on down in this list. The retrofit and rehabilitation appendix to the City's JRMP (Appendix E) describes methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including those projects that make progress towards the FPWQCs and WQIP numeric goals, feasibility of the project, total project area of high threat to water quality properties, land use and availability, amount of impervious area, cost effectiveness, and opportunities for infiltration or retention. Grants are the most likely funding mechanism. It is also possible that projects could be built as part of an alternative compliance program.	FY16	Yes	Yes	None		Yes
NC-21	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	See creek restoration project described later on down in this list. Also refer to JRMP Appendix E which describes the factors in identifying candidate projects. Candidate selection will be based upon a variety of factors including those projects that make progress towards the FPWQCs and WQIP numeric goals, feasibility of the project, multiple benefits of a project, land use and availability, and amount of impervious area. Grants are the most likely funding mechanism. It is also possible that projects could be built as part of an alternative compliance program.	FY16	Yes	Yes	The Prop 84-funded Kimball Park LID and Paradise Creek Restoration Project will be completed during FY17 (as summarized in NC-32)		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Illicit Discharge, Detection, and Elimination (IDDE) Program (Provision E.2)								
NC-22	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP.	The City's Municipal Code prohibits illicit discharges and illicit connections (IC/ID). All IC/IDs are sources of non-storm water flow and can serve as transport mechanisms for pollutants, including bacteria. IC/IDs can also be direct sources of pollutants. Examples of IC/IDs include the following types of discharges to the MS4: irrigation runoff, power washing, commercial vehicle washing, mop water, wet cleaning of trash enclosures or dumpsters, washing activities as animal facilities, washing off construction equipment, and indoor drains connected to the storm drain system. To identify IC/IDs, the City inspects all its major MS4 outfalls twice per year and operates a public hotline to receive reports from the public and City staff and contractors. The City also identifies IC/IDs during its inspections of existing development (see Provision E.5 strategies) and construction sites (see Provision E.4 strategies). IC/IDs identified through any of these pathways are required to be eliminated per the City's Enforcement Response Plan (see Provision E.6 strategies). Trash accumulation in the MS4 discovered through these programs is removed through infrastructure cleaning (see Provision E.4 strategies). Refer to JRMP Section 3 for additional information about the City's IDDE program.	FY16	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Public Education and Participation (Provisions E.7, B.3.b(1)(a)(iii))								
NC-23	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Direct education is provided through interaction with the public through inspections, hotline call response investigations, and plan review comments. Educational materials on a variety of storm water topics are also made available on the City's website. Targeted educational content on pollutants, such as messages about used cooking oil storage for eating and drinking establishments (bacteria), is provided. The City also educates residents and businesses about sources of pollutants, including waste management (trash), erosion prevention (sediment), proper fertilizer use (nutrients), and discharge prevention, during inspections (see Provision E.5 strategies) and hotline call response investigations (see Provision E.2 strategy).	FY16	Yes	Yes	None		Yes
NC-24	Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions.	Website will be updated to inform the public of new and existing requirements for commercial and industrial businesses, residents, and development/redevelopment projects. Educational content will include practices and information that will benefit habitat/wildlife and trash goals.	FY16	Yes	Yes	None		Yes
NC-25	Collaborate with regional education and outreach efforts.	The City contributes to regional outreach efforts done collectively by all Copermittees.	FY16	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
NC-26	Collaborate with local water authority to promote and encourage water conservation and irrigation runoff reduction programs, including utility-funded rebate or other incentive programs.	National City will collaborate with Sweetwater Water Authority to educate the public about the requirement to eliminate irrigation runoff and to promote incentives and rebates for landscape or irrigation system retrofits. Collaborative educational material will be distributed to residents and properties as needed.	FY15	Yes	Yes	City staff worked closely with Sweetwater Authority staff to reduce water use during FY16, in accordance with drought requirements.		Yes
NC-27	Provide municipal staff training.	Staff are trained on BMP requirements and implementation. Key internal target audiences include Public Works field staff, construction inspectors, and plan reviewers. Training covers BMPs to reduce discharges of pollutants, such as proper material storage, waste management BMPs for trash, pet waste management, erosion control BMPs, and catch basin cleaning. Plan review training emphasizes the importance of LID, which is effective for all pollutants	FY16	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Enforcement Response Plan (Provision E.6)								
NC-28	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	The City has established the legal authority to require BMP implementation, including preventing illicit discharges, through the Municipal Code. Examples of how enforcement is used to bring about compliance with BMPs that reduce discharges of pollutants include preventing illicit discharges (bacteria, trash), requiring proper management of trash areas (bacteria, trash), requiring proper erosion controls for landscaped areas (sediment), and requiring maintenance to ensure proper functioning of structural BMPs (bacteria, trash, sediment). When noncompliance is noted, the City follows an escalated enforcement process to bring about correction. For example, the City has the authority to issue fines and stop work orders. More details about the City's enforcement process are provided in the enforcement response plan section of the City's Storm Water BMP Manual (JRMP Appendix B).	FY16	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Non-JRMP Strategies (Optional Strategies, B.3.b(1)(b))								
Structural								
Green Infrastructure								
Green Streets								
NC-29	8th Street Smart Growth.	Bioretention areas along 8th Street from approximately Highland Avenue to National City Boulevard. Funding and resources have been secured. Implementation of structural BMP maintenance will be ongoing.	FY14	Yes	Yes	None		Yes
NC-30	4th Street Corridor.	Infiltration areas along 4th Street at Clairemont Drive and Belmont Drive. Funding and resources have been secured. Implementation of structural BMP maintenance will be ongoing.	FY14	Yes	Yes	None		Yes
NC-31	"A" Avenue Green Street and Pedestrian Pathway project.	National City is performing green street retrofits for a 49 acre drainage area. Bioretention, infiltration, water harvesting/reuse for irrigation in Kimball Park, and a trash removal device will be installed. This project is funded by Proposition 84 grants awarded to the City and has been a collaboration with the SWRCB. Implementation of structural BMP maintenance will be ongoing upon project completion.	FY15	Yes	Yes	The project will be completed in FY17.		Yes
Green Infrastructure								
NC-40	Sweetwater River Park Bioretention	Regional BMP (approximately 18,500 ft^2 bioretention area) treating a large area east of and north of Plaza Bonita Mall. The project would also include trails in an open space park around the bioretention area that connect to the adjacent Sweetwater River Bikeway. This project will proceed if (1) grant funding or other funding is secured and approved by City Council and (2) appropriate environmental approvals and resource agency permits are obtained.	If Triggered	NA, Not Triggered in FY16	NA, Not Triggered in FY16	The City submitted an application for funding under Round 1 of the Prop 1 Storm Water Grant Program. The project will proceed if requested funds are awarded.	Additional potential strategy added as a part of the City's overall retrofit and rehabilitation program.	If Triggered

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Multiuse Treatment Areas								
Stream, Channel and Habitat Rehabilitation Projects								
NC-32	Kimball Park LID and Paradise Creek Restoration project.	The City will restore approximately 1,000 linear feet of channelized stream with concrete bottom. The concrete bottom will be removed to restore wetland habitat. Approximately 30,000 sq. ft. of native vegetation will be planted along the Creek. The project will also include LID features along streets in the neighborhood to the south of the park and within the park. These LID features will treat an approximately 73 acre tributary drainage area. This project is funded by Proposition 84 grants awarded to the City and has been a collaboration with the SWRCB. Implementation of LID feature maintenance will be ongoing upon project completion.	~~Optional~~ FY17	Yes	Yes	Project is under construction and is scheduled to be completed in FY17.	Revised to clarify when the project will be completed.	Yes, once construction is completed the City will continue to maintain the project
NC-33	Paradise Creek Educational Park.	Paradise Creek Educational Park is located along Hoover Avenue south of 18th Street and continues south along Paradise Creek to 22nd Street. The project includes removing impervious area, constructing LID, and establishing native vegetation along Paradise Creek. This project will be funded by grants awarded to the City. Construction anticipated to be completed in ~~FY 16~~ FY17 and maintenance would be ongoing after the project has been completed.	~~FY15~~ FY17	Yes	No	Project design occurred during FY16. The project was put out for bid and awarded in FY17 and is scheduled to begin construction in November 2016.	The schedule was revised due to the grant process and coordination with stakeholders, including utilities and National School District.	Yes, once construction is completed the City will continue to maintain the project

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
Water Quality Improvement BMPs								
Proprietary BMPs								
NC-34	Coolidge Avenue Pedestrian Improvements.	High-rate biofilters (Filterra or equivalent) were installed at Civic Center & Harding, 14th Street & Wilson, and 18th Street & Hoover. Funds and resources have been secured. Construction completed in FY14 and maintenance would be ongoing after the project has been completed.	FY14	Yes	Yes	BMP maintenance is ongoing.		Yes
Non-Structural								
NC-35	Enhance school and recreation-based education and outreach.	The City partners with National School District to put on a storm water quality themed art contest for elementary students. Teachers encourage students to incorporate native plants, animals, and City landmarks, such as Paradise Creek and Sweetwater River. The themes of the calendar, which have included "Keeping the Community Clean" and "A Clean City Starts With you and Me," concentrates on proper trash disposal. Winners' artwork is displayed in a storm water educational calendar distributed throughout the City. Winners are also recognized by the City Council.	FY15	Yes	Yes	None		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
NC-36	Increase inspection for highest pollutant potential businesses within the Paradise Creek drainage area	Prioritization is based on site-specific evaluation of pollutant discharge potential. If a site has been identified as having the potential to be significant sources of trash to Paradise Creek and do not drain to structural trash control BMPs, it will be considered high threat to water quality. High threat to water quality facilities are inspected more than once every five years, while the typical inspection frequency is annual. Minimum BMPs that will be assessed include waste management and parking lot and outdoor area housekeeping. City resources to complete the strategy include staff time to implement additional inspections and to work with the responsible property owner or manager to see that the additional BMPs are implemented. Funding and resources have been secured through the industrial and commercial inspection program, which is funded through the City's General Plan.	FY16	Yes	Yes	Food service establishments were targeted for inspections in FY16. Inspections emphasized storm water pollution prevention and fats, oils, and grease BMPs, which help prevent sanitary sewer overflows.		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
NC-37	Collaborate with Urban Corps of San Diego or other nonprofit groups to remove invasive species.	Significant populations of invasive species are identified in one or more locations in the City. The Urban Corps or other nonprofit groups are equipped to remove the type(s) of invasives discovered. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) a project area has been identified, including public input as applicable 2) project scope has been prepared and approved 3) staff resources necessary to coordinate with Urban Corps of San Diego are identified and secured, 4) funds have been secured through grants or City Council approval, 5) funds for any future maintenance of the area are secured, and 6) permits required by regulatory agencies have been secured. The duration of each project depends on the specific scope of each project. Potential funding may be through a grant or departmental maintenance budget.	If Triggered	NA, Not Triggered in FY16	NA, Not Triggered in FY16	None		If Triggered
NC-38	Conduct trash cleanups through community-based organizations involving target audiences.	Local organizations regularly conduct cleanups, both on their own and in direct partnership with the City. Paradise Creek Educational Park, Inc. (PCEPI) completes regular cleanups in Paradise Creek. The City also regularly works with "I Love a Clean San Diego" to complete creek cleanup near Sweetwater River, which removes accumulated trash from homeless encampments. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Yes	Yes	Cleanups were completed along Paradise Creek and by the Sweetwater River, adjacent to Plaza Bonita Mall.		Yes

Table 11-1 (continued)
City of National City Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Status			Proposed Modifications	
				Implemented as planned in current FY (FY16)?	Completed in current FY (FY16)?	Notes	Modification (If modified or canceled, provide rationale)	Planned Implementation into the next FY? (Y/N)
~~NC-38~~ NC-39	Contribute to regional effort to provide sanitation and trash management for persons experiencing homelessness.	Support a non-profit or consortium to provide sanitation services associated with hygiene as well as trash management for persons experiencing homelessness. Rented or purchased shower/sanitary trailers providing mobile showers may be organized at specifically scheduled locations and times. This provision has been proposed as a method for preventing surface water usage for sanitation and bathing, as well as opportunity for outreach and referral by social service agencies. The trash management services will include providing trash bags, trash collection areas, and shower/sanitary facilities at centers that provide daytime shelter to their clients, or on a mobile-basis for known transit camps. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) homeless communities are identified as sources of bacteria to the City's MS4 2) funding to address MS4 discharges is identified and secured through a public process, 3) staff resources necessary to coordinate with a regional group are identified and secured, and 4) partners have been identified and formal MOUs have been developed. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy is approximately $10,000 to $50,000 per year. Once initiated, program development is expected to take at least one year, with implementation following development on a continuous basis as long as funding is available.	If Triggered	NA, Not Triggered in FY16	NA, Not Triggered in FY16	None	Revised strategy number; no change to strategy implementation approach or schedule.	If Triggered

11.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

No modifications to the BMP Design Manual have been made since the WQIP was The National City BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. The BMP Design Manual became effective in February 2016 and replaced the City's Standard Urban Storm Water Mitigation Plan (SUSMP). No modifications to the City's BMP Design Manual have been made since February 2016. The BMP Design Manual, an applicability checklist for project applicants, a City-specific Storm Water Quality Management Plan template, and answers to common developer questions are available on the City's website: http://www.nationalcityca.gov/city-government/engineering-public-works/engineering-division/storm-water-program/development-redevelopment-requirements.

11.5 MODIFICATIONS TO THE JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM

Modifications to National City's JRMP have been made since the WQIP was approved in spring 2016. Changes include clarifications in language, revisions to program procedures, and updates based on FY 16 data. Table 11-2 summarizes these changes, including the portions of the JRMP that were modified and the rationale for each change. The current National City JRMP is posted on the City's website, and the link to this page is listed on Project Clean Water.

Table 11-2
City of National City JRMP Modifications

Update Description	JRMP Section(s)	Rationale
Removed redundant text that is included in the Enforcement Response Plan (Appendix C) and provided a reference to Appendix C.	3.3.2, 4.6, 5.6 6.5, 7.5, 9.5	Removed redundant text that is included in the Enforcement Response Plan (Appendix C) and provided a reference to Appendix C to streamline future JRMP updates.
Included text that references the completed BMP Design Manual. The BMP Design Manual is now included as an attachment to Appendix B.	4.1, 4.2, 4.3, 4.4, Appendix B	The BMP Design Manual was completed during FY 2016 and has been in effect since February 16, 2016, replacing the SUSMP.
Updated the prioritization process for projects with structural BMPs.	5.5	Based on the City's inspection history, the updated prioritization is more representative of determining high threat to water quality facilities.

Table 11-2 (continued)
City of National City JRMP Modifications

Update Description	JRMP Section(s)	Rationale
Updated text to explain that City inspectors will conduct post-event BMP inspections for special events instead of the special event applicant.	7.3.2	The decision was made to have City inspectors conduct Post-Event BMP inspections for special events instead having the applicant conduct the inspection. This will allow the City to directly evaluate the effectiveness of the BMPs implemented during the special event.
Updates to WQIP Jurisdictional Strategies	Appendix A	Updates were made to Appendix A to reflect changes made to the City's jurisdictional strategies in the San Diego Bay WQIP Annual Report.
Updated the Enforcement Response Plan.	Appendix C	Added text to provide additional information on what is considered an escalated enforcement action and criteria for determining when escalated enforcement is necessary.
Updated the major outfall locations and major outfall drainage area layers of the map (Attachment 1).	Appendix D, Attachment 1	The major outfall drainage areas and the status of major MS4 outfalls as having persistent flow, transient flow, or being dry was updated with the collection of more data from the Dry Weather Major MS4 Outfall Discharge Monitoring Program. Updates to the status of major MS4 outfalls as having persistent flow, transient flow, or being dry will also be provided through the Water Quality Improvement Plan annual reporting process.

12 PORT OF SAN DIEGO

12.1 ANNUAL REPORT CERTIFICATIONS

The Port of San Diego's signed Statement of Certification and Legal Authority Establishment for the San Diego Bay WMA Water Quality Improvement Plan 2015-2016 Annual Report is included on the following page.

Unified Port of San Diego

3165 Pacific Highway, San Diego CA 92101
P.O. Box 120488, San Diego CA 92112-0488
619.686.6200 · www.portofsandiego.org

SAN DIEGO BAY WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the San Diego Unified Port District has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Jason H. Giffen
Assistant Vice President, Operations
San Diego Unified Port District

1/20/17
Date

12.2 ANNUAL REPORT FORM

The Port of San Diego's completed JRMP Annual Report form and supplemental Tables 12-1 through 12-12 are provided below.

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Table 12-1. Illicit Connections and Illicit Discharges Investigations During 2015-2016.

Location	Watershed	Inspection Date	Reporting Source[1]	Source of Discharge[2]	Pollutant	Response[3]	Type[4]	Discharge Eliminated	General Description
N Harbor Drive San Diego, CA	908.21	8/3/2015	Other Jurisdiction	Municipal	None	Closed - No Further Action	N/A	N/A	Port staff investigated report of power washing occurring on airport property. Upon investigation, Port staff determined that Port General Services had power washed sidewalk on Harbor Dr. However, per General Services power washing policy, water was directed to the landscape.
937 Harbor Dr San Diego, CA 92101	908.21	8/6/2015	Harbor Police Department	Other	Sediment and Oil and Grease	Contact Outside Jurisdiction	Non-Stormwater Discharge	Yes	Port staff received report of sediment discharge in the street as a result of a water main break in parking lot of Navy complex near USS Midway. Upon investigation, it was determined that a previous water main break had occurred within the City of San Diego. Incident was referred to the City of San Diego.
Dole Fruit at Tenth Avenue Marine Terminal (TAMT)	908.22	8/13/2015	Contractor	Contractor	Sediment, Metals	Applied Enforcement	Non-Stormwater Discharge	Yes	Port staff was notified of sediment discharge at Dole Fruit leasehold on TAMT. The on-site contractor responsible was required to clean impacted storm drain line and surrounding area.
Cabrillo Isle Marina 1450 Harbor Island Drive San Diego, CA, 92101	908.21	8/20/2015	Harbor Police Department	Citizen	Oil & Grease	Closed - No Further Action	Non-Stormwater Discharge	Yes	Staff responded to report of a fuel line break at Cabrillo Isle Marina. The marina manager had deployed booms around a boat that was leaking the fuel, and boarded the vessel to shut off the bilge power (the source of the discharge). Absorbent pads were placed in water to soak up spill material, and waste remediation contractor was called by boat owner to remove remaining material built up in bilge.
Costerra 880 Harbor Island Drive San Diego, CA, 92101	908.21	9/8/2015	Harbor Police Department	Port Tenant	Oil & Grease, Bacteria	Closed - No Further Action	Non-Stormwater Discharge	Yes	Port staff responded to grease trap spill as a result of plumbing activity at Costerra restaurant. An unknown amount of grease entered parking lot. Additionally, electricity to facility's sump pump malfunctioned and approx. 2 gallons of water discharged into the storm drain equipped with a filtration BMP. The presence of BMP prevented grease from discharging. Plumbing service cleaned up storm drain inlet and BMP where grease and water had entered. No evidence of grease remained after cleaning. No Further Action.
Best Western Posada At The Yacht Harbor 5005 North Harbor Drive San Diego, CA, 92106	908.10	8/12/2015	Port Department	Port Tenant	None	Ongoing	Illicit discharge/connection	No	Port staff received report of discharge from the Best Western Posada Inn to the curb line along N. Harbor Drive. Based on the Port's interview with the site facility general manager, the pool filtration system located in the parking area (below street grade) malfunctioned and the pool water leaked out into the parking lot and into a catch basin on site. Inside the catch basin is a sump pump that pumps the water from the garage (flood mitigation) to the street where it discharges from a small pipe in the curb. This system was installed when the hotel was built in the 1960's-1970's. The Port is investigating this issue to understand the prior permits of the sump pump and the discharges to determine additional enforcement actions. No additional discharges from the pipe have been observed or reported.
Port District Administration Building and Annex 3165 Pacific Highway San Diego, CA, 92101	908.21	10/21/2015	Port Department	Municipal	Gross Pollutants, Oil & Grease	Closed - No Further Action	Non-Stormwater Discharge	Yes	Staff observed wash water on pedestrian bridge at Port administration building, and observed inadequate BMPs implemented next to stair case to try to contain wash water. Absorbent socks were placed near storm drain, but were inadequately placed. General Services staff were contacted to resolve the issue and ensure that proper BMPs for pressure washing are used in the future.

Table 12-1. Illicit Connections and Illicit Discharges Investigations During 2015-2016.

Location	Watershed	Inspection Date	Reporting Source[1]	Source of Discharge[2]	Pollutant	Response[3]	Type[4]	Discharge Eliminated	General Description
G Street Mole Tuna Lane at the Foot of G Street San Diego, CA, 92101	908.21	11/2/2015	Port Department	Citizen	Oil & Grease, Organics	Closed- No Further Action	N/A	N/A	Staff received a complaint of an oil spill and absorbent material left on the pier. No discharge to MS4 was observed. General Services staff was contacted to clean the area. Area was cleaned. No further action.
TAMT 687 Switzer Street San Diego, CA, 92101	908.22	11/5/2015	Port Department	Unknown	Oil & Grease, Organics	Contact Outside Jurisdiction	Non-Stormwater Discharge	Yes	Port staff received report of sheen coming from Switzer creek area discharging into the Bay. Staff checked each Port-owned MS4 that discharges into Switzer Creek. All MS4 lines discharging into the creek were dry, ponded or damp and with no evidence of overland flow. Based on observations, it appeared that discharge was originating from the City of San Diego, therefore the incident was referred to the City for follow-up.
Coronado Yacht Club 1631 Strand Way Coronado, CA, 92118	910.10	11/9/2015	Port Department	Contractor	Gross Pollutants	Closed - Unjustified Complaint	N/A	N/A	Port staff responded to report of concrete discharge to bay at Coronado Yacht Club as a result of construction activity. Staff observed no discharge of concrete-laden water upon arrival, however, approved concrete work was observed with appropriate BMPs. No further action is required.
1360 N. Harbor Drive San Diego, CA 92101 Sewer line located under wharf structure	908.2	12/3/2015	Port Department	Port Tenant	Bacteria	Applied Enforcement	Illicit discharge/connection	Yes	Administrative Citation issued to both Anthony's Fish Market and SD Maritime Museum for leaking sewage pipe. Leak was stopped by responsible party by within approximately 1 hour of detection on 12/3/2015. Corrective actions beyond stopping the leak immediately included (1) a summary report w/photographic documentation regarding the permanent fix of the cause of the leak, and (2) measures/actions to be taken to prevent further discharges and to detect possible leaks. Regional Board was notified of the incident via email on 12/3/2016.
Outfall CSD145 at end of Talbot and Anchorage Lane (Shelter Island)	908.1	1/19/2016	Port Department	Municipal	None	Contact Outside Jurisdiction	Non-stormwater discharge	Yes	Port staff observed non storm water discharge from outfall at end of Anchorage Lane near Shelter Island. The outfall drains a City of San Diego line with no Port influence. City of San Diego staff were notified of the incident, who sampled water and obtained non-detect results for metals, bacteria, nutrients, and sediment. Follow-up revealed no additional outfall discharge.
Derelict Vessel Lot 891 G St. Chula Vista, CA, 91910	909.12	5/10/2016	Port Department	Municipal	None	Closed - Unjustified Complaint	N/A	N/A	Port staff received complaint of possible oil spill within the Derelict Vessel lot. Staff received subsequent notification from General Services that reported spill was in fact was just rain water that collected on a nearby tarp that leaked on the ground. No further action is required.
California Yacht Marina 640 Marina Parkway Chula Vista, CA, 91910	909.12	5/19/2016	Citizen	Unknown	Oil & Grease	Closed - Unjustified Complaint	N/A	N/A	Staff received report of sheen on water in California Yacht Marina. Staff arrived on site and questioned both the California Yacht Marina and Chula Vista marina staff about incident and they both informed staff that they were not notified of fuel in the water. No sheen was observed by staff and marina staff were not aware of incident. No further action.
Cruise Ship Terminal (B St.) 1150 North Harbor Drive San Diego, CA, 92101	908.21	6/20/2016	Port Department	Unknown	None	Closed - Unjustified Complaint	N/A	N/A	Port staff received complaint of possible discharge at B Street cruise ship terminal. Staff observed trash, foam and bubbles near outfall at the terminal. Wind and prevailing current appeared to be the cause of the material arriving on-shore (the material was windblown and likely not discharging from storm drain).

Table 12-1. Illicit Connections and Illicit Discharges Investigations During 2015-2016.

Location	Watershed	Inspection Date	Reporting Source[1]	Source of Discharge[2]	Pollutant	Response[3]	Type[4]	Discharge Eliminated	General Description
Storm Drain inlet 1277 (across the street from Solar Turbines) San Diego, CA, 92101	908.1	6/23/2016	Port Department	Municipal	None	Closed- No Further Action	Illicit discharge/connection	Yes	Irrigation discharge was detected by Port staff while in the field. Port General Services was contacted to correct a leaking sprinkler head which was causing the discharge. Upon follow-up inspection, sprinkler was repaired and discharge was eliminated.
Best Western Island Palms Hotel 2051 Shelter Island Drive San Diego, CA, 92106	908.10	1/6/2016	Port Department	Port Tenant	Organics, Trash/Debris	Closed - No Further Action	N/A	N/A	Port staff observed an uncovered dumpster at the Best Western Island Palms hotel that was leaking a white substance that was later identified as paint. Best Western management was quickly alerted and their staff was directed to cover and contain the dumpster unit and clean the affected area. No discharge to MS4 was observed.
Tuna Harbor	908.21	6/14/2016	Citizen	Port Tenant	None	Closed - Unjustified Complaint	N/A	N/A	Staff received citizen complaint regarding vessel maintenance in Tuna Harbor leading to discharge into the Bay. Upon arrival, Port staff observed on-deck boat maintenance onboard the Trailblazer vessel. The work appeared to be confined to the deck and no discharge to the bay was observed. Staff reminded vessel owner of his responsibilities to keep vessel maintenance from releasing pollutants into the bay. No further action.
3165 Pacific Highway San Diego, CA 92101	908.21	1/27/2016	Port Department	Municipal	Oil & Grease, Gross Pollutants	Closed - No Further Action	Illicit discharge/connection	Yes	Port staff received complaint of coolant leak from broken generator in Port Administration building parking lot. However, upon arrival staff observed General Services staff applying absorbent pads to the spill. Port staff traveled down gradient and observed what appeared to the coolant at the bottom of the storm drain inlet downstream along the north bound land on Pacific Coast Highway. Port cleaned the coolant from the inlet. The coolant did not reach the MS4 across the street along the south bound land of Pacific Highway.
Bali Hai Restaurant 2230 Shelter Island Drive San Diego, CA, 92106	908.10	2/17/2016	Tenant	Municipal	Sediment	Closed - No Further Action	Illicit discharge/connection	Yes	Port staff received notification of water discharge into storm drain in front of Bali Hai. Upon arrival, staff observed water discharging from a sewer manhole and running down the street and discharging into a nearby storm drain. Based on further investigation, it was determined that the water was coming from the Port's irrigation line. General Services was contacted to repair the irrigation line. No further action.
Hilton - San Diego Bayfront 1 Park Boulevard San Diego, CA, 92101	908.21	4/4/2016	Citizen	Unknown	Nutrients, Oil & Grease	Closed - No Further Action	N/A	N/A	Port staff responded to report of irrigation discharge near Hilton San Diego Hilton Hotel. Upon arrival, no evidence of irrigation runoff was observed. Investigation indicated that discharge was unlikely to be the result of irrigation runoff from the Bayfront Hotel. Staff conducted follow-up meeting with hotel staff to reinforce prohibition of irrigation runoff.
Tenth Avenue Marine Terminal 687 Switzer Street San Diego, CA, 92101	908.22	5/3/2016	Port Department	Municipal	Sediment, Gross Pollutants	Closed - No Further Action	Non-stormwater discharge	Yes	Port staff responded to a report of discharge to the Bay. Upon arrival, observed a leaky water pipe on the Crosby street pier. A work order was submitted to General Services to repair. Follow-up investigation indicated that water line had been repaired.

Table 12-1. Illicit Connections and Illicit Discharges Investigations During 2015-2016.

Location	Watershed	Inspection Date	Reporting Source[1]	Source of Discharge[2]	Pollutant	Response[3]	Type[4]	Discharge Eliminated	General Description
Inlet upstream of outfall C3-2.1 Coronado, CA	910.1	5/12/2016	Port Department	Unknown	Metals	Contact Outside Jurisdiction	Illicit discharge/connection	No	During Persistent Outfall Monitoring, Port staff observed a non-storm water discharge upstream of outfall C3-2.1 (outfall is tidally inundated). Salinity test showed 10 ppt water, indicating freshwater influence. Staff conducting sampling for all pollutants outlined in the San Diego Bay WQIP Monitoring and Assessment Program. The discharge was reported to the City of Coronado. Results of the sampling analysis showed a dissolved copper concentration of 7.6 ppb, which is above the non-storm water action level outlined in the municipal permit (all other pollutants tested were below NALs)
Shelter Island Shoreline Park Southerly of Shelter Island Drive San Diego, CA, 92106	908.10	6/30/2016	Citizen	Municipal	Oil & Grease, Sediment	Closed - No Further Action	Non-stormwater discharge	Yes	Port staff received report of discharge to MS4 at Shoreline Park. Upon arrival, staff observed significant over-irrigation and the water was discharging into the MS4. PGP Staff contacted General Services and a work order was submitted to have the water shut off. Follow-up investigation revealed no further irrigation discharge to the MS4.

TABLE KEY

MS4: Municipal Separate Storm Sewer System

[1] **Reporting Source Party:**
Public: A member of the public not associated with the Port
Contractor: A business operating within the Port's jurisdiction on behalf of the Port of San Diego or a Port Tenant.
Harbor Police Department: An employee of the Harbor Police Department (HPD).
Port Department: Port staff not associated with the Port's Environmental and Land Use Management Department (ELUM).
Port Stormwater Monitoring: Port ELUM staff conducting water quality monitoring or inspection activities.
Port Tenant: A Port of San Diego tenant or subtenant operating within the Port's jurisdiction.
Other Jurisdiction: A staff person from another jurisdiction.

[2] **Source of discharge:**
Port Tenant: Incident is the result of activities by a Port of San Diego tenant within the Port's jurisdiction.
Municipal: Incident is the result of Port of San Diego staff or municipal operations.
Contractor: Incident is the result of a contractor operating within the Port's jurisdiction on behalf of the Port of San Diego or a Port Tenant.
Public: Incident is the result of a person or persons not involved in business activities within the Port's jurisdiction.
Mobile Business: Incident is the result of a mobile business operating within the Port's jurisdiction.
Special Event: Incident is the result of a permitted event in a park or other public area within the Port's jurisdiction.
Unknown: Incident is the result of an unidentifiable responsible party.
Other: Incident may be the result of an identifiable source which cannot be characterized otherwise.

[3] **Response:**
Applied Enforcement: Incident involves a spill or release of pollutants from a known source which have the ability to enter the MS4 and/or threaten receiving water quality and requires Port enforcement procedures to resolve the complaint. Where incidents involve Port -maintained facilities, an enforceable work order is issued to resolve the issue.
Closed – No Further Action: Incident may involve the release of pollutants which do not enter the MS4 or threaten receiving water quality and are cleaned properly by a responsible party or may not have the ability to require enforcement actions due to a lack of an identifiable source.
Referred to Other Jurisdiction: Incident occurred outside of Port jurisdictional boundaries or authority and is forwarded to another agency for proper resolution
Closed – Unjustified Complaint: Investigation reveals that the complaint does not involve a spill or release of pollutants which have the ability to reach the MS4 or threaten receiving water quality.
Ongoing: Investigation and/or enforcement actions are ongoing as of the time of this report.

[4] **Type:**
Non-Stormwater Discharge: A discharge of non-stormwater to the MS4, or the receiving water due to failure of appropriate BMPs and/or infrastructure; includes NPDES permitted discharges.
Illicit Discharge or Connection: A non-permitted, intentional release of non-stormwater to the MS4 and/or receiving water as a result of illegal dumping and/or connection.

Table 12-2. Inventory Summary: Treatment Control BMPs, Inspections, and Verification of Maintenance Results 2015-2016.

Project Name	Watershed	Treatment Control BMP	Required BMPs	Port Inspection Date	Port BMP Inspection Results	Operation and Maintenance Verification Results	Follow-up Action
Anchorage Lane (Point Loma Pavement Maintenance)	908.1	Infiltration practices, Darin inlet inserts (2)	3	4/25/2016	Drain inlet #1149 and associated insert need to be cleaned.	Annual verification of maintenance completed by Port Staff as part of annual inspection on 4/25/2016	BMP was cleaned on 6/23/2016.
Cabrillo Isle Marina	908.2	Inlet filters (4), porous pavement strips (5)	9	5/26/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 7/30/2016 indicates BMPs were inspected monthly and appear present and clean. Maintenance was performed monthly and includes cleaning filters, removing debris and securing BMPs.	No corrective action required
Continental Maritime	908.2	Inlet filters	7	5/25/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 3/14/2016 indicates BMPs were inspected 3/11/2016 and no maintenance was required.	No corrective action required
Coronado Cays Yacht Club	910.1	Infiltration strip	1	5/19/2016	BMPs appeared properly maintained	Annual verification of maintenance form dated 3/18/2016 indicates BMPs were inspected 3/12/2016 and are in good working condition, no maintenance required.	No corrective action required
Fisherman's Landing	908.1	Pervious pavement	2	5/18/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 7/4/2016 indicates BMPs were inspected 7/1/2016 and were found to be clean and not requiring maintenance.	No corrective action required
H Street Extension	909.1	Bio retention facility (15), high rate media filter (2)	17	6/8/2016	Media filter BMP #129 appeared to be near capacity, all bio retention facilities appeared to be properly maintained	Annual verification of maintenance completed by Port Staff as part of annual inspection on 6/8/2016	Media filters were cleaned on 9/30/2016
Harbor Drive Improvements @8th Street	908.2	Landscaping, inlet filters (5)	6	5/18/2016	Three inserts were near capacity and required cleaning.	Annual verification of maintenance completed by Port Staff as part of annual inspection on 5/18/2016	BMP inserts were cleaned on 6/23/2016
Hertz Dollar Thrifty Rental Car Temporary Relocation	908.2	Media Filter	7	5/25/2016	Two storm drain inlets located in the parking lot were observed to be missing inlet inserts.	Port inspection on May 25, 2016 indicated two storm drain inlets were missing inlet inserts per the project USMP.	Escalated Enforcement Action taken. Port issued an administrative citation on 6/15/2016 for failing to inspect, maintain and repair treatment control BMPs. Hertz submitted documentation on 7/14/2016 showing corrective action had been addressed and missing BMP inserts were replaced.
Hilton Garden Inn (Island Palms Best Western Hotel)	908.1	Stormceptor, pervious pavement	3	5/26/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 6/24/2016 indicates an inspection occurred 6/24/2016 and BMPs were vacuumed and cleaned monthly.	No corrective action required
Hilton San Diego Bayfront Hotel	908.2	Inlet filters (2), CDS (1), landscaping (1)	4	5/11/2016	A steel plate was installed blocking the majority of flow to one inlet.	Annual verification of maintenance form dated 5/10/2016 indicates inspections occurred on 5/5/2016 and all BMPs were clean and in good working condition.	Escalated Enforcement Action taken. Port issued an administrative citation on May 11, 2016 for the steel plate blocking one storm drain inlet. Port required Hilton remove the plate to inspect and clean the drain filter. Hilton submitted photo documentation on June 28, 2016 indicating the steel plate had been removed as required.
Holiday Inn San Diego Bayside	908.1	Bio retention (1), porous pavement (2), hydrodynamic separators (1), inlet filter (5)	9	5/24/2016	BMPs appeared properly maintained.	Annual verification of maintenance indicates an inspection occurred on 1/11/2016 and 5/03/2016 and all BMPs requiring maintenance were cleaned on 1/13/2016 and 5/06/2016.	No corrective action required
Island Palms Best Western Hotel - parking lot repavement	908.1	Pervious pavement	2	5/26/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 6/24/2016 indicates an inspection occurred 6/24/2016 and BMPs were vacuumed and cleaned monthly.	No corrective action required
Koehler Kraft	908.1	Closed loop water evaporation system, landscaping	2	6/21/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 8/15/2016 indicates BMPs are inspected daily and are maintained weekly. Maintenance includes cleaning and clearing leaves and debris from BMPs. This is a boatyard that is covered under a boatyard NPDES permit. The facility is designed to retain runoff onsite using an evaporation system.	No corrective action required
Kona Kai Resort	908.1	High rate media filter	1	5/17/2016	Filter inserts appeared properly maintained. Downspout media filters were not installed per the approved USMP.	Annual verification of maintenance dated 7/28/2016 indicates inspections and maintenance cleaning occurred 7/24/2015, 11/3/2015, 1/6/2016, 4/8/2016 and 7/7/2016. All BMPwere present and working, with the exception of downspout filters.	Escalated Enforcement Action taken. Port issued an administrative citation on 5/17/2016 for failure to install two downspout media filters per the approved USMP design. In a 10/18/2016 response, Kona Kai sent photographic documentation showing that the downspout media filters had been installed.

Table 12-2. Inventory Summary: Treatment Control BMPs, Inspections, and Verification of Maintenance Results 2015-2016.

Project Name	Watershed	Treatment Control BMP	Required BMPs	Port Inspection Date	Port BMP Inspection Results	Operation and Maintenance Verification Results	Follow-up Action
Marriott Pool/Hall Renovations	908.2	Landscaping	10	5/31/2016	Landscaping in-place and appeared to be maintained	Operation and Maintenance of the landscaping strips were verified by Port staff during 5/31/2016 inspection. A second phase of this project including the installation of additional treatment control BMPs is undergoing construction.	No corrective action required
National City Marine Terminal (SW Perimeter)	908.3	Pervious pavement	1	5/24/2016	BMP requires cleaning. Cleaning scheduled for August 22, 2016	Annual verification of maintenance completed by Port Staff as part of annual inspection on 5/24/2016.	BMP cleaning completed 09/23/2016
North Embarcadero Visionary Plan (NEVP)	908.2	Bio retention facility	1	6/16/2016	The NEVP project site includes portions of Broadway and Harbor Drive. The Port is responsible for the Harbor Drive portion of the project, and the City of San Diego is responsible for the Broadway portion of the project site. The Harbor Drive BMPs have been inspected and appear to be maintained and not requrie replacement at this time.	Annual verification of maintenance completed by Port Staff as part of annual inspection on 6/16/2016.	No corrective action required
Pier 32 Marina	908.3	CDS, landscaping	2	5/19/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 5/20/2016 indicates BMPs were inspected and maintained routinely throughout the year, ranging from weekly to monthly.	No corrective actions required
Point Loma Marina	908.1	Pervious pavement, CDS within landscaping	2	5/25/2016	BMPs appeared properly maintained	Annual verification of maintenance form dated 5/28/2016 indicates weekly and monthly inspections occurred for porous pavement and drains, and an annual inspection of the CDS unit occurred on 5/18/2016. All BMPs were found to be in good working condition and required no maintenance.	No corrective action required
Point Loma Seafood's Remodel	908.1	Landscaping (2), pervious pavement (2)	4	5/11/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 3/16/2016 indicates BMPs were inspected monthly and were found to be in working condition requiring no maintenance.	No corrective action required
Red Sails Inn	908.1	Inlet filters	1	5/20/2016	BMPs appeared properly maintained	Annual verification of maintenance form dated 7/20/2016 indicates BMPs were inspected and cleaned every other week and the filter is replaced every other month.	No corrective action required
Ruocco Park	908.2	Inlet filters (3), landscaping	4	5/2/2016	BMPs appeared properly maintained. Accumulation of debris in the filter is at about 20%	Annual verification of maintenance completed by Port staff as part of annual inspection on 5/2/2016	No corrective action required
San Diego Yacht Club	908.1	Contech media filter, porous pavement, inlet filter	3	5/19/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 6/15/2016 indicates visual inspections occurred monthly and the annual inspection and maintenance for the Contech filter occurred on 6/10/2016.	No corrective action required
Seaport Village/Old Police Headquarters	908.2	Inlet filters (3), pervious pavers	5	5/24/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 8/3/2016 indicates four of five BMPs were in need of maintenance. Maintenance was performed on 5/18/2016. All inserts were inspected, cleaned and filter media was replaced.	No corrective action required
Shelter Island Drive Pavement Repairs	908.1	Inlet filters	9	5/16/2016	Six storm drain inlets appeared to be near capacity and were in need of cleaning/maintenance.	Annual verification of maintenance completed by Port Staff as part of annual inspection on 5/16/2016	BMP inserts were cleaned on 6/23/2016
Shelter Pointe Hotel and Marina (Kona Kai)	908.1	Inlet filters	2	5/1/2015	BMPs appeared properly maintained	Annual verification of maintenance dated 7/28/2016 indicates inspections and maintenance cleaning occurred 7/24/2015, 11/3/2015, 1/6/2016, 4/8/2016 and 7/7/2016. All BMPs were present and working.	No corrective actions required
Sheraton Harbor Island - Temporary Parking	908.2	Gravel lot for infiltration, inlet filters (2)	3	5/17/2016	BMPs appeared properly maintained	Annual verification of maintenance form dated 6/23/2016 indicates an inspection occurred 6/23/2016 and BMPs were found in working condition with no maintenance required.	No corrective action required
Silver Gate Yacht Club	908.1	infiltration basin, drain basket	2	5/12/2016	BMPs appeared properly maintained	Annual verification of maintenance form dated 8/12/2016 indicates BMPs were inspected on 6/23/2016. Waste receptacle was not enclosed and a lid was purchased on the same day. FloGuard filters were present and inspected monthly with cleaning as necessary.	No corrective action required
Solar Turbines Parking Lot Expansion	908.2	Infiltration strips	2	5/10/2016	BMPs appeared properly maintained	Annual verification of maintenance form dated 3/17/2016 indicates the BMP was inspected 3/15/2016 and is on a quarterly inspection schedule. No maintenance was required and the BMP was in good working condition.	No corrective action required

Table 12-2. Inventory Summary: Treatment Control BMPs, Inspections, and Verification of Maintenance Results 2015-2016.

Project Name	Watershed	Treatment Control BMP	Required BMPs	Port Inspection Date	Port BMP Inspection Results	Operation and Maintenance Verification Results	Follow-up Action
Southwestern Yacht Club	908.1	Pervious pavement	1	5/24/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 3/18/2016 indicates the BMP is inspected and swept daily and in good condition. Street sweeping was performed twice, on 7/7/2015 and 2/17/2016.	No corrective action required
Spiro's Gyros (inspected under Coronado Ferry Landing)	910.1	Vegetated swales	1	6/21/2016	BMPs appeared properly maintained	Annual verification of maintenance form submitted 6/22/2016 indicates BMPs were inspected and maintained as necessary in December 2015 and January 2016.	No corrective action required
Sun Harbor Marina	908.1	Inlet filters	4	5/19/2016	BMPs appeared properly maintained. One storm drain inlet BMP was removed as part of the stormwater design for the newly- completed adjacent North Harbor Drive Realignment project. All drainage previously treated by the removed BMP is now treated by a treatment control BMP associated with the new project.	Annual verification of maintenance dated 6/12/2016 indicates BMPs were inspected and cleaned on 8/25/2015, 2/6/2016, and 5/3/2016, including replacement of gasket and replacement of pouches as needed.	No corrective actions required
TAMT North Gate Improvements	908.2	Porous Asphalt	1	5/26/2016	Sediment, oil and asphalt particles accumulated on permeable pavement, cleaning required	Verification of maintenance completed by Port staff as part of annual inspection on 5/26/2016.	Permeable pavement maintenance and cleaning completed on 6/29-30/2016
TAMT Railroad Pavement and Track Improvements	908.2	CDS, inlet filters (2), infiltration strip	4	5/26/2016	BMPs appeared properly maintained	Verification of maintenance completed by Port staff as part of annual inspection 5/26/2016	No corrective action required
TAMT Transit Shed 1, Bay D	908.2	high rate media filter	1	5/26/2016	BMPs appeared properly maintained	Verification of maintenance completed by Port staff as part of annual inspection 5/26/2016	No corrective action required
Tom Ham's Lighthouse Renovations	908.2	Vegetated Bioswale	1	5/18/2016	BMPs appeared properly maintained	Annual verification of maintenance form dated 5/18/2016 indicates BMP is inspected weekly and cleaned as needed, including removal of litter and debris, and managing plants.	No corrective action required
Water Transportation Center (Fifth Avenue Landing)	908.2	Vegetated swale, CDS	2	5/11/2016	BMPs appeared properly maintained	Annual verification of maintenance dated 3/22/2016 indicates the CDS was inspected on 2/11/2016 and no maintenance was required. Floating debris was removed during the inspection.	No corrective action required
Water Street Pavement Repair	908.2	Permeable Pavers (2)	2	5/24/2016	BMPs appeared properly maintained	Annual verification of maintenance completed by Port staff as part of annual inspection 5/24/2016	No corrective action required

Table 12-3: Construction Inspections Conducted in 2015-2016.

Project Name	Priority	Watershed	> 1 Acre	WDID	Weeks of Active Construction in Wet Season	Wet Season Inspection	Dry Season Inspection	Follow-up Inspections Conducted [2]	Active, Inactive, or Completed (As of June 30, 2016)
501 and 505 First Street Coronado Site Work	High	910.1	No	N/A	1	1	0	0	Completed
880 Harbor Island Restaurant	High	908.2	Yes	9 37C36957	8	4	2	2	Completed
BAE Systems Pier 4 Project	High	908.2	Yes	937C364730	9	5	3	1	Completed
Bay Club Hotel and Marina Pool Windscreen Replacement	High	908.2	No	N/A	11	6	0	0	Completed
Broadway Pier North & West Bull Rail Mounting Hardware Repair	High	908.2	No	N/A	0	0	1	0	Active
D Street Fill Restoration Project	High	908.3	Yes	9 37C37398	18	10	0	1	Completed
Driscoll/Kettenburg Boatyard Renovation	High	908.1	Yes	937C346760	31	14	5	3	Active
Humphrey's Half Moon Inn Marina Dock Redevelopment	High	908.1	No	N/A	10	5	2	3	Completed
Lane Field Development (includes Lane Field Development (North) and Lane Field Setback Park)	High	908.2	Yes	937C351660	22	11	3	2	Completed
Navy Pier Fender Pile Removal (South Side)	High	908.2	No	N/A	1	1	2	2	Completed
NCMT Berth 24-10 Structural and Mooring Repairs[1]	High	908.3	Yes	N/A	0	0	2	1	Active
North Embarcadero Emergency Wharf Repairs	High	908.2	No	N/A	0	0	2	0	Completed
Public Viewing Platform Improvement and Repairs Project	High	908.2	No	N/A	23	12	2	1	Completed
SDGE South Bay Substation Relocation Project	High	910.2	Yes	937C370499	9	4	5	4	Active
Shelter Island Boat Yard Crane Replacement & Pier Additions 2014	High	908.1	No	N/A	31	11	4	0	Active
Shoreline Stabilization at Bayside Park (Emergency)	High	909.1	No	N/A	16	5	0	4	Completed
TAMT Berths 10-1 and 10-2 Fender System Upgrade	High	908.2	No	N/A	3	2	2	1	Completed
TAMT Berths 10-3 thru 10-8 Yokohama Fender Replacement	High	908.2	No	N/A	11	2	0	0	Completed
BAE Shipyard Sediment Cleanup Site - North Shipyard	Medium	908.2	No	N/A	31	15	3	1	Completed

Table 12-3: Construction Inspections Conducted in 2015-2016.

Project Name	Priority	Watershed	> 1 Acre	WDID	Weeks of Active Construction in Wet Season	Wet Season Inspection	Dry Season Inspection	Follow-up Inspections Conducted [2]	Active, Inactive, or Completed (As of June 30, 2016)
Coronado Yacht Club Boat Hoist Repair	Medium	910.1	No	N/A	14	7	0	1	Completed
J Street Offsite Drainage Improvements	Medium	908.1	No	937W002055	0	0	2	0	Completed
Kona Kai Resort- Renovations 2014[1]	Medium	908.1	No	N/A	0	0	4	1	Active
Lane Field South	Medium	908.2	Yes	Pending	11	3	2	1	Active
Marriott Marquis SD Marina Dock Repair	Medium	908.2	No	N/A	24	12	2	1	Active
National City Aquatics Center	Medium	908.3	No	N/A	7	11	3	1	Completed
North Harbor Drive Realignment	Medium	908.1	Yes	937C371720	0	0	6	2	Completed
San Diego International Boat Show - Temporary Dock Installation	Medium	908.2	No	N/A	0	0	2	1	Completed
San Diego Marriott Marquis and Marina - New Marriott Hall	Medium	908.2	Yes	9 37C37069	31	15	5	13	Active
South Campus Phase 4A Demolition 2014	Medium	909.1	Yes	9 37C36884	0	6	6	0	Completed
The Wharf - Building C (Point Loma Marina)	Low	908.1	No	N/A	31	9	5	6	Active
The Wharf - Recycling and Trash Enclosure (Point Loma Marina)	Low	908.1	No	N/A	31	7	5	1	Active
Point Loma Marina Harbor Services Parking Lot	Low	908.1	No	N/A	21	7	4	0	Completed
B Street Pier West End Fender System Upgrade	Low	908.2	No	N/A	23	12	0	2	Completed
BAE Systems Pier 1 North Drydock Project	Low	908.2	No	N/A	13	7	2	1	Active
Coronado Cays Dry Boat Storage Facility	Low	910.1	No	N/A	3	1	3	1	Active
Coronado Ferry Landing Accessible Parking Improvements	Low	910.1	No	N/A	4	2	0	0	Completed
DecoBike San Diego Bike Share Stations	Low	908.2	No	N/A	0	0	3	1	Completed
Dole Fresh Fruit - Reefer Outlet Addition	Low	908.2	No	N/A	3	2	3	0	Completed

Table 12-3: Construction Inspections Conducted in 2015-2016.

Project Name	Priority	Watershed	> 1 Acre	WDID	Weeks of Active Construction in Wet Season	Wet Season Inspection	Dry Season Inspection	Follow-up Inspections Conducted [2]	Active, Inactive, or Completed (As of June 30, 2016)
Harbor Police HQ Patrol Building	Low	908.2	No	N/A	0	0	1	0	Completed
Manchester Grand Hyatt - Sally's Restaurant Remodel	Low	908.2	No	N/A	12	4	0	1	Completed
NASSCO Primeline 1 Replacement	Low	908.2	No	N/A	3	1	2	0	Active
San Diego Bay Fiber Optic PH 9	Low	908.1	No	N/A	2	1	2	4	Active
San Diego Symphony - Summer Pops 2015	Low	908.2	No	N/A	0	0	1	0	Completed
San Diego Yacht Club Stair and Roof Eave Repair	Low	908.1	No	N/A	13	5	0	0	Completed
San Salvador Assembly Site	Low	908.2	Yes	N/A	5	1	3	0	Completed
Sheraton San Diego Hotel & Marina Pavement Improvement Project	Low	908.2	No	N/A	6	2	4	0	Completed
South Bay Power Plant Monument	Low	910.2	No	N/A	0	0	3	0	Completed
Spiro's Gyros Building Addition	Low	910.1	No	N/A	0	0	1	0	Completed
Sprint Convention Center (Cell Tree)	Low	908.2	No	N/A	1	1	2	0	Completed
TAMT Dole Facility Pavement Maintenance	Low	908.2	No	N/A	0	0	1	0	Completed
Verizon Cell Site at Spanish Landing Park	Low	908.2	No	N/A	10	7	3	5	Active
Totals						**231**	**118**	**69**	

[1] No escalated enforcement measures were required on any project during the 2015-16 year. Noted in bold in the above table, Administrative Citations were issued by the Port to the following sites:

1) Kona Kai Resort-Renovations 2014. On June 16, 2016, an Administrative Citation was issued to Kona Kai Resort for failing to provide perimeter sediment control BMPs around a portion of the working area observed during the May 27, 2016 inspection. A follow-up inspection conducted on June 3, 2016 confirmed perimeter protection had been put in place and no further action was required.

2) NCMT Berth 24-10 Structural and Mooring Repairs. On June 11, 2016 an Administrative Citation was issued to the contractor for failing to provide perimeter sediment control BMPs around a portion of the working area observed during the May 24, 2016 inspection. A follow-up inspection conducted on May 26, 2016 confirmed perimeter protection had been put in place and no further action was required.

[2] Follow-up inspections were conducted to ensure corrective actions that were identified during an initial inspection are adequately addressed. Corrective actions are relayed to the contractor through inspection reports that also serve as written warnings to the contractor regarding stormwater compliance.

Table 12-4. Summary of Municipal, Commercial, and Industrial Facility Inspections During 2015-2016.

Component	Priority	Facility Name	Watershed	Inspection Date	Follow-up Inspection [1]	Enforcement Required[2,3]	Escalated Enforcement[3,4]
Municipal							
Municipal	High	Anchorage Lane	908.10	5/16/2016	N/A	N/A	N/A
Municipal	High	Anchorage Lane and Canon Street	908.10	6/23/2016	1	N/A	N/A
Municipal	High	Canon Street	908.10	5/16/2016	N/A	N/A	N/A
Municipal	High	Emerson Street	908.10	5/16/2016	N/A	N/A	N/A
Municipal	High	Harbor-Shafter	908.10	6/22/2016	1	N/A	N/A
Municipal	High	Harbor-Torpedo	908.10	6/22/2016	N/A	N/A	N/A
Municipal	High	Shelter Island Boat Launch Ramp	908.10	5/18/2016	2	N/A	N/A
Municipal	High	Shelter Island Drive	908.10	5/16/2016	2	N/A	1
Municipal	High	Shelter Island Fishing Pier	908.10	5/16/2016	N/A	N/A	N/A
Municipal	High	Shelter Island Port Boat Maintenance and Dive Locker	908.10	6/30/2016	1	N/A	N/A
Municipal	High	Shelter Island Shoreline Park	908.10	5/16/2016	2	N/A	1
Municipal	High	Talbot Street	908.10	5/16/2016	N/A	N/A	N/A
Municipal	High	Lane Field Park	908.21	6/28/2016	N/A	N/A	N/A
Municipal	High	Ruocco Park	908.20	5/2/2016	N/A	N/A	N/A
Municipal	High	Broadway Pier Port Pavilion	908.21	5/23/2016	N/A	N/A	N/A
Municipal	High	Cancer Survivor's Park	908.21	5/18/2016	N/A	N/A	N/A
Municipal	High	Coast Guard	908.21	6/22/2016	1	N/A	1
Municipal	High	Convention Way	908.21	5/24/2016	N/A	N/A	N/A
Municipal	High	Embarcadero Marina Park, North	908.21	5/2/2016	N/A	N/A	N/A
Municipal	High	Embarcadero Marina Park, South	908.21	4/18/2016	N/A	N/A	N/A
Municipal	High	Embarcadero Park South Pier	908.21	5/24/2016	N/A	N/A	N/A
Municipal	High	Embarcadero-1	908.21	6/21/2016	2	N/A	1
Municipal	High	Embarcadero-2	908.21	6/21/2016	2	N/A	1
Municipal	High	Embarcadero-3	908.21	6/21/2016	2	N/A	1
Municipal	High	G Street Mole	908.21	5/23/2016	2	N/A	1
Municipal	High	Harbor Island Drive	908.21	5/26/2016	N/A	N/A	N/A
Municipal	High	Harbor Island Park	908.21	5/26/2016	N/A	N/A	N/A

Component	Priority	Facility Name	Watershed	Inspection Date	Follow-up Inspection [1]	Enforcement Required[2,3]	Escalated Enforcement[3,4]
Municipal	High	Harbor Island Taxi Road	908.21	5/26/2016	2	N/A	1
Municipal	High	Harbor Dr - Ash	908.21	6/21/2016	1	N/A	1
Municipal	High	Harbor-Laurel-1	908.21	6/22/2016	N/A	N/A	N/A
Municipal	High	Harbor-Laurel-2	908.21	6/22/2016	1	N/A	N/A
Municipal	High	Kettner Boulevard	908.21	5/24/2016	N/A	N/A	N/A
Municipal	High	Marina Park Way	908.21	5/31/2016	N/A	N/A	N/A
Municipal	High	Midway	908.21	6/29/2016	N/A	N/A	N/A
Municipal	High	N Embarcadero Artery	908.21	6/27/2016	N/A	N/A	N/A
Municipal	High	North Harbor Drive	908.21	6/16/2016	N/A	N/A	N/A
Municipal	High	Pacific Highway - Harbor Dr	908.21	6/20/2016	2	N/A	1
Municipal	High	Pacific Highway	908.21	5/24/2016	N/A	N/A	N/A
Municipal	High	Park Blvd	908.21	5/24/2016	N/A	N/A	N/A
Municipal	High	Rent A Car Access	908.21	5/26/2016	1	N/A	1
Municipal	High	Sea Port Village - Pacific Highway	908.21	6/20/2016	1	N/A	1
Municipal	High	Spanish Landing East Road	908.21	5/18/2016	N/A	N/A	N/A
Municipal	High	Spanish Landing Park	908.21	5/18/2016	N/A	N/A	N/A
Municipal	High	Tuna Harbor Park	908.21	5/23/2016	N/A	N/A	N/A
Municipal	High	Tuna Harbor Park Pier	908.21	5/23/2016	N/A	N/A	N/A
Municipal	High	W G Street	908.21	5/23/2016	N/A	N/A	N/A
Municipal	High	Belt Street	908.22	5/26/2016	N/A	N/A	N/A
Municipal	High	Cesar Chavez Park	908.22	5/25/2016	N/A	N/A	N/A
Municipal	High	Cesar E. Chavez Parkway	908.22	5/25/2016	N/A	N/A	N/A
Municipal	High	Crosby Road	908.22	5/25/2016	N/A	N/A	N/A
Municipal	High	Switzer Street	908.22	5/25/2016	N/A	N/A	N/A
Municipal	High	Water Street	908.22	5/24/2016	N/A	N/A	N/A
Municipal	High	General Services Department Administration Building	908.32	6/27/2016	1	N/A	1
Municipal	High	Pepper Park	908.32	5/26/2016	N/A	N/A	N/A
Municipal	High	Derelict Vessel lot	909.12	6/29/2016	2	N/A	1

Component	Priority	Facility Name	Watershed	Inspection Date	Follow-up Inspection [1]	Enforcement Required[2,3]	Escalated Enforcement[3,4]
Municipal	High	Bay Marina Drive	909.12	5/31/2016	2	N/A	1
Municipal	High	Bayside Parkway	909.12	5/31/2016	N/A	N/A	N/A
Municipal	High	Chula Vista Bayfront Park	909.12	4/18/2016	N/A	N/A	N/A
Municipal	High	Chula Vista Bayside Park	909.12	4/18/2016	N/A	N/A	N/A
Municipal	High	Chula Vista Bayside Park Pier	909.12	4/18/2016	1	N/A	1
Municipal	High	Chula Vista Boat Launch Ramp	909.12	4/18/2016	N/A	N/A	N/A
Municipal	High	G Street	909.12	5/31/2016	N/A	N/A	N/A
Municipal	High	Marina View Park	909.12	4/18/2016	N/A	N/A	N/A
Municipal	High	Quay Avenue	909.12	5/26/2016	2	N/A	1
Municipal	High	Sandpiper Way	909.12	5/31/2016	N/A	N/A	N/A
Municipal	High	Tidelands Avenue	909.12	5/26/2016	2	N/A	1
Municipal	High	W 28th Street	909.12	5/31/2016	N/A	N/A	N/A
Municipal	High	W 32nd Street	909.12	5/26/2016	2	N/A	1
Municipal	High	W J Street	909.12	5/31/2016	N/A	N/A	N/A
Municipal	High	Caribe Cay Boulevard North	910.1	6/1/2016	N/A	N/A	N/A
Municipal	High	Coronado Boat Launch Ramp	910.10	6/1/2016	N/A	N/A	N/A
Municipal	High	Coronado Grand Caribe Shoreline Park	910.10	6/1/2016	N/A	N/A	N/A
Municipal	High	Coronado Landing Park	910.10	6/1/2016	N/A	N/A	N/A
Municipal	High	Coronado Tidelands Park	910.10	6/1/2016	N/A	N/A	N/A
Municipal	High	Glorietta Road	910.10	6/1/2016	N/A	N/A	N/A
Municipal	High	ImpBch-Elkwood	910.10	5/31/2016	N/A	N/A	N/A
Municipal	High	ImpBch-Seacoast	910.10	5/21/2016	N/A	N/A	N/A
Municipal	High	Imperial Beach Dunes Park	910.10	5/31/2016	N/A	N/A	N/A
Municipal	High	Imperial Beach Municipal Pier	910.10	5/31/2016	1	N/A	1
Total Municipal Facilities initial and follow-up inspections:				79	39	0	20
Industrial							
Industrial	High	Nielsen Beaumont Marine Inc.	908.10	2/2/2016	N/A	N/A	N/A
Industrial	High	Driscoll Boat Works	908.10	2/3/2016	1	N/A	1

Component	Priority	Facility Name	Watershed	Inspection Date	Follow-up Inspection [1]	Enforcement Required[2,3]	Escalated Enforcement[3,4]
Industrial	High	Shelter Island Boatyard	908.10	2/9/2016	N/A	N/A	N/A
Industrial	High	Driscoll's West	908.10	5/12/2016	N/A	N/A	N/A
Industrial	High	Koehler Kraft Company, Inc.	908.10	6/21/2016	1	N/A	N/A
Industrial	High	CP Kelco	908.21	1/21/2016	1	N/A	1
Industrial	High	Solar Turbines Incorporated	908.21	5/10/2016	1	1	N/A
Industrial	High	Chesapeake Fish Company	908.21	1/5/2016	N/A	N/A	N/A
Industrial	High	Cruise Ship Terminal	908.21	2/16/2016	1	N/A	1
Industrial	High	Pacific Tugboat Service	908.22	3/24/2016	1	N/A	N/A
Industrial	High	Tenth Avenue Marine Terminal	908.22	5/26/2016	1	N/A	N/A
Industrial	High	BAE Systems San Diego Ship Repair	908.22	2/4/2016	N/A	N/A	N/A
Industrial	High	National Steel and Shipbuilding Company	908.22	3/21/2016	N/A	N/A	N/A
Industrial	High	Continental Maritime	908.22	5/25/2016	N/A	N/A	N/A
Industrial	High	Marine Group Boat Works- National City	908.32	2/10/2016	2	1	N/A
Industrial	High	Dixieline ProBuild - Distribution Center	908.32	2/25/2016	N/A	N/A	N/A
Industrial	High	National City Marine Terminal	908.32	5/24/2016	1	N/A	1
Industrial	High	Goodrich/South Campus	909.10	6/8/2016	1	N/A	N/A
Industrial	High	Marine Group Boat Works- Chula Vista	909.12	2/10/2016	1	N/A	N/A
Industrial	High	Harvest Meat Company, Inc.	909.12	2/2/2016	N/A	N/A	N/A
Industrial	High	Fabrication Technologies	909.12	2/3/2016	N/A	N/A	N/A
Industrial	High	Pepper Oil Company, Inc.	909.12	2/5/2016	1	N/A	1
Industrial	High	San Diego Cold Storage	909.12	2/25/2016	1	N/A	1
Total Industrial Facilities initial and follow-up inspections:				23	14	2	6
Commercial[5]							
Commercial	Low	VMT Auto Sales	910.2	1/27/2016	N/A	N/A	N/A
Commercial	High	Bali Hai Restaurant	908.1	1/4/2016	1	1	N/A
Commercial	High	Point Loma Seafood's	908.1	5/11/2016	1	N/A	N/A
Commercial	High	Red Sails Inn	908.1	5/20/2016	1	N/A	1
Commercial	Medium	Best Western Posada At The Yacht Harbor	908.1	1/5/2016	1	N/A	1

Component	Priority	Facility Name	Watershed	Inspection Date	Follow-up Inspection [1]	Enforcement Required[2,3]	Escalated Enforcement[3,4]
Commercial	High	Humphrey's Half Moon Inn and Suites	908.1	1/11/2016	1	N/A	N/A
Commercial	High	Bay Club Hotel and Marina	908.1	2/16/2016	N/A	N/A	N/A
Commercial	High	Kona Kai Resort	908.1	5/17/2016	1	1	N/A
Commercial	Medium	Holiday Inn San Diego Bayside	908.1	5/24/2016	1	N/A	1
Commercial	High	Best Western Island Palms Hotel	908.1	5/26/2016	N/A	N/A	N/A
Commercial	High	Driscoll's Wharf	908.1	1/28/2016	N/A	N/A	N/A
Commercial	High	Gold Coast Anchoring Marina	908.1	2/2/2016	N/A	N/A	N/A
Commercial	High	Shelter Cove Marina	908.1	2/24/2016	N/A	N/A	N/A
Commercial	High	Silver Gate Yacht Club	908.1	5/12/2016	N/A	N/A	N/A
Commercial	High	Marina Kona Kai (and Yacht Club)	908.1	5/17/2016	1	N/A	1
Commercial	High	Sun Harbor Marina	908.1	5/19/2016	N/A	N/A	N/A
Commercial	High	San Diego Yacht Club	908.1	5/19/2016	N/A	N/A	N/A
Commercial	High	Coronado Cays Yacht Club	908.1	5/19/2016	N/A	N/A	N/A
Commercial	High	Southwestern Yacht Club	908.1	5/24/2016	N/A	N/A	N/A
Commercial	High	Point Loma Marina	908.1	5/25/2016	N/A	N/A	N/A
Commercial	Low	Baker Marine Instruments and Repair	908.1	1/28/2016	N/A	N/A	N/A
Commercial	Medium	San Diego Marine Exchange, Inc.	908.1	2/3/2016	N/A	N/A	N/A
Commercial	Medium	Eichenlaub Marine	908.1	2/22/2016	1	N/A	N/A
Commercial	High	Marlin Club (Fish Weighing)	908.1	2/22/2016	1	N/A	1
Commercial	Medium	Outboard Boating Club	908.1	3/10/2016	N/A	N/A	N/A
Commercial	High	Coronado Ferry Landing	908.1	6/21/2016	N/A	N/A	N/A
Commercial	High	Scott Street Parking, Inc.	908.1	5/18/2016	N/A	N/A	N/A
Commercial	High	Hallmark Yachts, Inc.	908.1	2/1/2016	N/A	N/A	N/A
Commercial	High	Crow's Nest Yacht Sales and Ship Brokerage	908.1	2/4/2016	1	N/A	1
Commercial	High	High Seas Fuel Dock	908.1	1/19/2016	N/A	N/A	N/A
Commercial	High	Pearson Marine Fuels Inc.	908.1	1/27/2016	N/A	N/A	N/A
Commercial	High	H and M Sportfishing Landing	908.1	2/24/2016	N/A	N/A	N/A
Commercial	High	Fisherman's Landing	908.1	5/18/2016	N/A	N/A	N/A

Component	Priority	Facility Name	Watershed	Inspection Date	Follow-up Inspection [1]	Enforcement Required[2,3]	Escalated Enforcement[3,4]
Commercial	High	Point Loma Sportfishing Association	908.1	5/18/2016	N/A	N/A	N/A
Commercial	Low	Sound of Beach	908.1	2/25/2016	N/A	N/A	N/A
Commercial	High	Tonga Landing	908.1	2/29/2016	N/A	N/A	N/A
Commercial	High	Shelter Island Fuel Dock	908.1	N/A[5]	N/A	N/A	N/A
Commercial	Medium	Fish Market Restaurant and Top of the Market	908.21	1/6/2016	1	N/A	N/A
Commercial	High	Joe's Crab Shack	908.21	1/6/2016	N/A	N/A	N/A
Commercial	High	Anthony's Fish Grotto and Star of the Sea Room	908.21	1/7/2016	1	N/A	N/A
Commercial	High	Island Prime	908.21	5/12/2016	1	N/A	N/A
Commercial	High	Tom Ham's Lighthouse	908.21	5/18/2016	1	N/A	1
Commercial	Medium	San Diego Airport Hilton	908.21	1/11/2016	N/A	N/A	N/A
Commercial	High	Manchester Grand Hyatt	908.21	1/25/2016	N/A	N/A	N/A
Commercial	High	Wyndham San Diego Bayside	908.21	2/11/2016	1	N/A	1
Commercial	High	San Diego Marriott Marquis and Marina	908.21	5/10/2016	1	N/A	N/A
Commercial	High	Hilton - San Diego Bayfront	908.21	5/11/2016	1	N/A	1
Commercial	High	Sheraton San Diego Hotel & Marina	908.21	5/17/2016	1	N/A	1
Commercial	High	Marina Cortez, Inc.	908.21	1/4/2016	1	N/A	N/A
Commercial	High	Harbor Island West Marina	908.21	2/9/2016	1	N/A	N/A
Commercial	High	Sunroad Marina	908.21	2/23/2016	N/A	N/A	N/A
Commercial	High	Fifth Avenue Landing	908.21	5/11/2016	1	N/A	N/A
Commercial	High	Cabrillo Isle Marina	908.21	5/26/2016	1	N/A	N/A
Commercial	High	USS Midway Museum	908.21	2/5/2016	N/A	N/A	N/A
Commercial	High	Maritime Museum Assoc. of SD	908.21	2/8/2016	1	N/A	1
Commercial	Medium	San Diego Convention Center Corporation	908.21	3/3/2016	N/A	N/A	N/A
Commercial	High	Seaport Village Management	908.21	5/24/2016	1	N/A	1
Commercial	High	Budget Rent A Car	908.21	1/7/2016	1	N/A	N/A
Commercial	Medium	Park, Shuttle, & Fly Airport Parking	908.21	1/12/2016	N/A	N/A	N/A
Commercial	High	National Rental Car	908.21	1/14/2016	1	N/A	N/A
Commercial	High	Avis Rent A Car	908.21	1/14/2016	N/A	N/A	N/A

Component	Priority	Facility Name	Watershed	Inspection Date	Follow-up Inspection [1]	Enforcement Required[2,3]	Escalated Enforcement[3,4]
Commercial	High	Hertz Rental Car	908.21	5/25/2016	1	N/A	1
Commercial	Medium	Bob Stivers Shell #2	908.21	1/12/2016	N/A	N/A	N/A
Commercial	High	Hornblower Cruises and Events	908.21	2/8/2016	N/A	N/A	N/A
Commercial	High	Flagship Cruises & Events	908.21	6/29/2016	N/A	N/A	N/A
Commercial	Medium	Park N' Go Inc.	908.21	2/17/2016	N/A	N/A	N/A
Commercial	Low	American Tuna Boat Association	908.21	3/8/2016	N/A	N/A	N/A
Commercial	Low	San Diego Sports Fishing Association	908.21	N/A[5]	N/A	N/A	N/A
Commercial	High	Chula Vista Marina (and RV Park)	909.12	1/13/2016	1	N/A	1
Commercial	High	California Yacht Marina	909.12	1/26/2016	N/A	N/A	N/A
Commercial	High	Pier 32 Marina	909.12	5/19/2016	1	N/A	N/A
Commercial	High	JJ's Sunset Deli	909.12	N/A[5]	N/A	N/A	N/A
Commercial	High	Glorietta Bay Marina	910.1	6/28/2016	N/A	N/A	N/A
Commercial	High	Coronado Ferry Landing Management	910.1	6/21/2016	1	N/A	N/A
Commercial	High	Cow-A-Bunga Micro Ice Creamery	910.1	2/17/2016	N/A	N/A	N/A
Commercial	High	The Tin Fish Restaurant	910.10	2/17/2016	N/A	N/A	N/A
Commercial	High	Loews Coronado Bay Resort	910.10	4/28/2016	N/A	N/A	N/A
Commercial	High	Coronado Island Marriott Resort	910.10	4/28/2016	1	N/A	1
Commercial	High	Coronado Yacht Club	910.10	4/28/2016	N/A	N/A	N/A
Total Commercial Facilities initial and follow-up inspections:				76	32	2	15

[1] Follow-up inspections were conducted to ensure corrective actions, such as BMP maintenance, that were identified during an initial inspection are adequately addressed. Corrective actions are relayed to the facility through inspection reports that also serve as written warnings to the facility regarding stormwater compliance.

[2] Municipal facilities: Where corrective actions or discharges were observed at Port maintained facilities, Port stormwater staff submited a compliance work request to the General Services's Department to make corrective actions immediately or as soon as feasible.

[3] All non-compliance issues requiring corrective enforcement actions were resolved and closed.

[4] Escalated enforcement: Any enforcement scenario where a violation or other non-compliance is determined to cause or contribute to the highest or focused priority conditions identified in the San Diego Bay WQIP. The Port's priorities are trash, bacteria, and metals. Of the facility inspections requiring enforcement, 10 out of 15 commercial facility violations and three out of eight industrial facility violations were due to missing stormwater training documentation.

[5]Two facilities in the Port's inventory were not inspected in FY 2016. Shelter Island Fuel Dock does not exist and JJ's Sunset Deli was not in operation. One facility in the inventory, San Diego Sports Fishing Association, is a sub-tenant of a master leaseholder facility and inspected with that facility's inspection.

Table 12-5. Summary of Municipal - Special Event Inspections During 2015-2016.

Watershed	Park Facility Name	Event Name	Pre-Event Inspection Date	Post-Event Inspection Date	Follow-up Required (Y/N)	Follow-up Inspection[1]	Escalated Enforcement[2]
908.1	Scott Street Parking lot	Day at the Docks NPCE	4/13/2016	4/18/2016	Yes	4/25/2016	None
908.1	Shelter Island Shoreline Park	Open Bay Bass Tournament	1/11/2016	1/25/2016	No	N/A	N/A
908.2	Broadway Pier & Pavilion	U.S. Sand Sculpting Challenge and Dimensional Art Exposition	9/4/2015	9/9/2015	No	N/A	N/A
908.2	Broadway Pier & Pavilion	Latin Food Festival	8/12/2015	8/17/2015	Yes	8/18/2015	None
908.2	Broadway Pier & Pavilion	San Diego Reader Feast	9/10/2015	9/14/2015	No	N/A	N/A
908.2	Broadway Pier & Pavilion	OCT Amtrak Century	9/10/2015	9/14/2015	No	N/A	N/A
908.2	Broadway Pier & Pavilion	San Diego HP Global Launch	11/2/2015	11/3/2015	No	N/A	N/A
908.2	Broadway Pier & Pavilion	San Diego Brewers Guild Festival	11/5/2015	11/3/2015	No	N/A	N/A
908.2	Broadway Pier & Pavilion	New Years Eve at Broadway	12/29/2015	1/4/2016	No	N/A	N/A
908.2	Broadway Pier & Pavilion	The Mustache Bash	4/1/2016	4/4/2016	No	N/A	N/A
908.2	Broadway Pier & Pavilion	Charles Froup Corporate Reception	4/7/2016	4/12/2016	No	N/A	N/A
908.2	Broadway Pier & Pavilion	Networking & Sales Entertainment event	4/7/2016	4/12/2016	No	N/A	N/A
908.2	Broadway Pier & Pavilion	Team Rady 2016	5/4/2016	5/12/2016	No	N/A	N/A
908.2	Broadway Pier & Pavilion	Makers Arcade	5/19/2016	5/23/2016	No	N/A	N/A
908.2	Embarcadero Marina Park North	No Alec Zone Rally	7/21/2015	7/23/2015	No	N/A	N/A
908.2	Embarcadero Marina Park North	2015 San Diego Free to Breath Run/Walk	8/7/2015	8/10/2015	No	N/A	N/A
908.2	Embarcadero Marina Park North	Relay For Life Of Downtown San Diego	8/13/2015	8/17/2015	Yes	8/26/2015	None
908.2	Embarcadero Marina Park North	D + H Corporate Celebration	9/2/2015	9/3/2015	No	N/A	N/A
908.2	Embarcadero Marina Park North	CPO Pride Day 2015	9/9/2015	9/14/2015	No	N/A	N/A
908.2	Embarcadero Marina Park North	San Diego Blues Festival	9/21/2015	9/28/2015	Yes	9/28/2015	None
908.2	Embarcadero Marina Park North	Autonomy Farms Dinner	10/7/2015	10/16/2015	Yes	10/20/2015 & 10	None
908.2	Embarcadero Marina Park North	San Diego Bay Wine & Food Festival	11/2/2015	11/3/2015	Yes	Photos submitted by event coordinator	None
908.2	Embarcadero Marina Park North	5K Super Run	3/4/2016	3/7/2015	No	N/A	N/A
908.2	Embarcadero Marina Park North	Uncorked Wine Festivals	4/1/2016	4/4/2016	No	N/A	N/A
908.2	Embarcadero Marina Park North	4th Annual Day @ The Bay Show & Shine	4/12/2016	4/13/2016	Na	N/A	N/A
908.2	Embarcadero Marina Park North	San Diego Oyster Festival 2016	*	6/21/2016	No	N/A	N/A
908.2	Embarcadero Marina Park South	San Diego Symphony Summer Pops	7/2/2015	7/8/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	San Diego Symphony Summer Pops	7/9/2015	7/13/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	San Diego Symphony Summer Pops	7/13/2015	7/20/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	Picnic For Cubic	7/16/2015	7/20/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	San Diego Symphony Summer Pops	7/20/2015	7/24/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	Fire Fighter Chili Cookoff	7/24/2015	7/27/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	CFS/SPF Annual Open Reception	7/24/2015	7/27/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	San Diego Symphony Summer Pops	7/30/2015	8/3/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	San Diego Symphony Summer Pops	8/6/2015	8/10/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	San Diego Symphony Summer Pops	8/13/2015	8/17/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	8th Annual Bike the Bay	8/18/2015	8/24/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	San Diego Symphony Summer Pops	8/20/2015	7/28/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	San Diego Symphony Summer Pops	9/3/2015	9/4/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	El Festival del Grito	9/10/2015	9/14/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	Susan G. Komen SD 3 Day Walk	11/2/2015	11/3/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	Lung Force Walk Event Site	11/4/2015	11/9/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	Fit Foodie 5K Event Site	11/4/2015	11/9/2015	Yes	11/10/2015	None
908.2	Embarcadero Marina Park South	FanDuel World Fantasy Football Championship	12/11/2015	12/14/2015	No	N/A	N/A
908.2	Embarcadero Marina Park South	Best Coast Beer Festival	3/3/2016	3/14/2016	No	N/A	N/A
908.2	Embarcadero Marina Park South	Speak Up 5K	4/15/2016	4/18/2016	No	N/A	N/A
908.2	Embarcadero Marina Park South	Walk for Wishes 5K	4/21/2016	4/25/2016	No	N/A	N/A
908.2	Embarcadero Marina Park South	FroYo Run	4/28/2016	5/2/2016	Yes	5/9/2016	**Administrative Citation**

Watershed	Park Facility Name	Event Name	Pre-Event Inspection	Post-Event Inspection	Follow-up Required	Follow-up Inspection[1]	Escalated Enforcement[2]
908.2	Embarcadero Marina Park South	Bacon and Barrels	5/19/2016	5/23/2016	Yes	5/25/2016	None
908.2	Harbor Drive/Ash Street Parking Lot	Port of San Diego Festival of Sail	9/4/2015	9/8/2015	No	N/A	N/A
908.2	Ruocco Park	BAMF	7/10/2015	7/13/2015	No	N/A	N/A
908.2	Ruocco Park	Microsoft Tailgaming	11/5/2015	11/9/2015	No	N/A	N/A
908.2	Ruocco Park	Bumble Bee 5k	12/29/2015	1/4/2016	No	N/A	N/A
908.2	Ruocco Park	Campagnolo Granfondo San Diego	4/6/2016	4/11/2016	No	N/A	N/A
908.2	Ruocco Park	San Diego International Triathalon	6/24/2016	6/27/2016	No	N/A	N/A
908.2	Spanish Landing Park	Mammoth Heart	4/21/2016	4/25/2016	No	N/A	N/A
908.2	Spanish Landing Park	National MS Society Walk 2016	4/22/2016	4/25/2016	No	N/A	N/A
908.2	Spanish Landing Park	Gator By the Bay	5/3/2016	5/9/2016	Yes	5/11/2016	**Administrative Citation**
908.2	Spanish Landing Park	San Diego International Boat Show	*	6/22/2016	No	N/A	N/A
908.3	Pepper Park	Mariachi Festival	3/8/2016	3/14/2016	No	N/A	N/A
908.3	Pepper Park	Dia De San Juan Portorican Festival	6/21/2016	6/27/2016	No	N/A	N/A
909.1	Chula vista Bayside Park	Chula Vista Challenge	7/17/2015	7/20/2015	No	N/A	N/A
909.1	Chula Vista Bayside Park	Chula Vista Harbor Fest	8/20/2015	8/24/2015	No	N/A	N/A
909.1	Chula Vista Bayside Park	South Bay Pride Art and Music Festival	9/10/2015	9/14/2015	No	N/A	N/A
909.1	Chula Vista Bayside Park	CV Bayfront Parade Band Review & Festival A Salute to Veterans	11/13/2015	11/15/2015	No	N/A	N/A
909.1	Chula Vista Bayside Park	Go Green & Clean	4/7/2016	4/12/2016	No	N/A	N/A
909.1	Chula Vista Bayside Park	We Support U 5K RunWalk	4/12/2016	4/18/2016	No	N/A	N/A
909.1/908.2	Chula Vista Bayside Park / Embarcadero Marina Park South	Ragnar Relay SoCal 2016	4/1/2016	4/4/2016	No	N/A	N/A
909.1	Chula Vista Marina View Park	Annual South Bayfront Pow-Wow	7/27/2015	8/3/2015	No	N/A	N/A
910.1	Coronado Tidelands Park	Symphony Concert For Coronado	8/12/2015	8/17/2015	No	N/A	N/A
910.1	Coronado Tidelands Park	GKN Aerospace Picnic	9/10/2015	9/14/2015	No	N/A	N/A
910.1	Coronado Tidelands Park	Navy's 30th Bday	5/13/2016	5/16/2016	No	N/A	N/A
Total Special Event Inspections and follow-up inspections:			**70**	**72**	**10**	**-**	**2**

[1]The need for a follow-up inspections is based on the post-event inspection results.

[2]Escalated enforcement: Any enforcement scenario where a violation or other non-compliance is determined to cause or contribute to the highest or focused priority conditions identified in the San Diego Bay WQIP. The Port's priorities are trash, bacteria, and metals. Of the 72 Special Events that occurred on Port tidelands, **two** required escalated enforcement. Corrective actions were taken by both event organizers and the items were closed.

*Pre-event inspection was not completed due to availability of Port staff

Table 12-6. MS4 Inventory and Inspections During 2015-2016

MS4	Inventory[1]		Inspected	Percent (%) of Inventory Inspected[2]
Total MS4				
	Original	**Revised**		
Catch Basins and Inlets	597	516	585	98%
Manholes	65	51	64	98%
Outfalls	154	154	131	86%
Total MS4	816	721	780	96%
High Priority MS4				
	Original	**Revised**		
Catch Basins and Inlets	592	511	585[3]	99%
Manholes	65	51	64[4]	98%
Outfalls	153	153	131[5]	86%
Total High Priority	810	715	780	96%
Non-High Priority MS4				
Catch Basins and Inlets	5		N/A	N/A
Manholes	0		N/A	N/A
Outfalls	1		N/A	N/A
Total Non-High Priority	6		N/A	N/A
Stormwater Conveyance (miles)				
Total High Priority	16.1[6]		16.1	100%
Total Non-High Priority	0.08		N/A	N/A
Total Miles	16.2		16.1	99%
BMPs				
Total High Priority	115		115	100%
Non High Priority	0		N/A	N/A
Port Total	115		115	100%
Stormwater Conveyance Cleaning				
Total Cleaned (miles)			2.2	
BMP and MS4 Cleanings[7]				
Structure Type	**# Cleaned**		**Trash Observed[8]**	**% With Trash Observed**
BMPs	26		14	53%
MS4s	48		18	38%

1. The 2015 JRMP update indicates 816 total municipal MS4 structures and 810 total high priority municipal MS4 structures in the inventory; however, there were a total of 95 structures confirmed abandoned or removed based on 2015-2016 MS4 inspections. The numbers in the "Revised" column reflect the new MS4 inventory numbers based on the removal of these 95 structures.
2. Percentages are based on 15-16 original inventory numbers (inventory numbers prior to removal of abandoned or removed structures).
3. A total of 5 catch basins were inaccessible and 2 catch basins were located in construction areas with BMPs on them and were not inspected.

4. One manhole was not inspected for traffic safety reasons.
5. All 21 uninspected outfalls were either tidally inundated or inaccessible. In each of these instances, at least one MS4 feature on the outfall's line was inspected.
6. Approximately 2 miles of stormwater conveyance line was confirmed abandoned or removed as a result of construction.
7. BMPs and MS4s were cleaned if inspections indicated >33% accumulation of debris in the structure.
8. Top 2 debris categories accumulated in MS4 and/or BMP structure are recorded during inspections (grass, leaves, sediment, vegetation, debris, or trash). This column denotes MS4 and BMP structures with > 33% accumulation of debris and trash as one of the top 2 observed debris categories.

Table 12-7. Overall Education Activities for Identified Target Audiences during 2015-2016

Target Audience	# of Activities	# of People
Municipal Development Planning	2	25
Municipal Construction	6	77
Municipal Industrial and Commercial[1]	8	52
Municipal Marine	1	10
Municipal Other	9	501
Construction Site Owners and Developers	5	708
Industrial and Commercial Owners and Operators[1]	6	108
Residential Community and General Public[2]	42	133,992
School Children	13	17,810
TOTAL	**92**	**153,283**

[1]A training video created by the Port, entitled *"Port of San Diego's Storm water Best Management Practices (BMP) Training for Industrial and Commercial Facilities,"* was made available to commercial and industrial tenants to be shown at training events in FY 2016. The training video has been viewed 1,191 times since it was published in November 2015 (https://www.portofsandiego.org/environment/stormwater/302-stormwater-management-program.html).

[2] Residential Community and General Public activities include: 16 cleanups (1,748 people), 12 public seminars or outreach events (105,694 people), and sponsorship of Think Blue San Diego PSA announcements (26,550 people).

Table 12-8. Education Activities Reaching Underserved Audiences During 2015-2016

Activity	Completion Date	Description of Underserved Audience Reached	Number Reached
Chula Vista Elementary School District Education Program at the Living Coast Discovery Center	May-16	At least 50% of the schools are Title 1	4,919
Groundworks San Diego Chollas Creek - Chollas Creek to SD Bay Waterkeepers Initiative[1]	May-16	All participating schools are Title 1	600
I Love a Clean San Diego - Kicking Trash, Connecting Kids to Conservation	Feb-16	Title 1 schools reached	934
Living Coast Discovery Center Educational Program	May-16	At least 50% of the schools are Title 1	2,173
Maritime Museum of San Diego Educational Outreach	May-16	At least 50% of the schools are Title 1	790
Ocean Discovery Insitute - Wetland Avengers Field Trips[1]	May-16	At least 50% of the schools are Title 1	953
Ocean Discovery Institute - Ocean Science Explorers, City to Bay Scientists[1]	Feb-16	All participating schools are Title 1	950
Resource Conservation District– Watershed Education Program	May-16	At least 50% of the schools are Title 1	2,460
San Diego Coastkeeper San Diego Bay Environmental Education Kit	May-16	At least 50% of the schools are Title 1	806
The Green Machine	May-16	Title 1 schools reached	1,505
The Ocean Foundation/ The Ocean Connectors - Sea Turtle Education Services	May-16	All participating schools are Title 1	605
The Ocean Foundation/ The Ocean Connectors - Whale Exploration Foundation	May-16	At least 50% of the schools are Title 1	590
Wildcoast - Sea Turtle Education Program	May-16	At least 50% of the schools are Title 1	525
		TOTAL	17,810

[1]Educational programs specifically occurring within the Chollas Creek HSA (908.22). In addition,six watershed education presentations to 142 high school studentsby I Love A Clean San Diego also occured in Chollas Creek.

Table 12-9. Public Participation Opportunities During 2015-2016			
Opportunity	**Target**	**Target Reached?**	**Summary**
Port Environmental Committee	Collaborate	Yes	Collaboration was successfully achieved during the reporting period. At the 3 meetings held, an average of 25 stakeholders attended at each meeting. They represented non-profit groups, Port Tenants, academia, consultants and government agencies. Tehse stakeholders were given the opportunities to review documents, make comments on presentations, and provide input on the selection of enviromental projects benefitting San Diego Bay. Specific projects with opportunity for collaboratoin and relevance to the JRMP included presentations on the California Energy Commission/ Port Collaboarative, native oyster reefs, Climate Action Plan, aquaculture, the Regional Harbor Monitoring Program, mitigation banking and Port Environmental Fund sponsored projects.
Board of Port Commissioner (BPC) Meetings	Consult	Yes	Consultation was successfully achieved during the reporting period. At the BPC meetings held, a told of 92 public comments were made on environmental issues from stakeholders representing non-profit groups, private industry, and Port tenants. All of the comments were taken into consideration during the decision-making process by the Board of Port Commissioners.
Copper Reduction Program	Involve	Yes	Involvement was successfully achieved during the reporting period. Several stakeholders attended the Port's Clean and Green Boating Expo a key outreach event for the Copper Reduction Program. They represented nonprofit groups, Port tenants, local boating public and businesses, and the public. The Port also interacted with stakeholders through their participation in 4 other local boating-related community events: Day at the Docks, Earth Day at the Bay, San Diego Boat Show and the Sunroad Boat Show.
Integrated Pest Management (IPM) Committee	Collaborate	Yes	Collaboration was successfully achieved during the reporting period. On May 19, 2016, the Port sponsored IPM for Landscape Professionals seminar was attended by **117** gardening and landscape professionals. The participants learned about activity-specific BMPs, laws and regulations applicable to pesticide use. The seminar also highlighted the connection between water quality impacts and pesticide use throughout the tideland.

Table 12-10. San Diego County Copermittees Fiscal Analysis Report for Urban Runoff Management Programs.

Copermittee Name:	Port of San Diego
Date:	1/31/2017
Reporting Year:	2015-2016

EXPENDITURE SUMMARY

ADMINISTRATION/MUNICIPAL/IDDE	$	1,570,553
DEVELOPMENT PLANNING/CONSTRUCTION	$	281,698
INDUSTRIAL AND COMMERCIAL	$	255,254
RESIDENTIAL	$	-
EDUCATION	$	264,811
PUBLIC PARTICIPATION	$	-
SPECIAL INVESTIGATIONS/TMDL SUPPORT	$	447,912
NON-EMERGENCY FIREFIGHTING		
	$	**2,820,228**

San Diego Bay Watershed	$	113,592
	$	**113,592**

Copermitttee Cost Share of Regional Budget	$	25,204
	$	**25,204**

	$	**2,959,024**

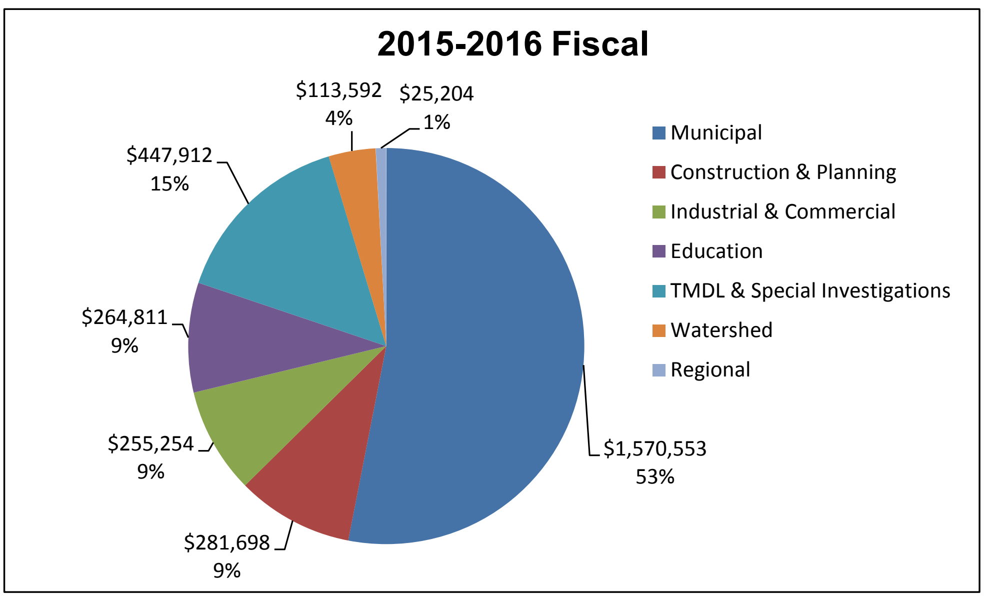

Table 12-11. 2015-2016 Port Staffing Expenditures by Program Component & Activity.

Category	Category Description	Total Spent
MUNICIPAL		
Administration	Administration includes general administrative activities, meetings, general reporting, and PGP staffing for the implementation of the Municipal Stormwater Permit.	$193,485
Municipal Inspections	Includes PGP staffing for storm drain inspections, site inspections (parks, Port facilities, etc.), special event inspections, departmental meetings, storm drain markers/GPS efforts, and BMP studies.	$37,618
Waste Management	PGP staffing to begin development of Waste Program	$7,388
BMP Implementation	General Services dept. staffing for street sweeping.	$198,782
BMP Implementation	General Services dept. staffing for bay debris.	$24,966
BMP Implementation	General Services dept. staffing for trash collection.	$776,882
Other expenditures	Includes PGP staffing for GIS and database management and GIS/Mapping/data utilization.	$2,370
CONSTRUCTION & PLANNING		
Compliance Inspections & Enforcement	Construction activities include meetings with contractors, Port engineers and construction staff, site inspections, follow-ups, and written correspondence.	$65,023
Project Planning & Engineering	Environmental project and proposal review, SUSMP applicability and the review of SWPPP and SUSMP documents.	$22,991
INDUSTRIAL / COMMERCIAL		
Industrial Compliance	Industrial compliance includes staff time for the implementation of the Industrial Permit for the TAMT, NCMT, and Cruise Ship Terminal.	$69,379
IGP Program Update	SWPPP template updates for marine terminals and facilities	$1,590
Compliance Inspections & Enforcement	Tenant compliance includes industrial and commercial inspections (including all follow-ups, written correspondence, meetings, etc.), and ICID tenant issues.	$33,115
EDUCATION		
Education & Outreach	Education includes Port staff training, adult education, children (school) education, regional education meetings, regional outreach efforts, internal and external outreach events, clean-up events, brochure development and website development.	$28,797
WATERSHED		
Administration	Watershed management includes staff time for meetings and report preparation, GIS/Mapping, WQIP strategies (PO-19, PO-20, PO-30, PO-43, PO-44, PO-46, PO-47) watershed education, watershed cleanup events (PO-39), MS4 Permit, etc.	$38,761

Table 12-11. 2015-2016 Port Staffing Expenditures by Program Component & Activity.

TMDL		
SIYB TMDL Implementation	SIYB TMDL for Dissolved Copper /Copper Reduction Program.	$136,936
SISP TMDL	TMDL bacteria sampling, meetings, reporting	$23,117
Chollas TMDL Collaboration	Chollas Creek TMDL for Diazinon, Dissolved Metals and Bacteria.	$4,581
URBAN RUNOFF & RECEIVING WATER MONITORING		
Regional Harbor Monitoring	Regional Harbor Monitoring includes staff time for meetings report preparation and review, coordination and planning.	$9,125
MS4 Permit Required Monitoring	Monitoring includes field work for dry weather monitoring and coastal monitoring, report preparation, ICID response to incoming calls and investigations resulting from complaints.	$7,900
Other Monitoring Programs	Monitoring includes participation in RWQCB San Diego Bay Strategy and San Diego Bay Debris Study	$2,075
	2015-2016 Total Staffing Expenditures	**$1,684,881**

Table 12-12. 2015-2016 Port External Expenditures by Program Component & Activity.

Component	Program Description	Total Spent
PERMITS & FEES		
Copermittee Regional Cost Share	Regional MOU cost share, Wet Weather Copermittee Mass Loading Station Monitoring Program and cost share for Bacterial Reference study.	$25,204
SD Bay Watershed Collaboration Cost Share	Watershed consultant support forcompleting and implementing San Diego Bay WQIP (Port portion of cost-share only)	$8,017
Permits	Fees for municipal, industrial and construction permits.	$8,425
EDUCATION		
Outreach/Education Support	Consultant support for staffing education & outreach efforts for the stormwater program.	$9,552
Ocean Discovery Institute (formerly Aquatic Adventures)	Fourth graders within the Port School Partnerships Program participate in "Wetland Avengers", a program that teaches students about wetlands in south San Diego Bay .	$37,032
I Love a Clean San Diego	"Kicking Trash: Connecting kids to conservation" program and watershed presentation to students	$22,284
Living Coast Discovery Center	Provides 40 classrooms teacher training and docent-lead tours of the Nature Center.	$67,800
The Ocean Foundation	Elementary school education program	$11,000
Green Machine Outreach Van	Mobile agriculture education program featuring I.P.M. & water cycle demonstrations to 43 schools along Chollas Creek.	$9,370
Groundwork SD - Chollas	Educational outreach program.	$9,793
I.P.M. Training Seminars	Coordinates and funds annual seminars for San Diego County pest controllers on Integrated Pest Management methods and pollution reduction.	$9,000
Maritime Museum Association of San Diego	Educational outreach program.	$20,000
Resource Conservation District	Brings interactive watershed model to classrooms for watershed and storm water demonstrations.	$14,593
Pro Peninsula/ Ocean Foundation	Sea turtle education program.	$7,584
San Diego Coastkeeper		$1,106
Chula Vista School District	Environmental Education Program	$12,400
WiLDCOAST	Provides sea turtle education to students in San Diego County.	$4,500
CONSTRUCTION SUPPORT		
Tenant Projects - Inspections & Support		$104,469
Capital Projects - Inspections & Support		$24,505
USMP and SWPPP Review	Review of SUSMP and SWPPP Documents, consultant support w/JRMP Report, Alternative Compliance Program (PO-42) and template development, and SWQMP Development.	$64,710
INDUSTRIAL COMMERCIAL SUPPORT		
Commercial/Industrial facilities inspection	Contracted services for assistance with conducting inspections of commercial and industrial facilities.	$29,012

Table 12-12. 2015-2016 Port External Expenditures by Program Component & Activity.

TMDL SUPPORT		
SIYB TMDL Implementation	Contracted services for implementation plan, compliance monitoring, reporting, and education efforts.	$196,428
Other TMDL related studies	Contracted services for review, implementation, and monitoring of existing or draft TMDLs (i.e., Shelter Island Shoreline Park).	$7,127
Chollas Creek TMDL Implementation	Port cost-share for Chollas Creek TMDL Compliance.	$4,394
SPECIAL STUDIES & INVESTIGATIONS		
Regional Harbor Monitoring	Compliance with RWQCB directive issued in July 2003.	$64,129
STORMWATER PERMIT MONITORING		
Outfall Monitoring	Includes coastal and targeted MS4 outfall monitoring and transitional monitoring.	$2,090
Industrial Monitoring and Review	Wet weather monitoring at Port Industrial Facilities also includes update to Industrial Stormwater permit (IGP) program and SWPPP review.	$122,158
WATERSHED & OTHER COLLABORATIVE EFFORTS		
SD Bay Watershed	Consultant support for Focused Priority Condition monitoring, and implementing watershed strategies (PO-23 and PO-47)	$65,814
Watershed group-related clean up events	A watershed-based activity sponsored and conducted by the Port as one if the San Diego Bay Watershed Copermittees.	$1,000
MUNICIPAL ACTIVITIES OPERATIONS & MAINTENANCE		
Stormwater Data Management	Contracted services for development and implementation of stormwater database.	$10,788
Trash Collection	Contracted services for waste pick-up, removal, and disposal.	$209,464
Recycling	Paper, glass, plastic, and aluminum recycling for Port facilities.	$16,290
Waste Collection	Baywide debris removal and clean-up programs - Operation Clean Sweep.	$20,000
Stormwater Training, Equipment & Supplies	Provides training for staff, equipment for monitoring projects, special studies, and ICID investigations. (analyte kits, field computers, Arc-pad, etc.), printed materials, meeting supplies, etc.	$4,468
MS4 Maintenance	Contracted services for inspections, maintenance, repair/replacement and cleaning of MS4 and Port owned BMPs.	$49,637
TOTAL		**$1,274,143**

12.3 PORT OF SAN DIEGO STRATEGIES

In FY 2016, the Port implemented strategies as identified in the San Diego Bay Watershed WQIP to address the watershed's Highest Priority and Focused Priority Conditions. In order to capture the benefits and efficiencies of standardized routines and requirements, a majority of the Port's strategies were implemented jurisdiction-wide; such as requiring the same minimum best management practices (BMPs) for construction sites regardless of location. The Port also identified targeted strategies focused on specific priority condition areas. Overall, the Port's strategies targeted trash, bacteria, and metals as the primary pollutants to address the WQIP's Highest and Focused Priority Conditions.

In June 2015, the Port updated its JRMP and incorporated the WQIP strategies thereby meeting the requirements of the Municipal Permit. All of the seventeen (17) strategies identified for FY 2016 were implemented along with eighteen additional (18) optional strategies. The two-page JRMP annual report form with supplemental Tables 12-1 through 12-12 and WQIP Strategies in Table 12-13 provide more information on the Port's activities in FY 2016.

<u>JRMP Implementation</u>

The Port's JRMP program was implemented in accordance with the Municipal Permit requirements. The Regional Board JRMP Annual Report Form and supplemental tables in Section 12.2 contain a more detailed account of the activities conducted and the programs implemented to address the inspection, monitoring, investigation, education, and enforcement requirements of the Municipal Permit.

Several notable accomplishments occurred during the FY 2016 reporting period. Collectively, 681 initial and follow-up inspections of 178 municipal, commercial/industrial facilities and 51 construction sites were completed. The Port inspected 97% of the entire municipal, commercial, and industrial facility inventory, including all of the high priority facilities identified in the inventory. Another 142 initial and close-out inspections were completed for special events. Six new priority development projects were completed within the reporting year resulting in an additional 12 acres of treated area.

In FY 2016, the Port continued to educate the public about pollution prevention and BMP implementation reaching over 153,283 people through 924 education activities. The Port also funded or hosted 16 cleanup events jurisdiction-wide, in which 1,748 people participated overall and approximately 16.5 tons of trash was removed. The municipal component resulted in an additional 1,168 tons of trash and debris being removed from tidelands and the bay.

The Port also conducted an internal audit of its storm water program in June 2016. Specifically, special events, construction, industrial/commercial and illicit discharge inspection processes were reviewed for compliance with the Port 2015 JRMP and internal standard operating procedures (SOP). Overall, the audit indicated that the inspections, notices, follow-up, and enforcement were processed in accordance with the Port SOPs and the 2015 JRMP. Recommendations were made to further refine the special events inspection process and refine the communication of corrective actions to inspected parties. The audit also recommended an additional quality check process to provide additional verification of the Port's facility inventory. All of these recommendations have been incorporated into the Port's SOP process.

Implementation of the updated JRMP posed several challenges that the Port is continuing to address. First, implementation of the revised JRMP program and incorporation of the finalized WQIP and BMP Design Manual that occurred mid-year required revised SOPs and additional education outreach both internally and with the regulated public. Updates to the storm water database to effectively track all the JRMP program elements, escalated enforcement versus routine enforcement, and WQIP strategies continues to be a challenge the Port is addressing. The Port worked on updates to its storm water database through FY 2016 and will continue through the next FY 2017 to address these issues.

In FY 2016, the Port issued 51 Administrative Citations and Work Orders which is a greater number of enforcement actions than in previous years. This is in part a result of the incorporation of the Enforcement Response Plan in the 2015 JRMP. Escalated enforcement at the municipal facilities was generally a result of greater attention to the presence of trash and debris at Port parks and parking lots. Routine cleaning of all the Port areas and facilities is already in practice however, the Port has also been ramping up its waste management program to address those issues and increasing the inspection frequency in those areas.

A majority of the escalated enforcement citations issued to commercial and industrial facilities in FY 2016 were mainly a result of missing employee storm water training documentation. In the past, this BMP would have triggered a (required corrective action) written warning to complete within a specified timeframe. In the 2015 JRMP, employee storm water training was identified as a minimum required BMP that triggers escalated enforcement. Although the Port sent out notifications to all the facilities in the inventory regarding required BMPs and employee storm water training requirements, and posted a bilingual storm water BMP training video on the Port website, however employee storm water training was still found to be the most frequently deficient BMP and resulted in escalated enforcement actions. It is notable however, that in most of the instances where employee training was deficient or missing, other BMPs were not. For this reason, in FY 2017, the Port has modified the employee storm water training to be a required minimum BMP but it will not be identified as a BMP that will trigger escalated enforcement. Instead, where employee storm water training is found to be deficient or missing, the Port will identify it as a required corrective action that will need to be completed within a specified timeframe in order for the facility to avoid further enforcement action.

Targeted Approach

The Port's approach to address the Highest or Focused Priority Conditions and their sources includes employing targeted efforts focused on specific priority condition areas along with the core (or optional) JRMP strategies. The following three strategies focused specifically on segments of the Port tidelands within the Physical Aesthetics Focused Priority Condition areas.

- PO-34. Baseline Trash Assessment and BMP Feasibility Pilot Study: This optional study was initiated in FY 2016 to identify potential need for structural or source control improvements at high-volume trash-generating areas within the 909.1 and 910.2 HAs. Results of the study are expected to inform the Port on potential program improvements and adjustments identify where BMP retrofits and installations are feasible, and plan for meeting the WQIP trash goals. In addition, the study serves as a template that could be applied jurisdiction-wide. The study is scheduled to be completed in FY 2017.
- PO-30. Program Assessment: The MS4 inspection and cleaning data from the past five years was evaluated to identify whether modifications to inspection and/or cleaning activities were needed to effectively address higher trash generating areas. This optional assessment was done in a phased approach by first assessing the Focused Priority Condition Areas, then evaluating jurisdiction-wide. Of the 780 MS4 components assessed jurisdiction-wide, thirty-one (31) met the prioritization criteria for increased inspection frequency (two times per year) and will be inspected at the higher frequency in FY 2017. However, none of the MS4 components meeting the criteria were located in the Physical Aesthetics Focused Priority Condition areas.
- PO-41. Structural Control: The Port installed a 950-foot custom fence that replaced a chain-link fence along the southern perimeter of the 95-acre Pond 20 site at 1400 Palm Avenue. The fence helps protect the Pond 20 area by preventing trash and debris from entering the area. The Port funded the project through its Capital Improvement Program. The new fence was designed with significant public input and incorporates local flora, fauna, and surfboards to enhance the site's unique, panoramic bay view.

In addition, while the majority of the strategies were implemented jurisdiction-wide, the Port was often able to track results by HA. This provided a more holistic evaluation of the Port's overall implementation efforts to specifically address each of the Priority Conditions in FY 2016. Additional information on the Port's efforts to address the Highest and Focused Priority Conditions is provided in Section 4.6 (Chollas Creek), Section 7 (Physical Aesthetics), and Section 8 (Swimmable Waters) of the San Diego Bay WQIP annual report.

Fiscal Analysis

The Port's overall expenditures for the FY2016 reporting period totaled approximately $3 million dollars. Municipal services, activities and operations comprised the bulk of the program, accounting for over 53% of overall expenditures. TMDL and special investigation efforts accounted for another 15%. Education, industrial and commercial program, and construction each comprised 9% of the overall expenditures. Over half of the fiscal expenditures went toward staffing (57%), with the remaining 43% going to pay for external consultant or contracted services for specialized program assistance.

In summary, it appears that the Port's JRMP program, as a whole, has been effective in addressing the Highest and Focused Priority Conditions and other priority water quality conditions during FY 2016. The Port's JRMP continues to evolve with time and staff continues to make improvements to processes, programs and assessments. As characteristics, policies, and procedures continue to change in the Port's tidelands jurisdiction, so will the Port JRMP program.

Table 12-13
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
JRMP (E.2-E.7) Strategies (E.3.b.(1)(a))								
Development Projects (including Priority Development Projects)								
PO-1	Implement Core JRMP Program for all development projects to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	For proposed development projects, the Port prescribed source control and LID BMP requirements during the project planning process and prior to project approval consistent with the Port BMP Design Manual. Implementation of BMPs will be incorporated into project approvals. Verification of BMP installation was conducted by Port staff. Refer to JRMP Section 4 and JRMP Appendix D Port BMP Design Manual. Optional strategies relating to Development include PO-18, PO-19, PO-20, and PO-47. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by the Port's Board of Commissioners (BPC). Permit-required strategy to be implemented jurisdiction-wide and continuously throughout permit term.	FY16	Implemented as planned, On-going	• 5 USMP (Urban Storm Water Mitigation Plan) documents approved (1 of the 5 was actually a SWQMP [Storm Water Quality Management Plan], under the new permit language) • One USMP document approved in 910.1 HA - Coronado Ferry Landing Restaurant SWQMP (construction has not started on this) • 115 acres treated by BMPs (12 acres of treated area added in 2015-2016)	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-2	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	For all PDPs, the Port prescribed treatment control BMP requirements as applicable and feasible during the project planning process and prior to project approval consistent with the Port BMP Design Manual. Implementation of BMPs will be incorporated into project approvals. Verification of BMP installation was conducted by Port staff. Refer to JRMP Section 4 and JRMP Appendix D Port BMP Design Manual. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and continuously throughout permit term.	FY16	Implemented as planned, Ongoing	The Port implemented the program as scheduled. The FY 2016 jurisdiction-wide construction inspection program results (Treatment Control BMPs, Inspections, and Verification of Maintenance) are provided in the Port's JRMP annual report form and supplemental Table 12-3. • 909.1 HA: Annual inspections to verify maintenance of BMPs occurred at one PDP project in this HA during the reporting period. The Port carried out an annual project inspection at the H Street Extension Project that required a follow-up to verify all required post-construction BMPs were installed. A follow-up inspection found no citations or escalated enforcement was required. • 910.1 HA: Inspections at two PDP projects occurred in this HA during the reporting period. The projects required annual verification of maintenance of BMPs. The BMPs were inspected and found to be maintained as necessary, and did not require corrective actions.	N/A	N/A	Yes
PO-3	Train all applicable departments annually on storm water requirements for all development projects	The Port conducted education efforts focusing on new development and redevelopment projects and their relationship to urban runoff impacts on water quality. See JRMP Sections 4.7.1 and 9.3.1. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and on an annual basis throughout the permit term.	FY15	Implemented as planned, On-going	The Port held seven trainings to a total of 102 staff during the reporting year. In addition to new development and redevelopment project information, topics also included a discussion on WQIP priority conditions and pollutants (trash, metals, and bacteria).	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-4	Conduct project closeout inspection for all development projects to verify that Trash, Metals, and Bacteria BMPs are properly implemented	Permit-required strategy to be implemented jurisdiction-wide and will be conducted on a continuous basis as part of the PDP project closeout inspection. Post construction inspections will be conducted at PDP sites to verify that any and all approved structural BMPs have been installed as approved by the Port. The close-out inspection will also verify that trash, metals, and bacteria BMPs are installed and functioning correctly where applicable. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by BPC.	FY16	Implemented as planned, On-going	The BMP Design Manual became effective in February 2016. Five projects were completed between February and June 2016. However, those projects were reviewed, approved and commenced prior to the BMP Design Manual effective date.	N/A	N/A	Yes
PO-5	Provide technical education and outreach to the development community on the design and implementation of the MS4 permit and WQIP requirements	Technical education and outreach to the development community was conducted and included outreach on design standards, Port BMP design manual, and WMAA. See JRMP sections 4.7.1, 9.3.11, and 9.3.2.1. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide at least annually.	FY16	Implemented as planned, On-going	The Port held or sponsored five trainings for a total of 708 people during the reporting year.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Construction Program								
PO-6	Implement Core JRMP Program to require and to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements. [SWPPP Review, inspections, BMP Implementation]	Prior to the approval of a construction project, the Port requires that all applicable minimum and seasonally appropriate BMPs have been identified and the proposed methods of implementation are appropriate to the project site. The review also confirms that minimum BMPs that address WQIP priorities are included. Construction inspections are conducted at a minimum of monthly basis based on assessed threat to water quality. Inspection frequency may increase based on issues of non-compliance with respect to trash, metals, bacteria BMPs. ~~See Supplemental Attachment 1 for details on construction-related BMPs that will be implemented to address sources causing or contributing to the Highest or Focused Priority Conditions~~. See JRMP Section 5.5 and 5.6, and JRMP Appendix C- Enforcement Response Plan. Optional strategies relating to Construction include PO-18 and PO-20. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and on a continuous basis.	FY15	Implemented as planned, On-going	The Port implemented the Construction Program as scheduled. Overall, 349 construction inspections/69 follow-up inspections required (total of 418 inspections including follow-ups). No escalated enforcement measures were required on any project during FY 2015-2016.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Existing Development								
Commercial / Industrial Facilities								
PO-7	Implement Core JRMP Program for existing development (commercial and industrial facilities) to require implementation of minimum BMPs that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods, maintenance of an existing development inventory, and enforcement.	The strategy involves implementing the existing development core program, and identifies the minimum BMPs and pollution prevention practices that the Port will require for existing facilities as well as the Port inspection and verification process. For facilities that are not considered a higher priority based upon the WQIP pollutants, inspections will occur at least once during the Permit cycle and at least 20% of the inventoried facilities inspected each year. See JRMP Section 7.5.1 and 7.6.1. Annual inspections were performed at facilities that are determined to be higher sources of trash, metals, and bacteria. See PO-21 for additional information. Other optional strategies relating to Construction include PO-18, PO-21, 44, 45, 47, and 48. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and on a continuous basis.	FY15	Implemented as planned, On-going	• Jurisdiction-wide: BMPs inspected at all commercial and/or industrial facilities jurisdiction-wide (76 commercial and 23 industrial) in reporting period. 93.5% BMPs properly implemented. Commercial • 909.1 HA: Of the three commercial facilities inspected, one facility required escalated enforcement. • 910.1 HA: Three of four commercial facilities are properly implementing BMPs to address trash, metals, and bacteria. One facility did require escalated enforcement. • 910.2 HA: One commercial facility was properly implementing MS4 Permit required BMPs Industrial • 908.22 HA: Within Chollas Creek HSA, one industrial facility was properly implementing MS4 Permit required BMPs • 909.1 HA: Two of six industrial facilities are properly implementing BMPs to address trash, metals, and bacteria. Of the four facilities needing follow-ups, only two required escalated enforcement. *Jurisdiction-wide commercial and industrial facilities inspection information is located in the Port of San Diego's JRMP annual report form and supplemental Table 12-4. All non-compliance issues requiring corrective enforcement actions were resolved and closed.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Municipal Areas & Facilities								
PO-8	Implement Core JRMP Program for existing development (municipal facilities) to require implementation of minimum BMPs for municipal facilities that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of the municipal facilities at appropriate frequencies and using appropriate methods, maintenance of a facility inventory and enforcement.	The strategy involved implementing the existing development core program, and identified the minimum BMPs and pollution prevention practices that the Port will require for existing facilities as well as the Port inspection and verification process. For facilities that are not considered a higher priority based upon the WQIP pollutants, inspections will occur at least once during the Permit cycle and at least 20% of the inventoried facilities inspected each year. See JRMP Section 6.5 and 6.6. ~~Please see Supplemental Attachment 1 for details on minimum BMPs that will be implemented to address sources causing or contributing to the Highest or Focused Priority Conditions.~~ Annual inspections will be performed at facilities that are determined to be higher sources of trash, metals, and bacteria. Those facilities are designated as “high priority” in the facility inventory. See PO-21 for additional information. In addition, Optional strategies relating to municipal facilities include PO-22, PO-23, PO-24, PO-25, PO-26, PO-28, PO-31, PO-32, PO-46, and PO-47. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and will be on a continuous basis.	FY15	Implemented as planned, On-going	• Jurisdiction-wide: BMPs inspected at 63 facilities and 18 parks. 92% of the municipal facility inventory was inspected in FY 2016. • 909.1 HA: Nine of 15 facilities are properly implementing BMPs to address trash, metals, and bacteria. All three parks properly implemented BMPs to address trash, metals, and bacteria • 910.1 HA: Nine of 10 facilities are properly implementing BMPs to address trash, metals, and bacteria. All four parks properly implemented BMPs to address trash, metals, and bacteria *Jurisdiction-wide commercial and industrial facilities inspection information is located in the Port of San Diego’s JRMP annual report form and supplemental Table 12-4.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-9	Provide List of BMPs for Special Events with requirements for trash, metals, and bacteria, and ensure compliance thru inspections	The strategy involved reducing and/or preventing the discharge of high priority pollutants from special events of 500 or more people on Port Tidelands. The strategy involved establishing a set of designated BMPs and conducting inspections to verify compliance. See JRMP Section 6.3.6 and 6.5.1. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and on a continuous basis.	FY15	Implemented as planned, On-going	• BMP list was developed and distributed to special events coordinators • Jurisdiction-wide: A total of 72 special events were held at ten parks and two parking lot/street locations during FY 2016. • 908.2 HA: Of the 58 special events in 908.21 HA, nine special events required follow-up. Seven of the follow-up inspections were for trash and bacteria related issues. Two special events were also issued a citation. • 909.1 HA: Of the eight special events in 909.1 HA, none of the events required follow-up inspections. However, four events were out of compliance for not submitting training and BMP implementation records. • 910.1 HA: Of the three special events in 910.1 HA, none required follow-up inspections. However, two of the three events were out of compliance for not submitting training and BMP implementation records. *Jurisdiction-wide special events inspection information is located in the Port of San Diego's JRMP annual report form and supplemental Table 12-5. All non-compliance issues requiring corrective enforcement actions were resolved and closed.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
MS4 Infrastructure								
PO-10	Implement Core JRMP Program for MS4 infrastructure (inspection and cleaning) for water quality improvement.	The core program involves the inspection and cleaning of the MS4 and associated BMPs that the Port owns and operates. It also includes record keeping and tracking of those activities for MS4 infrastructure. See JRMP Section 6.3.5, 6.5.1, and 6.6.4. In addition, optional strategies relating to the MS4 infrastructure include PO-30, PO-45, and PO-47. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and on a continuous basis.	FY15	Implemented as planned, On-going	• 780 High priority MS4 structures inspected • 2.2 miles of MS4 conveyance cleaned • 31 MS4 and BMPs inspected found with accumulated trash exceeding cleaning criteria • MS4 data assessment (PO-30 optional) found the cleaning frequency appears adequate for all current MS4 and BMP structures in the 909.1 or 910.2 HAs. *Jurisdiction-wide MS4 infrastructure information is located in the Port of San Diego's JRMP annual report form and supplemental Table 12-6.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Roads, Streets, and Parking Lots								
PO-11	Implement Core JRMP Program for Street and Parking Lot Maintenance. Includes inspection and cleaning of public streets, paved roads, and parking lots.	The Port has identified minimum BMPs for streets and parking lot maintenance as well as an inspection process to verify compliance. The Port conducted annual drive-by inspections of the streets, roads, and parking lots that are owned and operated by the Port. Although roads and streets will receive an annual drive-by inspection, Port staff or contractors performed street sweeping on a weekly basis. The Port tracked the areas in which the street sweepers operate and tabulates the number of curb miles swept. See JRMP Sections 6.5.1, 6.6.2, and 6.5.11. ~~See Supplemental Attachment1 for details on BMPs that will be implemented to address sources causing or contributing to the Highest or Focused Priority Conditions~~. In addition, optional strategies relating to the MS4 infrastructure include PO-24, PO-25, PO-28, and PO-29. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and on a continuous basis.	FY15	Implemented as planned, On-going	• 17,892 total curb-miles swept • 860 parking lots swept; • 133.5 tons of waste and litter removed	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Pesticide, Herbicides, and Fertilizers BMP Program								
PO-12	Implement Core JRMP Program requiring implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	The Port has an Integrated Pest Management policy to limit and/or eliminate the use of toxic substances and has developed minimum BMPs to implement to address potential discharges of pesticides, herbicides, and fertilizers. See JRMP Sections 6.5.1 and 6.5.14. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and on a continuous basis.	FY15	Implemented as planned, On-going	On May 19, 2016, the Port sponsored IPM for Landscape Professionals seminar was attended by 117 gardening and landscape professionals. The participants learned about activity-specific BMPs, laws, and regulations applicable to pesticide use. The seminar also highlighted the connection between water quality impacts and pesticide use throughout the tidelands.	N/A	N/A	Yes
Retrofit and Rehabilitation in Areas of Existing Development								
PO-13	Develop and implement a strategy that identifies candidate areas of existing development for retrofit and rehabilitation opportunities to address trash, bacteria, and metals	The retrofit and rehabilitation strategy includes methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to highest or focused priority conditions, potential pollutant load removal effectiveness, and feasibility of implementation. See JRMP Section 6.8, 7.8, and JRMP Appendix H. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit required administrative update to be implemented jurisdiction-wide and on a continuous basis.	FY15	Implemented as planned, On-going	• Completed development of program and submitted June 2015 with Port of San Diego JRMP Update in Appendix H. • Ordered inlet BMPs at Tenth Avenue Marine Terminal.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Illicit Discharge, Detection, and Elimination (IDDE) Program								
PO-14	Implement Core JRMP Program for IDDE program. Requirements include: maintain MS4 map, identify and report illicit discharges, maintain a hotline for public reporting of illicit discharges, monitor MS4 outfalls, and investigate and address any illicit discharges. When sewage is detected, identify source and implement measures to eliminate sources.	Investigate and eliminate dry weather discharges and illegal connections to the MS4 as reported to the Port or identified by Port staff. The Port utilizes appropriate enforcement actions to achieve compliance such as Administrative Citations with or without fines and corrective actions. See JRMP Chapter 3 and JRMP Appendix C. IDDE related BMPs are also included in the Construction, Development, and Existing Development components of the JRMP. This strategy also relates to PO-15 and PO-16. See Supplemental Attachment 1 for IDDE related BMPs that will address sources causing or contributing to the Highest or Focused Priority Conditions. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and on a continuous basis.	FY15	Implemented as planned, On-going	The Port implemented the IDDE Program as scheduled. There were 24 IDDE investigations in FY 2016. The FY 2016 jurisdiction-wide IDDE program results are provided in the Port's JRMP annual report form and supplemental Table 12-1. 909.1 HA: The Port was notified two times of discharges at facilities in this HA during the reporting period. The incidents were investigated and found to be either unjustified or did not require further action. 910.1 HA: The Port was notified once in this HA during the reporting period of an incident at a construction site was investigated and found unjustified and did not require further action. A second incident was observed during the Persistent Outfall Monitoring Program by Port staff and reported to the City of Coronado.	N/A	N/A	Yes
Enforcement Response Plan								
PO-15	Develop and implement the Enforcement Response Plan [escalating enforcement responses; statutes, ordinances, permits, contracts, orders, and other requirements].	The Plan includes escalated enforcement process for violations from sources related to bacteria, metals, and trash. The strategy also includes an update. See JRMP Appendix G. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit required administrative update to be implemented jurisdiction-wide and implemented on a continuous basis.	FY15	Completed, and implemented as planned, On-going	Completed development of plan	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-16	Update Port's Storm Water Ordinance	The Port's storm water ordinance was updated to provide Port legal authority to enforce the JRMP and the requirements of the Permit. See JRMP Section 2.2 and JRMP Appendix B. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit required administrative update to be implemented jurisdiction-wide and completed prior to JRMP submittal.	FY15	Completed as planned.	Completed update	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Public Education and Participation								
PO-17	Implement Core JRMP Program for Education and Outreach program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences. ~~Staff training:~~ Municipal Training: ~~Development Planning, Municipal Construction Activities, Municipal Industrial/Commercial Activities, Municipal Other Activities~~ Educational Outreach: Industrial & Commercial Owners & Operators; Residential Community & General Public; School Children; Underserved Audiences	Program will promote public support of the Port's water quality protection efforts through outreach and education as they conduct Port employee-specific training, and promote participation of the public. The education program is tailored towards specific target audiences. Topics also include a discussion on WQIP priority conditions (trash, metals, and bacteria). The strategies include core jurisdictional programs that meet baseline permit requirements which will be implemented throughout the permit term and strategies that enhance the program or focused efforts. See JRMP Chapter 9. Optional public education and participation strategies include PO-24, PO-25, PO-27, PO-33, PO-35, PO-36, and PO-37. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Permit-required strategy to be implemented jurisdiction-wide and on a continuous basis.	FY15	Implemented as planned, On-going	*Jurisdiction-wide public education and outreach FY 2016 information is located on the Port of San Diego's JRMP annual report form and in supplemental Tables 12-7, 12-8, and 12-9. Jurisdiction-wide overall education activities total: • 92 education efforts annually; • 153,283 people reached • Port staff created an approximately 15 minute bi-lingual (English and Spanish) training video "*Stormwater Best Management Practices (BMP) Training for Industrial and Commercial Facilities*" in FY 2016 and has shown it at a number of training events for commercial and industrial tenants and Port staff. https://www.portofsandiego.org/environment/stormwater/302-stormwater-management-program.html or at https://www.youtube.com/watch?v=Xytid-LlxMk	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Non-JRMP Strategies (Optional Strategies, B.3.b(1)(b))								
Non-structural								
PO-18	Add BMP to construction BMPs that requires covering material stockpiles of treated wood during wet weather	Where material stockpiles include treated wood, the concentrated discharge of metals that may be leached from the wood will be minimized by covering the stockpile. See JRMP Section 5.6. ~~Refer to Supplemental Attachment 1 for details on construction-related BMPs that will be implemented to address sources causing or contributing to the Highest or Focused Priority Conditions.~~ This strategy is planned for implementation so no trigger is needed. Funding and resources have been secured for FY2015. Funding for future fiscal years is contingent on annual budget approval by BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide and on a continuous basis.	FY15	Completed as planned.	Completed addition to construction BMPs	N/A	N/A	No
PO-19	Require install shutoff irrigation sensors (e.g., Cal-Sense) for MM/CIP development projects. [CAP Water Conservation Measure (WC 1.3)][1]	This strategy will assist in eliminating non-storm water discharge by requiring the irrigation sensors, where applicable, to development plans. This strategy will be triggered upon identification of new landscape area in Port sponsored major maintenance or capital improvement projects. Funding and resources required include cost for equipment, design, installation, and routine maintenance. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide and as-needed.	FY17	N/A	N/A	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-20	Adopt Construction and Demolition Recycling Ordinance or include language into general requirements for all projects [CAP Waste Reduction and Recycling Measure (SW2)][1]	This strategy will focus on providing direction to development and construction projects regarding how to manage waste and recyclable materials. This strategy will be triggered following an evaluation of potential conflicts with member cities. If member cities have existing ordinances, the Port may elect to follow the corresponding city's ordinance. Funding and resources have been secured for FY2016 and will be requested for FY2017. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide and one-time.	FY17	N/A	N/A	N/A	N/A	Yes
PO-21	Perform annual inspection of commercial, industrial, and municipal facilities that are higher sources of trash, metals, and bacteria	The frequency of inspections will be expanded from the baseline frequency (at least once during the permit cycle) to annually for higher sources of trash, metals, and bacteria. Facilities that may have higher sources of trash, metals, and/or bacteria were identified through standard operating procedures developed by Port staff. The strategy includes ensuring proper implementation of minimum BMPs that are specific to the facility, area types, and Pollutant Generating Areas (PGAs), and, as appropriate; enforcement of violations; and providing education as-needed. This strategy is planned for implementation, so no trigger is needed. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY16	Implemented as planned, On-going	• Of the 184 facilities in the Port's inventory, 178 were inspected. All high priority facilities (those that may have higher sources trash, metals, and/or bacteria) were inspected in FY 2016. • 92.9% facilities inspected had properly implemented BMPs to address trash, metals, and bacteria • Port staff is currently analyzing inspection data and the priority levels associated with the facilities within the tidelands to determine how many facilities will be inspected in FY 2017. Efforts are also underway to determine any changes to the Ports facility inventory which will also determine the number of inspections that will take place in FY 2017.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-22	Continue pet waste bag dispensers in parks	The strategy addresses pet waste in municipal areas and includes ensuring proper installation, maintenance, and restocking of dispensers. Port staff periodically reevaluates the locations of dispensers and where new dispensers may be needed in the future. This strategy has been planned for implementation, so no trigger is needed. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY15	Implemented as planned, On-going	• 74 cases of pet waste bags were purchased in FY16 • 444,000 bags were dispensed in public parks within Port tidelands.	N/A	N/A	Yes
PO-23	Implement Preventative Maintenance (PM) Plan to prevent backups in Municipal public restrooms	The strategy includes implementing a janitorial and preventative maintenance services plan for public restrooms on Port Tidelands to prevent waste material generated from public restroom facilities from entering into storm water conveyance system. This strategy has been implemented, so no trigger is needed. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional Non-Permit Required JRMP Strategy to be implemented jurisdiction-wide.	FY15	Implemented as planned, On-going	• New janitorial contract (three year term) started in FY 2016. The new Scope of Services for janitorial services has Environmental Requirements section (Section C – Article 10 requirements and environmentally preferred products), and includes implementing measures to prevent waste material generated from restroom facilities at the 18 public parks maintained by the Port of San Diego from entering the storm drains. The company maintains the restrooms three times daily between May 1through September 30. The rest of the year, the cleaning frequency is two times per day and trash enclosures will be maintained three times per week. • Eight work orders were issued for sewer line clean outs jurisdiction-wide. All issues were resolved.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-24	Development of BMP guidance document for general services staff conducting minor maintenance operations	This strategy involved the development of a guidance document to help guide General Services staff in implementing the necessary BMPs procedures to mitigate the discharge of contaminated debris, trash, and potential chemicals during minor maintenance and construction activities. The document will provide guidance on selecting the appropriate BMPs, as well as proper BMP implementation, operation, and maintenance This strategy is planned for implementation, so no trigger is needed. Funding and resources have been secured for FY2016. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY16	Completed as planned.	Completed	N/A	N/A	No
PO-25	Train general services staff on proper BMP implementation during minor maintenance operations	This strategy involved training General Services staff on the implementation of a BMP guidance document to use as a guide for selecting, implementing, and monitoring BMPs. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY16	Implemented as planned, On-going	The Port held one training event to 88 staff in the reporting period. The training included guidance on identifying the BMPs to implement to address specific sources of metals, bacteria, and trash associated for each minor maintenance activity.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-26	Conduct Trash Receptacle Assessment in municipal areas	This strategy will identify the current waste management practices in municipal facilities and areas (i.e., parks) and determine whether the size, number, and location of the receptacles provided are adequate. Where improvements are required, the assessment will identify potential options to address deficiencies. This strategy is planned for implementation, so no trigger is needed. Funding and resources have been secured for FY2016. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY16	Implemented as planned, Scheduled to be complete in FY 2017	The assessment was initiated in FY 2016. • Assessment scope of work developed spring 2016 • Consultant tasked with project and initiated assessment in May 2016	N/A	N/A	Yes
PO-27	Develop a process to improve data management for tracking waste and materials diverted from waste stream and landfills [CAP Waste Reduction and Recycling Measure (SW)][1]	The strategy includes identifying effective and efficient use of trash receptacles that are specific to the area types, pollutant generating activities (PGAs), and/or event, as appropriate. The goal of this strategy is to provide recommendations to be implemented to address the WQIP Focused Priority Conditions (Physical Aesthetics and Swimmable Waters (bacteria)) and the State-led Trash Amendments. This strategy is planned for implementation, so no trigger is needed. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY17	N/A	N/A	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-28	Replace/upgrade current maintenance equipment, such as street sweeper or power washer, to new, more efficient and effective options	This strategy involves the acquisition of maintenance equipment that is more efficient and effective than the equipment currently in use by Port's General Services Department (GSD). Equipment acquisition will be based on the GSD's equipment replacement schedule and the BPC approval of funds. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY16	Implemented as planned, On-going	The Port purchased (1) Side-Loader Refuse Truck in FY 2016. The vehicle provides multiple benefits for other programs, such as the Port's Climate Action Plan (CAP). The vehicle is fueled by a cleaner alternative fuel (CNG) which contributes to the CAP's Green House Gas (GHG) emissions reduction goals. In FY 2015, the Port also purchased a new regenerative air street sweeper.	N/A	N/A	Yes
PO-29	Replace all Port owned/leased vehicle brake pads with copper-free brake pads	As copper-free brake pads become commercially available, implement installation of copper-free brake pads on Port owned or leased vehicles to reduce pollution deposition. This strategy will be triggered based on availability of effective copper-free brake pads and equipment replacement schedule. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY17	N/A	N/A	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-30	Evaluate MS4 inspection and cleaning locations and adjust as-needed for higher trash generating areas	This strategy will enhance the current program through an annual jurisdiction-wide evaluation of the inspection and maintenance activities for catch basins, storm water inlets, and other storm water conveyance structures the Port of San Diego owns and operates within the Tideland boundary. The annual evaluation of the MS4 program data will enable the Port to identify whether modifications to inspection and/or cleaning activities are needed and to be implemented (i.e., change in frequency or location) to effectively address higher trash generating areas. This strategy is planned for implementation, so no trigger is needed. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented in a phased approach, targeted areas then jurisdiction-wide.	FY16	Implemented as planned, On-going	31 MS4 and/or BMP structures were identified for increased inspection frequency (two times per year), based on analysis of past five years of MS4 monitoring data. Structures that had greater than 50% accumulation for at least two of the five years, or structures that required cleaning three or more times in five years, were determined to require increased inspection frequencies (none of these structures were located in HSAs 909.1, 910.1, or 910.2).This analysis was performed for all municipal MS4s on Port of San Diego Tidelands.	N/A	N/A	Yes
PO-31	Update Power-washing Standard Operating Procedure Manual	This strategy will provide updates to the Port's General Services Department on new requirements and restrictions on power-washing operations. This strategy is planned for implementation, so no trigger is needed. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY17	N/A	N/A	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-32	Create Standard Operating Procedure for proper washout procedures in public restrooms	This strategy will create a standard operating procedure, or SOP, for General Services staff and contractors to follow when maintaining public restrooms. This strategy is planned for implementation, so no trigger is needed. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, additional Non-Permit Required Jurisdictional Strategy to be implemented jurisdiction-wide.	FY17	N/A	N/A	N/A	N/A	Yes
PO-33	Improve consistency and content of websites to highlight permit requirements and facilitate public reporting	Port staff regularly evaluates the website content and provide updates to ensure that the information on the website remains current and easy to find. In addition, staff collaborates with other Copermittees to improve the consistency in messaging and content on agency websites on a watershed and regional level as part of this ongoing activity. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY16	Implemented as planned, On-going	• The Port participated in the watershed workgroup to provide updates for the public on San Diego Bay WMA WQIP on the Project Clean Water website. • A new Port website is under development. The new website will be designed to improve the public's ability to find information quickly and facilitate public reporting.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-34	Site/Area prioritization study to identify high volume trash areas	This study will assist the Port to prioritize areas under its jurisdictional authority that are high volume trash areas to help focus resources and potentially install structural controls, where feasible. This strategy is planned for implementation, so no trigger is needed. Funding and resources have been secured for FY2016. Optional, jurisdictional program enhancement to be implemented in a phased, targeted approach then jurisdiction-wide.	FY16	Implemented as planned, Scheduled to be complete in FY 2017	Study was initiated in FY 2016: • Study scope of work developed December 2015 • Consultant tasked with project and initiated study in February 2016. • Field work completed in FY 2016, but final report available in first quarter of FY 2017	N/A	N/A	Yes
PO-35	Sponsor, conduct, and host cleanup activities (Operation Clean Sweep, Coastal Cleanup Day, Creek to Bay, etc.). Sponsor regional/watershed collection events for large items or items that may otherwise be illegally dumped.	The Port provided funding to sponsor various cleanup events and/or participate by soliciting volunteers, working as site captains, and participating in the cleanup events. Collection events collect large, unwanted household items (e.g., refrigerators, mattresses, etc.), vegetation, and other debris with the intent of preventing illegal dumping of these items in the San Diego Bay WMA. This strategy may be implemented if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, and 3) partners have been identified and formal MOUs have been developed, as-needed. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by Port BPC. WMA (Multi-jurisdictional) Optional Program Enhancement to be implemented jurisdiction-wide.	FY16	Implemented as planned, On-going	• Jurisdiction-wide: 16 cleanup and/or collection events on Port Tidelands, 1,748 number of people reached/participated, Approximately 16.5 tons of trash collected jurisdiction-wide (includes recycled waste) • 908.22 HSA: Approximately 962 lbs. of trash in 2 events were collected by an estimated 100 people in Chollas Creek • 909.1 and 910.2 HA: Approximately 2.7 tons of trash in nine events were collected by an estimated 398 people • 910.1 HA: Trash was collected by an estimated 60 people at one event in 910.1 HA	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-36	Develop and conduct public perception survey on Physical Aesthetics and Swimmable Waters Conditions	This strategy will be implemented to understand public opinions about the current status of the focused priority conditions and to help the RPs identify how they may adapt their programs to improve both water quality and public perception. This strategy will be triggered upon final approval on a MOU by all RPs involved, the consultant selection and contract(s), and scope of work. Funds/resources needed for this strategy include staff time and/or consultant expenses to develop and implement the survey. WMA (Multi-jurisdictional) Optional, Additional Non-Permit Required Strategy to be implemented in targeted drainage areas.	FY17	N/A	N/A	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-37	Support organizations to address homelessness and to provide resources and educational materials to address trash and bacteria	This strategy involved efforts to research and implement outreach and intervention services through near, medium, and long term strategies to assist the homeless population along the Tidelands, while coordinating efforts at a regional level. This strategy may be implemented if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include Port staff to coordinate with the regional effort and consultant or third party assistance to implement projects. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the Port's annual budget. Funding is secured on an annual basis and is contingent on annual budget approval by Port BPC. WMA (Regional) Optional, Additional Non-Permit Required Strategy to be implemented jurisdiction-wide.	FY16	Implemented as planned, On-going	Since 2014, the Port has sponsored Alpha Project's efforts to provide outreach and intervention services to the homeless on Port tidelands. Alpha Project provides services through their Outreach Team at various hours during the day to capture the most accurate statistics possible. The Port's sponsorship supports Alpha Project programs to provide the homeless with food/water, hygiene supplies, blankets, clothing, housing, work placement, medical and mental health referrals. In addition to the humanitarian aspects of providing these services, MS4 and receiving water quality may be improved due to reduced trash or waste as a result of these efforts.	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-38	Participation in the San Diego Regional Reference Stream Study	WMA (Regional) Optional, project that focuses on collecting data necessary to derive reasonable and accurate numeric targets for bacteria, nutrients, and heavy metals by referencing natural, local conditions. This study will provide a scientific basis for evaluating bacteria compliance levels in the Bacteria TMDL. The results of this study are used to support the forthcoming reopener of the recently adopted Bacteria TMDL and to support numeric targets in future TMDLs for bacteria, nutrients, and metals. This strategy has been planned for implementation, so no trigger is needed. Funding and resources have been secured for FY2016.	FY15/16	Implemented as planned, Completed in FY 2016	The Port collaborated with other Copermittees in the San Diego region in a workgroup and cost share for the Reference Stream Study. The Reference Stream Study report was completed in June 2016. Results of the Reference Stream Study are discussed in Appendix 4, Section 7.1.	N/A	N/A	No

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-39	Participation in the Southern California Coastal Water Research Project's (SCCWRP) San Diego Bay Trash Study.	The Trash Study is a comprehensive bay-wide study to help managers understand the current extent and magnitude of plastic-based debris accumulation and takes into account seasonal changes to better understand the plastic debris conditions throughout San Diego Bay and its upland contributing areas. SCCWRP will initially assess targeted geographic areas and may include (1) assessment of current conditions to provide a baseline to demonstrate progress in the future, (2) identification of high-priority areas for targeted strategy implementation, and (3) identification of commonalities among jurisdictions for potential collaborative outreach opportunities. This strategy has been planned for implementation, so no trigger is needed. Funding and resources were secured for FY2015. WMA (Multi-jurisdictional) Optional, Program Enhancement to be implemented jurisdiction-wide.	FY15	Implemented as planned, Not completed in FY 2016	• Data collection completed in FY 2016 and data analysis initiated • Analysis completed and final report to be available in FY 2017	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-40	Delisting feasibility study for Tidelands Park, Coronado	WMA (Multi-jurisdictional) Optional, Non-Permit Required Strategy to be implemented in targeted drainage areas (Tidelands Park, Coronado). The study will assess available historical AB411 monitoring data from the County of San Diego's Department of Environmental Health to determine the number of exceedances of *Enterococcus* WQOs that have occurred at EH-070 and to identify whether the results warrant consideration of removal of the water body from the SWRCB 303(d) List (i.e., de-listing). This strategy has been planned for implementation, so no trigger is needed. Resources necessary to implement this strategy include Port staff or consulting team. Funding and resources have been secured for FY2016.	FY16	Implemented as planned, Not completed in FY 2016	Dry Weather: Based on the results of this assessment of *Enterococcus* data using three methods from the SWRCB de-listing policy (SWRCB, 2004), the site is below allowable exceedances for single-sample, rolling 30-day geometric mean, and monthly geometric mean. This indicates the section of Tidelands Park on the 303(d) list could be eligible for de-listing in dry weather for *Enterococcus* indicator bacteria. Wet Weather: Limited wet weather monitoring data existed prior to FY 2016. The San Diego Bay WQIP Monitoring and Assessment Plan provided information on the wet weather monitoring approach, which was initiated in FY 2016. The results of the FY2016 monitoring are discussed in Appendix 4, Section 6.	N/A	N/A	Yes
Structural								
PO-41	Install fence along southern parameter of Pond 20 to capture trash and debris	The Port of San Diego installed a custom fence to improve the South San Diego site known as Pond 20. This strategy has been implemented, so no trigger is needed. Funding and resources were secured for FY2015. Optional, jurisdictional program, to be implemented in a Specific drainage area (Otay Sub-watershed).	FY15	Completed as planned.	Installation completed. • The 950-foot fence replaced a chain-link fence and runs within Caltrans' right-of-way along the southern perimeter of the site at 1400 Palm Avenue. • Grates were also installed at stormdrain inlets to capture trash and debris.	N/A	N/A	No

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-42	Develop an alternative compliance program framework that provides options for PDPs	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. This strategy is planned for implementation, so no trigger is needed. Funding and resources have been secured for FY2016. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY16	Completed as planned.	Completed	N/A	N/A	No
PO-43	Implement an alternative compliance program providing options for PDPs	Administer an alternative compliance program for on-site structural BMP implementation (includes identifying WMAA candidate projects). This strategy is planned for implementation, so no trigger is needed. Funding for future FY 2017 is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented jurisdiction-wide.	FY17	N/A	N/A	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-44	Develop and implement a retrofit program to encourage installation of water conservation measures in existing businesses (e.g. xeriscaping, irrigation sensors, etc.) [CAP Water Conservation Measure (WC 1.3)][1]	This strategy involves the development and implementation of the retrofit program to promote water conservation and source abatement. Once the program is developed, Port staff will coordinate with industrial and commercial tenants to voluntarily installing water conservation measures. This strategy will be triggered either by identification of grant funding or may be included as a corrective action for facilities that have repeat violations related to irrigation runoff BMPs. Projected funding needs may be met through grant funding, support from community groups or other institutions, or PGP's annual budget. All Port funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, jurisdictional program enhancement to be implemented in phased, targeted areas then jurisdiction-wide.	FY17	N/A	N/A	N/A	N/A	Yes

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-45	Installation of structural treatment control BMPs in storm drains in high priority areas to address trash, metals, and bacteria	The strategy will address industrial and commercial facilities that have repeat violations for discharges, specifically metals, and bacteria. The facility may be required to install structural treatment control BMPs to reduce or eliminate discharges of pollutants to the MS4 causing or contributing to an impairment of water quality standards. This strategy will be triggered based on facility inspections history, repeat violations and site location and conditions. The industrial or commercial facility tenant will be responsible for providing the necessary funding to implement required systems. Optional, jurisdictional program to be implemented in phased, targeted areas then jurisdiction-wide.	FY16	Implemented as planned, On-going	No facilities triggered this requirement in the reporting period.	N/A	N/A	Yes
PO-46	Retrofit trash enclosures, where applicable, in municipal areas	This strategy will be triggered according to results of PO-26 and PO-34 and identification of the appropriate action to be taken as result of retrofit program. Projected funding needs may be met through grant funding, or PGP or GS annual budget. Resource needs to implement the project include equipment (i.e., trash receptacles) and staff or contract resources to install and maintain. All Port funding for future fiscal years is contingent on annual budget approval by the BPC. Optional, jurisdictional program enhancement to be implemented in phased, targeted areas then jurisdiction-wide.	FY18	N/A	N/A	N/A	N/A	No

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-47	Installation of inlet inserts in storm drains in high priority areas	Trigger is based on results of PO-34 and availability of funding. Projected funding needs may be met through grant funding, or PGP or GS annual budget. Resource needs to implement the project include equipment (i.e., inlet inserts) and staff or contract resources to install and maintain. All Port funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, additional non-permit required to be implemented in phased, targeted areas then jurisdiction-wide.	FY18	N/A	N/A	N/A	N/A	No
PO-48	Installation of trash skimmers in marina basins	Optional, non-permit required to be implemented in a phased approach, implemented first in marinas in areas of the Port specified under the Physical Aesthetics Focused Priority Condition, then will assess application jurisdiction-wide. The trash skimmers will help to collect trash and debris found within marina basins. This strategy will be triggered if marinas are identified as high trash generating area in assessment Projected funding needs may be met through grant funding, or PGP or GS annual budget. All Port funding for future fiscal years is contingent on annual budget approval by Port BPC.	FY18	N/A	N/A	N/A	N/A	No

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
Restoration								
PO-49	Otay District Habitat Improvement (Former South Bay Power Plant)	Decommission the South Bay Power Plant (completed) in a manner that allows habitat improvements to be performed at the site. Buffer area (25 acres) for habitat enhancements and/or mitigation purposes and will create additional upland transition, intertidal and subtidal habitat. This strategy will be triggered upon completion of the following: 1) Multi-jurisdictional approval of development plans; 2) CEQA review process has been completed; and 3) Approval by California Coastal Commission. Projected funding needs may be met through grant funding, support from community groups or other institutions, or as a potential alternative compliance program candidate project. All Port funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, non-permit required strategy involving multiple agencies and third parties.	FY 2025	N/A	N/A	N/A	N/A	No

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-50	Enhance wetland and connections to F and G St marsh and J Street marsh.	Habitat enhancement of marsh, and associated mudflats and low-lying salt marsh and upland transition areas. Enhance through improved flushing of saltwater marsh currently serviced by a small, ineffective culvert. Enhancement potential: An additional channel, refuge islands, secondary tidal channels, and bay-ward expansion of the marsh. This strategy will be triggered upon completion of the following: 1) Multi-jurisdictional approval of development plans; 2) CEQA review process has been completed; and 3) Approval by California Coastal Commission. Projected funding needs may be met through grant funding, support from community groups or other institutions, or as potential alternative compliance program candidate projects. All Port funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional, non-permit required strategy involving multiple agencies and third parties.	FY 2020	N/A	N/A	N/A	N/A	No

Table 12-13 (continued)
Port of San Diego Jurisdictional Strategies

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Inventory BMPs, B.3.b.(1)(a)(ii)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Planned Implementation or Construction Year	Implementation		Proposed Modifications		
				Implemented as planned in current FY? Completed in current FY?	Strategy Information	Modification (If modified or canceled, provide rationale)	Modification Type (Schedule, Approach, New)	Planned Implementation into the next FY? (Y/N)
PO-51	Pond 20 – Site Development Mitigation Banking	The strategy will include the establishment of a mitigation bank while entitling certain parcels for future commercial development. This includes a Port Master Plan Amendment to bring the site into the Port's Coastal Permitting jurisdiction, and setting aside parcels for future commercial development. The strategy involves two different objectives for site development-mitigation banking that focus on habitat conservation and developing the site for commercial purposes. This strategy will be triggered upon completion of the following: 1) the necessary entitlement process is completed; 2) CEQA review process has been completed; and 3) Approval by California Coastal Commission. Any proposed method for moving forward with a mitigation bank would require future approvals from the BPC. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by Port BPC. Optional WMA -Multi-jurisdictional, non-permit required strategy.	FY 2020	N/A	N/A	N/A	N/A	No

Notes:
1 CAP - Port of San Diego's Climate Action Plan (2013) (https://www.portofsandiego.org/environment/clean-water/doc_download/5515-port-of-san-diego-climate-action-plan.html)
PGP – Planning and Green Port; REO – Real Estate Department; GS – General Services Department; Eng – Engineering Department; MarCom – Marketing and Communications Department; GCR – Government and Community Relations Department; HPD – Harbor Police Department; USFWS – United States Fish and Wildlife Service.

12.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

No modifications to the BMP Design Manual have been made since the WQIP was approved in spring 2016. The current Port of San Diego BMP Design Manual is posted on the Port's website, and the link to this page is listed on Project Clean Water.

12.5 MODIFICATIONS TO THE JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM

Table 12-14 describes modifications to the Port's JRMP have been made since the WQIP was approved in February 2016. The updated Port of San Diego JRMP is posted on the Port's website, and the link to this page is listed on Project Clean Water.

Table 12-14
Port of San Diego JRMP Updates

Update Number	JRMP Section	Description of Change	Rationale for Change
1	Universal	Update name of department from "Environmental and Land Use Management (ELUM)" to "Planning and Green Port (PGP)"	Change due to Port internal restructuring in FY 2016.
2	Universal	Changes to WQIP strategy numbers	Since the JRMP document was submitted in June 2015, the Port's WQIP strategies table was reorganized and/or WQIP strategies modified prior to final submittal of the WQIP in September 2015. Therefore, some of the individual strategy numbers have changed.
3	1.4.2	Remove the following language: "In fiscal year 2016, the Port will be developing individual strategy "cut sheets" that will include a more detailed description of the strategy, the strategy approach, applicability, and the effectiveness assessment methods the Port will use to determine if the strategy needs to be modified, removed or continue to be implemented as written. Once completed, the cut sheets will be included as part of the JRMP update and added to Appendix A."	The development of individual strategy cutsheets required more resources than anticipated and were not completed in FY 2016. The development of the individual strategy cutsheets will be pursued at a later date.

Table 12-14
Port of San Diego JRMP Updates (continued)

Update Number	JRMP Section	Description of Change	Rationale for Change
4	2.1	Update Port organizational charts (Figure 2-1 and Figure 2-2) to reflect current Port structure	Change due to Port internal restructuring in FY 2016.
5	2.2.3	Modification to fourth sentence in paragraph to read "Consistent with the Port BMP Design Manual, projects are required to implement low impact development (LID) BMPs as well as source control and site design BMPs applicable to the project."	Clarification that the projects, not the BMPs, are required to meet these requirements.
6	2.2.3	Replace last sentence of paragraph with the following: "Additionally, new development and redevelopment are required to submit a storm water quality management plan (SWQMP) identifying post-construction BMPs for the project."	Clarification
7	2.2.6	Change statement to read that the certified statement regarding legal authority was submitted with the first San Diego Bay WQIP annual report.	Clarification
8	3.2, 4.2, 5.2, 6.2, 7.2, 9.2	Modify language to differentiate between core and optional strategies and update to state the strategies will address highest and focused priority conditions.	Clarification
9	3.2, 4.2, 5.2, 6.2, 7.2, 9.2	Updated the WQIP strategies in each program component's table (Tables 3-1, 4-2, 5-2, 6-2, 7-2, and 9-2).	The Port's WQIP strategies table was reorganized since the JRMP document was submitted in June 2015. In addition, some of the WQIP strategies were also modified and/or incorporated into other strategies.
10	3.5	Update second paragraph to reflect Regional Board's acceptance of the WQIP and post-transitional period.	Revised to reflect current Municipal Permit requirements.

Table 12-14
Port of San Diego JRMP Updates (continued)

Update Number	JRMP Section	Description of Change	Rationale for Change
11	3.5.2	Update language to reflect post-transitional period.	Clarification
12	4.4	Updated reference to implementation date of BMP Design Manual	The implementation date was previously listed as December 24, 2015. The date was updated to reflect the February 16, 2016 effective date per the Municipal Permit requirements.
13	4.3, 4.4, and 4.5.1	Deleted reference to two WQIP strategies that removed from the Port's strategies list in the JRMP Update that was submitted in June 2015: • Update Stormwater Requirements Checklist to identify whether a project has a high potential to generate trash, metals, and bacteria (original PO-3) Update BMP Design Manual to include enhancements for projects (both non-PDP and PDP projects) having a high potential to generate trash, metals, and bacteria (original PO-4).	Reference to the two strategies was removed because the Port's WQIP strategies table was reorganized and/or WQIP strategies were modified since the JRMP document was submitted in June 2015. These two strategies were incorporated into the core JRMP strategy (PO-1) and are no longer stand-alone strategies.
14	4.4	Modified language to reflect updates to the Storm Water Requirements Applicability checklist, the Port's BMP Design Manual, and the Storm Water Quality Management Plan (SWQMP) templates.	Ensure section reflects updates to the templates comply with the Municipal Permit requirements that were submitted by the February 16, 2016 effective date.
15	4.5.2	Added Table 4-5 regarding Priority Development categories	The section referred to a table that was inadvertently not included.
16	4.6.3	Added information stating the Port's Alternative Compliance Program was developed in FY 2016 and incorporated into the Port's BMP	Update status of the Alternative Compliance Program

Table 12-14
Port of San Diego JRMP Updates (continued)

Update Number	JRMP Section	Description of Change	Rationale for Change
		Design Manual to be implemented in FY 2017.	
17	5.3	Updated language to reflect updates to the Construction BMP plan template in FY 2016	Ensure section reflects updates to the template.
18	5.7.2	Added a new procedure to the inspection programs that will be initiated in FY 2017. Following all inspections, the Port will email the inspection report with findings and corrective actions to the responsible parties.	The modification was incorporated based on recommendation from an internal audit of the Port's Storm Water Program in June 2016. These new procedures will help improve communications and assist in obtaining timely and complete corrective actions.
19	7.6.2	Added a new procedure to the inspection programs that will be initiated in FY 2017. The Port now requires acknowledgement of inspection results and corrective actions from responsible parties in the form of a signature on hardcopy inspection form or via certified mail.	The modification was incorporated based on recommendation from an internal audit of the Port's Storm Water Program in June 2016. These new procedures will help improve communications and assist in obtaining timely and complete corrective actions.
20	6.3 and 7.4.2	The Port added a new quality assurance process to verify the accuracy of all inventories (i.e., commercial, industrial, and municipal) to ensure all activities are accurately represented and accounted for in the Port's storm water database.	The new quality assurance process will be implemented as a result of the recommendations from an internal audit of the Port's Storm Water Program in June 2016.
21	6	Added new section for Special Events (new Section 6.7). Narrative added to discuss the Special Event BMP requirements and inspection process, inspection frequency, inspection type and content, and tracking and record keeping	The Special Event Section was created since the inspection component has a number of elements specific to this type of activity which were not explicitly discussed in Section 6 previously. In addition, the modification to the inspection process was based on

Table 12-14
Port of San Diego JRMP Updates (continued)

Update Number	JRMP Section	Description of Change	Rationale for Change
		(previous Section 6.7 will now be Section 6.8). In addition, the inspection process was modified to include processes to obtain acknowledgement by event organizer that they have received written BMP guidance prior to the event.	recommendations from an internal audit of the Port's Storm Water Program in June 2016.
22	6.6.4	Updated discussion regarding the review of MS4 inspection results to focus on MS4 structures and BMPs that require more frequent cleaning	In FY 2016, the Port completed the evaluation of the results of MS4 inspections (PO-30). Modifications to the MS4 inspection program were identified based on this analysis.
23	6.8	Added reference to PO-13	Clarification
24	10.3	Updates to Tables 10-2 and 10-3 to reorganize the categories	The modifications were done to improve table organization and reporting.

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APPENDIX 3

WATER QUALITY IMPROVEMENT PLAN NUMERIC GOALS

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Chollas Creek TMDL

Bacteria and Metals

Dry and Wet Weather Numeric Goals

Table 3-1
Dry Weather Numeric Goals for Chollas Creek

Compliance Pathways		Baseline	Assessment Period and Fiscal Year			
			Current Permit Term	FY 16–20	FY 21–25	FY 26–30
DRY WEATHER METALS						
			FY 18	FY 19[1]	FY 24	FY29[1]
MS4 Discharges Allowable % Above Effluent Limitations	Copper Lead Zinc	% exceedance of effluent limitations (Monitoring and Assessment Program Section of the Final Water Quality Improvement Plan)	See Performance Measures	20%	15%	0%
OR						
Receiving Water Allowable % Above Receiving Water Limitations	Copper Lead Zinc	0% exceedance of receiving water limitations (Transitional Monitoring and Assessment Program 2012 – 2014)	See Performance Measures	0%	0%	0%
OR						
# of Direct or Indirect MS4 Discharges to Receiving Water		Number of flowing MS4 outfalls during dry weather monitoring (Monitoring and Assessment Program Section of the Final Water Quality Improvement Plan)	See Performance Measures	0	0	0
OR						

Table 3-1 (continued)
Dry Weather Numeric Goals for Chollas Creek

Compliance Pathways		Baseline	Assessment Period and Fiscal Year: Current Permit Term	FY 16–20	FY 21–25	FY 26–30
Implement Accepted Water Quality Improvement Plan Strategies to Reduce MS4 Discharges Will Result in % Load Reduction (Using WER Update 2014)	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix 2). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.					
	Copper	0% Load Reduction (2003 TMDL Model)	See Performance Measures	0%	0%	0%
	Lead		See Performance Measures	0%	0%	0%
	Zinc		See Performance Measures	0%	0%	0%
DRY WEATHER INDICATOR BACTERIA						
			FY 18	FY 19[1, 3]	FY 21[1]	N/A
Receiving Water % Days Exceeding WQO	Fecal coliform	100% (1996-2002[2])	See Performance Measures	50%	0%	
	Enterococcus	100% (1996-2002[2])		50%	0%	
OR						
MS4 Discharges % Load Reduction	Fecal coliform	0% (2002 TMDL Model)	See Performance Measures	49.4%	98.8%	
	Enterococcus			49.7%	99.3%	
	Total coliform[4]			46.1%	92.1%	
OR						
MS4 Discharges % Days Exceeding WQO	Fecal coliform	Historical MS4 dry weather data will be used to identify the baseline in the first annual report	See Performance Measures	0%	0%	
	Enterococcus			0%	0%	
	Total coliform[4]			0%	0%	
OR						

Table 3-1 (continued)
Dry Weather Numeric Goals for Chollas Creek

<table>
<tr><th rowspan="2" colspan="2">Compliance Pathways</th><th rowspan="2">Baseline</th><th colspan="4">Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term</th><th>FY 16–20</th><th>FY 21–25</th><th>FY 26–30</th></tr>
<tr><td colspan="2"># of Direct or Indirect MS4 Discharges to Receiving Water</td><td>Number of persistently flowing major MS4 outfalls provided in the Monitoring and Assessment Program Section of the Final Water Quality Improvement Plan</td><td>See Performance Measures</td><td>0</td><td>0</td><td></td></tr>
<tr><td colspan="6">OR</td><td></td></tr>
<tr><td rowspan="2">% of Exceedances of Final Receiving Water WQOs due to Natural Sources[5]</td><td>Fecal coliform</td><td rowspan="2">Not Available</td><td rowspan="2">100%</td><td rowspan="2">100%</td><td rowspan="2">100%</td><td rowspan="2"></td></tr>
<tr><td>Enterococcus</td></tr>
<tr><td colspan="6">OR</td><td></td></tr>
<tr><td>Implement Accepted Water Quality Improvement Plan</td><td colspan="5">Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.</td><td></td></tr>
</table>

Notes:
1. Denotes TMDL final and interim target. Alternative interim compliance dates are presented.
2. The existing exceedance frequency was calculated on the basis of available monitoring data between 1996 and 2002 per Municipal Permit requirements and presented in more detail in Appendix H.
3. The County of San Diego has selected an alternative interim schedule for compliance with interim Chollas Creek Bacteria TMDL targets. The County will meet the goal in FY 20.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

Table 3-2
Wet Weather Numeric Goals for Chollas Creek

Compliance Pathways		Baseline	Assessment Period and Fiscal Year				
			Current Permit Term	FY 16–20	FY 21–25	FY 26–30	FY 31–36
Wet Weather Metals							
			FY 18	FY 19[1]	FY 24	FY 29[1]	N/A
MS4 Discharges Allowable % Above Effluent Limitations	Copper Lead Zinc	100% exceedance of effluent limitations in FY 09 (Year 1 of TMDL compliance)	See performance measures	20%	15%	0%	
Or							
Receiving Water Allowable % Above Receiving Water Limitations	Copper Lead Zinc	100% exceedance of receiving water limitations in FY09 (Year 1 of TMDL compliance)	See performance measures	0%	0%	0%	
Or							
Number of Direct or Indirect MS4 Discharges to Receiving Water		Number of flowing MS4 outfalls during wet weather monitoring (Monitoring and Assessment Program Section of the Final Water Quality Improvement Plan)	See performance measures	0	0	0	
Or							

Table 3-2 (continued)
Wet Weather Numeric Goals for Chollas Creek

Compliance Pathways		Baseline	Assessment Period and Fiscal Year				
			Current Permit Term	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY 18	FY 19[1]	FY 24	FY 29[1]	N/A
Implement Accepted Water Quality Improvement Plan Strategies to Reduce MS4 Discharges Will Result in % Load Reduction (Using WER Update 2014)	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix 2). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.						
	Copper	0% Load Reduction (2003 TMDL Model)	See performance measures	0%	0%	0%	
	Lead			0%	0%	0%	
	Zinc			23.3%	24.7%	29.1%	
Wet Weather Indicator Bacteria							
			FY 18	FY 19	FY 24[1, 2]	FY 29[2]	FY 31[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	60% Days Exceeding WQO (2002 TMDL Model)	See performance measures	60%[3]	41%	32%	22%
	Enterococcus	63% Days Exceeding WQO (2002 TMDL Model)		63%[3]	43%	33%	22%
Or							
			FY 18	FY 19	FY 24[1, 2]	FY 29[2]	FY 31[1]
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	5%	15%	26%	29%
	Enterococcus			4%	12%	20%	24%
	Total coliform[4]			3%	9%	15%	18%
Or							

Table 3-2 (continued)
Wet Weather Numeric Goals for Chollas Creek

Compliance Pathways		Baseline	Assessment Period and Fiscal Year				
			Current Permit Term	FY 16–20	FY 21–25	FY 26–30	FY 31–36
MS4 Discharges % Days Exceeding WQO	Fecal coliform	Historical MS4 wet weather data will be used to identify the baseline in the first annual report	See performance measures.	22%	22%	22%	22%
	Enterococcus			22%	22%	22%	22%
	Total coliform[4]			22%	22%	22%	22%
Or							
Number of Direct or Indirect MS4 Discharges to Receiving Water		Number of flowing MS4 outfalls during wet weather monitoring (Monitoring and Assessment Program Section of the Final Water Quality Improvement Plan)	See performance measures.	0	0	0	0
Or							
			FY 18	FY 19	FY 24[1, 2]	FY 29[2]	FY 31[1]
% of Exceedances of Final Receiving Water WQOs due to Natural Sources[5]	Fecal coliform	Not available	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
Or							
Implement Accepted Water Quality Improvement Plan	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.						

Table 3-2 (continued)
Wet Weather Numeric Goals for Chollas Creek

Compliance Pathways	Baseline	Assessment Period and Fiscal Year				
		Current Permit Term	FY 16–20	FY 21–25	FY 26–30	FY 31–36

Notes:
1. Denotes TMDL final and interim target. Alternative interim compliance dates are presented.
2. The County of San Diego has selected alternative interim schedules and goals for compliance with the Bacteria TMDL. The County will meet the goal in FY 29. See Section 4.3.4.1 for County of San Diego final and interim goals.
3. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RAs by maintaining the existing wet weather exceedance frequency.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WER = Water-Effect Ratio; WQO = Water Quality Objective

Chollas Creek TMDL

Bacteria Baseline Exceedance Rate

Table 3-3
Chollas Creek (908.22) MS4 Bacteria Baseline Exceedance Rate

Parameter	Dry Weather Percent Days Exceeding[a]	Wet Weather Percent Days Exceeding[b]
Enterococcus	100%	100%
Fecal Coliform	100%	100%
Total Coliform	100%	100%

Notes:

a. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 21013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.

b. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.5 of the 2013 mS4 Permit for each monitoring year for which data were available. The observed wet weather days in exceedance for monitored years were summed and divided by the total wet weather days in exceedance for the historical 5-year period.

Chollas Creek TMDL

Bacteria and Metals

City of La Mesa Numeric Goals

Table 3-4
Goals for Chollas Creek – City of La Mesa

Performance Measure for Key First Permit Term Strategies		**Assessment Period and Fiscal Year**
		Current Permit Term
Performance Measure—Wet and Dry Weather		
Performance Metrics		FY 18
Design, Construct, and Maintain Low-Impact Development (LID) Retrofits	Linear feet	Approximately 4,540 linear feet of bioretention areas will replace impervious asphalt along University Avenue between La Mesa Boulevard and Harbison Avenue.

Chollas Creek TMDL

Bacteria and Metals

City of Lemon Grove Numeric Goals

Table 3-5
Dry and Wet Weather Numeric Goals for Chollas Creek – City of Lemon Grove

Performance Measures for Key First Permit Term Strategies		Current Permit Term (FY 14–FY 18)
		FY 18
Performance Measures—Wet Weather		
Reduction in Bacteria	Restaurant used cooking oil bins stored in covered areas and protected from run-on.	75 percent (%)[1]
Or		
Municipal Facility Retrofits for Reduction of Bacteria and Metals	Redirect parking lot runoff to pervious area.	2 municipal facilities retrofitted (drainage area/facility to be determined (TBD) during site selection in FY 16)
	Redirect roof downspouts to pervious area.	2 municipal facilities retrofitted (drainage area/facility TBD during site selection in FY 16)
Performance Measures—Dry Weather		
Non-Storm Water Flow Reduction Programs	Install smart irrigation systems at municipal facilities.	8 Cal-Sense smart irrigation systems installed

Note:
1. These data have not been directly recorded in past inspection programs. The City's current BMP requirements state that bins must be kept clean but do not always require coverage. Based on discussion with inspection staff, it is estimated that about 20-30% of used oil cooking bins are stored in covered areas protected from run-on.

Chollas Creek TMDL

Bacteria and Metals

City of San Diego Numeric Goals

Table 3-6
Dry and Wet Weather Numeric Goals for Chollas Creek – City of San Diego

Suite of Strategies to Measure Performance during First Permit Term	Baseline	Assessment Period Current Permit Term (FY 14–FY 18) FY 18
Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL.	44.6 acres of drainage area treated through construction of 6 green infrastructure BMPs[1]
Implement runoff reduction programs that include targeted education and outreach efforts, enhanced inspections, additional rebate programs[2], and increased enforcement	Historical dry weather monitoring data will be used to establish a baseline in the first Water Quality Improvement Plan annual report.	10% prohibited[3] dry weather reduction in flow from baseline measured at persistently flowing outfalls in the WMA

Chollas Creek TMDL

Bacteria and Metals

County of San Diego

Table 3-7
Dry Weather Numeric Goals for Chollas Creek – County of San Diego

Compliance Pathways		Baseline	Assessment Period and Fiscal Year		
			Current Permit Term	FY 16–20	FY 21–25
Dry Weather Metals					
			FY 18	FY 19[1]	FY 24
MS4 Discharges	Copper	% exceedance of effluent limitations (Monitoring and Assessment Program Section of the Final Water	See Performance Measures	20%	15%
	Lead				
	Zinc				
Or					
Receiving Water Allowable % Above Receiving Water Limitations	Copper	0% exceedance of receiving water limitations (Transitional Monitoring and Assessment Program 2012 – 2014)	See Performance Measures	0%	0%
	Lead				
	Zinc				
Or					
# of Direct or Indirect MS4 Discharges to Receiving Water		Number of flowing MS4 outfalls during dry weather monitoring (Monitoring and Assessment Program Section of the Final Water Quality Improvement Plan)	See Performance Measures	0	0
Or					
Implement Accepted Water Quality Improvement Plan Strategies to Reduce MS4 Discharges Will Result in % Load Reduction (Using WER Update 2014)	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.				
	Copper	0% Load Reduction (2003 TMDL Model)	See Performance Measures	0%	0%
	Lead		See Performance Measures	0%	0%
	Zinc		See Performance Measures	0%	0%

Table 3-7 (continued)
Dry Weather Numeric Goals for Chollas Creek – County of San Diego

Compliance Pathways		Baseline	Assessment Period and Fiscal Year		
			Current Permit Term	FY 16–20	FY 21–25
Dry Weather Indicator Bacteria					
			FY 18	FY 20[1,3]	FY 21[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	100% (1996-2002[2])	See performance measures.	50%[3]	0%
	Enterococcus	100% (1996-2002[2])		50%[3]	0%
Or					
MS4 Discharges % Load Reduction	Fecal coliform	0% (2002 TMDL Model)	See performance measures.	49.4%[3]	98.8%
	Enterococcus			49.7%[3]	99.3%
	Total coliforms[4]			46.1%[3]	92.1%
Or					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	Historical MS4 dry weather data will be used to identify the baseline in the first annual report.	See performance measures.	0%	0%
	Enterococcus			0%	0%
	Total coliforms[4]			0%	0%
Or					
Number of Direct or Indirect MS4 Discharges to Receiving Water		To be determined	See performance measures.	0	0
Or					

Table 3-7 (continued)
Dry Weather Numeric Goals for Chollas Creek – County of San Diego

Compliance Pathways		Baseline	Assessment Period and Fiscal Year		
			Current Permit Term	FY 16–20	FY 21–25
% of Exceedances of Final Receiving Water WQOs due to Natural Sources[5]	Fecal coliform	Not Available	100%	100%	100%
	Enterococcus				
Or					
Implement Accepted Water Quality Improvement Plan	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.[6]				

Notes:
1. Denotes TMDL final and interim target.
2. The existing exceedance frequency was calculated on the basis of available monitoring data between 1996 and 2002 per Municipal Permit requirements and presented in more detail in Appendix H.
3. The County of San Diego has selected alternate interim schedules and goals for compliance with the Bacteria TMDL; alternative dry weather compliance in FY 20 and wet weather compliance in FY 28.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance.

Table 3-8
Wet Weather Numeric Goals for Chollas Creek – County of San Diego

Compliance Pathways		Baseline	Current Permit Term	FY 16–20	FY 21–25	FY 26–30[3]	FY 31–36
			Assessment Period and Fiscal Year				
Wet Weather Metals							
			FY 18	FY 19[1,3]	FY 24	FY 29[1]	N/A
MS4 Discharges Allowable % Above Effluent Limitations	Copper	100% allowable exceedance of effluent limitations in FY 09 (Year 1 of TMDL compliance)	See performance measures.	20%	15%	0%	
	Lead						
	Zinc						
Or							
Receiving Water Allowable % Above Receiving Water Limitations	Copper	100% allowable exceedance of receiving water limitations in FY 09 (Year 1 of TMDL compliance)	See performance measures.	0%	0%	0%	
	Lead						
	Zinc						
Or							
Number of Direct or Indirect MS4 Discharges to Receiving Water		To be determined	See performance measures.	0	0	0	
Or							
Implement Accepted Water Quality Improvement Plan Strategies to Reduce MS4 Discharges Will Result in % Load Reduction (Using WER Update 2014)	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.						
	Copper	0% Load Reduction (2003 TMDL Model)	See performance measures.	0%	0%	0%	
	Lead			0%	0%	0%	
	Zinc			23.3%	24.7%	29.1%	

Table 3-8 (continued)
Wet Weather Numeric Goals for Chollas Creek – County of San Diego

Compliance Pathways		Baseline	Current Permit Term	FY 16–20	FY 21–25	FY 26–30[3]	FY 31–36
			Assessment Period and Fiscal Year				
Wet Weather Indicator Bacteria							
			FY 18	FY 19	FY 24	FY 28[1]	FY 31[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	60% Days Exceeding WQO (2002 TMDL Model)	See performance measures.	60%[2]	54%	41%[3]	22%
	Enterococcus	63% Days Exceeding WQO (2002 TMDL Model)		63%[2]	57%	43%[3]	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	5%	11%	15%[3]	29%
	Enterococcus			4%	9%	12%[3]	24%
Or							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	Historical MS4 wet weather data will be used to identify the baseline in the first annual report	See performance measures.	22%	22%	22%	22%
	Enterococcus			22%	22%	22%	22%
Or							
Number of Direct or Indirect MS4 Discharges to Receiving Water		TBD	See performance measures.	0	0	0	0
Or							

Table 3-8 (continued)
Wet Weather Numeric Goals for Chollas Creek – County of San Diego

Compliance Pathways		Baseline	Assessment Period and Fiscal Year					
			Current Permit Term	FY 16–20	FY 21–25	FY 26–30[3]	FY 31–36
% of Exceedances of Final Receiving Water WQOs due to Natural Sources[4]	Fecal coliform	Not available	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
Or							
Implement Accepted Water Quality Improvement Plan	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.[5]						

Notes:
1. Denotes TMDL final and interim target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RPs by maintaining the existing wet weather exceedance frequency.
3. The County of San Diego has selected alternate interim schedules and goals for compliance with the Bacteria TMDL; alternative dry weather compliance in FY 20 and wet weather compliance in FY 28.
4. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
5. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance.

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Water Quality Within Caltrans Jurisdiction

Dry and Wet Weather Numeric Goals

Table 3-9
Goals for Chollas Creek (Wet Weather)—Caltrans

Goals	Unit of Measure	Assessment Metric
MS4 Discharges	Cooperative implementation agreement	Achieve compliance units by contributing funds to a cooperative implementation agreement or grant program.
	Or	
MS4 Discharges	Implement nonstructural BMPs.	Continued implementation of wet weather nonstructural BMP activities within the watershed
	Or	
MS4 Discharges	Implement structural BMPs.	Continued implementation of wet weather structural BMP activities for proposed projects within the watershed

Table 3-10
Goals for Chollas Creek (Dry Weather)—Caltrans

Goals	Unit of Measure	Assessment Metric
MS4 Discharges	Reduce dry weather flow.	Eliminate dry weather flows by implementing control measure to ensure effective prohibition.
	Or	
MS4 Discharges	Implement dry weather BMPs.	Implement drought-tolerant landscaping and conversion to smart irrigation controllers within the watershed.

Water Quality Within Airport Authority Jurisdiction

Copper and Zinc Concentrations

Dry and Wet Weather Numeric Goals

Table 3-11
Goals for Water Quality (Copper and Zinc)
Within Airport Authority Jurisdiction (908.21)

WATER QUALITY						
Numeric Goals		Assessment Period and Fiscal Year				
		Current Permit Term	FY 16-20	FY 21-25	FY 26-30
		FY 17	FY 18	FY 21	FY 26
		Interim Goal[1]			Final Goal[2]
MS4 Discharges Jurisdiction-wide % of Wet Weather Samples With Concentrations Exceeding Target)	Dissolved Copper	70%	30%	20%	0%
	Dissolved Zinc	65%	35%	25%	0%
OR					
Performance Metrics		FY 16	FY 18	FY 21	FY26
MS4 Discharges Sub-basins 1, 3, and 5 (in total) Area Treated with Street Sweeping	Acres/ Week	7 Acres/ Week (Current Frequency)	21 Acres/ Week (3-fold increase in area)		

Notes:
1. Interim Goals are based on State Industrial General Permit (IGP) Numeric Action Levels (NALs), which are based on the 2008 USEPA NPDES Multi-Sector General Permit benchmark values. Benchmark values for copper and zinc are 33.2 ug/L and 260 ug/L, respectively, and were calculated based on the highest hardness as CaCO3 value in the 2008 MSGP hardness table.
2. Final Goals are based on the 1-hour average concentration for dissolved solids from the USEPA California Toxics Rule Criteria for Enclosed Bays and Estuaries. Criteria values for copper and zinc are 4.8 ug/L and 90 ug/L, respectively.

Riparian Area Habitat in Paradise Creek

Dry and Wet Weather Numeric Goals

Table 3-12
Delisting Goals for Riparian Area Habitat in Paradise Creek (909.1)

Riparian Area Quality				
Goal Type/Performance Metrics		Assessment Period and Fiscal Year		
		Current Permit Term (FY 14 – FY 18)	FY 16 – FY 20	FY 21 – FY 25
		FY 16	FY 18	FY 22
Water Body Delisting	Removal of Paradise Creek 303(d) Selenium Listing	Collect and analyze 48 samples for selenium, with 0 exceedances of the water quality objective.[1]	If data support removal of segment from 303(d) List, submit data during earliest available solicitation period (1 data submission).	Removal of Paradise Creek from 303(d) List for selenium (1 delisting)

- Note:
  1. These numbers are designed such that the when analyzed together with the historical data upon which the current 303(d) Listing is based, the entire data set (current study data plus historical data) will meet the delisting criteria in the State listing policy (State Board, 2004).

Table 3-13
Habitat Restoration Goals for Riparian Area Habitat in Paradise Creek (909.1)

<table>
<tr><th colspan="8">Riparian Area Quality</th></tr>
<tr><th rowspan="3">Goal Type</th><th colspan="2">Create Restored Areas</th><th colspan="5">Establish and Maintain Restored Areas[1]</th></tr>
<tr><th rowspan="2">Performance Metrics</th><th>Current Permit Term (FY 14 – FY 18)</th><th colspan="2" rowspan="2">Performance Metrics</th><th colspan="3">FY 16 – FY 20</th></tr>
<tr><th>FY 17</th><th>FY 18</th><th>FY 19</th><th>FY 20[2]</th></tr>
<tr><td rowspan="8">Restore Native Riparian Vegetation and Wetlands</td><td rowspan="2">Remove concrete bottom from Paradise Creek</td><td rowspan="2">1,000 Linear Feet</td><td rowspan="4">Riparian Woodland and Riparian Scrub Areas</td><td>% Survival of Plantings[3]</td><td>100</td><td>90</td><td>90</td></tr>
<tr><td>% Minimum Native Cover[4]</td><td>50</td><td>60</td><td>70</td></tr>
<tr><td>Wetland restoration</td><td>6,000 Square Feet</td><td>% Maximum Allowable Non-Native Weed Cover[5]</td><td>5</td><td>5</td><td>5</td></tr>
<tr><td rowspan="3">Total native plant restoration, including wetlands</td><td rowspan="3">35,000 Square Feet</td><td>% Bare Ground</td><td>45</td><td>35</td><td>25</td></tr>
<tr><td rowspan="4">Brackish Marsh and Salt Marsh Areas</td><td>% Survival of Plantings[3]</td><td>100</td><td>90</td><td>90</td></tr>
<tr><td>% Minimum Native Cover[4]</td><td>40</td><td>50</td><td>60</td></tr>
<tr><td rowspan="2">Provide treatment for tributary urbanized areas</td><td rowspan="2">130 Treated Acres</td><td>% Maximum Allowable Non-Native Weed Cover[5]</td><td>5</td><td>5</td><td>5</td></tr>
<tr><td>% Bare Ground</td><td>55</td><td>45</td><td>35</td></tr>
</table>

- Notes:

1. These success criteria are taken from the Wetland and Riparian Habitat Restoration, Maintenance, and Monitoring Plan submitted as part of the resource agency permitting process for the Paradise Creek restoration project.
2. Monitoring will also be completed to confirm continued attainment of the final (FY 20) goals in FY 21 and FY 22. The City of National City owns the property where the creek restoration is being completed and will protect the restored area in perpetuity.
3. Denotes container planted species, with percentage based upon original planting quantities.
4. Percentages based upon absolute cover values from transect data collected in year 3 after restoration completion (anticipated to be FY 20), visual estimates only in years 1 and 2 (FY 18 and FY 19).
5. Percentages are for annual weed species. The site shall also remain free of invasive exotic/noxious weed species as identified by the California Invasive Plant Pest Council (Cal IPPC), and shall have 0% cover of noxious species by the end of year 3 after restoration completion (anticipated to be FY 20).

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Physical Aesthetics

Dry and Wet Weather Numeric Goals

Table 3-14
Goals for Physical Aesthetics in Lower Sweetwater HA (909.1) and Otay HA (910.2)

PHYSICAL AESTHETICS						
Numeric Goal	Unit of Measure	Baseline	Assessment Period and Fiscal Year			
			Current Permit Term (FY 14 – FY 18)	FY 16–20	FY 21–25	FY26–30
			FY 18	FY 20	FY 24	FY 28
MS4 Discharges % Optimal[1] Trash Assessment Scores	MS4 Outfalls Assessed for Trash	60%[2]	65%	75%	85%	95%
Or						
MS4 Discharges % of High Volume Trash Drainage Area Treated for Trash within 910.2[3]	% Drainage Area Feasible for BMP retrofit	Historical trash assessment data[4]	10%	20%	50%	100%[5]

Notes:
1. Historically, an optimal score was given to sites meeting the following requirements: “On first glance, no trash visible. Little or no trash (<10 pieces) evident when evaluated area is closely examined for litter and debris.” This definition may change in the future and will be noted in Water Quality Improvement Plan updates.
2. Based on the RPs’ cumulative number of site visits of major MS4 outfalls in the Focused Priority Condition area for dry weather and MS4 outfall monitoring during FY 12 through FY 14
3. These values are based on best available information and current jurisdictional knowledge. A feasibility study is required to determine where BMP retrofits can be implemented. The interim goals may be adapted if needed.
4. An assessment is needed and will incorporate review of all available trash and source assessment data, drainage areas, and potential locations in high volume trash generating areas to feasibly implement structural control BMPs to identify or verify High Volume Trash Areas and % area feasible to retrofit with trash BMPs. The goals may be updated accordingly and provided in a future annual report.
5. The final numeric goal is in line with the State Trash Amendments compliance tracks and time schedule requirements to demonstrate compliance ten years after the trash amendments are incorporated into the next Municipal Permit.

Swimmable Waters (Beaches) in Coronado

Dry and Wet Weather Numeric Goals

Table 3-15
Dry and Wet Weather Goals for Swimmable Waters (Beaches) in the Coronado HA (910.1)

<table>
<tr><th colspan="5">SWIMMABLE WATERS</th></tr>
<tr><th rowspan="3">Numeric Goal</th><th rowspan="3">Unit of Measure</th><th></th><th colspan="2">Assessment Period and Reporting Year</th></tr>
<tr><th rowspan="2">Baseline</th><th>Current Permit Term (FY 16 – FY 18)</th><th>FY 19–23</th></tr>
<tr><th>FY 18</th><th>FY 21</th></tr>
<tr><td>Receiving Water
Removal from the List of Impaired Water Quality Impaired Segments of one 303(d) Listing for Recreation Water Contact (REC-1 Beneficial Use)</td><td>% of Samples Exceeding Single-Sample Enterococcus WQO[1]</td><td>Below 15% for dry weather monitoring[2]

44% for wet weather monitoring[3]</td><td>Below 15% for dry weather monitoring

33% for wet weather monitoring</td><td>• Below 15% for dry weather monitoring[4]
• 22% for wet weather monitoring[5]
• Submit data to Regional Board to support the delisting of one segment - San Diego Bay Shoreline, Tidelands Park from 303(d) List for Enterococcus (REC-1)[6]</td></tr>
<tr><td colspan="5">Or</td></tr>
<tr><th colspan="2"></th><th>Baseline</th><th>FY 18</th><th>FY 23</th></tr>
<tr><td rowspan="2">Water Quality Report Card – Achieve grade and inform the public</td><td>% Water Quality Report Card Grade Achieved (Dry Weather)[7]</td><td>80% – Grade A[8]</td><td>85% - Grade A</td><td>90% - Grade A</td></tr>
<tr><td>% Water Quality Report Card Grade Achieved (Wet Weather)</td><td>58% – Grade A[9]</td><td>67% - Grade A</td><td>87% - Grade A</td></tr>
</table>

Table 3-15 (continued)
Dry and Wet Weather Goals for Swimmable Waters (Beaches) in the Coronado HA (910.1)

<table>
<tr><th colspan="5">SWIMMABLE WATERS</th></tr>
<tr><th rowspan="3">Numeric Goal</th><th rowspan="3">Unit of Measure</th><th></th><th colspan="2">Assessment Period and Reporting Year</th></tr>
<tr><th rowspan="2">Baseline</th><th>Current Permit Term (FY 16 – FY 18)</th><th>FY 19–23</th></tr>
<tr><th>FY 18</th><th>FY 21</th></tr>
</table>

<u>Notes:</u>

1. In order to include wet weather and wet season (November-March) data in the assessment, which are not collected frequently enough for a geometric mean calculation, single sample WQOs for *Enterococcus* will be used for assessment purposes.
2. Cumulative data from 1999-2014 showed a dry weather exceedance rate below the allowable threshold for 303(d) de-listing consideration. Due to this finding, the interim and final goals are focused on maintaining the current dry weather exceedance rate, while simultaneously lowering the exceedance rate of wet weather samples.
3. Baseline determined from line of evidence 27343 in the Final California 2010 Integrated Report 303(d) List/305(b) Report), which found 4 out of 9 wet weather receiving water samples exceeded the *Enterococcus* WQO. At the time the baseline was established, no other wet weather data was available to the RPs.
4. The Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List states that WQOs for bacteria are not exceeded using a binomial distribution methodology. The Policy also allows use of a reference beach to compare results. The binomial distribution allows approximately 15% of samples to exceed WQO.
5. Final wet weather exceedance rate is based on the use of a Reference System Approach (Resolution No. R9-2008-0028) for impaired segments included in the Beach and Creeks Bacteria TMDL (RWQCB, 2012) and provided as a final TMDL target in Attachment E to the MS4 Permit. This approach authorizes allowable exceedances of REC-1 WQOs based on the exceedance frequencies observed in reference systems.
6. The goal reflects the RPs actions to submit a scientifically sound delisting that fully meets the delisting policy *Water Quality Control Policy, for Developing California's Clean Water Act Section 303(d) List (2004)*. In requesting the re-evaluation, the RPs will state the reason(s) the listing is no longer appropriate; and will provide valid data and information necessary to enable the Regional Board and State Water Resources Control Board to conduct the review. It should be noted that compliance with this goal is not dependent on the Regional Board's final adoption or delisting since that decision is fully dependent on Regional Board staff and funding responsibilities.
7. Percentage of beaches will be calculated using a five-year rolling average of two beaches, Tidelands Park and North Beach within in the Coronado HA (910.1), using the report card methodology from Heal the Bay.
8. Baseline for dry weather was calculated using a five-year rolling average (Years 10-11 through 14-15) for Tidelands Park from the Heal the Bay report cards. Results: Four As all years except for one B in 2012-13 yield the 80% baseline. Data will be collected for North Beach starting in 2015-16. Interim and final targets are based on the five-year rolling average grade card scores received for Tidelands Park and North Beach locations using the Heal the Bay methodology.
9. Using the Heal the Bay Annual Reports, the baseline for wet weather was calculated using a five-year rolling average for approximately 40 San Diego County Beaches in the Heal the Bay reports. However, the five-year rolling average scores include data collected during drought conditions as noted in the Heal the Bay Report for 2014-15. Using a five-year rolling average is anticipated to attenuate variability between drought and normal/high rainfall years. Wet weather data to be collected to determine percentage of years the beaches (Tidelands and North Beach) achieve water quality report grade of A.

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APPENDIX 4

MONITORING RESULTS AND ASSESSMENT

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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
%	percent
<	less than
>	greater than
≤	less than or equal to
≥	greater than or equal to
°C	degrees Celsius
µg	micrograms
µg/cm^2	micrograms per square centimeter
µg/L	micrograms per liter
µS/cm	micro-Siemens per centimeter
303(d) List	CWA Section 303(d) List of Water Quality Impaired Segments
AB 411	California Assembly Bill 411 (Beach Safety Act)
ABLM	Ambient Bay and Lagoon Monitoring
Bacteria TMDL	*Revised TMDLs for Indicator Bacteria, Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)* (Bacteria TMDL), Regional Board Resolution No. R9-2010-0001, approved February 10.
Basin Plan	Water Quality Control Plan for the San Diego Basin, Region 9
Bight ’13	Southern California Bight 2013 Regional Monitoring Survey
BMI	benthic macroinvertebrates
BMP	best management practices
BOD	biological oxygen demand
CCC	criteria continuous concentration
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
cf	cubic feet

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
CFR	Code of Federal Regulations
cfs or ft^3/second	cubic feet per second
City	City of San Diego
cm	centimeters
CMC	criteria maximum concentration
cm^2	square centimeters
Copermittee	an agency named in the Municipal Permit Provision B.1.
County	County of San Diego
CPOM	coarse particulate organic matter
CRAM	California Rapid Assessment Method
CSCI	California Stream Condition Index
CSUSM	California State University, San Marcos
CTR	California Toxics Rule
CWA	Clean Water Act (Federal Water Pollution Control Act, 33 U.S.C. 1251-1376)
DEH	(County of San Diego) Department of Environmental Health
DNA	deoxyribonucleic acid
E. coli	*Escherichia coli*
EMC	event mean concentration
EPA	United States Environmental Protection Agency (Analytical Method)
EPT	Ephemeroptera, Plecoptera, and Trichoptera taxa
FIB	fecal indicator bacteria
Focused Priority Condition	Focused Priority Water Quality Condition

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
FY	fiscal year
HA	hydrologic area
GIS	geographic information system
Highest Priority Condition	Highest Priority Water Quality Condition
HMP	Hydromodification Monitoring Program
HSA	hydrologic subarea
HU	hydrologic unit
IBI	Southern California Index of Biotic Integrity
IC/ID	illicit connection and/or illicit discharge
ID	identification
IDDE	illicit discharge, detection, and elimination
in	inches
J	estimated quantity
JRMP	Jurisdictional Runoff Management Program
lb	pounds
m	meters
MAP	Monitoring and Assessment Program
MBAS	Methylene Blue Active Substances
MDL	method detection limit
mg	milligrams
mg/cm^2	milligrams per square centimeter
mg/L	milligrams per liter
mL	milliliters
MLS	mass loading station

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
mm	millimeters
MMI	multi-metric indices
MPN	most probable number
MPN/100mL	most probable number per 100 milliliters
MS4	municipal separate storm sewer system
MST	microbial source tracking
Municipal Permit	San Diego Regional Water Quality Control Board Order Number R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region (Regional Board, 2013a)
NA	not applicable or not available
NAL	non-storm water action limit
ND	not detected
NPDES	National Pollutant Discharge Elimination System
NS	not sampled
NSWD	non-storm water discharge
NTU	nephelometric turbidity unit
NWS	National Water Service
O/E	ratio of observed taxa at a site to the expected taxa at a site
OPP	Office of Pesticide Programs (USEPA)
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PHAB	physical habitat

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
pMMI	predictive multi-metric index of biotic integrity
QA	quality assurance
QC	quality control
qPCR	quantitative Polymerase Chain Reaction
Regional Board	San Diego Regional Water Quality Control Board
Responsible Party (RP)	a Copermittee named in the Municipal Permit Provision B.1; all agencies that have included water quality improvement strategies in the Water Quality Improvement Plan
RHMP	Regional Harbor Monitoring Program
RL	reporting limit
RP	Responsible Party
RW	receiving water
RWL	receiving water limitation
SAFIT	Southwest Association of Freshwater Invertebrate Taxonomists
SAL	storm water action limit
SCCWRP	Southern California Coastal Water Research Project
SIYB	Shelter Island Yacht Basin
SM	Standard Method
SMC	Storm Water Monitoring Coalition
SQO	Sediment Quality Objective
State	State of California
State Board	State Water Resources Control Board
sub-AV	sub area-velocity (probe)
SWAMP	Surface Water Ambient Monitoring Program

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
TBD	to be determined
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TMAR	Transitional Monitoring and Assessment Report
TMDL	total maximum daily load
USEPA	United States Environmental Protection Agency
WER	water effects ratio
WLA	waste load allocation
WMA	Watershed Management Area
WQBEL	water quality-based effluent limit
WQIP	Water Quality Improvement Plan
WQO	water quality objective

1 Introduction – Monitoring and Assessment Program

The Monitoring and Assessment Program (MAP) for the San Diego Bay Watershed Management Area (WMA) is discussed in Section 5 and detailed in Appendix K of the Water Quality Improvement Plan (WQIP). The MAP incorporates requirements of Provision B and Provision D of the Municipal Permit,[1] along with the specific monitoring and assessment requirements for the Dissolved Copper Total Maximum Daily Load (TMDL) in the Shelter Island Yacht Basin and the Bacteria TMDL for Shelter Island Shoreline Park listed in Attachment E of the Municipal Permit.

The Monitoring Program includes three major components: (1) the receiving water monitoring program, which measures the long-term health of the watershed; (2) the municipal separate storm sewer system (MS4) outfall monitoring program, which investigates the elimination of dry weather flows from MS4 outfalls and improvement to the quality of the flows that exit the MS4 outfalls during rain events; and (3) special studies. Figure 1-1 shows the locations of the monitoring stations that are a part of the San Diego Bay WMA MAP.

This report summarizes the monitoring data collected from October 1, 2015, through September 30, 2016, as well as data that were not summarized in the 2013–2014 and 2014–2015 Transitional Monitoring and Assessment Program Reports for the San Diego Bay WMA. Reported data include both receiving water and MS4 outfall monitoring data for dry and wet weather events. Monitoring methodologies were summarized in Section 5 of the San Diego Bay WMA WQIP and were specified in the associated Appendix K Monitoring Plans component (Project Clean Water, 2016). These documents provide detailed information regarding monitoring locations, monitoring techniques, analytes sampled, and quality assurance/quality control (QA/QC) requirements.

The Responsible Parties (RPs) have established interim and final goals for the Highest Priority Water Quality Conditions (Highest Priority Conditions) and Focused Priority Water Quality Conditions (Focused Priority Conditions), as appropriate, during this Municipal Permit term to demonstrate progress toward compliance with the Municipal Permit and applicable TMDL requirements. Generally, RPs have identified near-term goals to address potential pollutant sources, reduce non-storm water dry weather flow in MS4 outfalls, and implement best management practices (BMPs).

The MAP includes an annual analysis of the data collected for the monitoring year as well as a time series analysis of all data collected over the entirety of the permit cycle. This appendix details the MS4 Outfall Discharge Assessments, which evaluate the dry weather information associated with the Illicit Discharge, Detection, and Elimination (IDDE) program collected as part of the Jurisdictional Urban Runoff Management Program (JRMP) along with the dry and wet weather MS4 monitoring data collected by the RPs. The results of the special studies are also assessed in this appendix. The Receiving

[1] San Diego Regional Water Quality Control Board Order Number R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region

Water Assessment and the Integrated Assessments will be summarized in the Regional Monitoring and Assessment Report that will be submitted with Report of Waste Discharge in December 2017.

Table 1-1 provides an overview of the WQIP for the San Diego Bay WMA.

Table 1-1
Water Quality Improvement Plan Monitoring Overview

Monitoring Program	Temporal Extent	Monitoring Element[1]	Timeline (Fiscal Year)
Receiving Water Monitoring			
Long-Term Receiving Water Monitoring	Wet and dry weather	Chemistry/FIB Toxicity Trash assessment Bioassessment Hydromodification	2013–2014
Southern California Bight Regional Monitoring (Bight '13)	Dry weather	Chemistry Toxicity Bioassessment	2013–2014
Regional Storm water Monitoring Coalition (SMC)	Dry weather	To be determined (TBD) (bioassessment)	2013–TBD
Regional Hydromodification Monitoring Program	Wet weather	Rain gauge analysis Stream gauge analysis Channel assessment Flow Sediment transport	2013–2015 (TBD)
Sediment Quality	Dry weather	Chemistry Toxicity Bioassessment Trash assessment	2013[2] –2018
Regional Harbor Monitoring Program (RHMP)	Dry weather	Chemistry Bioassessment Trash assessment	2013–2014
MS4 Monitoring			
MS4 Field Screening	Dry weather	Flow Trash IC/ID Condition	2013–2018
MS4 Outfall Monitoring	Wet and dry weather	Chemistry/FIB Visual observations *In-situ* measurements	2013–2018

Table 1-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Program	Temporal Extent	Monitoring Element[1]	Timeline (Fiscal Year)
Highest Priority Condition Monitoring			
Chollas Creek Metals TMDL	Wet and dry weather*	Chemistry/FIB	2013–2018
Chollas Creek Bacteria TMDL	Wet and dry weather	FIB	2013–2018
Focused Priority Condition Monitoring			
Airport Metals[3]	Wet weather	Chemistry (metals)	2013–2018
Riparian Area Monitoring (Paradise Creek)	Dry weather	Bioassessment (CRAM), Plant communities	2014 (TBD)–2018
Physical Aesthetics (Sweetwater and Otay)[4]	Wet weather (post-storm) and dry weather	Trash assessments	2016–2018
Swimmable Waters—Beaches (Otay)[2]	Wet weather	FIB	2016–2018
	Dry weather		1999–2018
Additional TMDL Monitoring			
Shelter Island Yacht Basin Copper TMDL—Receiving Water	See Regional Board Investigative Order No. No. R9-2011-0036.		
Shelter Island Yacht basin Copper TMDL—MS4 Outfall	Wet and dry weather	Chemistry (dissolved copper)	2013–2018
Shelter Island Shoreline Park Bacteria TMDL	Wet and dry weather	FIB	2013–2018
Special Studies and AB 411 Monitoring			
San Diego Regional Reference Streams and Beaches	Wet and Dry Weather	Chemistry/FIB	2013–2016 (TBD)
		Flow	
		Bioassessment	
San Diego Bay Debris Study	Dry Weather	Trash Assessment	2014-2017
		Physical Habitat	
Pueblo HU Refuse Assessment Program	Dry Weather	Trash Assessment	2013–2018
Chollas Jurisdictional Boundary Study	Wet Weather	Chemistry	2013–2015 (TBD)

Table 1-1 (continued)
Water Quality Improvement Plan Monitoring Overview

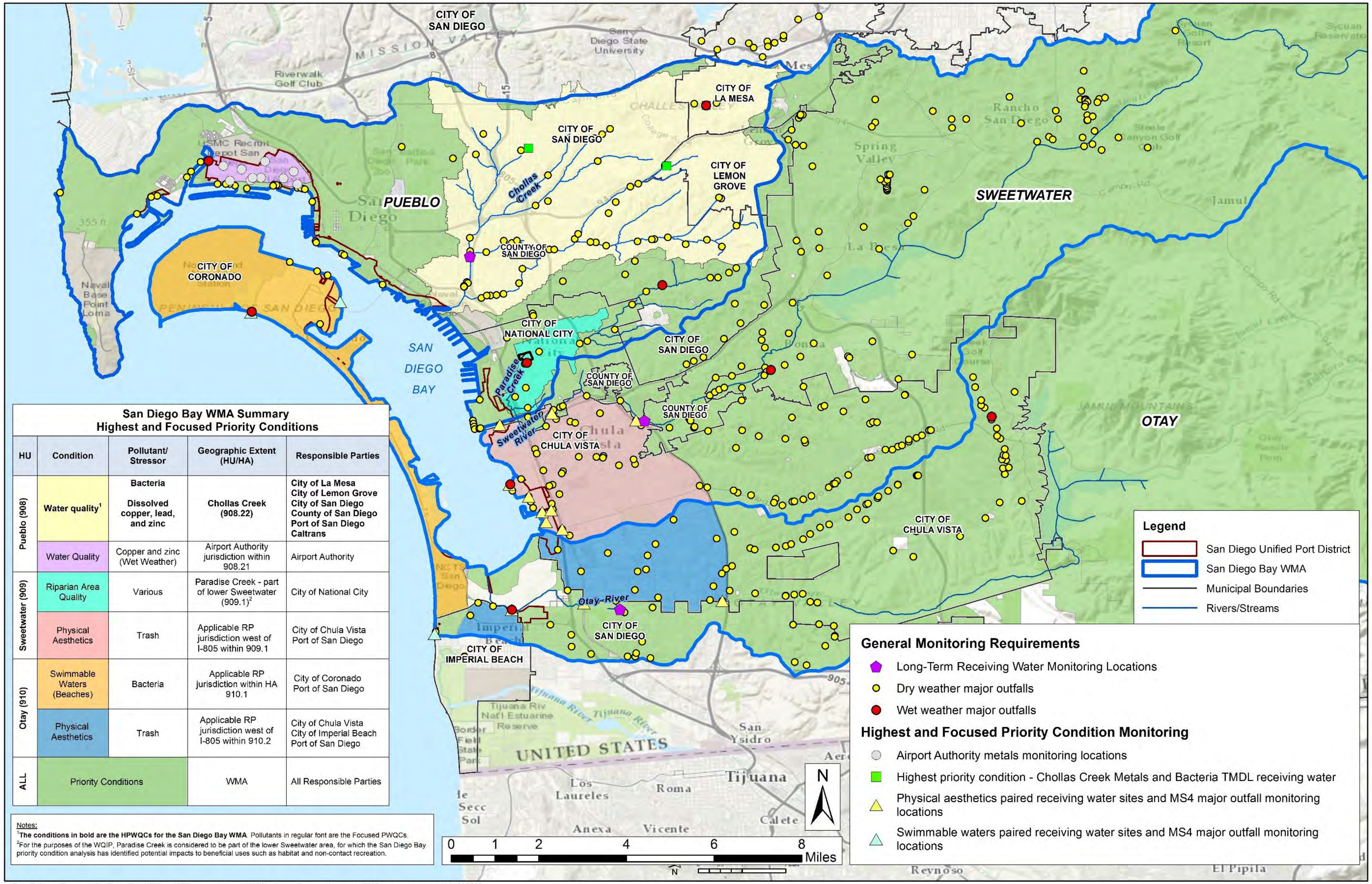
Monitoring Program	Temporal Extent	Monitoring Element[1]	Timeline (Fiscal Year)
Riparian Area Selenium Study	Wet and Dry Weather	Chemistry (selenium)	2013–2015 (TBD)
Regional Beach Water Quality (AB 411)[5]	Dry Weather	FIB	1999–2018

Notes:

AB 411 = California Assembly Bill 411; BOD = biological oxygen demand; CRAM = California Rapid Assessment Method; FIB = fecal indicator bacteria; HMP = Hydromodification Monitoring Program; HU = hydrologic unit; IC/ID = illicit connection and/or illicit discharge; RHMP = Regional Harbor Monitoring Program; SMC = Southern California Storm Water Monitoring Coalition; TBD = to be determined

* Dry weather metal monitoring in Chollas Creek has been completed as part of the Regional Monitoring Program.

1. Some monitoring elements may not be conducted under the entire temporal extent of the program. See Appendix K of the WQIP for details.
2. Completed under the Ambient Bay and Lagoon Monitoring (ABLM) Program, as part of Bight '13.
3. Airport monitoring for metals will be conducted as part of the Industrial General Permit (IGP) monitoring. Additional constituents are monitored under that program.
4. Monitoring is paired. Receiving Water and MS4 Outfall will be monitored the same day.
5. The AB 411 program monitoring is conducted during the dry season by the County of San Diego Department of Environmental Health (DEH) will be tracked and incorporated into bacteria-related receiving water assessments. Monitoring under AB 411 is not required under Provision D of the Municipal Permit, but bacteria monitoring is required as part of the Bacteria TMDL (Municipal Permit Attachment E.6). AB 411 monitoring may be used to augment RP monitoring and will be reviewed as part of the data assessment. RPs will be doing dry weather monitoring during wet weather season starting in fiscal year (FY) 2016.



San Diego Bay WMA Summary
Highest and Focused Priority Conditions

HU	Condition	Pollutant/ Stressor	Geographic Extent (HU/HA)	Responsible Parties
Pueblo (908)	**Water quality**[1]	**Bacteria** **Dissolved copper, lead, and zinc**	**Chollas Creek (908.22)**	**City of La Mesa** **City of Lemon Grove** **City of San Diego** **County of San Diego** **Port of San Diego** **Caltrans**
	Water Quality	Copper and zinc (Wet Weather)	Airport Authority jurisdiction within 908.21	Airport Authority
Sweetwater (909)	Riparian Area Quality	Various	Paradise Creek - part of lower Sweetwater (909.1)[2]	City of National City
	Physical Aesthetics	Trash	Applicable RP jurisdiction west of I-805 within 909.1	City of Chula Vista Port of San Diego
Otay (910)	Swimmable Waters (Beaches)	Bacteria	Applicable RP jurisdiction within HA 910.1	City of Coronado Port of San Diego
	Physical Aesthetics	Trash	Applicable RP jurisdiction west of I-805 within 910.2	City of Chula Vista City of Imperial Beach Port of San Diego
ALL	Priority Conditions		WMA	All Responsible Parties

Notes:
[1]**The conditions in bold are the HPWQCs for the San Diego Bay WMA**. Pollutants in regular font are the Focused PWQCs.
[2]For the purposes of the WQIP, Paradise Creek is considered to be part of the lower Sweetwater area, for which the San Diego Bay priority condition analysis has identified potential impacts to beneficial uses such as habitat and non-contact recreation.

Figure 1-1
San Diego Bay WMA Monitoring Locations

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In summary, this Monitoring Results and Assessments Appendix of the San Diego Bay WMA Water Quality Improvement Plan Annual Report includes the following sections.

Section 1, Introduction – Monitoring and Assessment Program – This section provides an overview of the MAP, the monitoring performed during the October 2015 through September 2016 monitoring year, and the assessments included in this appendix.

Section 2, Receiving Water Monitoring – This section describes the monitoring data collected as part of the Receiving Water Monitoring program. Data from various sources are compiled and summarized in this section. The data presented include those collected during the October 2015 through September 2016 monitoring year, as well as data collected previously but not included in the San Diego Bay WMA Transitional Monitoring Assessment report (submitted in January 2016).

Section 3, Non-Storm Water MS4 Outfall Monitoring – This section summarizes the wet weather related MS4 Outfall Discharge Assessments (Provision B.4.b). It includes a comparison with Non-Storm Water Action Limits (NALs) and Municipal Permit required assessments.

Section 4, Storm Water Outfall Monitoring Data – This section summarizes the wet weather related MS4 Outfall Discharge Assessments (Provision B.4.b). It includes a comparison with storm water action limits (SALs) and Municipal Permit-required assessments.

Section 5 Physical Aesthetics Focused Priority Condition Monitoring – This section summarizes the monitoring program and results of the Physical Aesthetics Focused Priority Condition in Sweetwater and Otay hydrologic unit (HU).

Section 6, Swimmable Waters Focused Priority Condition Monitoring – This section summarizes the monitoring program and results of the Swimmable Waters Focused Priority Condition implemented in the Coronado hydrologic area (HA).

Section 7, Special Study and Additional Program Results and Assessments – This section provides an overview of the findings of seven special studies completed or on-going in the San Diego Bay WMA: (1) the San Diego Regional Reference Streams and Beaches Study, (2) the study Addressing Trash, Debris, and Floating Material in Chollas and Paleta Creeks, (3) the San Diego Bay Debris Study, (4) the Pueblo HU Refuse Assessment Program, (5) the Chollas Jurisdictional Boundary Studies for metals and bacteria, and (6) the Riparian Area Selenium Study. The RPs also utilized California Assembly Bill 411 (AB 411) data obtained by the County of San Diego DEH to supplement the Swimmable Waters bacteria monitoring and the Shelter Island Shoreline Park Bacteria TMDL required monitoring.

Section 8, Publicly Available Data – This section provides a summary of the California Environmental Data Exchange Network (CEDEN) data submittal certifications for the October 2015 through September 2016 monitoring year.

2 Receiving Water Monitoring

This section highlights receiving water data collected according to the San Diego Bay WMA MAP. Because this is the first Annual Report to be submitted under the San Diego Bay WMA WQIP, data collected since the acceptance of the Municipal Permit in 2013 will be (1) referenced (if previously submitted to the San Diego Regional Water Quality Control Board [Regional Board]), (2) summarized (if sampling was conducted prior to the October 2015 through September 2016 monitoring year and the data have not been previously submitted to the Regional Board), or (3) reported as part of the October 2015 through September 2016 monitoring year report. Further, the data presented in this appendix will be used to complete the Report of Waste Discharge in December 2017 and the Integrated Assessment (which is detailed in the MAP).

2.1 Long-Term Receiving Water Monitoring

The Transitional Receiving Water Monitoring Program completed during the October 2014 through September 2015 monitoring year met state requirements; no monitoring was conducted during this reporting period. The results of this monitoring were presented in the Transitional Monitoring and Assessment Program Report[2] for the San Diego Bay WMA (2014–2015) (San Diego County Municipal Copermittees, 2016), including water quality monitoring during dry and wet weather, trash assessments, hydromodification monitoring, and bioassessment at the long-term monitoring stations.

2.2 Regional Monitoring

The Bight program is a multi-agency collaborative effort led by the Southern California Coastal Water Research Project (SCCWRP) to assess the ecological condition of the Southern California Bight from a cross-regional perspective.

The core monitoring program consists of sampling for sediment chemistry, sediment toxicity, benthic infauna and invertebrates, and demersal fish that live in the benthic zone. Since the first monitoring event in 1994, sampling has occurred over the course of five-year cycles, generating a long-term data set to monitor overall Bight ecosystem conditions over time.

The goal of the Southern California Bight 2013 Regional Monitoring Survey (Bight ’13) program was to answer three primary questions:

- What are the extent and magnitude of direct impacts from contaminants?
- How do the extent and magnitude of the environmental impacts vary by habitat?
- What is the trend in the extent and magnitude of direct impacts from contaminants?

[2] Transitional Monitoring and Assessment Repot can be found on the Project Cleanwater website: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=24&Itemid=64

In close coordination with Bight ’13, the San Diego Regional Harbor Monitoring Program (RHMP) included the same primary goals and questions and satisfied the initial monitoring requirements of the State of California Sediment Control Plan for San Diego Bay (San Diego Bay WMA Responsible Parties, 2016). The RHMP provides a comprehensive survey of the quality of water, sediments, and aquatic life on a five-year cycle in four southern California embayments in the San Diego Region: Dana Point Harbor, Oceanside Harbor, Mission Bay, and San Diego Bay.

Sampling of sediments and the water column was conducted during August and September 2013 at 59 sites in San Diego Bay and followed the Bight-approved methodologies (Bight ’13 Contaminant Impact Assessment Committee, 2013). There were 13 freshwater-influenced sites monitored in San Diego Bay as part of the Bight/RHMP monitoring in 2013. The data collected from the 13 freshwater influenced sites satisfied the RPs’ initial screening requirements for sediment quality described in the San Diego Bay MAP. Using the State of California Sediment Quality Objectives (SQO) approach, all of the freshwater-influenced locations in San Diego Bay were determined to be unimpacted or likely unimpacted by anthropogenic influences during the initial screening, with the exception of two sites near the mouth of Chollas Creek. There is a current investigative order (R9-2015-0058) at the mouth and tidally influenced area of Chollas Creek for impaired benthic communities.

The 2013 San Diego Regional Harbor Monitoring Report was provided in the 2015 Transitional Monitoring and Assessment Report in accordance with the Municipal Permit reporting requirements (Bight ’13 Contaminant Impact Assessment Committee, 2013). The full report and appendices are available on the Port of San Diego’s website at https://www.portofsandiego.org/document/environment/regional-harbor-monitoring-program/rhmp-2013.html.

2.3 Storm Water Monitoring Coalition Regional Monitoring Results

The SMC Regional Bioassessment Monitoring Program is a collaborative effort of leading storm water agencies as well as multiple local, state, and federal regulatory agencies in southern California. The SMC monitoring program is designed to generate the data to answer three key management questions:

(1) What is the condition of streams in southern California?

(2) What stressors are associated with poor condition?

(3) Are conditions changing over time?

Data are collected to characterize the benthic macroinvertebrate (BMI) and algae communities, as well as the quality of the physical habitat and water chemistry of each monitoring site. The following sections describe both methodology and results from the SMC monitoring program.

2.3.1 Stream Bioassessment Methods

Three monitoring reaches in the Sweetwater River HU were assessed in May and June of the 2015–2016 monitoring year for the SMC Regional Monitoring Program as described in Table 2-1. Stations included two SMC "condition" sites (Stations 909M24925 and 909M24937) and one “trend” site (Station 909WE0662), all located in the main stem of the Sweetwater River in the upper portion of the watershed, spanning approximately 15 stream miles from upstream of Palo Verde Lake to downstream of Green Valley Falls in Cuyamaca Rancho State Park. Condition sites are those that are selected from the SMC sample draw list each year and are sampled only once during the current five-year cycle (2015–2019) to discern an overall condition estimate of the health of streams in the region. Trend sites are those that have been randomly selected from the preceding five-year SMC cycle (2009–2013) list, and are being sampled each year of the current five-year cycle (2015–2019) to evaluate any overall trends in the health of streams in the region. Data from the San Diego Bay WMA sampling stations will be submitted to the SMC program and will be analyzed within the context of the South Coast Region of California in a five-year summary report produced by SCCWRP at the conclusion of the current 2015–2019 sampling cycle. This report will include any conclusions that may be drawn regarding the improving or worsening condition of the selected trend sites.

Table 2-1
San Diego Bay Storm Water Monitoring Coalition Regional Monitoring Program Bioassessment Sites for 2015–2016

SMC Region	WMA	Stream: Location	Site Type	Station Code	Date Sampled	Latitude/ Longitude
South San Diego	San Diego Bay	Sweetwater River: 0.3 Mile Downstream of Cuyamaca Rancho State Park	Trend (Open)	909WE0662	5/10/2016	32.89957/ -116.58789
		Sweetwater River: 0.4 Mile Upstream of Interstate 8	Condition	909M24925	5/10/2016	32.83849/ -116.63815
		Sweetwater River: 0.3 Mile Upstream of Palo Verde Lake	Condition	909M24937	6/22/2016	32.81829/ -116.71039

Notes:
SMC = Storm Water Monitoring Coalition; WMA = Watershed Management Area

All bioassessments were performed between May 10 and June 22, 2016, during the appropriate index period for the SMC (March through July). Biological condition and physical habitat quality were assessed in the field following the SWAMP bioassessment protocol (Ode et al., 2016) and the SMC 2015–2019 Work Plan (Mazor et al., 2015). The California Rapid Assessment Method (CRAM) followed procedures outlined in *California Rapid Assessment Method for Wetlands, Riverine Wetlands Field Book*, version 6.1 (CRAM, 2013).

Analysis of Benthic Community Data

Benthic community data analyses used standardized assessment tools adopted by SWAMP. BMI were identified in accordance with the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) Level 2 requirements. Data were then analyzed to produce two different multi-metric indices (MMI) of overall BMI health: (1) Southern California Index of Biotic Integrity (IBI) (Ode et al., 2005), and (2) the California Stream Condition Index (CSCI) (Mazor et al., 2015), and their associated biological metrics (see Attachment A).

According to the IBI, the BMI community is considered unimpaired (i.e., equivalent to reference condition) when a site scores in the Fair (40-59), Good (60-79), or Very Good (80-100) categories. According to the CSCI, a site is considered unimpaired (i.e., equivalent to reference condition) when a site scores in the Possibly Altered (0.79-0.91) or Likely Intact (>0.92) categories.

2.3.2 Stream Bioassessment Results

Table 2-6 summarizes IBI and CSCI index scores for the benthic community health and riverine wetland condition scores (i.e., CRAM) for the Sweetwater River monitoring locations. More detailed results of the IBI, CSCI, and CRAM are presented in Attachment A. Tables 2-7 through 2-9 summarize physical habitat, analytical chemistry, and algal biomass results, respectively. Algal taxonomy samples including soft-bodied algae and diatoms were collected and submitted to California State University, San Marcos (CSUSM) for taxonomic identification. Algal taxonomy sample processing by CSUSM is scheduled to be completed in spring 2017, followed by data submittal to SCCWRP by CSUSM and reported through the SMC program.

Table 2-6
Summary of the 2016 San Diego Bay WMA Bioassessment Monitoring Site Index Scores

Stream Name	Station Code	IBI Score	IBI Condition Category	CSCI Score	CSCI Condition Category	Overall CRAM Score
Sweetwater River	909WE0662	33	Poor	0.68	Likely Altered	82
	909M24925	36	Poor	0.83	Possibly Altered	89
	909M24937	50	Fair	0.87	Possibly Altered	75

Notes:

CRAM = California Rapid Assessment Method; CSCI = California Stream Condition Index; IBI = Southern California Index of Biotic Integrity

Table 2-7
Summary of the 2016 San Diego Bay WMA Physical Habitat Measures of SMC Bioassessment Monitoring Sites

Physical Habitat Measure[1]	Sweetwater River		
	909WE0662	909M24925	909M24937
Elevation (feet above sea level)	3,822	3,105	1,885
Gradient (% of slope)	0.5	4.0	1.3
Flow Volume (cfs, ft^3/second)	0.33	0.23	0.01
Mean Depth (cm)	9.2	16.7	20
Mean Wetted Width (m)	3.0	2.3	1.4
Mean Bankfull Width[2] (m)	7.4	9.1	2.3
Epifaunal substrate cover (0-20 scale)[3]	8	17	14
Sediment deposition (0-20 scale)[3]	18	17	18
Channel alteration (0-20 scale)[3]	20	20	20
Bank stability-left bank	Vulnerable	Stable	Stable
Bank stability-right bank	Vulnerable	Stable	Stable
Average canopy cover (% of reach)	83	74	91
Macroalgal cover (% of reach)	20	24	13
Aquatic macrophyte cover (% of reach)	50	17	1
CPOM presence[4] (% of reach)	95	49	62
Flow Habitats (% of Reach)			
Cascade habitat	0	2	0
Rapid habitat	0	2	0
Riffle habitat (fast-shallow)	12	30	8
Run habitat (fast-deep)	0	1	0
Glide habitat (slow-shallow)	88	45	53
Pool habitat (slow-deep)	0	20	29
Dry substrate	0	0	10
Substrate Composition (% of Reach)			
Roots	59	11	4
Fines (<0.06 mm)	16	16	1
Sand (0.06-2 mm)	19	17	53
Gravel (2-64 mm)	4	15	9
Cobble (64-250 mm)	0	10	22
Boulder (250-1,000 mm)	1	31	11
Bedrock	1	0	0

Table 2-7 (continued)
Summary of the 2016 San Diego Bay WMA Physical Habitat Measures of SMC Bioassessment Monitoring Sites

Notes:

% = percent; cfs or ft^3/second = cubic feet per second; cm = centimeters; m = meters; mm = millimeters

1. Physical habitat measures are described in detail in the SWAMP bioassessment protocol (Ode et al., 2016)
2. Bankfull width is the estimated width of the stream under a one to two year high flow recurrence interval.
3. Qualitative habitat quality assessment on a 0-20 point scale where 0 represents poor conditions and 20 represents optimal conditions.
4. CPOM = coarse particulate organic matter, a food resource for BMI.

Table 2-8
Summary of the San Diego Bay WMA Analytical Chemistry Results for SMC Bioassessment, 2016

Method	Constituent	Units	MDL	RL	Sample Type	Sweetwater River		
						909WE0662	909M24925	909M24937
NA	Water Temperature	°C	--	--	Point	15.7	11.9	16.8
NA	pH	units	--	--	Point	8.79	8.86	7.96
NA	Dissolved Oxygen	mg/L	--	--	Point	6.9	7.3	3.3
NA	Specific Conductance	µS/cm	--	--	Point	322	755	951
NA	Turbidity	NTU	--	--	Point	1.9	2.3	2.3
SM 2320 B	Alkalinity as CaCO3	mg/L	0.56	10	Grab	88	140	180
EPA 350.1	Ammonia as N	mg/L	0.048	0.10	Grab	ND	ND	ND
EPA 200.7	Calcium	mg/L	0.0160	0.100	Grab	36.1	55.1	85.8
EPA 300.0	Chloride	mg/L	1.0-2.5	10-12	Grab	33	79	130
EPA 200.7	Hardness as CaCO3	mg/L	0.0894	0.662	Grab	142	235	385
EPA 200.7	Magnesium	mg/L	0.0120	0.100	Grab	12.5	23.7	41.5
EPA 353.2	Nitrate + Nitrite as N	µg/L	10	100	Grab	ND	27[J]	ND
EPA 353.2	Nitrate as N	mg/L	0.041	0.10	Grab	ND	ND	ND
EPA 353.2	Nitrite as N	µg/L	10	100	Grab	ND	ND	ND
Calculation	Nitrogen, Total	mg/L	0.060	0.20	Grab	0.44	0.59	0.20
EPA 351.2	Nitrogen, Total Kjeldahl	mg/L	0.050	0.10	Grab	0.44	0.56	0.20
EPA 365.3	OrthoPhosphate as P	mg/L	0.00083	0.010	Grab	0.020	0.020	0.031
EPA 365.3	Phosphorus as P	mg/L	0.00083	0.010	Grab	0.010	0.0043[J]	0.024
EPA 300.0	Sulfate	mg/L	1.0-2.5	5.0-12	Grab	72	110	230
SM 2540 D	Total Suspended Solids	mg/L	0.5	5	Grab	1[J]	ND	ND

Notes:
°C = degrees Celsius; µg/L = microgams per liter; µS/cm = micro-Siemens per centimeter; EPA = United States Environmental Protection Agency analytical method;
MDL = method detection limit; mg/L = milligrams per liter; NA = not applicable; ND = not detected; NTU = nephelometric turbidity unit; RL = reporting limit; SM = Standard Method
J = Estimated concentration detected was <MRL and >MDL

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Table 2-9
Summary of the Algal Biomass Results for the San Diego Bay WMA SMC Bioassessment Site, 2016

Parameter	Sweetwater River		
	909WE0662	909M24925	909M24937
Total Surface Area Sampled (cm^2)	138.6	116.7	116.7
Sample Composite Volume (mL)	600	660	495
Chlorophyll *a* ($\mu g/cm^2$)	2.73	5.66	3.86
Ash-Free Dry Mass (mg/cm^2)	7.92	5.18	3.17

Notes:

$\mu g/cm^2$ = micrograms per square centimeter; cm^2 = square centimeters; mg/cm^2 = milligrams per square centimeter; mL = milliliters

2.3.3 Stream Bioassessment Discussion

Sweetwater River Below Green Valley Falls (909WE0662)

The uppermost Sweetwater River station (909WE0662) had an IBI score of 33 (Poor) and a CSCI score of 0.68 (Likely Altered) (Table 2-6). The IBI and CSCI scores both indicated a somewhat impaired BMI community (an IBI score of ≤39 is considered impaired and a CSCI score of <0.79 is considered impaired), although the O/E component of the CSCI score rated the site unimpaired with a score of 0.80 (Attachment A). Individual metrics of the BMI community were variable, with some aspects of the community indicating high-quality conditions and others reflecting lower quality community conditions. This variation was likely because the in-stream substrate was not ideal for BMI colonization (discussed below). Indicators of good biotic condition included the presence of intolerant (i.e., sensitive) BMI (5% of the community), including the highly sensitive mayfly, *Ameletus* sp. (15 individuals), the stonefly, *Isoperla* sp. (8 individuals), and two taxa of dixid midges (6 individuals) (Attachment A). Notably, the community lacked Trichoptera (caddisflies) and Coleoptera (beetles) which are typically found in high-quality streams.

According to the CRAM analysis, the riverine wetland condition of the uppermost Sweetwater River site (Figure 2-1) was of good quality with an overall score of 82 of a possible 100 points (Table 2-6). For each of the 14 CRAM attributes, a rating of A through D is given (where a rating of A represents the highest quality conditions). Most of the CRAM attribute metrics at this station scored an A or B, while two attributes (hydrologic connectivity to an active flood plain and number of co-dominant plant species) scored a C (Attachment A).

Figure 2-1
Sweetwater River Site 909WE0662 Looking Upstream

Stream flow at the time of sampling was moderate (0.33 cubic feet per second [cfs]) and the flow habitats were dominated by glide (slow-shallow; 88%) and riffle (fast-shallow; 12%) (Table 2-7). The streambed and riparian corridor were undisturbed and the banks were predicted to be stable under normal stormflows, with some areas potentially vulnerable to erosion under high flows. The vegetation was dominated by native species, and a relatively high percent coverage was observed in all vegetative layers, with a reach-wide overhead canopy cover of 83%. Although macrophytes were very dense and completely covered the stream in one part of the reach, macroalgal and aquatic macrophyte coverages were moderate overall (20% and 50%, respectively). A substantial amount of coarse particulate organic matter (CPOM; a food source for BMI) was present at 95% of the substrate assessment points. The substrate was composed mostly of fibrous roots of macrophytes and willows, fine sediment, and sand (94% combined), and a small percentage of gravel. This substrate composition was not conducive to the colonization of a diverse community of BMI, because many taxa prefer hard substrates and layered cobble.

The results for abiotic water quality and analytical chemistry are presented in Table 2-8. Measured parameters were indicative of reference conditions, where no limitations to BMI colonization would be expected. Because of the chemistry results and the observed poor quality of in-stream physical habitat conditions, the relatively low biotic index scores were likely due to the physical habitat and were not limited by water quality conditions.

Sweetwater River Upstream of Interstate 8 (909M24925)

The middle Sweetwater River site (Figure 2-2) had an IBI score of 36 (Poor) and a CSCI score of 0.82 (Possibly Altered) (Table 2-6). The IBI score indicated a slightly impaired BMI community, while the CSCI score indicated that the benthic community was above the impairment threshold. Breaking down the two components of the CSCI, the O/E rated the community equivalent to reference conditions and was much higher than the pMMI, with scores of 1.07 and 0.59, respectively (Attachment A). The BMI community did not contain any intolerant taxa and the number of EPT was relatively low (4 taxa) with no stoneflies or caddisflies. Of the mayflies present, one type was considered a sensitive EPT (*Centroptilum* sp.), with a tolerance value of 3. The community was dominated by Diptera taxa (true flies), where members of the Family Chironomidae and the black fly, *Simulium* sp., accounted for 63% of the community. Snails (primarily *Physa* sp.) were also present in relatively high numbers and accounted for 28% of the community.

Figure 2-2
Sweetwater River Site 909M24925 Looking Upstream

The riverine wetland condition of the monitoring reach was considered good, with a CRAM score of 89 of 100 possible points (Table 2-6). The site was rated high (A or B) for every attribute of CRAM, with the exception of hydrologic connectivity to an active flood plain, which was rated a C (Attachment A). The gradient of the reach was relatively high (4% slope), flow habitats were diverse, and the flow volume was 0.22 cfs (Table 2-7). The banks were predicted to be stable under high flow conditions and indicators of erosion were not observed. Overhead canopy exhibited 74% coverage across the reach, and macrolagal and aquatic macrophyte cover was somewhat limited with 24% and 17%

cover, respectively. CPOM was detected at 49% of the transect points assessed, which indicated adequate food sources for BMI. The stream substrate was diverse, with boulders identified as the dominant component (31% of the substrate), and all other substrate types composing at least 10% of the substrate. The qualitative assessment of epifaunal substrate quality was 17 of 20 points, indicating optimal habitat for BMI colonization.

The results for abiotic water quality and analytical chemistry indicated that none of the constituents were at levels that would limit the colonization of sensitive BMI (Table 2-8). These results indicate that the low IBI and MMI scores for the benthic community were due to a naturally low diversity of BMI taxa and that the O/E component of the CSCI, which rated the site as Likely Intact, was the best measure of biotic conditions at the site. The site was approximately one mile downstream of low-density housing and three miles downstream of the town of Descanso, and although it is possible that these anthropogenic influences could have contributed to the relatively low diversity of BMI, natural biological variability cannot be ruled out.

Sweetwater River Upstream of Palo Verde Lake (909M24937)

The lower Sweetwater River site (Figure 2-3) had an IBI score of 50 (Fair) and a CSCI score of 0.87 (Possibly Altered) that indicated an unimpaired BMI community by both indices. BMI metrics that indicated a good quality community included a low percentage of non-insects and high diversities of beetle and predator taxa. Relative to reference conditions, the site supported low numbers of EPT and intolerant taxa.

The riverine wetland condition of the monitoring reach was moderate, with an overall CRAM score of 75 out of 100 possible points (Table 2-6). The area surrounding the site was undeveloped open space with a natural streambed and bank. Because of limited and difficult site accessibility, there is likely negligible physical disturbance from humans. The reach received a poor rating (D) for two CRAM attributes related to vegetative biotic structure (number of co-dominant species and vertical biotic structure). The low CRAM scores for these two attributes could be directly related to the naturally rocky topography of the site (i.e., large car-sized boulders piled two to three deep throughout the entire reach), which naturally inhibited plant growth. Additionally, the observed boulder field also influenced both structural patch richness and vegetative horizontal interspersion, which that exhibited attribute scores of “C.”

The streambanks were stable, the gradient was moderate (1.3% slope), and flow volume was 0.01 cfs. The low flow volume at the time of sampling made riffles rare (8% of the flow habitat), although it was apparent that greater flow would enhance the amount of riffles. At the time of sampling, slow-moving glide and pool habitat dominated (53% and 29%, respectively). The rocky topography of the reach provided relatively unique streambed conditions, with very large (i.e., car-sized and larger) boulders stacked upon one another to create cave-like segments of the stream. The 91% canopy cover that was recorded was mostly attributed to rocky overhangs rather than vegetative canopy. The shading effect of the boulders likely inhibited aquatic macroalgae and macrophyte growth within the reach (13% and 1% cover, respectively), while CPOM was detected at 63% of the transect points. The wetted substrate within the reach was dominated by sand (53%), cobble (22%), and boulder (11%).

Figure 2-3
Sweetwater River Site 909M24937 Looking Downstream

The results of the abiotic water quality and analytical chemistry indicated that most of the constituents measured would likely not limit colonization of sensitive BMI, although a few constituents were near levels that could potentially inhibit full colonization. Dissolved oxygen was relatively low with a value of 3.3 milligrams per liter (mg/L), sulfate was 230 mg/L, and specific conductance was 951 micro-Siemens per centimeter (µS/cm) (which equates to a total dissolved solids value of 637 mg/L). The Water Quality Control Plan for the San Diego Basin (Basin Plan) (Regional Board, 1994) lists the Water Quality Objective (WQO) for chloride and total dissolved solids in this hydrologic unit at 250 and 500 mg/L, respectively.

2.3.4 Stream Bioassessment Conclusion

The trend site in Sweetwater River, 909WE0662, the farthest upstream, had a BMI community that was considered impaired according to both the IBI and the CSCI scores, although the site did support several sensitive organisms. The O/E component of the CSCI, however, rated the site unimpaired and there were no water quality constituents measured that would likely have a negative impact on BMI. The instream epifaunal substrate conditions were lacking hard substrates (e.g., cobble or boulder) and were not conducive to colonization by many types of BMI. Physical habitat limitations were the most likely cause of the relatively low index scores of the site.

The middle Sweetwater River site, 909M24925, had a BMI community that was slightly below the IBI impairment threshold, but was rated unimpaired by the CSCI score. EPT taxa diversity was relatively low and there were no highly sensitive organisms collected. The physical habitat was of high quality and the water quality constituents measured were all below Basin Plan benchmarks. The site was downstream of low-density housing and the town of Descanso, which have the potential to negatively impact BMI community quality, although this relationship could not be confirmed.

The lower Sweetwater River site, 909M24937, had a BMI community that was rated unimpaired by both the IBI and the CSCI scores. The community had high beetle diversity but had few sensitive or EPT taxa. The physical habitat was unique, with large boulders covering much of the streambed, which inhibited a dense and diverse riparian vegetative community. Overall, water quality constituents indicated favorable conditions for BMI diversity, with the exception of total dissolved solids (TDS) and sulfate, which were near levels that could potentially impact sensitive BMI.

Certain water quality constituents exhibited a pattern of increasing concentrations from upstream to downstream. Observed increases included ionic and dissolved constituents such as alkalinity, calcium, chloride, and sulfate. For example, sulfate increased from 72 mg/L at the upstream site to 110 mg/L and 230 mg/L at the middle and downstream sites, respectively. These constituents can occur naturally, and may be increasing in concentrations as geology changes through the watershed. Notably, nutrient levels were low at all sites and did not increase substantially from the upper to the lower site, although levels at the middle site (with closer proximity to development) were nominally higher than at the upstream and downstream sites. The lack of increasing nutrient levels in tandem with increasing ionic constituents could support the presumption that geology (and not anthropogenic input) was affecting water quality in this portion of the watershed.

2.4 Hydromodification Regional Monitoring Program

The Hydromodification Monitoring Program (HMP) was initially developed in response to the requirements of the 2007 Municipal Permit. The Monitoring Plan is defined in Chapter 8 of the HMP, and was updated by the San Diego County Regional Copermittees and accepted by the Regional Board in February 2014. The final report for the program is included as Attachment B.

2.5 Chollas Metals TMDL and Bacteria TMDL Monitoring

Monitoring for the Highest Priority Condition was developed to comply with the two TMDLs in effect for Chollas Creek. Sections 2.5.1 and 2.5.2 provide a brief overview of the monitoring programs and results. Full reports of monitoring results are in Attachment C.

2.5.1 Chollas Dissolved Metals and Diazinon TMDL

The Chollas Creek Diazinon and Dissolved Metals TMDLs Compliance Monitoring Program is designed to meet the requirements of Order No. R9-2004-0277 and State Water Resources Control Board (State Board) Resolution No. 2008-00054. To determine

TMDL compliance, the RPs conducted wet weather water quality monitoring at two mass loading stations (MLSs)—Z Street (South Fork of Chollas Creek) and SD8(1) (North Fork of Chollas Creek)—during three wet weather events during the 2015–2016 wet season (October 1 through April 30). MLS information is presented in Table 2-10.

Table 2-10
Chollas Creek TMDL Mass Loading Stations

Mass Loading Station (MLS)	MLS Identification	Latitude	Longitude
South Chollas Creek	Z Street	32.69296	-117.10945
North Chollas Creek	SD8(1)	32.70493	-117.12132

Samples were analyzed for the following TMDL compliance constituents: diazinon, dissolved metals (copper, lead, and zinc), total hardness, and toxicity. Additional constituent analyses were selected by the RPs to track potential water quality contaminants or issues in Chollas Creek.

Compliance was determined by comparing analytical results with applicable water quality criteria set forth in the approved TMDLs for the Chollas Creek hydrologic subarea (HSA), the pesticide criteria of the California Department of Fish and Wildlife (CDFW), and the Aquatic Life Benchmarks of the United States Environmental Protection Agency (USEPA) Office of Pesticide Programs (OPP). The data collected during the 2015–2016 wet season are summarized below by TMDL compliance constituent category. The final report for the Chollas Creek Diazinon and Dissolved Metals TMDL is included as Attachment C.1.

Dissolved Metals

Analytical results for dissolved copper, lead, and zinc were compared with the numeric targets on the basis of the hardness-dependent California Toxics Rule (CTR) set forth in the Chollas Creek Dissolved Metals TMDLs. Results are as follows:

- Chollas South Fork (Z Street)
  - During 3 of 3 wet events, dissolved copper, lead, and zinc concentrations were below acute and chronic WQOs.
- Chollas North Fork (SD8(1)):
  - Dissolved copper concentrations exceeded acute WQOs during 1 of 3 events and exceeded chronic WQOs during 2 of 3 event s.
  - Dissolved lead and zinc concentrations did not exceed acute and chronic WQOs during 3 of 3 events.
- Historical Dissolved Metals Trends:
  - Historical dissolved copper concentrations in Chollas Creek during wet weather monitoring events have fluctuated above and below both the acute and chronic WQOs.

- Historical dissolved lead concentrations have been consistently below the acute WQO and of the same magnitude to the chronic WQO.
- Historical dissolved zinc concentrations at the South Fork have been below the acute and chronic WQOs throughout the compliance monitoring period. Dissolved zinc concentrations at North Fork have fluctuated above and below the acute and chronic WQOs.

The City of San Diego has developed and submitted a Water Effects Ratio Confirmation Study (City of San Diego, 2015b) to the Regional Board for dissolved copper and dissolved zinc at Z Street and SD8(1). If approved, the updated water effects ratios (WERs) would provide for an alternative assessment of compliance with the TMDL waste load allocations (WLAs). The alternative WERs will assess dissolved copper and zinc specific to the ambient water chemistry within Chollas Creek rather than the default WER provided in the CTR.

Diazinon

Diazinon was not reported at concentrations above the method detection limit (MDL) at the Chollas Creek North or South Forks during the three wet weather monitoring events. The USEPA banned the retail sale of diazinon products as of December 31, 2004, because of their adverse health effects on the human nervous system. Since the ban, diazinon concentrations at both Chollas Creek MLSs have shown statistically significant decreasing trends (Weston, 2011).

Toxicity

No acute or chronic toxicity was reported for the samples collected during the 2015–2016 wet season.

2.5.2 Chollas Bacteria TMDL

The 2015–2016 Chollas Creek Bacteria Total Maximum Daily Load (Bacteria TMDL) compliance monitoring is designed to meet the requirements under Resolution No. R9-2010-0001 (Regional Board, 2013b), as incorporated into the Municipal Permit in 2013. The Bacteria TMDL monitoring program assesses the conditions of the receiving waters and has the following objectives:

- Characterize levels of bacteria concentrations at compliance monitoring locations.
- Track progress toward meeting the Bacteria TMDL numeric targets.

A full report of the monitoring results for the Chollas Creek Bacteria TMDL is in Attachment C.2.

Fecal indicator bacteria (FIB) sampling for the compliance monitoring season (October 2015 through September 2016) was conducted at three creek monitoring locations: the North and South Fork MLSs (SD8(1) and Z Street, respectively), and the tidally influenced mouth of Chollas Creek (CTL(1)). Wet weather samples were collected during three storm events on wet weather days (days with 0.2 inch of rainfall or more plus the following 72 hours) within 24 hours of the end of rainfall. Dry weather samples were collected on dry weather days (days with less than 0.1 inch of rainfall observed on each of the previous three days) at least weekly between April 1, 2015, and October 31, 2015, and at least monthly on dry weather days from November 1, 2015, through March 31, 2016. Compliance monitoring locations are presented in Table 2-11 and Figure 2-4.

The Chollas Creek Bacteria TMDL 2015–2016 Compliance Monitoring Report (Attachment C.2) summarizes FIB concentrations and key hydrologic data for the three compliance monitoring locations during the 2015–2016 monitoring season (October 1, 2015 through September 30, 2016). Compliance is determined by comparing analytical results for *Enterococcus* and fecal coliform with applicable receiving water limitations (RWLs), in accordance with the Bacteria TMDL requirements in Attachment E of the Municipal Permit. The RWLs are a combination of numeric targets for bacteria density and allowable exceedance frequencies. The single-sample maximum numeric targets are required to be achieved only during wet weather with a 22% final allowable exceedance frequency and apply only to wet weather days between October 1 and April 30 of each monitoring year. The 30-day geometric mean numeric targets must be achieved with a 0% exceedance frequency, and apply to both dry weather days during the dry season and combined wet and dry weather days during the wet season. The compliance schedule includes interim targets that must be achieved to demonstrate progress prior to attaining full compliance with the TMDL.

Table 2-11
Chollas Creek TMDL Monitoring Stations

Monitoring Location	Monitoring Identification	Latitude	Longitude
Chollas Creek South Fork	Z Street [1]	32.69296	-117.10945
Chollas Creek North Fork	SD8(1) [1]	32.70493	-117.12132
Chollas Creek tidal location downstream of North and South Fork Confluence	CTL(1)	32.69120	-117.12354

Notes:
1. Compliance monitoring location for Bacteria, Diazinon and Dissolved Metals TMDLs.

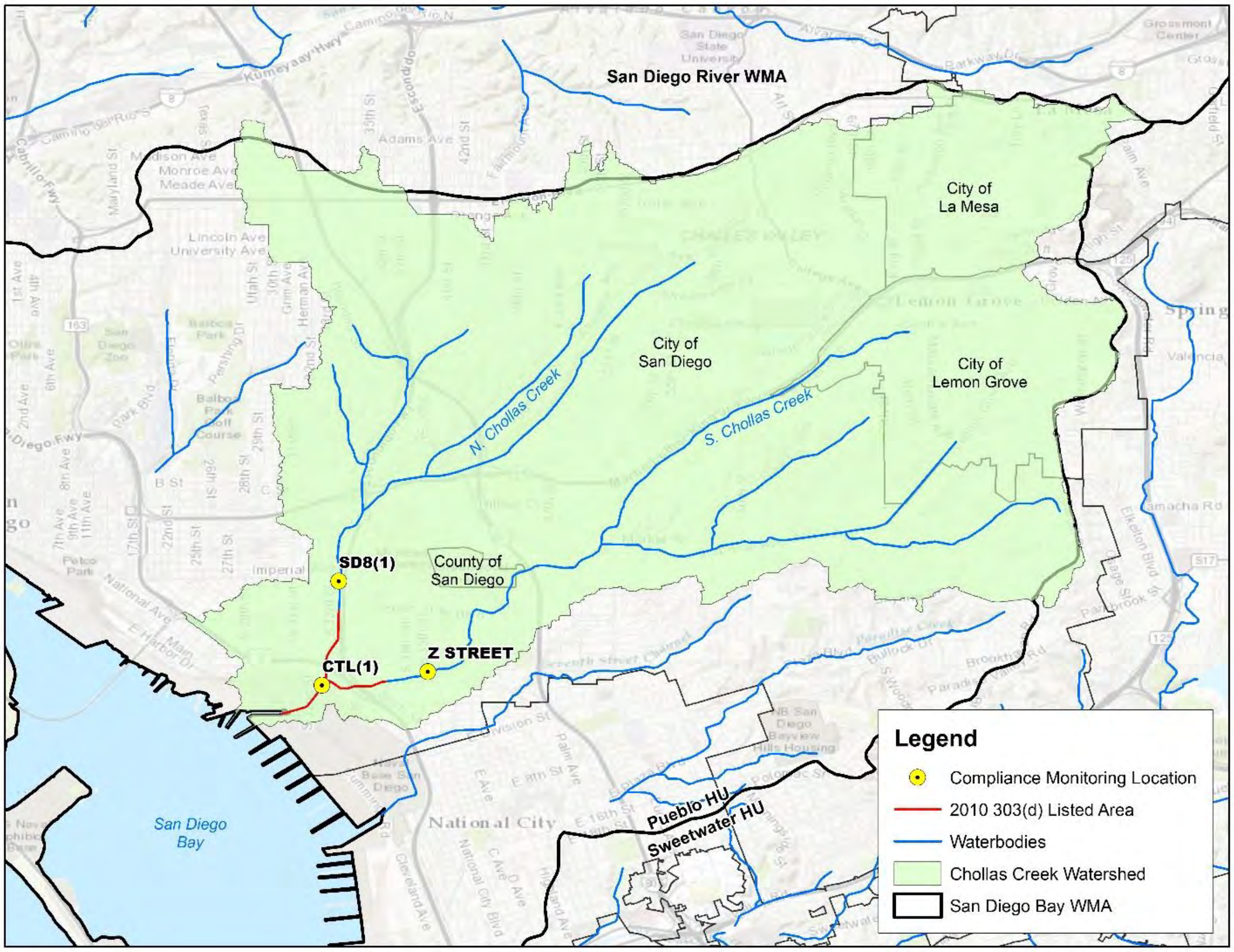

Figure 2-4
Chollas Creek Bacteria TMDL Compliance Monitoring Locations

2.6 Shelter Island Yacht Basin Metals Total Maximum Daily Load Monitoring

The Shelter Island Yacht Basin (SIYB) TMDL identified the City of San Diego (City) as a Responsible Copermittee for MS4 discharges to SIYB and required the City to demonstrate accordance with Shelter Island Dissolved Copper TMDL compliance requirements. The SIYB TMDL monitoring was conducted in fiscal year (FY) 2016 in accordance with the TMDL requirements. The annual report is provided in Attachment D.

2.7 Shelter Island Shoreline Park Bacteria Total Maximum Daily Load Monitoring

2.7.1 Shoreline Park Bacteria TMDL Monitoring Methods

To comply with the Shelter Island Shoreline Park TMDL, wet and dry weather indicator bacteria monitoring was performed during 2015–2016 at one receiving water location at Shelter Island Shoreline Park, EH-200. In addition to bacteria sampling of the receiving water, visual observations were recorded at site EH-200 (the swim beach), as well as four storm drains in the approximate vicinity of the beach. The responsible Copermittee (the Port of San Diego) utilized existing monitoring data collected by the San Diego County Department of Environmental Health (DEH) in accordance with AB 411. The DEH collects receiving water samples at EH-200 weekly during dry weather from April through October. From November 2015 through March 2016, the Port of San Diego collected monthly dry weather receiving water samples at the same location. In addition, the Port of San Diego collected receiving water samples at EH-200 during three wet weather events during 2015–2016. Wet weather samples were collected during the first 24 hours of a storm resulting in at least 0.1 inch of precipitation. Samples are analyzed for total and fecal coliform and *Enterococcus*. A summary of the sampling conducted in compliance with the TMDL is presented in Table 2-12. Results were compared with numeric targets in Attachment E.5 of the 2013 Municipal Permit.

In addition to the TMDL-required indicator bacteria sampling, the Port of San Diego has incorporated sampling for analysis of bacterial deoxyribonucleic acid (DNA) using quantitative Polymerase Chain Reaction (qPCR) with microbial source tracking (MST) markers to determine the genetic origin of *Enterococcus* species in water samples into its monitoring plan. Samples for MST analysis were collected when there were recent FIB WQO exceedances or when potential bacterial sources were observed during TMDL monitoring. This method may be a useful tool to identify sources of *Enterococcus* bacteria at Shelter Island Shoreline Park. *Enterococcus* was the only indicator bacteria to exhibit regular exceedances of WQOs at Shelter Island Shoreline Park during the 2015–2016 monitoring year (11 single-sample *Enterococcus* exceedances, compared with 2 fecal coliform exceedances and 0 total coliform exceedances).

Table 2-12
2015–2016 Shelter Island Shoreline Park Bacteria TMDL Monitoring Locations and Sampling Frequency

Location	Site	Analyte	Wet Weather Event Sampling Frequency	Dry Weather Event Sampling Frequency	
				April through October	November through March
Shelter Island Shoreline Park	EH-200	Total coliform	3 per Season (October through April)	Weekly	Monthly
		Fecal coliform			
		Enterococcus			

2.7.2 Shelter Island Shoreline Park Bacteria TMDL Monitoring Results

Results of dry weather monitoring at site EH-200, including concentrations of the indicator bacteria total coliform, fecal coliform, and *Enterococcus,* are summarized as follows:

- During wet weather, one single-sample exceedance was observed for both total and fecal coliform, while two exceedances were observed for *Enterococcus*.
- A single instance of a non-storm water discharge was observed from storm drains at Shelter Island Shoreline Park. The discharge volume was not large enough to sample. The source was determined to be irrigation runoff from a broken sprinkler head on Port of San Diego municipal property. The sprinkler head was repaired by Port of San Diego staff and a follow-up investigation revealed no irrigation runoff.
- The single-sample WQO exceedances were as follows: 14 for *Enterococcus* (of 55 samples), 2 for fecal coliform (of 45 samples), and 2 for total coliform (of 45 samples).
- A large number of gulls and other birds were observed in and around the receiving water at Shelter Island Shoreline Park, and some evidence of an anthropogenic contribution to the large number of birds (i.e., bird feeding) was observed. Of four bacteria samples collected for MST analysis, all four were positive for gull genetic marker, dog marker was positive in two of the four samples, and human marker was positive in one of the four samples.

The annual monitoring report is provided in Attachment E.

3 Non-Storm Water MS4 Outfall Monitoring

The purpose of this program is to identify non-storm water and illicit discharges within each RP's jurisdiction, determine which discharges are transient flows and which are persistent flows, and prioritize the dry weather MS4 discharges that will be investigated and eliminated. The MS4 Outfall Discharge Monitoring component involves the following types of data collection activities for the San Diego Bay WMA:

- Dry Weather MS4 Outfall Field Screening: inspecting major outfalls during dry weather conditions to identify and prioritize persistently flowing outfalls.
- Dry Weather Persistent MS4 Outfall Discharge Monitoring: testing the discharge for various pollutants and comparing the results with NALs.

3.1 Non-Storm Water MS4 Outfall Monitoring Data

During the 2015–2016 monitoring season (October 2015 through September 2016), the RPs implemented the first year of dry weather outfall discharge monitoring in accordance with Provision D.2.b of the Municipal Permit. The goals of dry weather outfall monitoring are to:

- Identify non-storm water and illicit discharges within its jurisdiction.
- Prioritize dry weather MS4 discharges that will be investigated and eliminated.
- Assess effectiveness of JRMPs toward effectively prohibiting non-storm water discharges into the MS4.

Dry weather outfall data are provided in Attachment F.1. Focused Priority Condition monitoring data are provided in Attachment F.2.

Details of the monitoring methodology are provided in the San Diego Bay WMA MS4 Outfall Monitoring Plan, available on the Project Clean Water website (www.projectcleanwater.org). The following subsections present the results of dry weather discharge monitoring in the San Diego Bay WMA.

To address the Municipal Permit requirements, the RPs determined the number of major MS4 outfalls within their jurisdictions within the WMA, as shown in Table 3-1.

Table 3-1
Number of Major Outfalls in San Diego Bay WMA

Copermittee	Total Number of Major Outfalls	HSA	Number of Major Outfalls per HSA
San Diego Airport Authority[1]	2[2]	908.21	2
City of Chula Vista	178[3]	909.11	32
		909.12	61
		910.20	81
		910.21	1
		910.32	2
City of San Diego	93[4]	908.10	4
		908.22	52
		908.31	4
		908.32	6
		909.12	7
		910.20	20
City of Coronado	7[2]	910.10	7
County of San Diego	57[2]	909.12	26
		909.21	26
		909.22	3
		909.24	1
		909.34	1
City of Imperial Beach	7[2]	910.2	5
		911.11	2
City of La Mesa	3[2]	908.22	3
City of Lemon Grove	4[2]	908.22	4
City of National City	21[2]	908.32	11
		908.31	3
		909.12	7
Port of San Diego[2]	52[2]	908.1	4
		908.21	16
		908.22	6
		908.32	12
		909.11	1
		909.12	10
		910.1	3
Total	424		

**Table 3-1 (continued)
Number of Major Outfalls in San Diego Bay WMA**

Notes:
HSA = hydrologic subarea

1. The Airport Authority has two major outfalls that are tidally influenced and cannot be safely screened or monitored. The nearest safe upstream access points will be screened/monitored as a proxy.
2. For RPs with fewer than 125 major outfalls in the WMA, 80% of total major outfalls must be screened twice per year.
3. For RPs with fewer than 500 but more than 125 major MS4 outfalls in the watershed, 100% of major outfalls must be screened once per year.
4. The City of San Diego has 502 outfalls within the City jurisdiction. The City of San Diego, in accordance with Municipal Permit Provision D.2.a(2).(a).(iv), is required to screen 500 sites city-wide once per year. The City is not required to screen 500 sites within each watershed.
5. Port of San Diego includes 12 proxy sites to major outfalls.

3.2 Non-Storm Water MS4 Outfall Monitoring Data Assessments

Assessments of jurisdictional MS4 monitoring programs were conducted individually by the jurisdictions, and watershed-wide. Per Provision D.4 of the Municipal Permit, assessments include the following:

- Progress of IDDE programs toward effectively prohibiting non-storm water and illicit discharges into the MS4 within Copermittees’ jurisdictions.
- Identification of known and suspected controllable sources (e.g., facilities, areas, land uses, pollutant-generating activities) of transient and persistent flows within the Copermittee’s jurisdiction in the WMA, sources of transient and persistent flows within the Copermittee’s jurisdiction in the WMA that have been reduced or eliminated, and modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory.
- Based on the dry weather MS4 outfall discharge field screening monitoring, the following are assessed and reported:
    - For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identification of the known and suspected sources within the Copermittee’s jurisdiction in the WMA that may cause or contribute to the NAL exceedances.
    - For each Copermittee, calculations or estimates of the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year.

Each Copermittee is required to conduct field screening to determine which non-storm water MS4 outfall discharges are transient or persistent non-storm water flows. Data collected during dry weather MS4 outfall monitoring are used to prioritize the non-storm water MS4 discharges that will be investigated and eliminated.

3.2.1 Classification of Major MS4 Outfalls Within each Copermittee's Jurisdiction

Each major outfall identified in each Copermittee's jurisdiction was classified (Table 3-2) by the following definitions:

- Persistent flow – having flowing, pooled, or ponded water more than 72 hours after a measurable rainfall event of 0.1 inch or greater during the three consecutive most recent monitoring and/or inspection events;
- Transient flow – having flowing, pooled, or ponded water during at least one but not on all three most recent consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation ≥ 0.1 inch;
- Tidal – having persistent or transient flow with ocean tides as the source;
- Dry – having no flowing, pooled, or ponded water during the last three consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation greater than 0.1 inch; and
- Unknown – the site cannot be evaluated, or has not been visited enough times to determine flow status.

Table 3-2
Classification of Major MS4 Outfalls in Dry Weather

Copermittee	Dry	Persistent Flow	Transient Flow	Tidal	Unknown	Total
San Diego Airport Authority	0	0	0	2	0	2
City of Chula Vista	58	68	50	0	23	179
City of San Diego	45	22	24	0	2	93
City of Coronado	3	1	0	2	1	7
County of San Diego	16	28	13	0	0	57
City of Imperial Beach	0	0	0	7	0	7
City of La Mesa	3	0	0	0	0	3
City of Lemon Grove	3	1	0	0	0	4
City of National City	11	7	3	0	0	21
Port of San Diego	40	0	4	8	0	52

Notes:
Each outfall is assigned to only one outfall category. Designations were made at or prior to the start of the monitoring period.

In the San Diego Bay WMA, 42% of the major outfalls were classified as dry, 22% as transient, and 30% as persistently flowing outfalls. Figure 3-1 presents classifications of major MS4 outfalls in the 2015–2016 monitoring year.

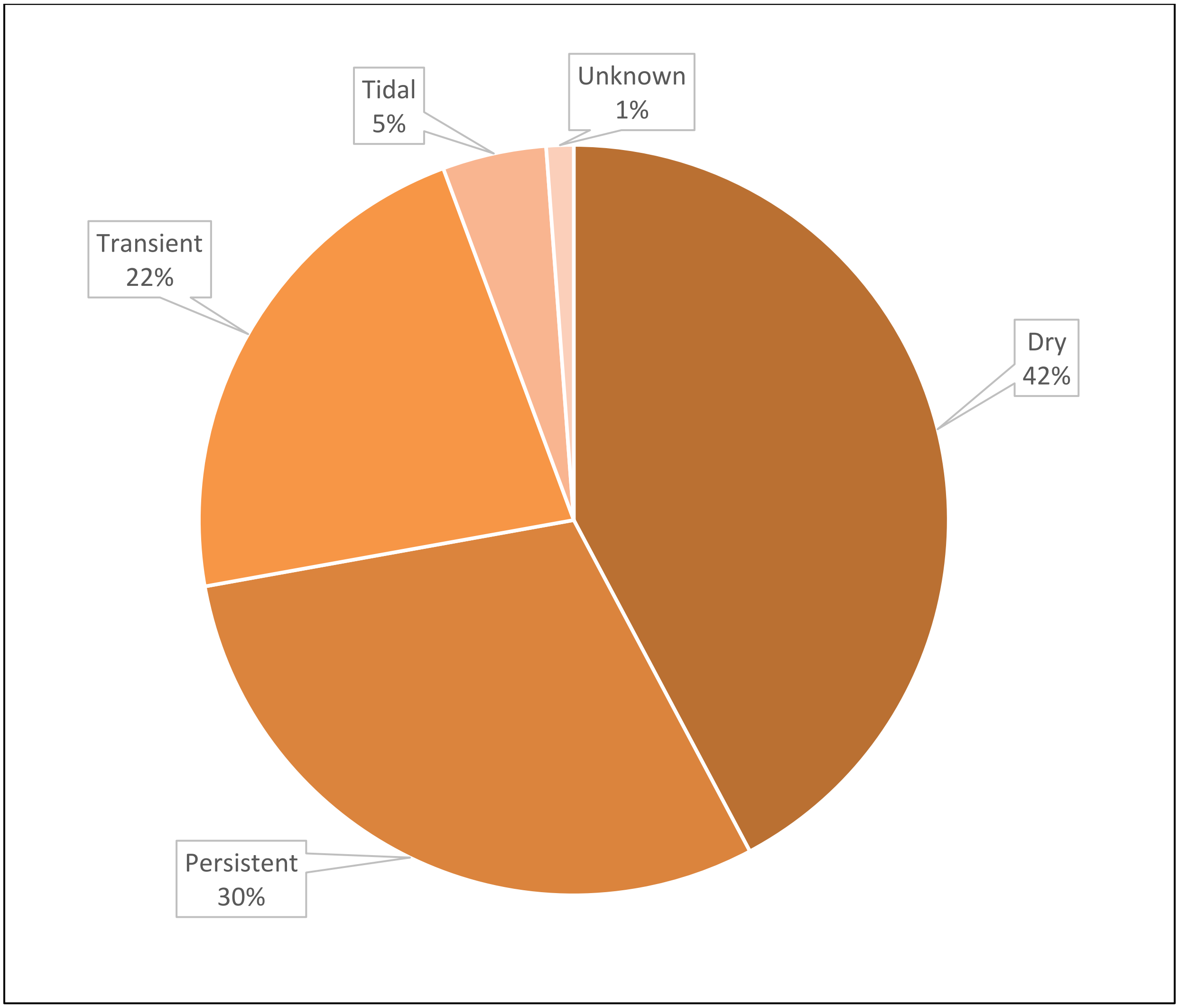

Figure 3-1
Classification of Major Outfalls in San Diego Bay WMA During the 2015-2016 Monitoring Year

3.2.2 Visual Observations at Major MS4 Outfalls

Of 1,252 observations, almost 80% of the visits were observed as dry outfalls. Table 3-3 presents the results of the visual observations at major MS4 outfalls in the San Diego Bay WMA during dry weather in the FY 2016 monitoring year.

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Table 3-3
Number of Dry Weather Visual Observations in 2015–2016 Monitoring Year

Copermittee	Total	Flowing	Ponded	Tidal	Dry	Unknown
San Diego Airport Authority[1]	4	0	0	4	0	0
City of Chula Vista[2]	190	58	40	0	92	0
City of San Diego[3]	77	20	13	1	43	0
City of Coronado[1]	12	2	0	2	8	0
County of San Diego[1]	175	65	49	0	61	0
City of Imperial Beach[1]	8	0	0	0	8	0
City of La Mesa[1]	6	2	2	0	2	0
City of Lemon Grove[1]	8	2	0	0	6	0
City of National City[1]	35	8	10	0	17	0
Port of San Diego[1,4]	111	5	2	31	72	1
Total	626	162	116	38	309	1

Notes:

1. For RPs with fewer than 125 major outfalls in the WMA, 80% of total major outfalls presented in the table must be screened twice per year.
2. For Responsible Parties with fewer than 500 but more than 125 major MS4 outfalls in the watershed, 100% of major outfalls must be screened once per year.
3. The City of San Diego has 502 outfalls within the City jurisdiction. The City of San Diego in accordance with Municipal Permit Provision D.2.a(2).(a).(iv) is required to screen 500 sites city wide once per year. The City is not required to screen 500 sites within each watershed.
4. Visual observation of unknown status was submerged outfall.

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3.2.3 Controllable and Non-Controllable Sources of Flow

The Municipal Permit requires classification of sources of runoff during visual observations that result in flowing or ponded water in dry weather. Known, controllable sources of runoff, such as irrigation runoff and residential washing, were identified during these visual observations. Other suspected sources of runoff were noted and may have included items such as broken pipes. Non-controllable runoff sources were also identified during dry weather visual observations and included mostly groundwater seepage. Finally, unidentified sources of runoff were noted during dry weather observations. Table 3-4 presents results of runoff source observations made in the 2015–2016 monitoring year.

Table 3-4
Sources of Dry Weather Flow in 2015-2016 Monitoring Year

Copermittee	Total Number of Observations Investigating Flow Source	Known Controllable Sources	Suspected Controllable Sources	Uncontrollable Sources	Unidentified Sources
San Diego Airport Authority	No Discharges Observed				
City of Chula Vista	109	57	0	36	23
City of San Diego	41	9	6	3	28
City of Coronado	2	2	0	1	0
County of San Diego	46	1	30	0	13
City of Imperial Beach	No Discharges Observed				
City of La Mesa	7	4	0	2	0
City of Lemon Grove	4	0	2	0	2
City of National City	35	10	0	2	25
Port of San Diego	7	2	3	0	2
Total	251	84	42	44	93

3.2.4 Illicit Discharge Detection and Elimination Program Data and Assessment

Non-storm water discharges (NSWDs) that have been reduced or eliminated during the 2015–2016 monitoring year have also been identified and are shown by Copermittee in Table 3-5. Details of these identifications and eliminations, as well as enforcement actions that are part of the IDDE program, are on each Copermittee' s completed JRMP Annual Report forms in Appendix 2.

Table 3-5
Dry Weather Discharges Eliminated in the 2015-2016 Monitoring Year

Copermittee	Number of Identified Discharges	Number of Eliminated Discharges
San Diego Airport Authority	4	4
City of Chula Vista	114	64
City of San Diego	828	819
City of Coronado	48	48
City of Imperial Beach	53	53
County of San Diego	28	28
City of La Mesa	12	7
City of Lemon Grove	7	7
City of National City	39	39
Port of San Diego	8	8
Total	1,141	1,077

3.3 Non-Storm Water Action Level Comparisons

The data collected as part of the dry weather MS4 outfall discharge monitoring were compared with the NALs per Municipal Permit Provision C.1.a.(3). NALs for the Focused Priority Pollutants listed in Table C-3 of the Municipal Permit were calculated using corresponding hardness measurements according to the calculations in 40 Code of Federal Regulations (CFR) 131.38(b)(2). These comparisons are shown in Tables 3-6 through 3-11.

Of the high priority major MS4 outfalls in the San Diego Bay WMA, four major MS4 outfalls flow to bay, harbor, or lagoon and estuary waters, as defined by the Municipal Permit. Of these four high priority major MS4 outfalls, two were in the Port of San Diego and two were in the City of Coronado. Ten of 71 samples exceeded dry weather NAL's in the 2015–2016 monitoring year: four exceedances of dissolved copper, five exceedances of *Enterococcus*, and three exceedances of fecal coliform. Results of NAL comparisons for bay, harbor, and lagoon and estuary waters are provided in Table 3-6.

Note that Imperial Beach has installed dry weather diversions at its outfalls, and therefore did not observe any flow during dry weather monitoring. The San Diego Airport Authority also did not observe any discharges in dry weather; therefore, NAL comparisons do not apply to either RP. The City of La Mesa did not have any outfalls classified as persistent until after the FY 16 monitoring program was completed. No samples were taken in FY 16 and their outfall inventory will be updated accordingly in FY 17.

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Table 3-6
NAL Comparison for MS4 Outfalls to Bays, Harbors, and Lagoon and Estuary Waters – City of Coronado and Port of San Diego

Analyte	NAL[1]	City of Coronado				Port of San Diego[2]		
		Result						
		CO_36		CO_16		CGeo39		CSD145
		5/3/16	7/6/16	5/4/16	7/6/16	5/12/16	7/7/16	7/7/16
Dissolved Cadmium	16 µg/L	<4.0	NA	0.1	0.2	0.023	<0.01	0.047
Dissolved Chromium III	-	NA	NA	NA	NA	0.45	0.43	0.55
Dissolved Chromium VI	83 µg/L	<10	NA	1.2	1.3	<5	<5	<5
Dissolved Copper	5.8 µg/L	6	NA	4	4	7.719	5.933	16.927
Enterococcus	104 MPN/100 mL[3]	122	NA	31	2420	180	50000	9000
Fecal Coliform	400 MPN/100 mL[4]	2	NA	80	1600	340	14000	1700
Dissolved Lead	14 µg/L	<0.3	NA	0.2	0.08	0.069	0.11	0.277
Dissolved Nickel	14 µg/L	1	NA	0.7	1	1.41	1.32	1.76
pH[5]	6.0-9.0	7.7	7.6	7.4	8	8.43	7.83	8.84
Dissolved Silver	2.2 µg/L	<0.5	NA	<0.1	2	<0.01	<0.01	<0.01
Turbidity[5]	225 NTU	5.91	3.97	0.41	0.27	1.12	14.4	2.33
Dissolved Zinc	95 µg/L	8	NA	5	18	29.21	3.3	15.83

Notes:

Bold = exceedance of NAL; NA = data not available; µg/L = micrograms per liter; mg/L = milligrams per liter; MPN/100mL = most probable number per 100 milliliters; NTU = nephelometric turbidity unit; < = Not Detected below Method Detection Limit

1. NALs for bays, harbors, and lagoons/estuaries (seawater) are as provided in Table C-2 and Table C-3 of Provision C.1.(2) of the Permit.
2. Port of San Diego high priority major MS4 outfalls 1271.1, 2172.1, and 2941.1 were dry upon observation or were tidally influenced, and therefore were not sampled in the 2015-2016 monitoring year.
3. This value has been set to the Basin Plan water quality objective for saltwater “designated beach areas” and is not applicable to water bodies that are not designated with the water contact recreation (REC-1) beneficial use.
4. The NAL is reached if more than 10 percent of total samples exceed 400 MPN per 100 ml during any 30 day period.
5. Field measurement reported as result.

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Of the high priority major MS4 outfalls in the San Diego WMA, 17 had observed flow draining to inland surface waters. The City of Chula Vista monitored a total of five major flowing outfalls, all of which drain to inland surface waters, and one of which was dry upon observation in the 2015-2016 monitoring year. The City of San Diego monitored a total of five major flowing MS4 outfalls that drain to inland surface waters. Two of these outfalls were dry upon observation in the 2015-2016 monitoring year. The County of San Diego monitored five major outfalls during 2015–2016 but collected samples from only four because one of the five County of San Diego highest priority sites, SWT-MS4-021, was dry on all visits. For the 2016–2017 monitoring year, this site will be replaced with the next highest ranking outfall on the County of San Diego's MS4 inventory, MS4-SWT-019. The City of Lemon Grove monitored one major MS4 outfall in the San Diego Bay WMA in the 2015–2016 monitoring year. The City of National City monitored five major flowing outfalls that drain to inland surface waters. A total of 466 of the 582 inland surface water results were below NALs, including 155 non-detect values. NALs were exceeded for concentrations of dissolved copper, *Enterococcus*, fecal coliform, total iron, total manganese, methylene blue active substance (MBAS), pH, total nitrogen, total phosphorous, and turbidity. Some of these analytes are found in groundwater and may be from unidentified groundwater intrusion. Other analytes will be addressed by the strategies developed by the RPs. The San Diego Bay WMA RPs have just begun implementation of the WQIP; they plan to continue implementing the strategies without modification, and will work toward eliminating dry weather flows. Additionally, they have implemented their IDDE programs, as summarized in Section 3.2.4, to identify sources of illicit dry weather discharges.

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Table 3-7
NAL Comparison for MS4 Outfalls to Inland Surface Waters – City of Chula Vista[1]

Analyte	NAL	RH-1		SS-3		SC-2		TC-11	
		Result							
		2/24/16	5/18/16	2/24/16	5/19/16	2/25/16	5/18/16	2/25/16	5/19/16
Dissolved Cadmium	** µg/L	<0.2 (24.4)	0.3 (18.1)	<0.2 (9.5)	<0.2 (7.5)	<0.2 (3.1)	<0.2 (3.1)	<0.4 (14.7)	<0.2 (13.6)
Dissolved Chromium III	** µg/L	0.2 (2550.1)	0.2 (1820.8)	0.5 (887.4)	0.4 (678.2)	<1 (256.2)	0.4 (256.2)	<0.4 (1445.5)	<0.06 (1325.0)
Dissolved Chromium VI	16 µg/L	<2	<2	<2	<2	<2	<2	<2	<2
Dissolved Copper	** µg/L	4 (144.0)	3 (101.3)	4 (47.9)	3 (36.2)	8 (13.1)	1 (13.1)	2 (79.6)	1 (72.7)
Dissolved Oxygen[1]	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	6.52	8.5[2]	6.69	9.2[2]	7.85	6.2[2]	6.4	9.1[3]
Enterococcus	61 MPN/100 mL	>1600	110	900	34	900	50	170	300
Fecal Coliform	400 MPN/100 mL	>1600	50	4	130	900	130	14	240
Total Iron	0.3 mg/L	0.658	0.101	0.095	0.054	0.301	0.052	0.153	0.091
Dissolved Lead	** µg/L	<1 (63.3)	<1 (44.6)	<1 (19.5)	<1 (14.1)	<1 (4.1)	<1 (4.1)	<2 (34.5)	<1 (31.3)
Total Manganese	0.05 mg/L	0.033	0.021	0.004	0.0008	0.02	0.058	0.984	0.943
MBAS	0.5 mg/L	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1
Dissolved Nickel	** µg/L	1 (813.4)	1 (574.3)	0.8 (273.4)	0.7 (207.1)	2 (75.8)	1 (75.8)	8 (452.5)	7 (413.6)
pH[2]	6.0-9.0	7.5	7.3	8.3	8.9	8.5	7.3	7.7	7.9
Dissolved Silver	** µg/L	<0.6 (924.3)	<0.6 (455.6)	<0.6 (100.7)	<0.6 (57.3)	<0.6 (7.4)	<0.6 (7.4)	<0.1 (280.6)	<0.6 (233.7)
Total Nitrogen	1.0 mg/L	20	14	5.6	8.6	15.6	124	2.1	2.1
Total Phosphorus	0.1 mg/L	0.1	0.14	0.11	0.1	0.51	<0.02	0.15	0.06
Turbidity[2]	20 NTU	2.08[3]	2.52	1.01[3]	0.57	1.21[3]	1.03	0.56[3]	1.9
Dissolved Zinc	** µg/L	37 (1855.5)	21 (1309.5)	4 (622.6)	8 (471.4)	13 (172.2)	4 (172.2)	3 (1031.3)	3 (942.6)
Hardness value used to calculate NAL	mg/L $CaCO_3$	2580	1710	711	512	156[4]	156	1290	1160

Notes:

Bold = exceedance of NAL; ( ) = Numbers in parentheses adjacent to analytical results are California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent values from 40 Code of Federal Regulations (CFR) 131.38(b)(1) calculated using the receiving water hardness result of the sample (for metals); ** = CTR Freshwater Continuous Concentration Hardness dependent non-storm water action level; µg/L = micrograms per liter; $CaCO_3$ = calcium carbonate; mg/L = milligrams per liter; MPN/100mL = most probable number per 100 milliliters; NAL = non-storm water action level; NTU = nephelometric turbidity unit; < = Not Detected below Method Detection Limit

1. City of Chula Vista high priority major MS4 outfall SW-1 was dry upon observation and therefore was not sampled in the 2015-2016 monitoring year.
2. Field measurement reported as result.
3. Results are from same outfall location on 6/7/16.
4. Hardness value from outfall sample outfall not available. Hardness value from 5/18/16 sample at same outfall location was used to calculate applicable CTR Freshwater Continuous Concentration Hardness dependent values.

Table 3-8
NAL Comparison for MS4 Outfalls to Inland Surface Waters – City of San Diego[1]

Analyte	NAL	DW0120		DW0179		DW0121	
		Result					
		2/25/16	4/26/16	2/25/16	4/26/16	2/25/16	5/23/16
Dissolved Cadmium	** µg/L	<0.2 (8.8)	0.25 (15.6)	<2 (5.0)	<0.14 (20.3)	<2 (5.0)	<2 (23.2)
Dissolved Chromium III	** µg/L	<0.5 (814.1)	1.1 (1545.7)	<0.5 (437.7)	1.9 (2070.0)	<0.5 (437.7)	<0.5 (2403.4)
Dissolved Chromium VI	16 µg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Dissolved Copper	** µg/L	<5 (43.8)	2.1 (85.4)	16 (23.0)	5.8 (115.8)	<5 (22.9)	<5 (135.4)
Dissolved Oxygen[2]	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	9.01	9.21	9.06	9.08	8.36	8.61
Enterococcus	61 MPN/100 mL	60	60	<20	40	<20	**6200**
Fecal Coliform	400 MPN/100 mL	<20	<18	<20	<18	<20	<18
Total Iron	0.3 mg/L	0.19	0.058	**0.4**	**0.34**	0.18	0.19
Dissolved Lead	** µg/L	<2.5 (17.6)	<1.9 (37.2)	<2.5 (8.1)	<1.9 (51.1)	<2.5 (8.1)	<2.5 (59.6)
Total Manganese	0.05 mg/L	0.027	0.004	**2**	**1.8**	**0.13**	**0.6**
MBAS	0.5 mg/L	<0.05	0.13	0.39	0.34	0.22	<0.05
Dissolved Nickel	** µg/L	<5 (250.1)	4.4 (484.9)	<5 (131.7)	8.3 (655.7)	<5 (131.7)	<5 (765.1)
pH[2]	6.0-9.0	8.8	8.5	8.4	7.8	8.7	8.6
Dissolved Silver	** µg/L	<5 (84.0)	<0.92 (323.0)	<5 (22.8)	<0.92 (596.5)	<5 (22.8)	<5 (816.2)
Total Nitrogen	1.0 mg/L	**5.7**	**6.4**	**6.4**	**4.3**	**1.1**	**1.4**
Total Phosphorus	0.1 mg/L	0.076	0.042	0.098	<0.025	0.073	0.083
Turbidity[2]	20 NTU	0.87	0.02	2.23	4.34	1.19	0.79
Dissolved Zinc	** µg/L	<10 (569.5)	16 (1105.4)	<10 (299.7)	12 (1495.4)	<10 (299.7)	<15 (1745.2)
Hardness value used to calculate NAL	mg/L $CaCO_3$	640	1400	300[3]	2000	300[3]	2400[4]

Notes:

Bold = exceedance of NAL; ( ) = Numbers in parentheses adjacent to analytical results are California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent values from 40 Code of Federal Regulations (CFR) 131.38(b)(1) calculated using the receiving water hardness result of the sample (for metals); ** = CTR Freshwater Continuous Concentration Hardness dependent non-storm water action level; µg/L = micrograms per liter; $CaCO_3$ = calcium carbonate; mg/L = milligrams per liter; MPN/100mL = most probable number per 100 milliliters; NAL = non-storm water action level; NTU = nephelometric turbidity unit; < = Not Detected below Method Detection Limit

1. High priority major MS4 outfalls DW0203 and DW0225 were dry upon observation and therefore were not sampled in the 2015-2016 monitoring year.
2. Field measurements reported as result.
3. Results are from paired receiving water location on 3/24/16.
4. Hardness value from paired receiving water sample not available. Hardness value from outfall was used to calculate applicable CTR Freshwater Continuous Concentration Hardness dependent values.

Table 3-9
NAL Comparison for MS4 Outfalls to Inland Surface Waters – County of San Diego[1]

Analyte	NAL	MS4-SWT-023		MS4-SWT-030		MS4-SWT-055		MS4-SWT-235	
		Result							
		5/2/16	7/6/16	5/2/16	7/6/16	5/2/16	7/6/16	5/2/16	7/6/16
Dissolved Cadmium	** µg/L	0.1 (5.1)	< 0.07 (4.9)	< 0.07 (5.2)	0.2 (5.8)	0.3 (8.5)	< 0.07 (8.2)	0.1 (11.1)	0.2 (11.1)
Dissolved Chromium III	** µg/L	< 0.06 (442.5)	< 0.06 (426.9)	0.2 (455.6)	0.7 (511.7)	< 0.06 (784.8)	0.09 (750.0)	0.5 (1054.8)	0.3 (1054.8)
Dissolved Chromium VI	16 µg/L	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Copper	** µg/L	0.8 (23.2)	0.8 (22.3)	24 (23.9)	24 (27.0)	2 (42.1)	1 (40.2)	14 (57.3)	15 (57.3)
Dissolved Oxygen[2]	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	10.49	7.32	6.72	5.62	6.26	5.56	8.78	6.02
Enterococcus	61 MPN/100 mL	9	80	1800	1200	5000	700	1100	1400
Fecal Coliform	400 MPN/100 mL	20	500	4000	7000	23000	3000	3000	3700
Total Iron	0.3 mg/L	0.207	0.235	0.081	0.735	0.032	0.049	0.083	0.057
Dissolved Lead	** µg/L	< 0.06 (8.2)	< 0.06 (7.9)	0.3 (8.6)	0.2 (10.0)	0.6 (16.8)	< 0.06 (15.9)	0.2 (24.0)	0.3 (24.0)
Total Manganese	0.05 mg/L	0.014	0.034	0.021	0.289	0.036	0.021	0.022	0.022
MBAS	0.5 mg/L	< 0.1	< 0.1	0.1	0.2	< 0.1	< 0.1	0.1	0.1
Dissolved Nickel	** µg/L	0.8 (133.2)	0.7 (128.4)	2 (137.3)	3 (154.8)	1 (240.8)	1 (229.8)	2 (326.8)	3 (326.8)
pH[2]	6.0-9.0	8.19	7.83	8.06	7.54	7.9	7.76	7.97	7.83
Dissolved Silver	** µg/L	< 0.1 (23.4)	< 0.1 (21.7)	< 0.1 (24.8)	< 0.1 (31.7)	< 0.1 (77.8)	< 0.1 (70.7)	< 0.1 (144.8)	< 0.1 (144.8)
Total Nitrogen	1.0 mg/L	0.6	4.8	3	2.1	5.1	1.1	4.3	6.4
Total Phosphorus	0.1 mg/L	0.02	0.05	0.33	0.77	0.17	0.1	0.42	0.88
Turbidity[2]	20 NTU	1.27[3]	5.25	3.17[3]	18.1	0.22[3]	4.33	1.46[3]	22.3
Dissolved Zinc	** µg/L	15 (303.1)	2 (292.0)	82 (312.3)	10 (352.2)	11 (548.3)	5 (523.1)	19 (744.4)	16 (744.4)
Hardness value used to calculate NAL	mg/L $CaCO_3$	304[4]	291[4]	315[4]	363[4]	612	579	878[5]	878

Notes:
Bold = exceedance of NAL; ( ) = Numbers in parentheses adjacent to analytical results are California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent values from 40 Code of Federal Regulations (CFR) 131.38(b)(1) calculated using the receiving water hardness result of the sample (for metals); ** = CTR Freshwater Continuous Concentration Hardness dependent non-storm water action level; µg/L = micrograms per liter; $CaCO_3$ = calcium carbonate; mg/L = milligrams per liter; MPN/100mL = most probable number per 100 milliliters; NA = data not available; NAL = non-storm water action level; NTU = nephelometric turbidity unit; < = Not Detected below Method Detection Limit

1. High priority major MS4 outfall MS4-SWT-021 was dry upon observation and therefore was not sampled in the 2015-2016 monitoring year.
2. Field measurements reported as result.
3. Results are from lab analysis instead of field meter measurement at outfall.
4. Hardness value from paired receiving water sample not available. Hardness value from outfall was used to calculate applicable CTR Freshwater Continuous Concentration Hardness dependent values.
5. Receiving water hardness not available for 5/2/16. Hardness value from 7/6/16 at same receiving water location was used to calculate applicable CTR Freshwater Continuous Concentration Hardness dependent values.

Table 3-10
NAL Comparison for MS4 Outfalls to Inland Surface Waters – City of Lemon Grove

Analyte	NAL	69	
		Result	
		9/8/16 10:00	9/8/16 13:40
Dissolved Cadmium	** µg/L	0.064 (14.3)	0.16 (16.3)
Dissolved Chromium III	** µg/L	0.4 (1399.4)	0.7 (1617.6)
Dissolved Chromium VI	16 µg/L	<2	<2
Dissolved Copper	** µg/L	2.5 (77.0)	2.5 (89.6)
Dissolved Oxygen[1]	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	9.78	12.02
Enterococcus	61 MPN/100 mL	11	8
Fecal Coliform	400 MPN/100 mL	50	110
Total Iron	0.3 mg/L	0.14	0.15
Dissolved Lead	** µg/L	0.66 (33.3)	0.39 (39.1)
Total Manganese	0.05 mg/L	0.035	0.028
MBAS	0.5 mg/L	0.1	<0.1
Dissolved Nickel	** µg/L	4.3 (437.6)	3.8 (508.3)
pH[1]	6.0-9.0	8	8.4
Dissolved Silver	** µg/L	0.068 (262.1)	<0.062 (355.4)
Total Nitrogen	1.0 mg/L	1.2	1.1
Total Phosphorus	0.1 mg/L	0.13	0.13
Turbidity[1]	20 NTU	2.95	1.45
Dissolved Zinc	** µg/L	30 (997.4)	19 (1158.7)
Hardness value used to calculate NAL	mg/L $CaCO_3$	1240[2]	1480[2]

Notes:

Bold = exceedance of NAL; ( ) = Numbers in parentheses adjacent to analytical results are California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent values from 40 CFR 131.38(b)(1) calculated using the receiving water hardness result of the sample (for metals); ** = CTR Freshwater Continuous Concentration Hardness dependent non-storm water action level; µg/L = micrograms per liter; $CaCO_3$ = calcium carbonate; mg/L = milligrams per liter; MPN = most probable number; NAL = non-storm water action level;

NTU = nephelometric turbidity unit; < = Not Detected below Method Detection Limit

1. Field measurement reported as result.
2. Hardness value from paired receiving water sample not available. Hardness value from outfall was used to calculate applicable CTR Freshwater Continuous Concentration Hardness dependent values.

Table 3-11
NAL Comparison for MS4 Outfalls to Inland Surface Waters – City of National City

Analyte	NAL	32		43B		47A-1		762		433[1]
		Result								
		6/29/16	7/25/16	6/28/16	7/25/16	6/29/16	7/26/16	6/29/16	7/25/16	7/26/16
Dissolved Cadmium	** µg/L	< 0.2 (3.4)	< 0.2 (4.0)	< 0.2 (2.0)	< 0.2 (3.3)	< 2.0 (20.1)	< 1.0 (26.1)	0.4 (5.1)	< 0.2 (3.8)	< 0.2 (18.5)
Dissolved Chromium III	** µg/L	0.2 (282.8)	0.1 (334.5)	0.2 (157.3)	0.4 (277.5)	< 0.06 (2053.1)	0.3 (2750.7)	0.4 (446.1)	0.9 (319.2)	< 0.06 (1864.3)
Dissolved Chromium VI	16 µg/L	NA	< 0.2	NA	< 2	NA	< 2	NA	< 2	< 2
Dissolved Copper	** µg/L	6 (14.5)	7 (17.3)	< 1 (7.9)	2 (14.2)	< 10 (114.8)	5 (155.8)	17 (23.4)	8 (16.5)	0.002 (103.9)
Dissolved Oxygen[2]	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	9.8	9.9	8.8	8.3	8.1	8.3	8	10.1	8.9
Enterococcus	61 MPN/100 mL	**1600**	**17000**	< 2	**110**	**110**	**500**	**1600**	**500**	**14000**
Fecal Coliform	400 MPN/100 mL	**1600**	**300000**	34	< 20	**500**	**1100**	**1600**	**5000**	**13000**
Total Iron	0.3 mg/L	**2**	**0.71**	**1.42**	**0.608**	0.216	0.231	**2.18**	0.175	0.225
Dissolved Lead	** µg/L	< 1.0 (4.6)	0.1 (5.8)	< 1 (2.1)	< 0.006 (4.5)	< 10 (50.7)	< 0.3 (68.2)	2 (8.3)	0.4 (5.4)	< 0.06 (45.7)
Total Manganese	0.05 mg/L	**0.085**	0.036	**0.061**	**0.071**	0.029	**0.056**	**0.159**	0.005	0.036
MBAS	0.5 mg/L	0.1	0.2	**0.7**	**2.8**	0.1	0.1	0.2	0.2	0.1
Dissolved Nickel	** µg/L	2 (83.9)	3 (99.8)	1 (45.8)	3 (82.3)	2 (650.2)	4 (879.6)	3 (134.3)	11 (95.1)	< 0.2 (588.5)
pH[2]	6.0-9.0	8	8.2	7.2	7.4	8.6	6.6	**9.6**	8.4	7
Dissolved Silver	** µg/L	< 0.6 (9.1)	< 0.1 (13.0)	< 0.6 (2.7)	< 0.1 (8.8)	< 6 (586.3)	< 0.5 (1083.7)	< 0.6 (23.8)	< 0.1 (11.8)	< 0.1 (478.7)
Total Nitrogen	1.0 mg/L	**3.2**	**3.7**	**1.5**	**3**	**3.1**	**6.9**	**9.3**	**6.4**	**1.3**
Total Phosphorus	0.1 mg/L	**0.3**	**0.38**	**0.36**	**0.56**	**0.19**	**0.29**	**1.76**	**0.77**	0.1
Turbidity[2]	20 NTU	14.4	15.45	**31.47**	16.31	1.86	1.87	**28.66**	1.57	6.06
Dissolved Zinc	** µg/L	10 (190.7)	29 (226.9)	10 (104.0)	9 (187.1)	11 (1482.7)	16 (2006.7)	204 (305.6)	32 (216.1)	6 (1341.9)
Hardness value used to calculate NAL	mg/L $CaCO_3$	176[3]	216[3]	86[3]	172[3]	1980[3]	2830[3]	307[3]	204[3]	1760[3]

Notes:

Bold = exceedance of NAL; ( ) = Numbers in parentheses adjacent to analytical results are California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent values from 40 CFR 131.38(b)(1) calculated using the receiving water hardness result of the sample (for metals);
** = CTR Freshwater Continuous Concentration Hardness dependent non-storm water action level; µg/L = micrograms per liter; $CaCO_3$ = calcium carbonate; mg/L = milligrams per liter; MPN/100mL = most probable number per 100 milliliters; NA = data not available; NAL = non-storm water action level; NTU = nephelometric turbidity unit; < = Not Detected below Method Detection Limit; < = Not Detected below Method Detection Limit

1. Outfall 433 was visited on 6/28/16 and was dry, therefore only one sample was taken in the 2015-2016 monitoring season.
2. Field measurement reported as result.
3. Hardness value from paired receiving water sample not available. Hardness value from outfall was used to calculate applicable CTR Freshwater Continuous Concentration Hardness dependent values.

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3.4 Non-Storm Water Volume and Pollutant Load Assessment

Copermittees must assess the non-storm water volumes and pollutant loads collectively discharged from their jurisdictions in the San Diego Bay WMA, per Municipal Permit Provision D.4.b(1)(c). The methodology used to calculate the non-storm water volumes and loads is provided in Attachment F.3.

3.4.1 Identification of Dry Weather Days

The first step in calculating annual non-storm water volumes and pollutant loads is to determine the number of dry weather days in the monitoring year. The number of dry weather days were determined using County of San Diego ALERT station data (https://sandiego.onerain.com). The Bonita ALERT station was selected to represent rainfall conditions in the San Diego Bay WMA. This representative ALERT station was also utilized in Wet Weather MS4 Outfall Discharge Monitoring Assessments, and is the station closest to a majority of wet weather MS4 outfall discharge monitoring stations.

A wet weather day was defined as any day with at least 0.1 inch of measurable rainfall within a 24-hour period, and the subsequent 72 hours. A dry weather day was defined as all other days during the monitoring year (October 1 through September 30). Table 3-12 presents the number of dry weather days identified in the San Diego Bay WMA during the 2015–2016 monitoring season.

Table 3-12
San Diego Bay WMA Dry Weather Days by Month

Month	Number of Days in the Month	Storm Dates	Number of Storm Days	Number of Storm Days +72 Hours	Number of Dry Days
October 2015	31	October 4–5	2	3	26
November 2015	30	November 3 November 10 November 27	3	9	18
December 2015	31	December 11 December 13 December 22 December 25	4	9	18
January 2016	31	January 4–7 January 31	5	3	23
February 2016	29	NA	0	3	26
March 2016	31	March 6–7 March 11 March 29	4	8	19
April 2016	30	April 7 April 9	2	5	23
May 2016	31	May 5–6	2	3	26
June 2016	30	NA	0	0	30
July 2016	31	NA	0	0	31
August 2016	31	NA	0	0	31
September 2016	30	September 20	1	3	26

Notes:
NA = not applicable, no storms recorded

3.4.2 Non-Storm Water Volume Assessment

An estimated annual non-storm water volume was calculated for each persistently flowing major MS4 outfall in each Copermittee's jurisdiction, as is presented in Table 3-13. Calculations of volume were dependent on the availability of flow data for each site. Details of these calculation methods are presented in the Dry Weather Assessment Methodology in Attachment F.3. The methods are summarized as follows:

- Scenario A: If a major MS4 outfall station was visited once during the monitoring year, and a single discrete flow rate was measured, and this flow rate was applied across all dry weather days within the year.
- Scenario B: If a major MS4 outfall station was visited more than once during the monitoring year, and more than one discrete flow rate was measured, monthly dry weather flow volumes were calculated. The monthly flow volume calculation method varied on the basis of whether a flow measurement was logged at the outfall during that month. For calendar months in which the outfall was visited one or more times, the mean of the measured flow rates was applied to all dry weather days within the month. For calendar months in which the outfall was not visited, the mean of all flow rates observed at that site during the calendar year was applied.
- Scenario C: If a major MS4 outfall station was monitored continuously for a period of time longer than a day, a measured daily flow volume was calculated for each monitored day. The mean of these daily flow volumes was applied to all non-monitored dry days.
- Scenario D: If a major MS4 outfall station was not visited during the monitoring year, the mean of annual outfall flow volumes for all monitored stations in the jurisdiction in the WMA was applied. This scenario was not encountered during the 2015–2016 monitoring season.

Within all these scenarios, observations of ponding (i.e., evidence of non-storm water in the MS4, with no connectivity to the receiving water) were assigned a flow rate of zero. If a station was observed to be flowing, but no flow rate was recorded, the average non-zero flow rate for that station was applied to that observation.

The methodology above assumes that a persistently flowing major MS4 outfall is flowing on 100% of dry weather days. This assumption is highly conservative. Additional information is provided in Section 3.4.6.

Table 3-13
2015–2016 Dry Weather Persistent Flow Volumes Collectively Discharged from the MS4 by Jurisdiction

Jurisdiction	Annual Non-Storm Water Volume Estimate (cf)
San Diego Airport Authority	0
City of Chula Vista	5,142,683
City of San Diego	9,302,068
City of Coronado	918,613
City of Imperial Beach	0
County of San Diego	4,800,298
City of La Mesa	3,821[1]
City of Lemon Grove	857,590
City of National City	190,613
Port of San Diego	24,399

Notes:
cf = cubic feet
1. City of La Mesa outfalls discharged the calculated volume, but outfalls were not classified as persistent until after the 2015–2016 monitoring program had ended. La Mesa's dry weather outfall inventory will be updated accordingly in FY 17.

3.4.3 Non-Storm Water Load Assessment

The Copermittees estimated the annual non-storm water pollutant loads collectively discharged from their persistently flowing major MS4 outfalls to receiving waters in the MS4.

A load was calculated for each pollutant required to be analyzed at each high-priority outfall, based on the arithmetic mean of the analytical results from the two dry weather outfall monitoring events at that outfall during the monitoring year. For each non-high-priority persistently flowing outfall in a Copermittee's jurisdiction in the WMA, the mean of that Copermittee's monitored outfall results for each pollutant was applied. For any pollutants not detected at the MDL, a concentration of MDL/2 was applied in calculating the loads. The non-storm water pollutant loads are presented by outfall in Attachment F.4 and by Copermittee in Attachment F.5.

3.4.4 Percent Contribution from Known Sources

Table 3-14 summarizes the estimated percentage of non-storm water volume and load contributions from known sources. This value was calculated by dividing the observed flow rate for each known source by the estimated annual outfall flow volume presented in Section 3.4.2. It was assumed for ease of calculation that the known source was flowing for the entire day on which the source was observed. Additionally, it was assumed that the percent load contribution is equal to the percent flow contribution for each known source.

Table 3-14
Estimated Percent Contribution from Known Sources

Copermittee	Station ID	Observation Date	Known Source	Known Source Flow Rate (cfs)	Known Source Daily Flow Volume (cf)	Annual Outfall Non-Storm Water Flow Volume (cf)	Percent Contribution from Known Source (%)
San Diego Airport Authority	No known sources observed.						
City of Chula Vista	C-1	2/15/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	C-1	5/17/2016		< 0.002	172.8		0.60%
	J-3	5/14/2016	Irrigation Runoff	0	0	0	0%
	LC-1	5/13/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	LC-3	5/13/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	LC-4	5/12/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	OLR-5	5/13/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	ORW-3	2/8/2016	Irrigation Runoff	< 0.002	172.8	0	0%
	PC-7	2/10/2016	Irrigation Runoff	0	0	0	0%
	PC-9	2/12/2016	Irrigation Runoff	0	0	0	0%
	PC-12	2/12/2016	Groundwater Seepage	< 0.002	172.8	28,586	0.60%
	PC-16	2/16/2016	Groundwater Seepage	< 0.002	172.8	0	0%
	PC-20	5/24/2016	Irrigation Runoff	0	0	0	0%
	PC-21	5/24/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	PC-22	5/24/2016	Irrigation Runoff	0	0	0	0%

Table 3-14 (continued)
Estimated Percent Contribution from Known Sources

Copermittee	Station ID	Observation Date	Known Source	Known Source Flow Rate (cfs)	Known Source Daily Flow Volume (cf)	Annual Outfall Non-Storm Water Flow Volume (cf)	Percent Contribution from Known Source (%)
City of Chula Vista (continued)	PC-25	5/23/2016	Irrigation Runoff	0	0	0	0%
	PC-27	2/16/2016	Irrigation Runoff	0	0	0	0%
	PR-5	2/10/2016	Irrigation Runoff	0.008	691.2	194,387	0.36%
	RC-5	5/16/2016	Groundwater Seepage	0	0	0	0%
	RH-1	2/24/2016	Irrigation Runoff	0.004	345.6	171,518	0.20%
	RH-2	2/24/2016	Irrigation Runoff	0	0	0	0%
	SC-3	2/16/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	SC-9	5/11/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	SC-10	5/16/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	SC-13	5/11/2016	Groundwater Seepage	0	0	0	0%
			Irrigation Runoff	0	0	0	0%
	SC-14	5/16/2016	Irrigation Runoff	0	0	0	0%
	SC-15	5/11/2016	Irrigation Runoff	0	0	0	0%
	SC-16	5/11/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	SC-18	5/10/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	SC-19	5/10/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	SC-24	5/10/2016	Irrigation Runoff	0.004	345.6	0	0%
	SR-6	2/17/2016	Irrigation Runoff	0.008	691.2	194,387	0.36%
	SS-1	5/13/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%

Table 3-14 (continued)
Estimated Percent Contribution from Known Sources

Copermittee	Station ID	Observation Date	Known Source	Known Source Flow Rate (cfs)	Known Source Daily Flow Volume (cf)	Annual Outfall Non-Storm Water Flow Volume (cf)	Percent Contribution from Known Source (%)
City of Chula Vista (continued)	SS-2	2/23/2016	Irrigation Runoff	0.004	345.6	114,345	0.30%
	SS-3	5/19/2016	Irrigation Runoff	< 0.002	172.8	80,042	0.22%
	SS-5	2/23/2016	Irrigation Runoff	0.011	950.4	285,863	0.33%
	SS-7	2/11/2016	Irrigation Runoff	0	0	0	0%
	SS-8	2/11/2016	Irrigation Runoff	0.015	1296	383,057	0.34%
	SS-9	2/11/2016	Irrigation Runoff	0.010	864	245,843	0.35%
	SS-10	2/11/2016	Irrigation Runoff	0.011	950.4	285,863	0.33%
	SV-1	2/17/2016	Irrigation Runoff	0	0	0	0%
	SV-1	5/25/2016	Irrigation Runoff	0	0	0	0%
	TC-8	5/20/2016	Groundwater Seepage	0	0	0	0%
	TC-11	2/25/2016	Groundwater Seepage	0.014	1209.6	197,246	0.61%
	TC-11	5/19/2016	Groundwater Seepage	< 0.002	172.8	197,246	0.09%
	TC-12	5/23/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	TC-13	5/20/2016	Irrigation Runoff	< 0.002	172.8	0	0%
	TC-14	5/20/2016	Irrigation Runoff	0.004	345.6	114,345	0.30%
	TC-17	5/20/2016	Irrigation Runoff	0	0	0	0%
	TC-19	5/20/2016	Irrigation Runoff	0	0	0	0%
	TC-20	5/18/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%

**Table 3-14 (continued)
Estimated Percent Contribution from Known Sources**

Copermittee	Station ID	Observation Date	Known Source	Known Source Flow Rate (cfs)	Known Source Daily Flow Volume (cf)	Annual Outfall Non-Storm Water Flow Volume (cf)	Percent Contribution from Known Source (%)
City of Chula Vista (continued)	TC-21	2/11/2016	Irrigation Runoff	0.014	1209.6	360,188	0.34%
	TC-22	2/11/2016	Groundwater Seepage	0.009	777.6	228,691	0.34%
	TC-23	2/11/2016	Irrigation Runoff	0.004	345.6	114,345	0.30%
	TC-26	5/23/2016	Irrigation Runoff	0.004	345.6	114,345	0.30%
	TC-29	2/11/2016	Residential Washing	0.003	259.2	85,759	0.30%
	TC-36	5/23/2016	Irrigation Runoff	< 0.002	172.8	0	0%
City of San Diego	DW0120-A	6/9/2016	Residential Impervious Surface Washing	0	0	54,128	0%
	DW0121-A	6/2/2016	Water Line Break	0.004	345.6	0	0%
	DW0179-E	8/18/2016	Rising Groundwater	0	0	60,517	0%
	DW0182U P02-G	12/18/2015	Water Line Break	0.001	86.4	31,788	0.27%
	DW0182U P02-H	12/3/2016	Residential Washing	0	0	31,788	0%
	DW0183-F	12/3/2016	Cooking Oil	0	0	0	0%
	DW0534	3/17/2016	Tidal	0	0	0	0%
	DW0891-A	1/21/2016	Weephole Discharge	0	0	0	0%
	DW0966	6/9/2016	Tidal	0.075	6480	0	0%
City of Coronado	CO_16	5/4/2016	Groundwater Seepage	0.027	2332.8	918,613	0.25%
	CO_36	5/3/2016	Discharges from Potable Water Sources	0.011	950.4	0	0%

Table 3-14 (continued)
Estimated Percent Contribution from Known Sources

Copermittee	Station ID	Observation Date	Known Source	Known Source Flow Rate (cfs)	Known Source Daily Flow Volume (cf)	Annual Outfall Non-Storm Water Flow Volume (cf)	Percent Contribution from Known Source (%)
City of Imperial Beach	No known sources observed.						
County of San Diego	MS4-SWT-023G	7/26/2016	Discharge from nearby pump station	0.0027	233.3	266,382	0.09%
City of La Mesa	OF-UNI-2	7/15/2016	Irrigation Runoff	0	0	0	0%
		7/18/2016		0	0		0%
	OF-UNI-3	7/15/2016	Irrigation Runoff	< 0.002	172.8	3,821	4.5%
		7/18/2016		< 0.002	172.8		4.5%
City of Lemon Grove	No known sources observed.						
City of National City	32	7/25/2016	Irrigation Runoff	< 0.002	172.8	28,586	0.60%
	47A-1	6/29/2016	Irrigation Runoff	0	0	0	0%
		7/26/2016	Irrigation Runoff	0	0		0%
	433	7/26/2016	Irrigation Runoff	0	0	0	0%
	752	7/26/2016	Rising Groundwater	< 0.002	172.8	14,293	1.2%
		7/27/2016		0	0		0%
	761	7/26/2016	Irrigation Runoff	< 0.002	172.8	0	0%
	762	6/29/2016	Air Conditioning Condensation	< 0.002	172.8	119,147	0.15%
		7/25/2016		< 0.002	172.8		0.15%
		8/3/2016		0.012	1,037		0.87%

Table 3-14 (continued)
Estimated Percent Contribution from Known Sources

Copermittee	Station ID	Observation Date	Known Source	Known Source Flow Rate (cfs)	Known Source Daily Flow Volume (cf)	Annual Outfall Non-Storm Water Flow Volume (cf)	Percent Contribution from Known Source (%)
Port of San Diego	1277.1	6/23/2016	Irrigation Runoff	0.000022	1.90	0	0%
	SI1-1.1	8/5/2016	Irrigation Runoff Leaking Pipe	0.00029	25.1	0	0%

Notes:
% = percent; cf = cubic feet; cfs = cubic feet per second

3.4.5 Percent Contribution from Sources Not Subject to Copermittee Legal Authority

Copermittees did not identify sources not subject to their legal authority within the San Diego Bay WMA during dry weather monitoring.

3.4.6 Dry Weather Assessment Methodology Assumptions and Limitations

Calculation of the Municipal Permit-required assessments necessitates a number of assumptions to translate the monitoring data into conclusions regarding flow volume and load for the entire WMA. These assumptions may introduce potential sources of error, while propagating potential errors inherent to the monitoring data. These assumptions and sources of error are summarized as follows:

- Monitoring Error—Annual non-storm water volumes and pollutants loads are based on the results from dry weather visual observations and dry weather outfall monitoring events. Error in the monitoring data could have the effect of propagating error in all subsequent calculations. Potential sources of error in the monitoring data include the following:
    - o Monitored Flow Selection—The pollutant loading estimations rely on monitoring data from one or more non-storm water visual observations per major MS4 outfall per year. The 2015–2016 monitoring year is the first year of dry weather flow volume and load calculation, and this period generally has represented drought conditions, which can affect the type and volume of non-storm water sources such as irrigation and groundwater. The potential for inter-annual variability is a source of error in both the flow and chemistry data.

- Flow Measurement Method—The MS4 Outfall Monitoring Plan provides different options to determine the non-storm water volume: (1) field-based estimation methods (e.g., “float method” or “bucket and stopwatch method”) and (2) equipment-based flow measurements. The method chosen varies among outfalls and Copermittees, introducing inter-site variability in volume estimations. Field-based estimation methods introduce potential human error in using stopwatches and error in determining volume amounts in non-graduated buckets. The consistent equipment-based flow monitoring approach is more accurate and precise compared with field-based estimation methods. However, this approach introduces variability because of the flow measurement device and sensor type used to account for site-specific conditions, and it can also be cost and time prohibitive across the number of outfalls monitored. Each measurement device and sensor type has an inherent accuracy range (e.g., ±2% accuracy for sub area-velocity [sub-AV] probes). Each flow measurement device and sensor type can also produce slightly different values for the same event, adding a layer of inter-site variability.
- Rainfall Measurement—The accuracy of determining the number of dry days relies on the accuracy of the rainfall measurements representing that outfall. Rainfall measurements were based on the County of San Diego ALERT rain gauge closest to the majority of wet weather outfalls in each WMA, and not site-specific rainfall data. Rainfall totals across the San Diego area can vary widely within a given storm.
- Chemistry Results—An attempt was made to maintain regional consistency in reporting limits (RLs) and MDLs. However, differences in laboratory capabilities can sometimes lead to different RLs and MDLs. This variability can introduce error if constituent concentrations are near or below the MDL for one monitoring event or Copermittee, and the MDL differs for another monitoring event or Copermittee. For the assessment calculations, an attempt was made to account for this type of error by assigning a value of MDL/2 to constituents that were not detected.

- Assessment Methodology Error—The assessments require a series of assumptions and extrapolations regarding the determination of annual volumes and pollutant loadings. Each assumption carries the possibility of error, including the following:
  - Annual Volume Estimation Representativeness—Regardless of the flow measurement method utilized, error is introduced when utilizing the median of more than one field measurement to determine an annual volume estimation. It is assumed that these field measurements are representative of “typical” non-storm water conditions because persistently flowing non-storm water flows are relatively consistent throughout the year. However, this may not be the case, and error could be introduced into these estimations. For example, groundwater base flows can increase during the wet season, increasing dry weather flow rates. Or, alternatively, irrigation and irrigation runoff may increase during the dry season, increasing dry weather flow rates. Unless flow

observations are made throughout the year under a variety of conditions, this seasonal variation may not be captured.

- Annual Volume Estimation Confidence—Based on availability of data, multiple calculation methods are used to estimate annual flow volume. The confidence associated with each estimate varies because different sample sizes are used for each estimate. That is to say, volumes calculated on the basis of continuous flow data are associated with a higher confidence than volumes based on one or two instantaneous flow measurements.

- Annual Pollutant Load Estimations—The annual volume estimation error introduced previously disseminates into the annual pollutant load estimations through calculations discussed in Section 3.4.3. Although persistent non-storm water flows are relatively consistent throughout the year, collecting two grab samples in one year provides a very brief snapshot in time of the pollutant concentration at an outfall, which may not be indicative of typical conditions or pollutant loadings. Additionally, using an arithmetic mean as a “typical” value of pollutant concentrations to estimate pollutant loads can introduce error if the sample size of the mean is too small, as means are sensitive to sample size.

4 Storm Water Discharge Monitoring Data

The purpose of this program is to identify pollutants in storm water discharges from the MS4s, guide pollutant source identification efforts, and track progress in achieving the WQIP goals. The RPs' locations for the wet weather MS4 outfall discharge monitoring component are chosen to be representative of the residential, commercial, industrial, and mixed-use land uses within the San Diego Bay WMA. These locations are monitored during one storm event annually. The wet weather MS4 outfall discharge monitoring is designed to answer the following questions:

- Do wet weather discharge concentrations at MS4 outfalls meet Municipal Permit action levels?
- What is the relative contribution of MS4 outfalls to priority water quality conditions during wet weather?
- How do representative MS4 outfalls discharge concentrations, loads, and flows change over time?

During the 2015–2016 monitoring season, the RPs implemented the first year of the WQIP wet weather outfall discharge monitoring in accordance with Provision D.2.c of the Municipal Permit. The goals of wet weather outfall monitoring are the following:

- Identify pollutants in storm water discharges from the MS4;
- Guide pollutant source identification efforts; and
- Determine compliance with the water quality-based effluent limits (WQBELs) associated with the applicable TMDLs presented in Attachment E of the Municipal Permit.

This monitoring was instated following completion and acceptance of the San Diego Bay WMA WQIP, and built upon the transitional wet weather outfall discharge monitoring completed during the 2013–2014 and 2014–2015 monitoring seasons. Details of the monitoring methodology are provided in the San Diego Bay WMA MS4 Outfall Monitoring Plan, available on the Project Clean Water website (www.projectcleanwater.org).The following subsections present the results of wet weather discharge monitoring in the San Diego Bay WMA, as well as the results of the required Storm water Pollutant Discharge Reduction Assessments.

4.1 Wet Weather Outfall Monitoring Locations

The RPs selected wet weather MS4 outfall discharge monitoring locations from the inventories developed pursuant to Provision D.2.a.(3)(a)(i) of the Municipal Permit for the San Diego Bay WMA:

- At least five wet weather MS4 outfall discharge monitoring locations that are representative of storm water discharges from areas consisting primarily of residential, commercial, industrial, and typical mixed-use land uses present within the San Diego Bay WMA; and

- At least one wet weather MS4 outfall discharge monitoring location for each RP within the San Diego Bay WMA.

The 10 stations monitored during the 2015–2016 monitoring season are presented in Table 4-1. The outfall monitoring locations and their associated drainage area delineations are shown by red circles in Figure 4-1. Each RP monitored its wet weather MS4 outfall discharge monitoring location in the San Diego Bay WMA once during the 2015–2016 monitoring season. Frequencies of monitoring of each MS4 outfall during the past three monitoring season are as follows:

- 2013–2014 (first transitional monitoring season) – 8 outfall stations
- 2014–2015 (second transitional monitoring season) – 9 outfall stations
- 2015–2016 (first WQIP monitoring season) – 10 outfall stations

One outfall, MS4-SDB-6 in Lemon Grove, changed from the 2013–2014 to 2014–2015 transitional year, and outfall MS4-SDB-9 in the Port of San Diego jurisdiction changed from the transitional period 2014–2015 and the WQIP monitoring year 2015–2016.

Table 4-1
2015–2016 San Diego Bay WMA Wet Weather Outfall Monitoring Locations

Monitoring Location	Responsible Party	Jurisdictional Identifier	Latitude/ Longitude	HSA Name	HSA Number
MS4-SDB-1	City of San Diego	DW797	32.69541/ -117.05776	Pueblo	908.32
MS4- SDB-2	City of Chula Vista	SC19	32.651985/ -116.948903	Otay	910.20
MS4- SDB-3	City of Coronado	SITE5960	32.68661/ -117.193424	Otay	910.10
MS4- SDB-4	City of Imperial Beach	K2	32.58832/ -117.10747	Otay	910.20
MS4- SDB-5	City of La Mesa	908UNIMASS	32.754663/ -117.043269	Pueblo	908.22
MS4- SDB-6[1]	City of Lemon Grove	SITE69	32.73470/ -117.05626	Pueblo	908.22
MS4- SDB-7	City of National City	44B	32.66974/ -117.10247	Pueblo	908.32
MS4- SDB-8	County of San Diego	SDB01	32.667388/ -117.021871	Sweetwater	909.12
MS4- SDB-9[2]	Port of San Diego	CV1	32.629627/ -117.108012	Sweetwater	909.12
MS4- SDB-10	San Diego Airport Authority	OUTFALL12	32.73635/ -117.207699	Pueblo	908.21

Notes:

HSA = hydrologic subarea

1. Monitoring location MS4-SDB-6 was relocated between the 2013–2014 and 2014–2016 monitoring years. The Jurisdictional Identifier of the previous monitoring location is 5.
2. Monitoring location MS4-SDB-9 was relocated between the Transitional Monitoring Period and the WQIP Monitoring year 2015–2016. The Jurisdictional Identifier of the previous monitoring location is CV1-1.

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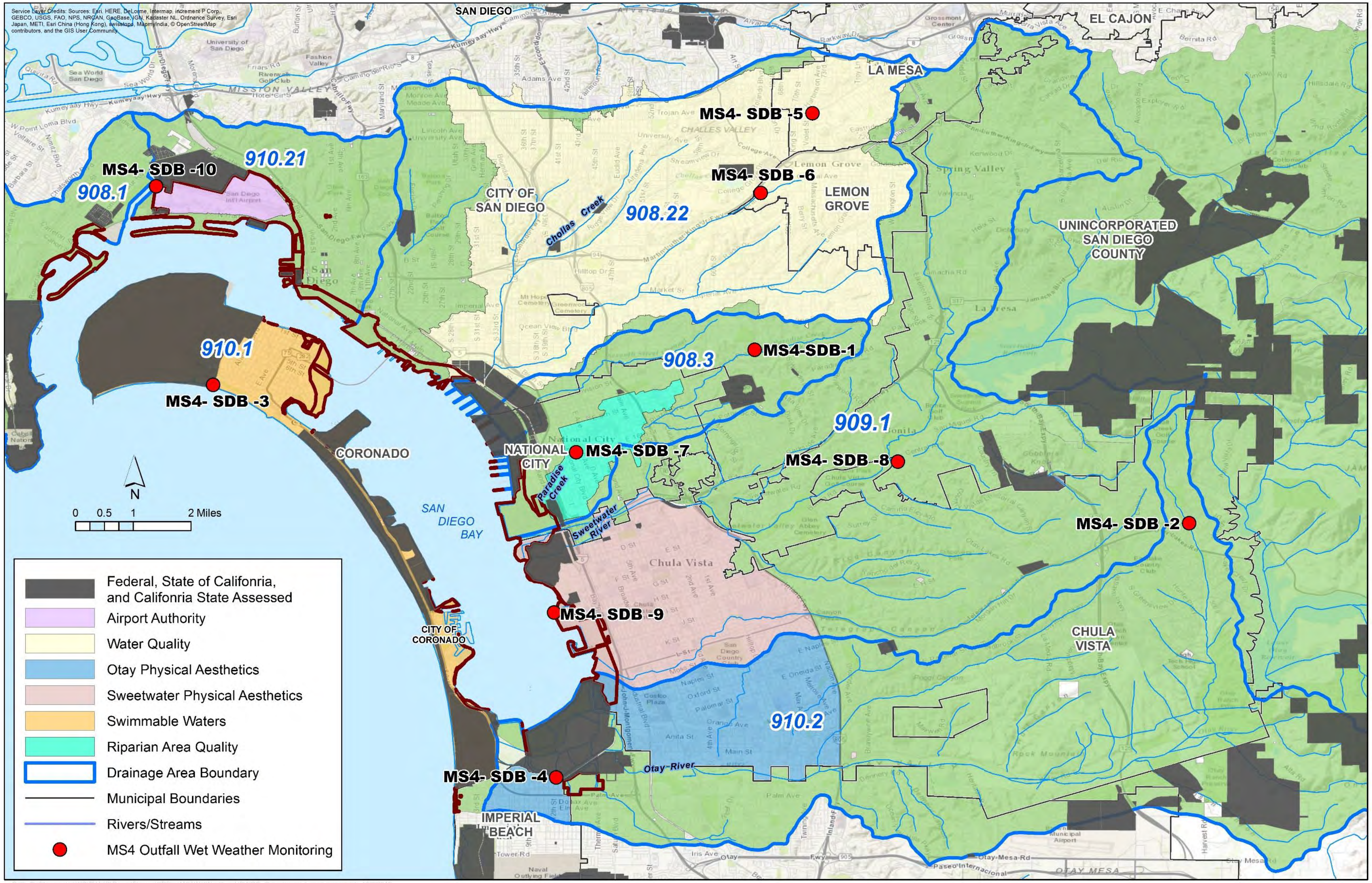

Figure 4-1
San Diego Bay WMA 2015–2016 Wet Weather Outfall Monitoring Locations

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4.2 Wet Weather Outfall Monitoring Event Field Observations

The San Diego Bay WMA wet weather outfall monitoring locations were monitored once each during the wet season (October 1 2015, through April 30, 2016), during three storm events on January 31, 2016, March 6, 2016, and April 7, 2016. Each location was monitored once, as shown in Table 4-2. Details of the monitoring events, including date and duration of the storm events sampled, rainfall estimates of the storm events, and duration between the storm events sampled and the end of the previous measurable storm event, are also presented in Table 4-2. Hydrographs for each monitored event, displaying event flows and rainfall amounts, are presented in Attachment G.1.

During the wet weather monitoring event, narrative descriptions and field observations were recorded on field data sheets at each wet weather MS4 outfall discharge monitoring location, per the Monitoring and Assessment Program included in the WQIP. Flow was measured using a Hach Sigma 920 flow meter with a sub-AV probe, or similar type device, in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), as described in the San Diego Bay WMA MS4 Outfall Monitoring Plan. Rainfall statistics for each monitored event were based on a nearby San Diego County Flood Control District ALERT station, where the closest ALERT station to each monitoring location was selected. If the closest ALERT station did not have storm event data available, the next closest ALERT station was used.

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Table 4-2
2015–2016 San Diego Bay WMA Wet Weather Outfall Monitoring Event Field Observations

Monitoring Location	Storm Event Date	ALERT Station	Storm Duration (hours)	Rainfall Depth (inches)	Rainfall Intensity (inches/ hour)	Antecedent Dry Days	Flow Volume (cubic feet)
MS4-SDB-1 (City of San Diego)	4/7/2016	Bonita	24.8	0.21	0.00847	9	1,132.8
MS4- SDB -2 (City of Chula Vista)	3/6/2016	Bonita	24.0	0.20	0.00833	33	94,507.2
MS4- SDB -3 (City of Coronado)	3/6/2016	Point Loma	45.1	0.36	0.00799	34	91,599.0
MS4- SDB -4 (City of Imperial Beach)	3/6/2016	Tijuana Estuary	12.7	0.28	0.02208	35	18,034.8
MS4- SDB -5 (City of La Mesa)	4/7/2016	Lake Murray	22.3	0.24	0.01079	8	4,062.0
MS4- SDB -61 (City of Lemon Grove)	4/7/2016	Lake Murray	23.5	0.28	0.01191	8	295,134.0
MS4- SDB -7 (City of National City)	4/7/2016	Bonita	29.5	0.15	0.00508	9	18,062.4
MS4- SDB -8 (County of San Diego)	1/31/2016	Bonita	7.1	0.52	0.07324	23	27,598.8
MS4- SDB -92 (Port of San Diego)	1/31/2016	Bonita	7.1	0.52	0.07324	23	7,542.0
MS4- SDB -10 (San Diego Airport Authority)	4/7/2016	Fashion Valley	15.6	0.12	0.00770	31	11,532.8

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4.3 Wet Weather Outfall Monitoring Event Analytical Methods

During each wet weather monitoring event, samples were collected according to the procedures described in the San Diego Bay WMA MAP's MS4 Outfall Monitoring Plan.

Grab samples were collected for bacterial indicators and receiving water hardness. A time-weighted composite sample was collected for all other analytes. All samples were collected in accordance with SWAMP protocols and following the quality assurance and quality control procedures in the San Diego Bay WMA MS4 Outfall Monitoring Plan.

In situ turbidity measurements were collected using a YSI 6600 or similar field meter. Automated samples for chemistry were collected using a Sigma 900MAX autosampler with Teflon-lined tubing.

The required analyses were based upon the following four groupings of constituents, per Provision D.2.c(5)(f) of the Municipal Permit:

- Constituents contributing to the Highest Priority Condition identified in the San Diego Bay WMA WQIP;
- Constituents listed as a cause for impairment of receiving waters in the San Diego Bay WMA, as listed on the Clean Water Act (CWA) Section 303(d) list of water quality impaired segments (303(d) List);
- Constituents for implementation plans or load reduction plans (e.g., Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for the San Diego Bay WMA where the RPs are listed as responsible parties under the TMDLs in Attachment E of the Municipal Permit; and
- Applicable SAL constituents listed in Provision C.2 of the Municipal Permit.

For each wet weather outfall station discharging to a fresh water receiving water, receiving water hardness grab samples were also collected. The receiving water hardness results were used to evaluate compliance with the USEPA one-hour maximum concentration criteria for metals, in the case of any SAL exceedances. Section 4.6 discusses SAL exceedances. Receiving water hardness samples were not collected for wet weather outfalls discharging to an ocean receiving water, or to a bay or estuary.

The 2015–2016 wet weather outfall analytical results are presented in Attachment G.2.

4.4 Storm Water MS4 Outfall Monitoring Data Assessment

Per Provision D.4.b.(2)(b)(i) of the Municipal Permit, the RPs are required to use a watershed model or other method to calculate the following:

- The average storm water runoff coefficient for each land use type within the San Diego Bay WMA;
- The volume of storm water and pollutant loads discharged from the monitored MS4 outfalls in the jurisdictions of each RP to receiving waters within the San Diego Bay WMA for each storm event with measurable rainfall greater than 0.1 inch;

- The total flow volume and pollutant loadings discharged from the jurisdictions of each RP within the San Diego Bay WMA over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and
- The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each HSA with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the jurisdictions of each RP within the San Diego Bay WMA for each storm event with measurable rainfall greater than 0.1 inch.

The methodology followed that of the Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan (San Diego County Regional Copermittees, 2015), with the changes listed below. The complete methodology is presented in Attachment G.3. Tables presenting storm water volumes and pollutant loads are included in Attachment G.4. The following subsections present the results of these required assessments.

The calculation of these required assessments comes with a number of assumptions and potential sources of both variability and systematic error. Variability is inherent in environmental monitoring. When using monitoring data within a model, variability can be mitigated by increasing the sample size to decrease the distance between the modeled results and the true value. Systematic error is non-random error caused by biases in either the monitoring or modeling approach. Variability and systematic error both contribute to the overall statistical error of a result. Potential sources of statistical error in this assessment are provided below. The sources of error are subdivided into monitoring error and assessment methodology assumptions, and are listed in order of the errors and assumptions with most potential to impact the results of the assessment to the least impactful errors and assumptions. The potential sources of statistical error include:

- Monitoring Error—Runoff coefficients and pollutant loads are based on the results of wet weather outfall monitoring events. Variability and error in the monitoring data could have the effect of propagating error in all subsequent calculations. Potential sources of variability and error in the monitoring data include the following:
    - *Monitored Storm Selection*—The calculation relies on monitoring data from one storm event per year. Although a range of storm conditions have been targeted over the period of monitoring (2013–2016), this period generally has represented drought conditions. The potential for inter-annual variability is a source of error in both the flow and chemistry data. An additional storm event is added to the historical data set each year, increasing the sample size and leading to greater accuracy of the average over time.
    - *Drainage Area Delineation*—The accuracy of the observed outfall runoff coefficient calculation relies on the accuracy of the drainage area delineation for that outfall. Drainage area delineations were based on the most recent jurisdictional delineation.
    - *Flow Measurement Method*—A consistent flow monitoring approach is described in the San Diego Bay WMA MS4 Outfall Monitoring Plan. However, this approach allows for variability in the flow measurement device and sensor

type used to account for site-specific conditions. Each measurement device and sensor type has an inherent accuracy range (e.g., ±2% accuracy for sub-AV probes). Additionally, each flow measurement device and sensor type can produce slightly different values for the same event, adding a layer of inter-site variability.

- *Rainfall Measurement*—The accuracy of the observed outfall runoff coefficient calculation relies on the accuracy of the rainfall measurement for that event at that outfall. Rainfall measurements were based on the nearest County of San Diego ALERT station rain gauge to each outfall and not site-specific rainfall data. Rainfall totals across the San Diego area can vary widely within a given storm. This error can be mitigated by utilizing onsite rain gauges where feasible.
- *Chemistry Results*—An attempt was made to maintain consistent RLs and MDLs across the monitoring seasons. However, differences in laboratory capabilities can sometimes lead to different RLs and MDLs. This variability can introduce error if constituent concentrations are near or below the MDL one monitoring year, and the MDL changes. For the assessment calculations, an attempt was made to account for this type of error by assigning a value of MDL/2 to constituents that were not detected.

- Assessment Methodology Assumptions—The assessments require a series of assumptions and extrapolations regarding land-use-based runoff coefficients and pollutant concentrations. Each assumption carries the possibility of error, including the following:
    - *Outfall Drainage Area Land Use Representativeness*—While an attempt has been made to select outfall monitoring locations with drainage areas of one primary land use type, the reality of storm water drainage systems in urban and suburban areas is that most monitoring locations are a mixture of multiple land use categories. To calculate the runoff coefficient from each land use category, the observed runoff coefficient is compared with standard values calculated using the San Diego County Hydrology Manual (County of San Diego, 2003). A correction factor based on the ratio of the observed runoff coefficient to the calculated runoff coefficient is then applied to each land use category to derive land use runoff coefficients.
    - *WMA Land Use Representativeness*—Not all land use categories within the WMA are represented in the monitored outfall drainage areas. Therefore, the pollutant concentration and runoff coefficient for one land use are sometimes substituted for another land use. For example, open space pollutant concentrations and runoff coefficients may be used as a proxy for agriculture land use values, in the absence of monitoring data from agricultural land uses. These proxies are summarized in Table 4-5.

- *Land Use Event Mean Concentration (EMC) Assumptions*—Apportioning pollutant loads to each land use type requires an assumption of pollutant concentration in each land use. To calculate a pollutant concentration from each land use category, the observed pollutant concentrations are compared with typical (arithmetic mean) values calculated on the basis of land use studies in the Los Angeles and San Diego areas. A correction factor based on the ratio of the observed pollutant concentration to the calculated typical pollutant concentration is then applied to each land use category to derive land use concentrations. However, literature values did not exist for all pollutants analyzed, and therefore the assumption is made that similar pollutants have similar land use-based concentrations For example, it is assumed that ratios of other dissolved metals concentrations from the analyzed land use categories follow the ratios of dissolved copper concentrations from those land use categories. Additionally, using an arithmetic mean as a “typical” value can introduce error if the sample size of the mean is too small, as means are sensitive to sample size.
- *Observed Outfall Runoff Coefficient Calculation*—Rainfall total, rather than rainfall intensity, of a monitored storm event is considered in these calculations. Storms of higher intensity generally produce more runoff for a given rainfall amount than do storms of lower intensity. Therefore, storms of higher intensity would be expected to exhibit a higher runoff coefficient.

- *Variability of Standard Runoff Coefficient and Pollutant Concentration Values*—The standard runoff coefficients and pollutant concentrations referenced represent a mean. There is, in reality, a range associated with the real-world land use runoff conditions for both runoff coefficient and pollutant concentrations. For example, land use runoff pollutant concentrations can vary on the basis of socioeconomic factors across a single land use category. The 2015 City of San Diego trash study found that median income in the drainage area is a driver for trash conditions at the outfall. It is possible that a similar pattern could be seen in other pollutants (City of San Diego, 2015a).

4.4.1 Land Use Storm Water Runoff Coefficient (D.4.b.(2)(b)(i)[a])

The average storm water runoff coefficient (Runoff “C”) was calculated for each land use type in the WMA, based on data collected through three seasons of wet weather MS4 outfall monitoring (2013–2014, 2014–2015, and 2015–2016). This calculation is based on the measured flow and rainfall values for each monitored outfall (Table 4-2), along with the outfall drainage area characteristics. The monitored outfall drainage areas and associated land uses are shown in Figure 4-2, as well as the outfalls indicated by red circles. The quantity (area and percentage) of each land use type by outfall drainage area is presented in Table 4-3.

Table 4-3
2015–2016 San Diego Bay WMA Wet Weather Outfall Monitoring Stations – Drainage Area Land Use

Land Use Category	San Diego Bay WMA																			
	MS4-SDB-1		MS4-SDB-2		MS4-SDB-3		MS4-SDB-4		MS4-SDB-5		MS4-SDB-6		MS4-SDB-7		MS4-SDB-8		MS4-SDB-9		MS4-SDB-10	
	City of San Diego		City of Chula Vista		City of Coronado		City of Imperial Beach		City of La Mesa		City of Lemon Grove		City of National City		County of San Diego		Port of San Diego		San Diego Airport Authority	
	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%
Agriculture-A	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture-B	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture-C	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture-D	0	0%	0	0%	0.08	0%	0	0%	0	0%	0	0%	1.61	2%	0	0%	0	0%	0	0%
Commercial	0	0%	0	0%	0	0%	11.66	10%	0.05	0%	145.75	19%	6.87	10%	0	0%	0	0%	0	0%
Educational	0	0%	24.21	31%	6.89	4%	4.40	4%	0	0%	17.15	2%	12.60	18%	0	0%	0	0%	0	0%
Industrial	0	0%	0	0%	0	0%	1.43	1%	0	0%	68.62	9%	0	0%	0.22	1%	0.16	1%	57.93	99%
Mixed Use	0	0%	0	0%	0	0%	0	0%	0	0%	0.95	0%	0	0%	0	0%	0	0%	0	0%
Open Space-A	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Open Space-B	0	0%	0	0%	1.67	1%	0	0%	0	0%	0	0%	0	0%	0.66	2%	0	0%	0	0%
Open Space-C	8.13	13%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Open Space-D	7.92	13%	3.43	4%	0.06	0%	1.63	1%	2.14	10%	30.19	4%	0	0%	0	0%	14.82	85%	0.32	1%
Residential: Multi Family	0	0%	0	0%	1.37	1%	13.23	11%	0	0%	60.18	8%	12.35	18%	0	0%	0	0%	0	0%
Residential: Rural	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Residential: Single Family	32.87	53%	37.10	48%	106.17	65%	46.82	39%	14.60	69%	275.95	37%	16.76	24%	35.50	83%	0	0%	0	0%
Transportation	12.91	21%	12.53	16%	46.59	29%	41.23	34%	4.45	21%	155.45	21%	18.48	27%	6.42	15%	2.40	14%	0	0%
Water[1]	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
TOTAL	61.84	100%	77.27	100%	162.82	100%	120.40	100%	21.23	100%	754.24	100%	68.67	100%	42.81	100%	17.39	100%	58.25	100%

Notes:
% = percent; WMA = Watershed Management Area
1. Water land use excluded from MS4 outfall assessments. Water land use assumed to be a sink for runoff storage.

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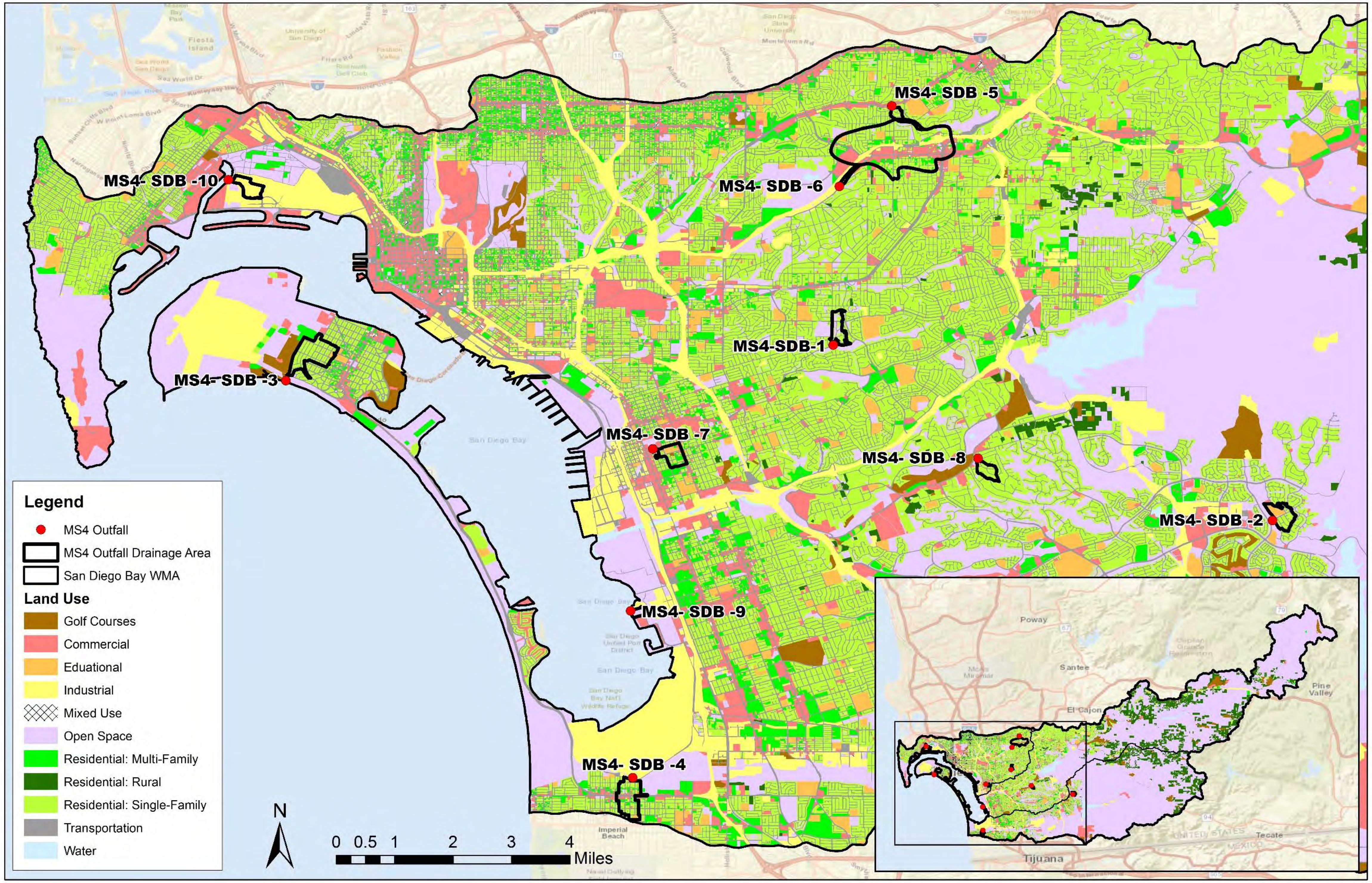

Figure 4-2
San Diego Bay WMA Monitored Outfall Drainage Areas and Associated Land Uses

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The observed Runoff "C" value was calculated for each outfall, based on the monitored event characteristics (event flow, event rainfall, and outfall drainage area). For outfalls that were monitored in previous years, the observed Runoff "C" value was averaged across all years of monitoring. This value was compared with the expected Runoff "C" value for each outfall, based on runoff coefficients listed in the San Diego County Hydrology Manual (County of San Diego, 2003). The 2015–2016 observed Runoff "C" value for each outfall, as well as the expected Runoff "C" for each outfall, is presented in Table 4-4.

Table 4-4
2015–2016 San Diego Bay WMA Observed Versus Expected Outfall Runoff Coefficients

Monitoring Location	**Observed Runoff "C"**	Hydrology Manual Runoff "**C**" (Expected)
MS4-SDB-1 (City of San Diego)	0.12	0.49
MS4- SDB -2 (City of Chula Vista)	0.67	0.55
MS4- SDB -3 (City of Coronado)	0.38	0.56
MS4- SDB -4 (City of Imperial Beach)	0.34	0.62
MS4- SDB -5 (City of La Mesa)	0.27	0.52
MS4- SDB -6 (City of Lemon Grove)	0.30	0.64
MS4- SDB -7 (City of National City)	0.24	0.62
MS4- SDB -8 (County of San Diego)	0.31	0.52
MS4- SDB -9 (Port of San Diego)	0.22	0.40
MS4- SDB -10 (San Diego Airport Authority)	0.35	0.87

The WMA Runoff "C" value for each land use was calculated using an area-weighted average of all monitored event Runoff "C" values for the monitored wet weather outfalls. To improve the accuracy of the calculation over time, historical (2013–2015) and current (2015–2016) Runoff "C" values were included in the calculation. The historical and 2015–2016 WMA Runoff "C" values for each land use are presented in Table 4-5.

Table 4-5
2015–2016 and Historical San Diego Bay WMA Calculated Land Use Runoff Coefficients

Land Use Category	2013–2014 Runoff "C"	2014–2015 Runoff "C"	2015–2016 Runoff "C"
Agriculture-A[1,2]	0.128	0.184	0.475
Agriculture-B[1,2]	0.128	0.184	0.475
Agriculture-C[1,2]	0.121	0.080	0.475
Agriculture-D[1]	0.093	0.640	0.475
Commercial	0.409	0.337	0.354
Educational	0.178	0.250	0.315
Industrial	0.381	0.329	0.347
Mixed Use	0.326	0.276	0.298
Open Space-A[1,3]	0.128	0.184	0.178
Open Space-B[1]	0.128	0.184	0.178
Open Space-C[1]	0.121	0.080	0.077
Open Space-D[1]	0.179	0.140	0.152
Residential: Multi Family	0.295	0.231	0.250
Residential: Rural[4]	0.206	0.192	0.203
Residential: Single Family	0.232	0.244	0.255
Transportation	0.346	0.332	0.349

Notes:
1. Agriculture and open space land use types were divided into subgroups based on hydrologic soil type. See http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ny/soils/?cid=nrcs144p2_027279 for more information on hydrologic soil types.
2. Because of limited WMA monitoring data for Agriculture Soil Group A, B, and C land use, Runoff "C" and EMC values based on San Diego Bay WMA monitored outfalls data for Agriculture Soil Group D.
3. Because of limited WMA monitoring data for Open Space Soil Group A land use, Runoff "C" and EMC values based on San Diego Bay WMA monitored outfalls data for Open Space Soil Group B.
4. Runoff "C" and EMC values based on San Diego Bay WMA monitored outfalls data for Open Space-D and Single-Family Residential land use types (averaged).

4.4.2 Monitored MS4 Outfall Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[b])

The volumes of storm water and pollutant loads discharged from the monitored MS4 outfalls to receiving waters in the jurisdictions of RPs within the WMA were calculated for each storm event with measurable rainfall greater than 0.1 inch. The wet season rainfall data for the ALERT station rain gauge closest to each monitoring location were used to calculate the qualifying measured rainfall for each site. Table 4-6 presents the estimated annual wet season storm water volume and pollutant load discharged from each monitored outfall.

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Table 4-6
2015–2016 San Diego Bay WMA Wet Season Estimated Flow Volume and Pollutant Loads from Monitored Outfalls

Analyte	Units	MS4-SDB-1 City of San Diego	MS4-SDB-2 City of Chula Vista	MS4-SDB-3 City of Coronado	MS4-SDB-4 City of Imperial Beach	MS4-SDB-5 City of La Mesa	MS4-SDB-6 City of Lemon Grove	MS4-SDB-7 City of National City	MS4-SDB-8 County of San Diego	MS4-SDB-9 Port of San Diego	MS4-SDB-10 San Diego Airport Authority
Qualifying Measured Rainfall	in	7.13	7.13	4.66	5.20	8.16	8.16	7.13	7.13	7.13	5.2
Wet Season Flow Volume	cf	188,341	1,337,714	1,055,343	765,737	171,416	6,758,054	433,706	347,366	99,590	382,097
Indicator Bacteria											
Enterococcus	MPN/100mL	1.29E+13	9.17E+13	7.23E+13	5.25E+13	1.17E+13	4.63E+14	2.97E+13	2.38E+13	6.82E+12	7.68E+10
Fecal Coliform	MPN/100mL	1.28E+14	1.89E+14	4.78E+13	3.47E+14	1.07E+12	1.72E+15	1.11E+13	7.87E+11	2.54E+13	8.66E+10
Total Coliform	MPN/100mL	1.28E+14	1.89E+14	4.78E+13	3.47E+14	1.16E+13	4.59E+15	2.95E+14	2.36E+13	4.51E+13	8.66E+10
Total Metals											
Cadmium	lb	5.88E-04	4.18E-03	3.29E-03	9.56E-03	5.35E-04	2.53E-01	2.98E-02	1.08E-03	1.24E-03	2.62E-02
Copper	lb	2.59E-01	3.59E+00	3.36E-01	1.72E+00	3.53E-01	7.59E+00	7.85E-01	3.47E-01	1.18E+00	1.22E+00
Iron	lb	9.11E+00	6.53E+00	3.24E+01	8.89E+01	1.04E+01	6.41E+02	1.90E+02	NS	NS	3.53E+00
Lead	lb	2.00E-02	2.51E-02	5.27E-02	4.25E-01	5.78E-02	4.22E+00	3.25E-01	4.34E-02	2.49E-02	2.62E-02
Manganese	lb	6.58E-01	5.26E-01	1.32E+01	3.06E+00	3.21E-01	3.21E+01	3.79E+00	4.34E-01	2.42E-01	1.46E-01
Mercury	lb	1.18E-01	NS	NS	NS	1.07E-01	4.22E+00	2.71E-01	NS	NS	2.39E-01
Selenium	lb	NS	NS	NS	NS	NS	NS	NS	1.95E-02	5.60E-03	NS
Zinc	lb	1.29E+00	6.51E+00	9.88E-01	9.56E+00	1.39E+00	5.06E+01	2.63E+00	8.67E-01	9.95E-01	1.91E+00
Dissolved Metals											
Cadmium	lb	5.88E-04	4.18E-03	3.29E-03	2.39E-03	5.35E-04	2.11E-02	1.35E-03	1.08E-03	3.11E-04	2.15E-02
Copper	lb	2.35E-01	2.25E+00	2.31E-01	9.08E-01	2.35E-01	4.13E+00	1.65E-01	2.10E-01	7.46E-01	8.59E-01
Iron	lb	4.61E-01	2.54E+00	4.28E-01	1.88E+00	7.78E-01	2.86E+01	5.04E+00	NS	NS	1.55E-01
Lead	lb	1.18E-03	8.35E-03	6.59E-03	1.43E-02	1.07E-03	3.38E-01	1.62E-02	2.17E-03	1.24E-03	2.39E-03
Manganese	lb	8.58E-02	5.01E-02	4.61E-01	6.21E-01	3.21E-02	4.01E+00	1.35E+00	1.95E-02	6.84E-02	1.00E-01
Mercury	lb	1.18E-01	NS	NS	NS	1.07E-01	4.22E+00	2.71E-01	NS	NS	2.39E-01
Selenium	lb	NS	NS	NS	NS	NS	NS	NS	1.95E-02	5.60E-03	NS
Zinc	lb	6.70E-01	5.43E+00	7.25E-01	4.64E+00	1.28E+00	4.22E+01	2.33E+00	2.82E-01	5.47E-01	1.91E+00
Nutrients											
Ammonia	lb	1.76E+00	4.84E+01	2.24E+01	2.34E+01	4.17E+00	7.59E+01	9.21E+00	4.77E+00	1.74E+00	4.53E+00
Nitrate as N	lb	4.47E+00	1.07E+02	3.23E+01	3.87E+01	1.05E+01	3.46E+02	2.60E+01	1.21E+01	2.18E+00	3.86E+01
Nitrite as N	lb	2.94E-01	7.52E+00	1.65E+00	2.87E+00	5.35E-01	2.53E+01	1.90E+00	5.42E-01	1.55E-01	3.63E+01

Table 4-6 (continued)
2015–2016 San Diego Bay WMA Wet Season Flow Volume and Pollutant Loads from Monitored Outfalls

Analyte	Units	MS4-SDB-1	MS4-SDB-2	MS4-SDB-3	MS4-SDB-4	MS4-SDB-5	MS4-SDB-6	MS4-SDB-7	MS4-SDB-8	MS4-SDB-9	MS4-SDB-10
		City of San Diego	City of Chula Vista	City of Coronado	City of Imperial Beach	City of La Mesa	City of Lemon Grove	City of National City	County of San Diego	Port of San Diego	San Diego Airport Authority
TKN	lb	3.29E+01	1.83E+02	6.46E+01	1.37E+02	2.05E+01	7.05E+02	7.15E+01	2.80E+01	8.39E+00	4.56E+01
Total Nitrogen	lb	3.74E+01	2.97E+02	9.68E+01	1.79E+02	3.16E+01	1.08E+03	9.96E+01	4.01E+01	1.06E+01	1.20E+02
Total Phosphorus as P	lb	5.76E+00	2.67E+01	1.32E+01	1.96E+01	3.42E+00	9.70E+01	1.54E+01	5.42E+00	1.18E+00	1.17E+01
PAHs											
Acenaphthene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Acenaphthylene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Anthracene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
benz(a)anthracene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Benzo(a)pyrene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Benzo(b)fluoranthene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Benzo(g,h,i)perylene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Benzo(k)fluoranthene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Chrysene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
dibenz(a,h)anthracene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Fluoranthene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Fluorene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Naphthalene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Phenanthrene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Pyrene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Total PAHs	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
PCBs											
PCB Araclor 1016	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
PCB Araclor 1221	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
PCB Araclor 1232	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
PCB Araclor 1242	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
PCB Araclor 1248	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
PCB Araclor 1254	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
PCB Araclor 1260	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Chlordane	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND

Table 4-6 (continued)
2015–2016 San Diego Bay WMA Wet Season Flow Volume and Pollutant Loads from Monitored Outfalls

Analyte	Units	MS4-SDB-1	MS4-SDB-2	MS4-SDB-3	MS4-SDB-4	MS4-SDB-5	MS4-SDB-6	MS4-SDB-7	MS4-SDB-8	MS4-SDB-9	MS4-SDB-10
		City of San Diego	City of Chula Vista	City of Coronado	City of Imperial Beach	City of La Mesa	City of Lemon Grove	City of National City	County of San Diego	Port of San Diego	San Diego Airport Authority
ddt(o,p')	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Diazinon	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Endrin	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
indeno(1,2,3-c,d)pyrene	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND
Solid Parameters											
TDS	lb	ND	NS	NS	NS	ND	ND	ND	NS	NS	ND

Notes:
cf = cubic feet; in = inches; lb = pounds; MPN = most probable number; mL = milliliter; ND = not detected; NS = not sampled; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; PAH = polycyclic aromatic hydrocarbon; PCB = polychlorinated biphenyl;

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4.4.3 Jurisdictional Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[c])

The volumes of storm water and pollutant loads discharged from the jurisdictions of RPs within the WMA over the course of the wet season were calculated for each storm event with measurable rainfall greater than 0.1 inch. The wet season data for the closest ALERT station rain gauge to the outfalls that most represented the WMA were used to report rainfall. Because the San Diego Bay WMA contains more than one ALERT station rain gauge, data from the Bonita rain gauge were used, because this station was closest to a majority of wet season MS4 outfall monitoring stations. Table 4-7 presents the estimated annual wet season storm water volumes and pollutant loads discharged from the jurisdictions of RPs in the San Diego Bay WMA.

Note that jurisdictional pollutant loads were calculated on the basis of the average EMC for constituents across all years of monitoring (2013–2016). Additionally, pollutant loads for constituents that were not monitored in all subwatersheds were based on the land area only within the subwatershed in which the constituent was monitored. These constituents include the following:

- Total and Dissolved Iron: Loads based on land area in Pueblo and Otay subwatersheds only
- Total and Dissolved Mercury: Loads based on land area in Pueblo subwatershed only
- Total and Dissolved Selenium: Loads based on land area in Sweetwater subwatershed only
- Polychlorinated Biphenyls (PCBs): Loads based on land area in Pueblo subwatershed only
- Polycyclic Aromatic Hydrocarbons (PAHs): Loads based on land area in Pueblo subwatershed only

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Table 4-7
2015–2016 San Diego Bay WMA Estimated Wet Season Flow Volume and Pollutant Loads

Analyte	Units	MS4-SDB-1	MS4-SDB-2	MS4-SDB-3	MS4-SDB-4	MS4-SDB-5	MS4-SDB-6	MS4-SDB-7	MS4-SDB-8	MS4-SDB-9	MS4-SDB-10
		City of San Diego	City of Chula Vista	City of Coronado	City of Imperial Beach	City of La Mesa	City of Lemon Grove	City of National City	County of San Diego	Port of San Diego	San Diego Airport Authority
Qualifying Measured Rainfall	in	7.13	7.13	7.13	7.13	7.13	7.13	7.13	7.13	7.13	7.13
Wet Season Flow Volume	cf	224,392,938	190,153,348	11,483,159	4,970,328	18,121,645	17,065,938	27,756,405	560,379,037	19,519,689	5,739,778
Indicator Bacteria											
Enterococcus	MPN/100mL	1.58E+17	1.47E+17	7.42E+15	3.19E+15	1.31E+16	1.29E+16	2.02E+16	4.96E+17	1.86E+16	3.29E+15
Fecal Coliform	MPN/100mL	1.50E+17	1.23E+17	7.18E+15	3.07E+15	1.20E+16	1.29E+16	2.23E+16	2.83E+17	2.50E+16	4.47E+15
Total Coliform	MPN/100mL	8.94E+17	6.80E+17	4.24E+16	1.89E+16	7.18E+16	7.63E+16	1.32E+17	1.31E+18	1.37E+17	2.75E+16
Total Metals											
Cadmium	lb	4.12E+00	3.75E+00	2.13E-01	8.46E-02	3.15E-01	3.21E-01	5.64E-01	1.05E+01	6.17E-01	2.14E-01
Copper	lb	4.24E+02	3.65E+02	2.46E+01	9.46E+00	3.06E+01	3.05E+01	5.55E+01	1.02E+03	4.93E+01	1.50E+01
Iron[1]	lb	2.56E+04	9.78E+03	1.12E+03	5.18E+02	1.49E+03	1.92E+03	2.48E+03	1.38E+04	1.42E+03	6.84E+02
Lead	lb	1.02E+02	8.71E+01	5.49E+00	2.22E+00	8.18E+00	8.18E+00	1.35E+01	2.40E+02	1.25E+01	3.17E+00
Manganese	lb	1.28E+03	1.06E+03	6.95E+01	2.88E+01	1.09E+02	1.06E+02	1.64E+02	2.94E+03	1.31E+02	3.40E+01
Mercury[2]	lb	3.43E+01	NS	NS	NS	2.30E+00	3.01E+00	4.00E+00	2.50E-01	2.23E+00	1.52E+00
Selenium[3]	lb	6.87E-01	4.39E+00	NS	NS	3.16E-01	1.11E-01	3.76E-01	1.34E+01	1.33E-01	NS
Zinc	lb	1.94E+03	1.47E+03	1.09E+02	4.39E+01	1.35E+02	1.42E+02	2.76E+02	2.71E+03	2.64E+02	8.57E+01
Dissolved Metals											
Cadmium	lb	1.19E+00	9.17E-01	6.74E-02	2.71E-02	8.13E-02	8.35E-02	1.68E-01	1.51E+00	1.68E-01	9.38E-02
Copper	lb	2.17E+02	1.60E+02	1.33E+01	5.25E+00	1.59E+01	1.57E+01	2.86E+01	2.89E+02	2.16E+01	9.15E+00
Iron[1]	lb	1.13E+03	3.38E+02	5.88E+01	2.46E+01	6.13E+01	8.00E+01	1.22E+02	2.35E+02	6.54E+01	3.39E+01
Lead	lb	8.81E+00	6.23E+00	5.49E-01	2.18E-01	6.53E-01	6.52E-01	1.18E+00	1.04E+01	8.51E-01	2.65E-01
Manganese	lb	4.51E+02	3.16E+02	2.86E+01	1.13E+01	3.46E+01	3.38E+01	5.86E+01	5.49E+02	3.72E+01	1.13E+01
Mercury[2]	lb	3.74E+01	NS	NS	NS	2.27E+00	2.98E+00	4.54E+00	2.10E-01	2.30E+00	1.45E+00
Selenium[3]	lb	6.43E-01	3.82E+00	NS	NS	2.72E-01	8.83E-02	3.17E-01	7.92E+00	8.81E-02	NS
Zinc	lb	1.09E+03	8.03E+02	6.33E+01	2.53E+01	7.17E+01	7.57E+01	1.56E+02	1.30E+03	1.46E+02	5.17E+01

Table 4-7 (continued)
2015–2016 San Diego Bay WMA Wet Season Flow Volume and Pollutant Loads

Analyte	Units	MS4-SDB-1	MS4-SDB-2	MS4-SDB-3	MS4-SDB-4	MS4-SDB-5	MS4-SDB-6	MS4-SDB-7	MS4-SDB-8	MS4-SDB-9	MS4-SDB-10
		City of San Diego	City of Chula Vista	City of Coronado	City of Imperial Beach	City of La Mesa	City of Lemon Grove	City of National City	County of San Diego	Port of San Diego	San Diego Airport Authority
Nutrients											
Ammonia	lb	5.96E+03	4.88E+03	3.16E+02	1.31E+02	4.92E+02	4.92E+02	7.99E+02	1.24E+04	6.88E+02	1.04E+02
Nitrate as N	lb	1.78E+04	2.53E+04	1.12E+03	2.98E+02	1.15E+03	1.12E+03	2.08E+03	1.15E+05	3.01E+03	3.45E+02
Nitrite as N	lb	1.77E+03	2.64E+03	1.08E+02	2.63E+01	9.86E+01	1.03E+02	2.21E+02	1.16E+04	3.86E+02	9.00E+01
TKN	lb	3.19E+04	2.78E+04	1.69E+03	6.94E+02	2.63E+03	2.57E+03	4.12E+03	8.06E+04	3.50E+03	7.42E+02
Total Nitrogen	lb	5.48E+04	6.52E+04	3.22E+03	1.03E+03	3.96E+03	3.88E+03	6.67E+03	2.63E+05	7.94E+03	1.15E+03
Total Phosphorus as P	lb	6.23E+03	5.78E+03	3.79E+02	1.38E+02	4.77E+02	4.61E+02	7.75E+02	1.79E+04	6.59E+02	1.51E+02
PAHs[2,4]											
Acenaphthene	lb	0	NS	NS	NS	0	0	0	0	0	0
Acenaphthylene	lb	0	NS	NS	NS	0	0	0	0	0	0
Anthracene	lb	0	NS	NS	NS	0	0	0	0	0	0
benz(a)anthracene	lb	0	NS	NS	NS	0	0	0	0	0	0
Benzo(a)pyrene	lb	0	NS	NS	NS	0	0	0	0	0	0
Benzo(b)fluoranthene	lb	1.55E-02	NS	NS	NS	1.15E-03	1.36E-03	1.37E-03	1.53E-05	2.81E-04	6.90E-05
Benzo(g,h,i)perylene	lb	0	NS	NS	NS	0	0	0	0	0	0
Benzo(k)fluoranthene	lb	0	NS	NS	NS	0	0	0	0	0	0
Chrysene	lb	0	NS	NS	NS	0	0	0	0	0	0
dibenz(a,h)anthracene	lb	0	NS	NS	NS	0	0	0	0	0	0
Fluoranthene	lb	3.13E-02	NS	NS	NS	1.17E-04	1.73E-03	1.06E-02	1.13E-06	2.24E-02	2.53E-02
Fluorene	lb	1.66E-02	NS	NS	NS	6.14E-05	9.18E-04	5.64E-03	5.67E-07	1.19E-02	1.34E-02
Naphthalene	lb	1.76E-01	NS	NS	NS	2.38E-03	1.01E-02	5.16E-02	2.94E-05	1.05E-01	1.18E-01
Phenanthrene	lb	8.92E-03	NS	NS	NS	3.34E-05	4.94E-04	3.03E-03	3.24E-07	6.39E-03	7.22E-03
Pyrene	lb	2.17E-02	NS	NS	NS	8.19E-05	1.20E-03	7.40E-03	8.11E-07	1.56E-02	1.76E-02
Total PAHs	lb	1.16E+00	NS	NS	NS	2.16E-02	6.81E-02	3.13E-01	2.72E-04	6.16E-01	6.91E-01
PCBs[2,4]											
PCB Araclor 1016	lb	0	NS	NS	NS	0	0	0	0	0	0
PCB Araclor 1221	lb	0	NS	NS	NS	0	0	0	0	0	0

Table 4-7 (continued)
2015–2016 San Diego Bay WMA Wet Season Flow Volume and Pollutant Loads

Analyte	Units	MS4-SDB-1	MS4-SDB-2	MS4-SDB-3	MS4-SDB-4	MS4-SDB-5	MS4-SDB-6	MS4-SDB-7	MS4-SDB-8	MS4-SDB-9	MS4-SDB-10
		City of San Diego	City of Chula Vista	City of Coronado	City of Imperial Beach	City of La Mesa	City of Lemon Grove	City of National City	County of San Diego	Port of San Diego	San Diego Airport Authority
PCB Araclor 1232	lb	0	NS	NS	NS	0	0	0	0	0	0
PCB Araclor 1242	lb	0	NS	NS	NS	0	0	0	0	0	0
PCB Araclor 1248	lb	0	NS	NS	NS	0	0	0	0	0	0
PCB Araclor 1254	lb	0	NS	NS	NS	0	0	0	0	0	0
PCB Araclor 1260	lb	0	NS	NS	NS	0	0	0	0	0	0
Chlordane	lb	0	NS	NS	NS	0	0	0	0	0	0
ddt(o,p')	lb	0	NS	NS	NS	0	0	0	0	0	0
Diazinon	lb	0	NS	NS	NS	0	0	0	0	0	0
Endrin	lb	0	NS	NS	NS	0	0	0	0	0	0
indeno(1,2,3-c,d)pyrene	lb	0	NS	NS	NS	0	0	0	0	0	0
Solid Parameters											
TDS	lb	28,871,477	37,977,693	1,900,624	540,256	2,211,822	2,102,548	3,268,931	169,595,159	3,903,355	225,704

Notes:

cf = cubic feet; in = inches; lb = pounds; MPN = most probable number; mL = milliliter; ND = not detected; NS = not sampled; PAH = polycyclic aromatic hydrocarbon; PCB = polychlorinated biphenyl; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen;

1. Load values modeled based on the jurisdictional land area within Pueblo and Otay subwatersheds only.
2. Load values modeled based on the jurisdictional land area within Pueblo subwatershed only.
3. Load values modeled based on the jurisdictional land area within Sweetwater subwatershed only.
4. No PCBs or PAHs were detected during the 2015–2016 monitoring year. Load values based on an average event mean concentration (EMC) from all years of monitoring.

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4.4.4 Land Use Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[d])

For each RP within the San Diego Bay WMA, the percent contributions of storm water and pollutant loads discharged from each land use type, within each HSA containing at least one major MS4 outfall, were calculated. As in the jurisdictional load calculations described in Section 4.4.3, the Bonita ALERT station was used to calculate the qualifying measured rainfall for the WMA. The percentages of wet season storm water volume discharged from each HSA with a major outfall in the San Diego Bay WMA are presented by RP jurisdiction in Tables 4-8 through 4-17. The percentages of the wet season storm water volume and pollutant loads discharged from each land use type within each HSA with a major outfall in the San Diego Bay WMA, by RP, are presented in Attachment G.4.

Table 4-8
City of San Diego Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 908.10	20,345,206	9%
Jurisdictional HSA 908.22	115,071,820	51%
Jurisdictional HSA 908.31	7,311,727	3%
Jurisdictional HSA 908.32	11,073,759	5%
Jurisdictional HSA 909.12	13,964,136	6%
Jurisdictional HSA 910.20	60,877,018	14%
Jurisdictional HSAs with No Major Outfall[1]	25,749,272	11%
Jurisdictional WMA	224,392,938	100%

Notes:

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

1. The City of San Diego has jurisdictional land area within HSAs 908.21, 910.10, 910.31, and 910.32 but has no major MS4 outfalls within these HSAs.

Table 4-9
City of Chula Vista Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 909.11	36,539,738	19%
Jurisdictional HSA 909.12	52,495,887	28%
Jurisdictional HSA 910.20	92,844,497	49%
Jurisdictional HSA 910.32	5,708,147	3%
Jurisdictional HSAs with No Major Outfall[1]	2,565,078	1%
Jurisdictional WMA	190,153,348	100%

Notes:
% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area
1. The City of Chula Vista has jurisdictional land area within HSA 910.31 but has no major MS4 outfalls within these HSAs.

Table 4-10
City of Coronado Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 910.10	11,141,398	97%
Jurisdictional HSAs with No Major Outfall[1]	341,761	3%
Jurisdictional WMA	11,483,159	100%

Notes:
% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area
1. The City of Coronado has jurisdictional land area within HSA 910.20 but has no major MS4 outfalls within the HSA.

Table 4-11
City of Imperial Beach Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 910.20	3,827,525	77%
Jurisdictional HSAs with No Major Outfall[1]	1,142,803	23%
Jurisdictional WMA	4,970,328	100%

Notes:
% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area
1. The City of Imperial Beach has jurisdictional land area within HSA 910.20 but has no major MS4 outfalls within this HSA.

Table 4-12
City of La Mesa Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 908.22	12,054,775	67%
Jurisdictional HSAs with No Major Outfall[1]	6,066,870	33%
Jurisdictional WMA	**18,121,645**	**100%**

Notes:

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

1. The City of La Mesa has jurisdictional land area within HSA 909.12 but has no major MS4 outfalls within this HSA.

Table 4-13
City of Lemon Grove Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 908.22	14,981,145	88%
Jurisdictional HSAs with No Major Outfall[1]	2,084,793	12%
Jurisdictional WMA	**17,065,938**	**100%**

Notes:

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

1. The City of Lemon Grove has jurisdictional land area within HSA 909.12 but has no major MS4 outfalls within this HSA.

Table 4-14
City of National City Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 908.31	3,863,732	14%
Jurisdictional HSA 908.32	16,485,158	59%
Jurisdictional HSA 909.12	7,407,489	27%
Jurisdictional HSAs with No Major Outfall	NA	0%
Jurisdictional WMA	**27,756,405**	**100%**

Notes:

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

Table 4-15
County of San Diego Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 909.12	67,294,441	12%
Jurisdictional HSA 909.21	148,981,047	27%
Jurisdictional HSA 909.22	9,415,100	2%
Jurisdictional HSA 909.24	6,184,254	1%
Jurisdictional HSA 909.34	27,806,233	5%
Jurisdictional HSAs with No Major Outfall[1]	300,697,961	54%
Jurisdictional WMA	**560,379,037**	**100%**

Notes:

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

1. The County of San Diego has jurisdictional land area within HSAs 908.22, 909.23, 909.25, 909.26, 909.31, 909.32, 909.33, 909.35, 910.20, 910.31, 910.32, 910.33, 910.34, 910.35, 910.36, and 910.37, but has no major MS4 outfalls within these HSAs.

Table 4-16
Port of San Diego Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 908.10	1,000,851	5%
Jurisdictional HSA 908.21	3,623,919	19%
Jurisdictional HSA 908.22	2,157,189	11%
Jurisdictional HSA 908.32	2,665,841	14%
Jurisdictional HSA 909.11	924,711	5%
Jurisdictional HSA 909.12	1,263,224	6%
Jurisdictional HSA 910.10	1,936,586	10%
Jurisdictional HSAs with No Major Outfall	5,947,369[1]	30%
Jurisdictional WMA	**19,519,689**	**100%**

Notes:

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

1. The Port of San Diego has jurisdictional land area within HSAs 910.20 and 912.00, but has no major MS4 outfalls within these HSAs.

Table 4-17
San Diego Airport Authority Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 908.21	5,739,778	100%
Jurisdictional HSAs with No Major Outfall	NA	0%
Jurisdictional WMA	5,739,778	100%

Notes:
% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

4.5 Evaluation of Monitoring Locations

Provision D.4.b.(2)(b)(ii) of the Municipal Permit allows the RPs to modify the wet weather MS4 outfall discharge monitoring locations and frequencies to better identify pollutants in storm water discharges from the MS4s in the WMA.

An analysis of wet weather MS4 outfall monitoring locations was performed in the 2014–2015 Transitional Monitoring and Assessment Report for the San Diego Bay WMA (TMAR) (San Diego County Municipal Copermittees, 2016). The purpose of the recommendations was to improve the effectiveness of MS4 monitoring in meeting the intended Municipal Permit goal (namely to accurately quantify the storm water volume and loads from the various land uses in the WMA). A comparison of the WMA land use with the monitored outfall drainage area land uses was made as part of the evaluation of monitoring locations in the TMAR. The results of this comparison are provided in Table 4-18.

Table 4-18
Land Use Comparison, WMA and Monitored Drainage Areas

Land Use	WMA Area (acres)[1]	WMA Area (%)[1]	Outfalls Area (acres)	Outfalls Area (%)	Percent Difference
Agricultural (Combined)	4,881	3.4%	2	0.3%	-3.1%
Commercial	3,025	2.1%	96	16.3%	14.2%
Educational	1,463	1.0%	9	1.5%	0.5%
Industrial	6,110	4.3%	13	2.2%	-2.1%
Mixed Use	4	0%	0	0%	0%
Open Space (Combined)	79,423	55.7%	71	12.0%	-43.7%
Residential: Multi-Family	1,861	1.3%	58	9.8%	8.5%
Residential: Rural	3,003	2.1%	27	4.6%	2.5%
Residential: Single-Family	12,222	8.6%	211	35.9%	27.3%
Transportation	6,032	4.2%	63	10.7%	6.5%
Total	118,024	–	550	–	–

Notes:
% = percent; WMA = Watershed Management Area
1. Acreage excludes state, federal, and tribal lands

The following conclusions can be drawn from the comparison:

- Overall, the wet weather MS4 outfall monitoring locations are representative of land uses in the WMA.
- Agricultural, industrial, and open space land uses are under-represented in the monitored outfall drainage areas; however, because the intention of monitoring is to characterize drainage from the MS4 (i.e., developed land uses). Drainages from both of these land uses may not be controllable by the RPs. Industrial drainage areas may be recommended for future monitoring.
- Single-family residential and commercial land uses are well represented in the monitored outfall drainage areas.

- It may be beneficial for the MS4 outfall assessments to target outfalls with a single primary land use. However, the nature of storm drain network service areas, particularly in suburban areas, may not facilitate targeting outfalls that represent only one land use.

The evaluation of monitoring frequency includes a comparison of monitored event rainfall conditions with annual rainfall conditions. During the 2015–2016 wet season (October 2015 through April 2016), rainfall totals at ALERT station gauges within the San Diego Bay WMA ranged from 7.99 inches at the Point Loma rain gauge to 24.74 inches at the Descanso CRS rain gauge. All ALERT station rain gauges within the WMA registered more rainfall during the wet season than the official National Weather Service (NWS) rain gauge at San Diego International Airport–Lindbergh Field (7.42 inches). The storms that occurred generally had totals of less than 1 inch of rainfall, although one very large storm, beginning January 4, 2016, produced more than 2 inches of rainfall throughout the WMA. The average wet season storm event rainfall total at the Bonita ALERT station is 0.55 inch. The rainfall totals for all outfall monitoring events were less than this average, although the monitoring events at outfalls MS4-SDB-8 and MS4-SDB-9 on January 31, 2016, approached the average with a rainfall total of 0.52 inch.

It was recommended in the TMAR to target additional monitoring events during average (greater than 0.5 inch) and large (greater than 1 inch) storms. The 2015–2016 sampling targeted two smaller (less than 0.5 inch) and one average storm. It is recommended to continue targeting storm events of various sizes during future wet seasons, to capture a range of data for Runoff “C” calculations, and particularly focus on capturing large rain events.

4.6 Storm Water Action Level Comparisons

The data collected as part of the wet weather MS4 outfall discharge monitoring were compared with the SALs and Highest Priority Condition WQBELs per Municipal Permit Provision D.4.b.(2)(c)(ii). Tables 4-19 and 4-20 summarize SAL and WQBEL exceedances, respectively. Details of these comparisons are shown in Tables 4-21 and Table 4-22, respectively. Three storm water action limit exceedances were recorded for all wet weather MS4 outfall discharge monitoring locations within the San Diego Bay WMA.

Table 4-19
Exceedances of SALs in the 2015–2016 Monitoring Year

Jurisdiction	Monitoring Location	Analyte Exceeding SAL
National City	SDB-7	Turbidity
Port of San Diego	SDB-9	Total Copper
San Diego Airport Authority	SDB-10	Nitrate + Nitrite

At SDB-7 in National City's jurisdiction, the concentration of turbidity exceeded the SALs. At SDB-9 in the Port of San Diego's jurisdiction, concentrations of total copper exceeded the SALs. At SDB-10 in the San Diego Airport Authority's jurisdiction, Nitrate + Nitrite as N concentrations exceeded the SALs. The aforementioned RPs began implementing their WQIP strategies that have primary and secondary pollutant reduction benefits during the 2015–2016 monitoring year. Implementation of the strategies without modification may potentially lead to pollutant reduction benefits related to respective pollutant conditions.

Table 4-20
Exceedances of Bacteria WQBELs in the Chollas Creek Drainage Area in the 2015–2016 Monitoring Year

Jurisdiction	Monitoring Location	Analyte Exceeding SAL
City of La Mesa	SDB-5	*Enterococcus*
City of Lemon Grove	SDB-6	*Enterococcus*; Total Coliforms; Fecal Coliforms

Four Bacteria TMDL WQBEL exceedances were recorded for the wet weather MS4 outfall discharge monitoring locations within the Chollas Creek drainage area in the San Diego Bay WMA. At SDB-5, the concentration of *Enterococcus* exceeded the WQBEL. At SDB-6, the concentrations of *Enterococcus*, total coliforms, and fecal coliforms exceeded the WQBELs. The aforementioned RPs began implementing their WQIP strategies that have primary and secondary pollutant reduction benefits for bacteria during the 2015–2016 monitoring year. RPs plan to continue implementing strategies without modification to realize the rewards of these pollutant reduction benefits and will work toward meeting the goals related to the Highest Priority Condition.

Table 4-21
MS4 Outfall Storm Water Action Level Comparison

Analyte	SAL	Monitoring Location									
		MS4-SDB-1	MS4-SDB-2	MS4-SDB-3	MS4-SDB-4	MS4-SDB-5	MS4-SDB-6	MS4-SDB-7	MS4-SDB-8	MS4-SDB-9	MS4-SDB-10
		City of San Diego	City of Chula Vista	City of Coronado	City of Imperial Beach	City of La Mesa	City of Lemon Grove	City of National City	County of San Diego	Port of San Diego	San Diego Airport Authority
Turbidity	126 NTU	17.4	2.7	4.4	22.2	32.3	39.2	**197**	10.8	42.3	10.5
Total Cadmium	3 µg/L	<0.1	<0.1	<0.1	0.2	<0.1	0.6	1.1	<0.1	0.2	1.1
Total Copper	127 µg/L	22	5.1	43	36	33	18	29	16	**190**	51
Total Lead	250 µg/L	1.7	0.8	0.3	8.9	5.4	10	12	2	4	1.1
Total Zinc	976 µg/L	110	15	78	200	130	120	97	40	160	80
Nitrate + Nitrite as N	2.6 mg/L	0.38	0.49	1.37	0.87	1.03	0.88	1.03	0.56	0.35	**3.14**
Total Phosphorous	1.46 mg/L	0.49	0.2	0.32	0.41	0.32	0.23	0.57	0.25	0.19	0.49

Notes:
Bold = exceedance of SAL
µg/L = micrograms per liter; J = estimate; mg/L = milligrams per liter; ND = not detected; NTU = nephelometric turbidity unit

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Table 4-22
Chollas Creek Drainage Area MS4 Outfall Water Quality-Based Effluent Limits Comparison

Analyte	WQBEL	Monitoring Location	
		MS4-SDB-5	MS4-SDB-6
		City of La Mesa	City of Lemon Grove
Enterococcus	61 (104[1]) MPN/100mL	>2,419.6	>2,419.6
Total Coliforms	10,000 MPN/100mL	2,400	24,000
Fecal Coliforms	400 MPN/100mL	220	9,000

Notes

> = greater than; MPN/100mL = most probable number per 100 milliliters

Bold = exceedance of WQBEL

1. A single sample maximum of 104 MPN/100mL may be applied as a receiving water limitation for creeks designated as "moderately or lightly used" or less frequent usage in the Basin Plan.

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5 Physical Aesthetics Focused Priority Condition Monitoring

The RPs initiated data collection for the Physical Aesthetics Focused Priority Condition in November 2015 following completion of the final WQIP. The Physical Aesthetics monitoring program was implemented in Sweetwater and Otay HU to assess trash conditions, as detailed in Appendix K of the San Diego Bay WMA WQIP. Physical aesthetics monitoring was a collaborative effort by the Port of San Diego, City of Chula Vista, and City of Imperial Beach. To conduct the monitoring for the 2015–2016 season, the RPs collaborated on development of a field monitoring sheet, a calibration training, and coordination of field monitoring efforts by each jurisdiction.

5.1 Monitoring and Methods for Physical Aesthetics

The physical aesthetic monitoring program consists of two main components: dry weather MS4 outfall monitoring and paired MS4 outfall and receiving water monitoring. The monitoring locations for both the MS4 outfall and paired MS4 outfall and receiving water monitoring are presented in Figure 5-1. MS4 inspections and predetermined transect lines will also be inspected for trash to characterize the habitat conditions and determine the impact of trash on the MS4.

The RPs continued to conduct dry weather MS4 outfall monitoring under their JRMP programs per the requirements of Provision D.2 of the Municipal Permit. The dry weather MS4 outfall monitoring program includes an assessment of trash at MS4 outfalls during dry weather conditions. Locations are classified as one of five categories, as shown in Table 5-1, based on the amount of trash visually observed at the site. An “optimal” rating indicates that the site has little to no trash. Using this process, the RPs assessed MS4 outfalls within the Focused Priority Condition area to identify the percentage of MS4 outfalls that receive optimal trash assessment scores during each assessment period. Using historical trash assessment data as a baseline, the RPs’ goal is to incrementally increase the percentage of sites consistently meeting the criteria for optimal conditions.

Table 5-1
Scoring System for Trash Assessments during Site Visits

Rating	Description of Rating
Optimal	On first glance, no trash visible. Little or no trash (<10 pieces) evident when evaluated area is closely examined for litter and debris.
Suboptimal	On first glance, little or no trash visible. After close inspection small levels of trash (~10–50 pieces) evident in evaluated area.
Marginal	Trash is evident in low to medium levels (~51–100 pieces) on first glance. Evaluated area contains litter and debris. Evidence of site being used by people: scattered cans, bottles, food wrappers, blankets, or clothing present.
Submarginal	Trash distracts the eye on first glance. Evaluated area contains substantial levels of litter and debris (>100–400). Evidence of site being used frequently by people: many cans, bottles, food wrappers, blankets, or clothing present.
Poor	Site is significantly impacted by trash. Evidence of trash accumulation behind a constriction point or evidence of excessive dumping. Evaluated area contains substantial levels of litter and debris (>400 pieces).

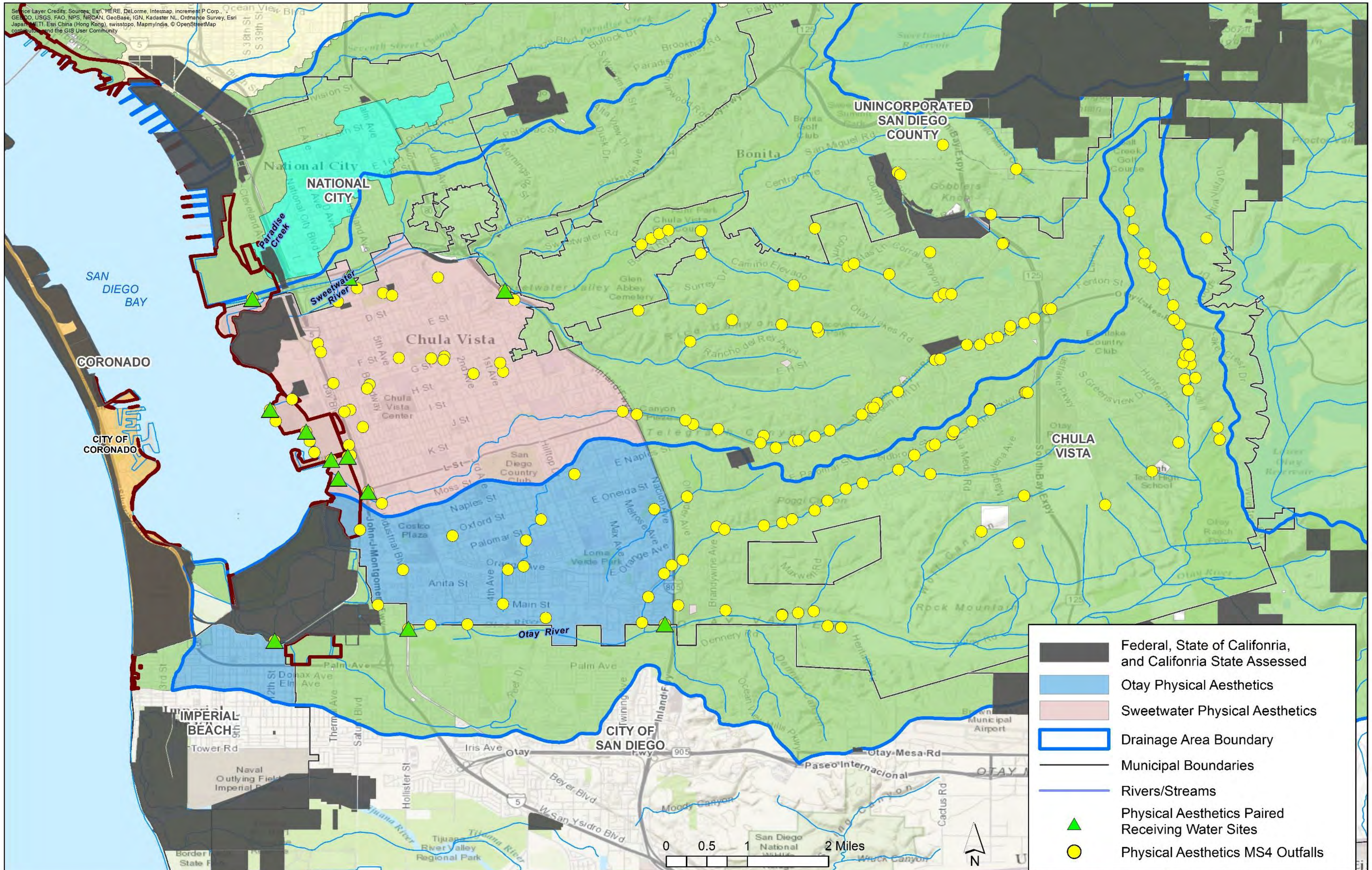

Figure 5-1
Physical Aesthetics Dry Weather MS4 Outfall and Paired Receiving Water Monitoring Locations

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In FY 2016, the RPs also began a paired monitoring approach at 12 MS4 outfalls. The RPs selected nine sites in the Sweetwater HU and three sites in the Otay HU to assess trash in the receiving water adjacent to the major MS4 outfall. Paired monitoring was conducted during two dry weather events (one dry season [May to September] and one wet season [October to April]) and one wet weather event (event within three days following a storm event with at least 0.2 inch of precipitation) annually. To avoid duplicating the efforts of the dry weather MS4 outfall monitoring program, the RPs conducted the paired dry weather events with outfall monitoring. The RPs coordinated and conducted paired monitoring events as feasible.

Trash assessments are conducted visually using standardized field sheets. The Trash Assessment Form (Attachment H) was designed by the RPs to provide an extensive description of the trash conditions for both dry and wet events for the paired monitoring efforts. A calibration field training session was conducted by the participating RPs on November 12, 2015, to standardize the monitoring and observational procedures completed by each RP for all events.

During site visits, teams used the field form to describe the site characteristics, including primary and secondary land use, public transportation nearby, or the presence of homeless encampments. Descriptions and types of receiving water were also noted on the field forms. If trash was present, field teams were to extensively describe the amount and extent of trash.

Trash type was labeled under 14 different categories, ranging from automotive to fabric/clothing to yard waste. The types of trash present in the evaluated area were to be ranked by volume 1 through 14 (1 is most prevalent – 14 is least prevalent). The route and the source by which the trash got to the site was to be recorded, if known.

5.2 Results of the Physical Aesthetics Monitoring

The RPs completed 86 dry weather visits to 64 MS4 outfall locations during the 2015–2016 monitoring year. Table 5-2 outlines the number of outfalls in each jurisdiction with the Physical Aesthetics Focused Priority Condition area and the number of times the outfall was monitored during dry weather.

Table 5-2
Number of Outfall Locations and Visits in Physical Aesthetics Site Visits

Jurisdiction	Number of Outfalls	Total Number of Outfall Visits
Chula Vista	55	68
Imperial Beach	1	2
Port of San Diego	8	16
Total	64	86

Table 5-3 provides the percentages of each rating for the 86 visits to major outfalls. The complete list of site visits and monitoring results, including trash types, potential trash sources, and routes, is provided in Attachment F.2.

Table 5-3
Percentage of Trash Ratings Observed During Physical Aesthetics Site Visits

Trash Rating[1]	Number of Major MS4 Outfall Visits	Percentage of Outfall Visits
None (0 pieces)	32	37%
Optimal (<10 pieces)	31	36%
Suboptimal (10-50 pieces)	13	15%
Marginal (51-100 pieces)	7	8%
Submarginal (>100 pieces)	3	3%
Poor (>400 pieces)	0	0%
Total	86	100%

Notes:
1. 76% of 58 outfall visits in 909.1 had optimal or better trash ratings; 68% of 28 outfall visits in 910.2 had optimal trash ratings or better. Trash ratings in both HAs were above the baseline of 60%.

More than 73% of the 86 visits of major MS4 outfall locations had “optimal” levels or no trash, defined as less than 10 pieces of trash per the monitoring methodology. Paired monitoring, initiated in FY 2016, noted that the most common trash type found at the MS4 sites was categorized as general packaging or plastic bags, with potential source identifications (IDs) noted as littering or household waste. As stated in the WQIP, trash will be evaluated for each assessment term in FY 2016 and FY 2017 for comparison with the interim FY 2018 goal.

At the receiving water sites, the most prevalent trash was categorized as general packaging with source IDs as transient, household waste, dumping, or littering. Although the RPs are monitoring the receiving water, other non-MS4 sources could contribute to trash in the receiving water. RPs are monitoring the receiving water to potentially demonstrate performance as it relates to strategies to address MS4 discharges. This information will not be used to assess progress towards meeting the focused priority goals.

6 Swimmable Waters Focused Priority Condition Monitoring

The RPs initiated data collection for the Swimmable Waters Focused Priority Condition in November 2015 following completion and submittal to the Regional Board of the final WQIP. The Swimmable Waters monitoring program was implemented in Coronado HA, as detailed in Appendix K of the San Diego Bay WMA WQIP. Data collection for bacterial indicators has proceeded as planned and includes year-round (wet and dry weather) sampling to augment existing data sets, such as the dry weather data collected by the County of San Diego Department of Environmental Health (DEH) for the California Assembly Bill 411 (AB 411) program. The data collected during this reporting period, when combined with data planned for FY 2017, will allow the RPs to begin assessing water quality and progress toward meeting the Swimmable Waters goals.

The monitoring data collected will be evaluated in support of any future BMP decisions and assess effectiveness, should they be necessary, to meet the interim and final goals.

6.1 Monitoring and Methods for Swimmable Waters

Table 6-1 presents the RPs' monitoring approach, frequency, and timing of Swimmable Waters receiving water monitoring for the Coronado HA of the San Diego Bay WMA.

Table 6-1
Swimmable Waters Monitoring Summary

Type	Receiving Water Wet Weather Monitoring	Receiving Water Dry Season, Dry Weather Monitoring	Receiving Water Wet weather season, Dry Weather Monitoring	MS4 Monitoring
Monitoring Approach	Monitor at Tidelands Park and North Beach sites	• Tidelands Park[1]: Current San Diego County Department of Environmental Health (DEH) sites. (No additional monitoring to be done by RPs at these sites during this period) • North Beach: Past DEH site and City of Coronado's current transitional wet and dry monitoring location and dry weather MS4 major outfall monitoring location	• Build upon DEH's dry weather monitoring. Add monitoring during the wet weather season. • Monitoring at Tidelands Park and North Beach sites[2]	• Paired Sampling: Perform MS4 monitoring at all beach sites at same time as monitoring receiving water quality • Sample three wet weather events during wet season at Tidelands Park in conjunction with receiving water, if feasible
Frequency (Number of Monitoring Events)	Annually sample three wet weather events during wet season at Tidelands Park and North Beach sites	• Tidelands Park site: Weekly • North Beach: Past DEH site and City of Coronado's current transitional wet and dry monitoring location and dry weather MS4 major outfall monitoring location	• Monthly at Tidelands Park and North Beach sites[2] (November 1–March 31)	Inspect MS4 monthly, year round
Timing of Monitoring	Sample within 72 hours of a storm (consistent with Bacteria TMDL[3])	During dry weather season (April 1–October 31)	During dry periods, 72 hours or more after storm event	Take sample at MS4 if there is flow/discharge

[3]Regional Board. 2010. *Revised TMDL for Indicator Bacteria, Project I—Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)*. Resolution No. R9-2010-0001. Approved February 10, 2010.

Table 6-1 (continued)
Swimmable Waters Monitoring Summary

Notes:

1. The Pacific shoreline of the Coronado HA 910.1 already has an established monitoring plan to assess the receiving water conditions through the South Bay Ocean Outfall Waste Discharge Requirements in Order R9-2014-0071 for the City of San Diego and Order R9-2014-0009 for the International Boundary and Water Commission. These permits establish a joint receiving water monitoring program for the South Bay Ocean Outfall and include weekly surf zone bacteria monitoring at 3 locations along the Coronado HA 910.1. These locations include S12 Carnation Ave (Camp Surf), S8 Silver Strand State Beach, and S9 Avenida del Sol (Hotel del Coronado). In addition, the County of San Diego Department of Environmental Health performs AB411 beach water quality monitoring throughout the year for public health along the Pacific shoreline of the Coronado HA 910.1. The existing beach water quality monitoring is sufficient to assess swimmable waters along the Pacific shoreline of the Coronado HA 910.1 and the San Diego Bay WMA Copermittees are to utilize these data for the Water Quality Improvement Plan Monitoring and Assessment Annual Report.
2. South Bay Ocean Outfall Sites: Weekly surf zone bacteria monitoring at three locations along the Coronado HSA 910.1. These locations include S12 Carnation Ave (Camp Surf), S8 Silver Strand State Beach, and S9 Avenida del Sol (Hotel del Coronado).

Site visits were conducted at the MS4 outfalls selected for Swimmable Water listed in Table 6-2 in FY 2016.

Table 6-2
Sampling Locations for Swimmable Waters (November 2015–September 2016)

Site ID	Type	Location	Jurisdiction	Latitude	Longitude
EH-070[1]	RW	Tidelands Park	Port	32.689930	-117.164190
1203.1	MS4	Tidelands Park	Port	32.690395	-117.164465
1206.1	MS4	Tidelands Park	Port	32.690791	-117.164465
1219.1	MS4	Tidelands Park	Port	32.691713	-117.164085
EH-060[2]	RW/MS4	North Beach	Coronado	32.686650	-117.19340

Notes:

RW = receiving water; MS4 = MS4 Outfall

1. Receiving water monitoring station sampled by the San Diego County DEH for the AB 411 program.
2. Site was historically sampled by the DEH.

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http://www.waterboards.ca.gov/sandiego/water_issues/programs/ tmdls/docs/bacteria/updates_022410/2010-0210_BactiI_Resolution&BPA_FINAL.pdf.

6.2 Swimmable Waters Monitoring Overview

The RPs evaluated sampling conditions for the receiving water and/or MS4 outfalls. Each location was visited on 14 occasions from November 2015 through September 2016, as noted in Tables 6-3 and 6-4. The RPs initiated wet weather sampling at two beach locations (EH-070 and EH-060) in the Coronado HA in FY 2016 and three storm events were sampled at each of the two locations. The storms events occurred on November 4, 2015, November 9, 2015[4], January 5, 2016, and March 8, 2016. The complete set of monitoring data collected during this reporting year is presented in Attachment F.2.

At North Beach in Coronado, site visits were conducted to inspect the MS4 outfall and evaluate conditions for sampling on 14 occasions from November 2015 through September 2016. As summarized in Table 6-3, the site visits by the City of Coronado resulted in the following number of samples during the reporting period.

Table 6-3
Summary of City of Coronado Sampling at North Beach
(November 2015 – September 2016)

Type	Number of Site Visits	Receiving Water (Ocean) Samples	MS4 Outfall[1] Samples	Total Samples
Wet Season/Wet Weather	3	3	3	6
Wet Season /Dry Weather	5	5	2	7
Dry Season /Dry Weather	6	6	1	7
Dry Season /Wet Weather	0	0	0	0
Total	14	14	6	20

Notes:
MS4 = municipal separate storm sewer system
1. Per established procedures, outfall is sampled when flowing or ponded water is present.

At Tidelands Park, site visits were also conducted to inspect the MS4 outfall and evaluate conditions for sampling on 14 occasions from November 2015 through September 2016. The number of site visits and sampling events by the Port of San Diego during the reporting period are summarized in Table 6-4.

[4] The first storm event sampling took place by the Port on Nov. 4, 2015 and by the City of Coronado on Nov. 9, 2015.

Table 6-4
Summary of Port of San Diego Sampling at Tidelands Park
(November 2015 – September 2016)

Type	Number of Site Visits	Receiving Water Samples[1]	MS4 Outfall Samples[2]	Total Samples
Wet Season /Wet Weather[3]	3	3	6	9
Wet Season /Dry Weather	5	5	0	5
Dry Season /Dry Weather[1]	6	27	1	28
Dry Season /Wet Weather	0	0	0	0
Total	14	35	7	42

Notes:
MS4 = municipal separate storm sewer system
1. Receiving water monitoring: 26 dry season, dry weather samples were collected by San Diego County Department of Environmental Health (DEH) for the AB 411 program. The Port of San Diego visited the site six times during dry season, dry weather conditions and collected one receiving water sample during one visit.
2. Per established procedures, the outfall is sampled when flowing or ponded water is present. Three outfalls are monitored at Tidelands Park.
3. Samples were collected at all three outfalls on two of the wet weather monitoring events.

6.3 Receiving Water Monitoring and Historical Data Review

Receiving water monitoring related to the Swimmable Waters Focused Priority Condition includes bacterial indicators at two sites, one on the Pacific Ocean at North Beach in the City of Coronado and one on San Diego Bay at Tidelands Park managed by the Port of San Diego. Receiving water monitoring for wet season was initiated at both locations in November 2015. Both dry and wet weather monitoring are slated to continue in the coming reporting year.

A total of 35 receiving water samples were collected during dry and wet seasons at Tidelands Park. Of the 35 receiving water samples collected at Tidelands Park, five samples exceeded Water Quality Objective (WQO) for *Enterococcus*. Of the five (5) ocean samples above the WQO, four (4) were collected during dry weather/dry season conditions and one (1) was collected during a wet season/wet weather event (on November 4, 2015). The number of dry weather receiving water samples exceeding the single sample WQO was below the allowable number of exceedances for 303(d) de-listing consideration based on sample size. For a sample size of 32, the allowable exceedance is five. Four (4), or 12.5%, of the 32 dry weather samples at Tidelands Park beach exceeded *Enterococcus* WQO. For the wet season/wet weather single sample monitoring, *Enterococcus* exceeded WQO during one of the three rain events.

Receiving water monitoring at North Beach was initiated in FY 2016 and is being conducted year-round. For North Beach, there are limited receiving waters (beach/ocean) monitoring data points for the site in the previous few years, because the site is no longer monitored by the County of San Diego DEH under the AB 411 program.

Of the 14 receiving water sampling events in the North Beach Pacific Ocean surf, ten (10) ocean samples were below the *Enterococcus* single sample WQO of 104 MPN/100ml. Of the four (4) ocean samples above the WQO, three (3) were collected during the wet weather period (November 1 through March 31) and one (1) was collected during the dry weather period. Of the four (4) *Enterococcus* samples above the WQO, only one (1) sample was collected during a rain event that included discharge from the MS4 paired with an MS4 outfall sample. The remaining three (3) *Enterococcus* results above the WQO do not appear to be correlated to MS4 outfall discharges.

The wet weather receiving water monitoring data set is limited at both locations because this was the first year in which the monitoring was conducted. As planned, receiving water samples will continue to be collected during dry and wet weather over the next two years so that the RPs can obtain a more robust dataset to adequately assess the interim 2018 goals at Tidelands Park and North Beach.

A delisting feasibility study for Tidelands Park in Coronado (PO-40 optional, COR-39.2) was completed in FY 2016. The study assessed available historical DEH AB 411 monitoring data to determine the number of exceedances of *Enterococcus* WQOs (104 most probable number per 100 milliliters [MPN/100mL]) that have occurred at the receiving water site EH-070 (Tidelands Park) since 1999. Limited receiving waters (beach/ocean) monitoring data are available for the North Beach site, because the site is not currently monitored by the County of San Diego DEH under the AB 411 program.

The purpose of the study was to identify whether the results warrant consideration of removal of the water body from the 303(d) List. Based on the cumulative data from 1999–2014, the site was found to be below allowable exceedances for dry season/dry weather for single-sample, rolling 30-day geometric mean, and monthly geometric mean. These results indicate that the beach segment of Tidelands Park on the 303(d) List could potentially be eligible for delisting in dry weather for *Enterococcus* indicator bacteria. However, limited wet weather monitoring data existed prior to FY 2016. Because of this finding, the RPs will focus on collecting data to demonstrate the current dry weather exceedance rate can be sustained, and collecting additional data to evaluate the exceedance rate during wet weather.

Tidelands Park was given an A grade for the summer dry season, dry weather in the 2015–2016 Heal the Bay report, using data collected in 2014–2015. North Beach was not evaluated by Heal the Bay since no data was available during that time period. Additional data were collected at both sites starting in November 2015 and these data will help track progress toward the goals related to water quality and future report cards (i.e., Heal the Bay) assessments.

http://www.healthebay.org/sites/default/files/BRC_2016_final.pdf.

6.4 MS4 Monitoring

A Tidelands Park MS4 outfall sampling

MS4 outfall monitoring related to swimmable waters includes bacterial indicators at two locations, at North Beach (City of Coronado) and one at Tidelands Park (Port of San Diego). MS4 outfall monitoring is performed when flow or standing water is detected at the outfall. The MS4 monitoring related to the Focused Priority Monitoring was initiated in November 2015 and is slated to continue in the coming reporting year. Storm drain monitoring was performed at the three storm drains in the vicinity of Tidelands Park beach (Table 6-2) during dry weather to detect potential non-storm water discharges. Port of San Diego staff visited the MS4 outfalls at Tidelands Park six times during the dry season (once a month), but found discharge during only one site visit. Port of San Diego staff also visited the sites during wet season/dry weather five times, but no discharges were observed. However, samples were collected at all three outfalls on two of the wet weather monitoring events. The third wet season, wet weather event could not be sampled because of an insufficient amount of effluent.

At North Beach, storm drain monitoring was performed at one storm drain (Table 6-2) during dry weather to detect potential non-storm water discharges. City of Coronado staff visited the MS4 outfalls at North Beach six times during the dry season, but found discharge during only one site visit. The MS4 outfall had ponded water, possibly from storm surge or tidal influence, on two occasions during the five site visits during wet season, dry weather.

North Beach MS4 outfall sampling location

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7 Special Study and Additional Program Results and Assessments

Special studies for the San Diego Bay WMA have been selected to further investigate the Highest Priority Conditions and Focused Priority Conditions, including water quality monitoring specifically addressing bacteria and dissolved metals, riparian area habitat quality, and physical aesthetics due to trash. The special studies have been conducted or are on-going, and are summarized below. Studies included the San Diego Regional Streams and Beaches Studies, San Diego Bay Debris Special Study, Creek Refuse Assessment Program in the Pueblo HU, Chollas Jurisdictional Bounty Study for Metals and Bacteria, and the Riparian Area Selenium Study.

7.1 San Diego Regional Reference Streams and Beaches Studies

The San Diego Regional Reference Streams and Beach Studies (SCCWRP, 2015 and SCCWRP, 2016) sought to establish the bacterial concentrations from natural streams and beaches that are minimally disturbed by anthropogenic activities and therefore can be characterized as “reference” conditions. The study also collected nutrients, metals, and toxicity data as secondary constituents. The data generated by this study may be used by the Regional Board in the Bacteria TMDL Reopener to derive reasonable and accurate numeric targets for bacteria on the basis of a reference system approach.

7.1.1 San Diego Regional Reference Streams Study

The goal of the San Diego Regional Reference Stream Study was to characterize the natural background concentrations of bacteria, nutrients, heavy metals, and conventional constituents in undeveloped watershed catchments during wet and dry weather. The goal of this study was to categorize the exceedance frequencies of FIB WQOs by geomorphologic, hydrologic, biotic, and abiotic factors. This summary focuses on presenting the findings for FIB, specifically *Escherichia coli (E. coli)*, *Enterococcus*, and total and fecal coliforms (SCCWRP, 2015).

The study was conducted from January 2012 through May 2015 in San Diego, Orange, and Ventura Counties’ watersheds. Sites were selected to target minimally disturbed streams (reference conditions defined as greater than 93% undeveloped catchment areas with no wildfires in the last three years). Additionally, the sites chosen represented a mix of watershed size and geologic composition (such as sedimentary versus igneous/metamorphic geology). Analysis of human genetic markers was used to eliminate sites or samples with potential human fecal contamination and therefore not representative of reference conditions. Wet weather monitoring consisted of FIB pollutograph sampling during eight storm events at five sites, for a total of 118 samples. During weekly dry weather sampling, 427 FIB samples were collected from 10 intermittent stream sites and were analyzed for bacteria. Samples were also collected biweekly and analyzed for nutrients, trace metals, and other conventional constituents. FIB concentrations and fluctuations were compared with data from previous studies in the region.

The San Diego Reference Stream Study had five major findings:

(1) FIB levels in natural streams likely result from a combination of natural inputs, such as wildlife, birds, and soil erosion and instream bacterial growth facilitated by high summer temperatures, availability of nutrients, and presence of decaying organic matter.

(2) Storm event mean concentration exceedances were low except for *Enterococcus*. Based on seven storms, exceedances of single-sample WQOs were 0% for *E. coli*, fecal coliform, and total coliform. The exceedance frequency for *Enterococcus* on the day of the storm was 87%, compared with 37% for the following three days after the end of the storm. The exceedance frequency increased for both *E. coli* and total coliform to 29% if the pollutograph maximum was used. The number of storm events captured was not sufficient to investigate the effect of geology or watershed size on storm event mean concentrations.

(3) FIB exceedances occurred in natural sites and were highest in summer dry weather (April through August). No exceedances of fecal coliform single-sample WQOs were observed; however, single-sample WQO exceedances of *Enterococcus* were as high as 30%. Annual 30-day geomean exceedance frequencies were 0% for both *E. coli* and fecal coliform, but were 48% and 30% for *Enterococcus* and total coliform, respectively. Exceedance frequencies were highest in the summer, particularly for *Enterococcus*, spiking up to 40% and 68% for single-sample and 30-day geometric mean WQOs, respectively. Using a rolling 30-day geometric mean rather than a monthly mean to calculate exceedance frequencies increased the exceedance frequencies for *Enterococcus* and total coliform as much as 20%.

(4) Temperature, and to a lesser extent, nutrients and organic carbon, was the major factor associated with elevated summer dry weather FIB concentrations and exceedance frequencies. No significant relationships were found between FIB concentrations and watershed size or geology during dry weather. Water column FIB concentrations could not be attributed directly to instream benthic algal biomass as a measure of stream trophic status, which was low and showed no distinct seasonal variation. In contrast, FIB, temperature, organic carbon, and nitrogen measurements spiked at the end of the season, coinciding with the end of stream flow. This cycle occurs naturally; organic carbon and nutrients are increasingly recycled from organic matter as flow diminishes and temperature increases, conditions that coincide with increased FIB concentrations.

(5) Event mean concentration fluctuations during wet weather were found to be 2 to 3 times greater than dry weather FIB fluctuations. Wet and dry weather fluctuations were comparable to those documented in previous southern California regional studies.

7.1.2 San Diego Regional Reference Beaches Study

The goal of the San Diego Regional Reference Beach Study was to characterize natural background concentrations of FIB and determine WQO exceedance frequencies in two "reference" recreational beaches and their adjoining estuary or mixing zone. Two beaches in southern California, San Onofre Creek in San Diego County and Deer Creek in Ventura County, were selected for the Reference Beach Study for dry and wet weather assessments of *Enterococcus*, fecal and total coliforms, and *E. coli*. These locations were selected because the watershed discharging to the beach was determined to be greater than 93% undeveloped and has not been subject to a fire within the last three years. Additionally, both beaches are openly exposed with breaking waves and contain freshwater inputs. Analysis of human genetic markers was used to eliminate sites or samples with potential human contamination and therefore not representative of a reference condition (SCCWRP, 2016).

The San Diego Regional Reference Beach Study was initiated in October 2014 and continued through April 2016. Sampling was conducted in the ocean immediately in front of the inlet or estuary, in the inlet mouth just upstream of the mixing zone, and in the freshwater flowing creek, for a total of three locations at each reference site. Dry weather monitoring was conducted on dry weather days during both wet and dry seasons to characterize baseline conditions throughout the year. Bacteria samples were collected weekly, such that five samples were collected in each 30-day period, to calculate a 30-day dry weather geometric mean. In creeks, dry weather sampling occurred when there was measureable flow at a site. During wet weather, sampling criteria included an antecedent dry period of three or more days and a forecast minimum of 0.20 inch of rainfall. Samples were taken during the day of the storm (defined as within 24 hours of the end of recorded rainfall), and then in days following the day of the storm event. A special study was also conducted to quantify FIB concentrations in the San Onofre estuary. When the estuary was open to tidal exchange, monitoring was extended to collect samples at high and low tides at all sites.

The San Diego Regional Reference Beach Study began during an extended period of drought in the southern California region, which limited the number of samples collected from creeks and during storms, as well as the overall volume of freshwater input to beaches. Dry weather beach sampling achieved the prescribed frequency, but samples from freshwater input sources were limited by extreme drought. From the onset of sampling, San Onofre Creek did not flow during the study period because of the extended drought. Deer Creek began flowing at the end of December 2014 and ceased in early May 2015; Deer Creek did not flow during the 2015–2016 winter dry weather period. In a similar effect, wet weather sampling was limited to only one storm during this study period because of the drought conditions. However human genetic markers were detected and so the results were excluded from the exceedance frequency analysis. The estuary special study was not completed because the San Onofre estuary berm remained closed throughout the study period for all but one storm event, which coincided with a tide in excess of 7 feet. The sampling locations were deemed inaccessible during that event, and so the estuary data collected only characterize concentrations during conditions with a closed estuary mouth.

Although major drought conditions limited the conditions in which data were collected, the Reference Beach Study had several key findings:

(1) The ranges of annual dry weather FIB concentrations at both beaches were considered low. The ranges are comparable to results from previous FIB beach bacteria reference studies that had estuaries closed to tidal exchange (i.e., San Onofre Creek) or flow to the beach without an estuary (i.e., Deer Creek), with WQO exceedance frequencies in the range of 0% to 3.5%. Prolonged drought conditions resulted in intermittent dry weather flow at Deer Creek and no dry weather flow at San Onofre Creek, which provides important context to interpret data on exceedance frequencies.

(2) Concentrations of FIB in the estuary or freshwater mixing zone of both San Onofre and Deer Creeks were typically 1 to 3 orders of magnitude higher compared with their respective beaches, with the highest WQO exceedance frequencies found in San Onofre Creek, and suggesting that dry weather exceedance frequencies may have been greater had the mouth of the estuary been open to tidal exchange and dispersal to the surf zone.

(3) In the San Onofre Creek estuary, the dry weather geometric mean exceedance frequency during summer was 72% for fecal coliform; the dry weather geometric exceedance frequency during summer was 100% for both *Enterococcus* and *E. coli*. Dry weather geometric mean exceedances during wet season months ranged from roughly 55% (for total coliform) to 100% (for *Enterococcus*). The higher WQO exceedance frequencies of San Onofre Creek estuary relative to the mixing zone of Deer Creek could be expected, given the abundance of labile organic matter to support microbial growth as well as the presence of water birds typically found in estuaries.

(4) At both beaches, no significant relationship was found with water temperature, salinity, or antecedent dry days. In contrast to San Onofre Beach, where FIB concentrations declined with the increasing duration of dry weather, the range and mean FIB concentrations in San Onofre Creek estuary increased with increasing antecedent dry days and salinity, suggesting that freshwater input from the ephemeral channel tended to dilute concentrations, rather than serve a source of bacteria to the beach. The slight increase of FIB concentrations as a function of temperature and the lack of surface freshwater input in San Onofre Creek estuary suggest that regrowth may be a factor, which is credible given the organic rich environment of the San Onofre Creek estuary.

7.1.3 Special Study Assessment

Per the Municipal Permit (Provision D.4.c), data resulting from special studies should be used to (1) assess their relevance to the RPs' characterization of receiving water conditions, (2) understand sources of pollutants and/or stressors, and (3) control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters. The San Diego Regional Stream and Beach Reference Studies provide more information on the natural "reference" conditions in streams and beaches.

The key findings of the San Diego Regional Stream Study with regard to the highest priority water quality condition is as follows:

- During dry weather conditions:
  - There are exceedances of FIB WQOs at natural sites for *Enterococcu*s and total coliform (single sample and annual 30-day geomean).
  - These are highest during summer months (April to August).
  - There were no exceedances of the fecal coliform single sample WQOs along with a 0% exceedance frequency of the annual 30-day geomean.
  - *E. coli* also had a 0% exceedance frequency of the annual 30-day geomean.
- During wet weather conditions:
  - Storm event mean concentration exceedances of single sample WQOs were 0% for *E. coli*, fecal coliform, and total coliform, but if the storm maximum pollutograph was included, there were exceedances for *E. coli* and total coliform.
  - For the storm event mean concentration exceedances of single-sample WQOs for *Enterococcus,* the exceedance frequency on the day of the storm was 87%, compared with 37% for the following three days after the end of the storm.
- In summary:
  - *Enterococcus* concentrations can often exceed the WQO in both dry and wet weather conditions in streams with no anthropogenic impacts.
  - Total coliform may also be present in streams, although in lower amounts than *Enterococcus,* in natural conditions at levels high enough to cause exceedances.
  - *E. coli* concentrations exceeded the WQO only during wet weather conditions in the reference watershed streams when the storm peak was incorporated into the event mean concentration.
  - Fecal coliform concentrations did not exceed WQO in dry and wet weather conditions in any reference watershed streams.

The key findings of the San Diego Regional Beaches Study with regard to the Highest Priority Condition were affected by prolonged drought conditions. Despite the fact that no storm water samples were collected, some inferences about bacteria concentrations during dry weather conditions can be made. The ranges of annual dry weather FIB concentrations at both reference beaches were considered low, although this condition has to be considered in the context of intermittent dry weather flow at Deer Creek and no dry weather flow at San Onofre Creek. Concentrations of FIB were one to three times higher in estuary or freshwater mixings zones than at the beaches, meaning that dry weather exceedance frequencies may have been greater had the mouth of the estuary been open to tidal exchange and dispersal to the surf zone. The study provided some insight into the exceedance frequency in estuaries as follows:

- The *Enterococcu*s dry weather annual 30-day geomean exceedance frequency was 100% for the whole year in the San Onofre Creek estuary.
- The total coliform dry weather annual 30-day geomean exceedance frequency was 55% during winter months in the San Onofre Creek estuary.
- The *E. coli* dry weather annual 30-day geomean exceedance frequency was 100% during summer months (April to August) in the San Onofre Creek estuary.
- The fecal coliform dry weather annual 30-day geomean exceedance frequency was 72% during the summer months in the San Onofre Creek estuary.

For reference beaches with both streams and estuaries closed from tidal exchange, *Enterococcus* concentrations exceeded WQOs. Total coliform, *E. coli*, and fecal coliform concentrations exceeding WQOs varied for seasons and waterbody types. Additionally, the variability in dry weather FIB concentrations is less than the variability in wet weather FIB event mean concentrations, confirming the findings of previous studies.

7.2 Addressing Trash, Debris, and Floating Material in Chollas and Paleta Creeks

Pursuant to Section A.4 of the Municipal Storm Water Permit (Regional Board, Order No. R9-2013-0001, as amended by order nos. R9-2015-0001 and R9-2015-0100) and letter from Mr. John H. Robertus dated December 18, 2002 (Regional Board, 2002), requiring technical reports pursuant to California Water Sections 13267, 13225, and 13383 regarding exceedances of Water Quality Objectives for trash, debris, and other floating material in Chollas and Paleta Creeks, the City of San Diego was required to report twice a year on existing and planned BMPs intended to prevent or reduce trash, debris, and floating materials in Chollas and Paleta Creeks. As addressed in the WQIP, the City of San Diego agreed to incorporate the technical report addressing trash, debris, and floating material in Chollas and Paleta Creeks (annual technical report) into the January 2017 WQIP Annual Report. This change in reporting frequency was formally agreed to by the Regional Board in a letter from Mr. David W. Gibson dated February 5, 2014 (Regional Board, 2014). The annual technical report covers the activities conducted during FY 2016 (July 1, 2015, through June 30, 2016) and includes the information summarized in the semi-annual report covering the activities conducted during the first half of FY 2016

(July 1, 2015, through December 31, 2015) that was submitted to the Regional Board on March 15, 2016. The final annual technical report is in Attachment I.

7.3 Trash – San Diego Bay Debris Special Study

The San Diego Bay Debris Study is a special study component under the Southern California Bight 2013 Regional Monitoring Program (Section 2.2). In 2014, the Bight Program began the first-ever comprehensive marine debris survey, which included, for the first time, a coastal embayment special study to assess the connection between land-based sources of debris and transport to the coastal ocean. In southern California, and particularly along the San Diego County coastline, coastal wetlands and bays provide an important connection between upland rivers and the coastal ocean, and the coastal embayments may be a key environmental sink for upland land-based debris. The Study Report covers three projects conducted in San Diego Bay and the contributing watersheds between fall 2014 and spring 2015.

The intent of the San Diego Bay Debris Study is to quantify the abundance and amount of plastic debris in a variety of bay habitats. Study areas include open water areas throughout San Diego Bay, enclosed area such as ports and marinas, intertidal areas (mudflats, salt marshes, sandy beaches, and protective rip-rap shoring), and upland areas in the contributing riverine habitats. Results of this study could be used as a baseline for future studies and for management of efforts to control trash, specifically plastic-based items.

The primary data analyses are intended to answer the following study questions:

- How do the quantities and types of debris in different habitats vary during dry and wet season?
- What are the quantities and types of debris found in San Diego Bay habitats?
- What are the quantities and types of debris found in watersheds flowing to San Diego Bay?
- How do the quantities and types of trash in different San Diego Bay habitats vary by summer and winter dry season?
- What are the quantities and types of trash in San Diego Bay following the first storms of the wet season?
- What types of riverine debris do wet weather flows transport to the bay?
- What species caught in the bay has ingested plastic pieces?

7.4 Trash – Pueblo HU: Creek Refuse Assessment Program Special Study

In 2007, the City of San Diego implemented the Creek Refuse Assessment Program (Refuse Program) to evaluate and record the types and volumes of trash at approximately 800 sites across the City. The Refuse Program was developed to assess trash conditions and provide long-term monitoring data to support watershed planning and monitor trash reduction efforts.

The recent adoption of the Trash Amendments by the State of California necessitated re-evaluating the City's trash monitoring data to identify high trash-accumulation areas and work toward solving the remaining trash issues. The goal of the following evaluations was to help the City reprioritize ongoing trash assessment programs to focus management actions on the high trash-accumulation areas and to provide a summary of the historical data against which future assessment data can be compared. To provide a technical foundation for the trash assessment, persistent trash types were identified in areas of recurring high trash accumulation, as well as common sources, disposal methods, entry routes of trash, and trends in trash volumes over time (City of San Diego, 2015a).

Key findings of the evaluation included the following:

- Of the 12 types of trash in the Refuse Program assessments, the most frequently observed types were food packaging, household items, and plastic bags.
- Trash issues were not evenly distributed across the City. Four hydrologic areas, including the Tijuana Valley, San Diego Mesa, Miramar Reservoir, and Lower San Diego River, were the areas with the highest average trash volumes. The San Diego Mesa Hydrologic Areas could be considered the City's highest priority area for future trash management efforts.
- In addition to land use as a factor to consider regarding trash-accumulating areas, trash volumes tended to be disproportionately large in areas where median incomes are lower in the surrounding communities.
- Open, Industrial, and Park land uses (Parks Open, Industrial Open, Commercial Parks, and Open Industrial), and Transient sources were associated with the highest average trash volumes per site.
- Open, Industrial, Park, and a limited number of Residential (Open Industrial, Open, Commercial Parks, Residential Parks, and Residential) land uses have shown a significant decrease in average volumes over time, suggesting that trash management strategies are working in these areas.
- Residential Industrial, Parks Open, Industrial Open, Commercial Open, Commercial, and Open Parks land uses showed no significant decreases in trash volumes over time, and should be prioritized for future monitoring and assessments.

The final report for the Pueblo HU Creek Refuse Assessment Program Special Study is in Attachment J.

7.5 Chollas – Jurisdictional Boundary Study for Metals

This Jurisdictional Boundary Special Study is a voluntary study completed by the City of San Diego; other jurisdictions in the Chollas Creek hydrologic subarea are not involved in the study. Wet weather monitoring results presented in the Jurisdictional Boundary Special Study monitoring report are above and beyond the compliance monitoring requirements of the Diazinon and Dissolved Metals TMDL in Order No. R9-2004-0277 and State Board Resolution 2008-00054. The purpose of this study is to collect wet weather water quality data at jurisdictional boundary locations to fill data gaps in understanding priority receiving water quality pollutants in the upper watershed in Chollas Creek. Monitoring was conducted during the 2015–2016 wet season in the upper Chollas Creek HSA at the jurisdictional boundaries of the Cities of San Diego and La Mesa, and of the Cities of San Diego and Lemon Grove.

Special Study Monitoring Results

Jurisdictional boundary monitoring was conducted during two wet weather events, October 4, 2015, and March 5, 2016, coinciding with the Diazinon and Dissolved Metals TMDL compliance monitoring program. Sites LG-1 and LM-1 are not compliance sites. LG-1 is located on the South Fork of Chollas Creek; LM-1 is located on the North Fork of Chollas Creek. Water quality samples were analyzed for the TMDL analytes (diazinon, total and dissolved metals [copper, lead, and zinc], and toxicity). Additional analytes (organophosphorus pesticides, organochlorine pesticides, PAHs, PCBs, chloride, sulfate, and general chemistry) as well as the analytes on the 303(d) List (nitrogen, phosphorus, total suspended solids, and particle size distribution) were also analyzed during the monitoring. Analytical results were compared with applicable water quality criteria, including those set forth in the approved TMDLs for the Chollas Creek HSA, pesticide criteria of the CDFW (CDFW 1998, 2000), the USEPA OPP Aquatic Life Benchmarks, and the USEPA National Recommended Aquatic Life Criteria for freshwater.

The data collected during the 2015–2016 wet weather season are summarized below. The results for the 2015–2016 monitoring season are summarized below, including the constituents not detected (Table 7-1), the constituents detected but above the WQOs (Table 7-2), and the detected constituents (Table 7-3).

Table 7-1
Constituents Not Detected in the 2015–2016 Monitoring Year

Site	Constituent
LG-1	Diazinon Methyl-parathion Organochlorine pesticides PAHs (1 of 2 events)
LM-1	TMDL Constituents Diazinon

Notes:
PAH = polycyclic aromatic hydrocarbon; TMDL = total maximum daily load

Table 7-2
Constituents Detected but Below WQOs in the 2015–2016 Monitoring Year

Site	Constituent
LG-1	Dissolved copper, lead, and zinc Acute or chronic toxicity to Ceriodaphnia dubia (C. dubia) Malathion 5 PAHs (1 of 2 events) PCBs Chloride (chronic) Sulfate Dissolved organic carbon
LM-1	Dissolved copper (acute), lead, and zinc Acute or chronic toxicity to *Ceriodaphnia dubia (C. dubia)* Malathion (chronic 1 of 2 events) Methyl-parathion alpha-chlordane gamma-chlordane 7-10 PAHs PCBs Chloride Sulfate Dissolved organic carbon

Notes:
PAH = polycyclic aromatic hydrocarbon; PCB = polychlorinated biphenyl

Table 7-3
Constituents Detected Above WQOs in the 2015–2016 Monitoring Year

Site	Constituent
LG-1	Chloride (acute) Total Nitrogen Total Phosphorus Dichlorvos (acute, 1 of 2; chronic 2 of 2)
LM-1	Dissolved copper (chronic) Malathion (chronic 1 of 2 events) Total Nitrogen Total Phosphorus Dichlorvos (acute, 2 of 2; chronic 1 of 2)

Statistical Relationship Between the Boundary Locations and Compliance Sites

The study included a statistical comparison of historical water quality conditions at the boundary locations (LG-1 and LM-1) related to the downstream compliance monitoring locations. Based on the results of the historical comparative analyses, three statistical significant findings, summarized as follows:

- The dissolved metals comparison showed that dissolved lead and zinc concentrations were significantly greater at LG-1 on the South Fork than at the respective compliance MLS. Also note that dissolved lead and zinc concentrations at LG-1 have consistently been below their respective WQOs, including for both storms in FY 2016.

- The dissolved metals comparison showed no statistically significant difference in median concentrations of dissolved copper, lead, and zinc between LM-1 on the North Fork and the respective compliance MLS.

- Historically, chloride concentrations exceeded the WQO only at the South Fork monitoring location, LG-1. The source of the concentrations of chloride at this location seem to be naturally occurring salt deposits presents in the tertiary marine sedimentary soils located in this area of the watershed. Chloride concentrations were below the USEPA Aquatic Life criteria maximum concentrations (CMC) and criteria continuous concentrations (CCC) for freshwater during both wet weather events at LM-1.

- Overall, the South Chollas Creek monitoring locations appear to have relatively greater concentrations of general chemistry analytes compared with concentrations measured at the North Chollas Creek locations. This relationship is important to note for total hardness, where lower total hardness values yield lower WQOs for dissolved metals. Note that the difference in hardness values between the two branches of Chollas Creek results in different WQOs for hardness-based trace metals.

The final reports for the Jurisdictional Boundary Metals and Bacteria studies are in Attachments K.1 and K.2, respectively.

7.6 California Assembly Bill 411 (AB 411) Data

The San Diego County DEH implements the Beach and Bay Water Quality Monitoring Program to support the statewide program funded by AB 411. This program is commonly referred to as AB 411 monitoring. The AB 411 monitoring program is not required by the Municipal Permit. However, dry weather season receiving water data from two AB 411 beach monitoring stations are used by the RPs to augment their monitoring programs and help assess water quality issues in the San Diego Bay WMA. One of the stations is in the Swimmable Waters Focused Priority Condition area, and one is in the Shelter Island Shoreline Park Bacteria TMDL area. The number of samples taken between October 1, 2015, and September 30, 2016, is presented in Table 7-4.

Table 7-4
San Diego Bay WMA AB411 Data Summary for 2015–2016 Monitoring Year

Site ID	Location	Latitude/ Longitude	Number of Samples per FIB Indicator	Total Number of Samples Oct 2015 to Sept 2016
EH-070	Tidelands Park – Coronado Bayside	32.690/ -117.164	9	27
EH-200	Shelter Island Shoreline Park – San Diego Bay	32.715/ -117.224	10	30

Notes:
FIB = fecal indicator bacteria

The resulting concentrations for *Enterococcus*, fecal coliform, and total coliform samples are discussed in Sections and 2.7 and 6. These data will be reviewed during the Receiving water Assessment completed in the Regional Monitoring and Assessment Report.

7.7 Riparian Area Selenium Study

The objective of the Paradise Creek Selenium Special Study was to collect additional selenium data in the portion of Paradise Creek within Kimball Park to submit a data set to the State Board to support efforts to remove the selenium impairment. In addition, one of National City's WQIP goals is to implement strategies that will lead to the removal of the creek from the 303(d) List.

Total selenium concentrations were below the water quality objective of 5.0 micrograms per liter (µg/L) for all 50 samples collected. This result provides a substantial basis for removing the selenium 303(d) Listing and National City has achieved the current Municipal Permit term WQIP goals of collecting and analyzing 48 samples for selenium, with zero exceedances of the water quality objectives.

The final report for the Riparian Area Selenium Study is in Attachment L.

7.8 Water Quality Objectives

WQOs, or benchmarks, were used to assess monitoring results in the San Diego Bay WMA. The WQOs are derived from several regulatory documents, including the Water Quality Control Plan for the Basin Plan, the CTR, and Title 22 regulations, as applicable. The WQOs may differ depending on condition (i.e., dry weather WQOs may be different from wet weather WQOs). Details of the WQOs used for the assessments in the San Diego Bay WMA are in Attachment M.

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8 Publicly Available Data

The Municipal Permit requires the RPs to provide monitoring data and assessment results to the public. The following sections provide the locations where the public may obtain applicable information.

8.1 California Environmental Data Exchange Network (CEDEN) Upload and Retrieval

Provision F.4.a.(6) of the Municipal Permit requires monitoring data collected as part of the San Diego Bay WMA MAP to be uploaded to CEDEN. Data upload confirmations from CEDEN, as required, are included in Attachment N.

CEDEN is a central location for finding and sharing information about California's water bodies and aggregates water quality, aquatic habitat, and wildlife health data. The data are accessible in downloadable forms at www.ceden.org.

Data collected under the San Diego Bay WMA MAP for the October 2015–September 2016 monitoring year will be available in 2017. Data in CEDEN are searchable by date and by location, project, station, or parameter. Data collected as part of the programs described in this Monitoring Results and Assessment Appendix of the San Diego Bay WMA Water Quality Improvement Plan Annual Report can be retrieved using the project names listed in Table 8-1.

Table 8-1
Project Names for CEDEN Data Retrieval

Monitoring Program	CEDEN Project Name **Field Name "ProjectCode"**
Chollas Creek Metals and Bacteria TMDL	Chollas_BacteriaTMDL
Shelter Island Yacht Basin Metals TMDL	ShelterIsland_CuTMDL_MS4
Shelter Island Shoreline Park Bacteria TMDL	SISP_TMDL
MS4 Outfall (Wet and Dry Weather)	MS4_WW_OFM MS4_DW_OFSM
Chollas Jurisdictional Boundary Study (Metals and Bacteria)	Chollas_SpecialStudy
Riparian Area Selenium Study	CWA303d_PCSe_NC

Notes:
CEDEN = California Environmental Data Exchange Network; TMDL = Total Maximum Daily Load

8.2 Regional Clearinghouse

For the 2015–2016 monitoring year, the RPs are providing the following data and documentation on the Project Clean Water website (www.projectcleanwater.org), which can be accessed by the general public:

- 2015–2016 Annual Report, including all appendices and associated attachments, including:
  - JRMP Annual Report for each RP within the WMA
  - Monitoring Results and Assessment Appendix
  - SMC Bioassessment Summary
  - Shelter Island Yacht Basin TMDL Report
  - Shelter Island Shoreline Park TMDL Report
  - Reports from special studies conducted in the WMA not previously submitted (San Diego Regional Reference Streams and Beaches Study, San Diego Bay Debris Study, Pueblo Creek Refuse Assessment Program, Chollas Jurisdictional Boundary Study for Metals and Bacteria, AB 411 Study, Riparian Area Selenium Study)
  - Monitoring data uploaded to CEDEN, with links to the uploaded data
- BMP Design Manual for each Responsible Party within the WMA and all updated versions with date of update
- Available geographic information system (GIS) data, layers, and/or shapefiles used to develop the maps to support the WQIP, Annual Reports, and JRMPs

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APPENDIX 5

ADAPTIVE MANAGEMENT/MODIFICATIONS

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1 Adaptive Management – Changes to Water Quality Improvement Plan Elements

- A select number of jurisdictions have made minor modifications to their strategies or schedules. A full list of updates is provided in Appendix 2.
- The Airport Authority has proposed a modification to their performance goal for airside street sweeping. For a detailed explanation, see Section 5.1.
- Lemon Grove has added strategy LG-47 to potentially trigger green streets, as seen in Appendix 2.
- National City has added strategy NC-40 to address green infrastructure, as seen in Appendix 2.
- Modifications to the San Diego Bay Watershed Management Area Analysis (WMAA) have been made to designate the portion of the Otay River between Lower Otay Reservoir Dam and I-805 as an exempt river reach, based on technical studies submitted to the watershed group and discussed at a previous Consultation Panel meeting. Revisions were made to Section 4.1.1 (Exempt River Reaches) and Attachment B.2 of the WMAA (Hydromodification Management Exemption Mapping), and technical studies prepared in support of the changes were added as a new Attachment to the WMAA (Attachment B.3). The revised WMAA, showing track changes, and Attachments B.2 and B.3 are provided in Attachment A.

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Attachment A – Watershed Management Area Analysis

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San Diego Bay
Watershed Management Area Analysis

Lake Henshaw

April 2015

Prepared for:
San Diego County Copermittees

Prepared by:

Geosyntec consultants
engineers | scientists | innovators

RICK ENGINEERING COMPANY

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ATTACHMENT C **ELECTRONIC FILES**

ATTACHMENT D **REGIONAL MS4 PERMIT CROSSWALK**

ACRONYMS AND ABBREVIATIONS

%	percent
>	greater than
<	less than
BMP	Best Management Practice
CB	Coarse Bedrock
CEG	Certified Engineering Geologist
CIP	Capital Improvement Project
CLRP	Comprehensive Load Reduction Plan
CSI	Coarse Sedimentary Impermeable
CSP	Coarse Sedimentary Permeable
E_P	Erosion Potential
ET	Evapotranspiration
FB	Fine Bedrock
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FSI	Fine Sedimentary Impermeable
FSP	Fine Sedimentary Permeable
GIS	Geographic Information System
GLU	Geomorphic Landscape Unit
HA	Hydrologic Area
HCP	Hydromodification Control Plan
HMP	Hydromodification Management Plan
HRU	Hydrologic Response Unit
HSA	Hydrologic Sub Area
HSG	Hydrologic Soil Group
IRWM	Integrated Regional Water Management
JURMP	Jurisdictional Urban Runoff Management Plan
LDW	Land Development Workgroup
LID	Low Impact Development
MAP	Mean Annual Precipitation

ACRONYMS AND ABBREVIATIONS continued

MHPA	Multiple Habitat Planning Area
MS4	Municipal Separate Storm Sewer System
MSCP	Multiple Species Conservation Program
NED	National Elevation Dataset
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
PDP	Priority Development Project
RCB	Reinforced Concrete Box
RCP	Reinforced Concrete Pipe
SCAMP	Southern California Aerial Mapping Project
SCCWRP	Southern California Coastal Water Research Project
SD	San Diego
SDRWQCB	San Diego Regional Water Quality Control Board
S_P	Sediment Supply Potential
SSURGO	Soil Survey Geographic Database
TMDL	Total Maximum Daily Load
USGS	United States Geological Survey
WMA	Watershed Management Area
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan
WURMP	Watershed Urban Runoff Management Plan

1. Introduction

1.1. Background

On May 8, 2013 the California Regional Water Quality Control Board, San Diego Region adopted Order No. R9-2013-0001; NPDES No. CAS 0109266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region (Regional MS4 Permit). The Regional MS4 Permit, which became effective on June 27, 2013, replaces the previous MS4 Permits that covered portions of the Counties of San Diego, Orange, and Riverside within the San Diego Region. There were two main goals for the Regional MS4 Permit:

1. To have more consistent implementation, as well as improve inter-agency communication (particularly in the case of watersheds that cross jurisdictional boundaries), and minimize resources spent on the permit renewal process.
2. To establish requirements that focused on the achievement of water quality improvement goals and outcomes rather than completing specific actions, thereby giving the Copermittees more control over how their water quality programs are implemented.

To achieve the second goal, the Regional MS4 Permit requires that Water Quality Improvement Plans (WQIPs) be developed for each Watershed Management Area (WMA) within the San Diego Region. As part of the development of WQIPs, the Regional MS4 Permit provides Copermittees an option to perform a Watershed Management Area Analysis (WMAA) through which watershed-specific requirements for structural BMP implementation for Priority Development Projects can be developed for each WMA. This report presents the Copermittees' approach and results for the regional elements of the WMAA developed for the San Diego County area.

1.2. Watershed Management Area Analysis (WMAA)

The Regional MS4 Permit, through inclusion of the WMAA, provides an optional pathway for Copermittees to develop an integrated approach for their land development programs by promoting evaluation of multiple strategies for water quality improvement and development of watershed-scale solutions for improving overall water quality in the watershed. The WMAA comprises the following three components as indicated in the Regional MS4 Permit:

1. Perform analysis and develop Geographic Information System (GIS) layers (maps) by gathering information pertaining to the physical characteristics of the WMA (referred to herein as WMA Characterization). This includes, for example, identifying potential areas of coarse sediment supply, present and anticipated future land uses, and locations of physical structures within receiving streams and upland areas that affect the watershed hydrology (such as bridges, culverts, and flood management basins).
2. Using the WMA Characterization results, compile a list of candidate projects that could potentially be used as alternative compliance options for Priority Development Projects. Such projects may include, for example, opportunities for stream or riparian area rehabilitation, opportunities for retrofitting existing infrastructure to incorporate storm

water retention or treatment, or opportunities for regional BMPs, among others. Prior to implementing these candidate projects the Copermittees must demonstrate that implementing such a candidate project would provide greater overall benefit to the watershed than requiring implementation of the onsite structural BMPs. Note, compilation or evaluation of potential projects was not performed as part of this regional effort. Identification and listing of candidate projects will be performed for each WMA through the WQIP process for WMAs that elect to submit the optional WMAA as part of the WQIP.

3. Additionally, using the WMA Characterization maps, identify areas within the watershed management area where it is appropriate to allow for exemptions from hydromodification management requirements that are in addition to those already allowed by the Regional MS4 Permit for Priority Development Projects. The Copermittees shall identify such cases on a watershed basis and include them in the WMAA with supporting rationale to support claims for exemptions.

1.3. Scope of Work for Regional WMAA

In July 2013, the Copermittees elected to fund a regional effort to develop elements of the regional WMAA for the 9 San Diego-area WMAs within the County of San Diego that are currently subject to the Regional MS4 Permit, which include:

- Santa Margarita River (for portion in San Diego County)
- San Luis Rey River
- Carlsbad
- San Dieguito River
- Los Peñasquitos
- Mission Bay & La Jolla Watershed
- San Diego River
- San Diego Bay
- Tijuana River (for portion in San Diego County)

The regional-level information developed through this effort is intended to provide consistency across WMAs and serve as the foundation for developing watershed-specific information for each WMA to be developed through the WQIP process. The regional effort scope of work included:

1. Development of GIS map layers that characterize the WMAs using data previously collected, readily available, and provided by the Copermittees, including:
    a. Description of dominant hydrologic processes, such as areas where infiltration or overland flow likely dominates;
    b. Description of existing streams in the watershed, including bed material and composition, and if they are perennial or ephemeral;
    c. Current and anticipated future land uses;
    d. Potential coarse sediment yield areas; and

   e. Locations of existing flood control structures and channel structures, such as stream armoring, constrictions, grade control structures, and hydromodification or flood management basins.

2. Development of a Microsoft® Excel (Excel) template for use by Copermittees to compile lists of candidate projects for an optional alternative compliance program.
3. Development of additional criteria and analyses to support reinstating the following proposed exemptions that were originally developed in the approved 2011 Final Hydromodification Management Plan but not included in the Regional MS4 Permit unless provided by the Copermittees in the WMAA. In addition, development of the associated Hydromodification Applicability/Exemption Mapping.
   a. Exempt River Reaches including:
      i. San Diego River;
      ii. Otay River;
      iii. San Dieguito River;
      iv. San Luis Rey River; and
      v. Sweetwater River
   b. Stabilized Conveyance Systems Draining to Exempt Water Bodies
   c. Highly Impervious/Highly Urbanized Watersheds and Urban Infill, and
   d. Tidally Influenced Lagoons (where data/study provided)

The scope of work for the regional effort excluded performing analysis within the following areas unless data was readily available, as Copermittees do not have jurisdiction over these areas:

1. State Lands;
2. U.S. Departments of Defense land;
3. U.S. National Forest land;
4. U.S. Department of Interior land and
5. Tribal land

Additional description of excluded areas, for the purposes of the Regional WMAA, is indicated in Section 2.3 Land Uses.

1.4. Project Process

The process for developing the Regional WMAA included close coordination with the Land Development Workgroup (LDW) at key points during the project. The LDW is composed of the 21 San Diego-area Copermittees and serves to develop and implement regional land development plans and programs necessary to support the requirements of the Regional MS4 Permit. The consultant team (Geosyntec Consultants and Rick Engineering Company) presented preliminary project assumptions and methodologies proposed to be used to develop the Regional WMAA to meet the requirements of the Regional MS4 Permit in December 2013. The consultant team incorporated workgroup feedback from this meeting and subsequently presented the preliminary

Regional WMAA project results to the LDW in March 2014, again to receive direction and incorporate input on the preliminary results. Subsequently, the draft report was released to the public in July 2014, by a public workshop that included Consultation Panel members from each of the WMAs on July 29, 2014. This version of the report including all of the input described above is being issued for optional inclusion into the respective WQIP Provision B.3 submittals to the SDRWQCB in December 2014.

1.5. Report Organization

This report is organized as follows:

- Chapter 1 provides the project background and purpose;
- Chapter 2 describes the technical basis for characterizing the WMA;
- Chapter 3 describes the template that can be used by Copermittees to compile the list of candidate projects;
- Chapter 4 summarizes the analyses performed to support reinstating select exemptions from hydromodification control requirements for PDPs;
- Chapter 5 presents the WMAA conclusions;
- Chapter 6 presents the references used for the WMAA;
- Attachment A presents the exhibits and additional supporting information for watershed management area characterization;
- Attachment B presents the exhibits and additional supporting information for hydromodification management applicability/exemptions;
- Attachment C expands on the structure of the geodatabase that hosts the GIS data developed by the WMAA; and
- Attachment D provides a crosswalk between the Regional MS4 Permit requirements for WMAA and this report.

1.6.Terms of Reference

The work described in this report was conducted by Geosyntec Consultants (Geosyntec) and Rick Engineering Company (RICK) on behalf of the County of San Diego and the regional Copermittees.

2. Watershed Management Area Characterization

Watershed health and function are strongly influenced by hydrological and geomorphological processes occurring in the watershed. Both hydrological response and geomorphological response of the watershed are dependent on a variety of physical characteristics of the watershed. To this end, the Regional MS4 Permit specifies a set of data that is required to adequately characterize overall watershed processes as a foundation to enhancing integration and effectiveness of watershed management and water quality programs. The following GIS map layers were developed to characterize the hydrological and geomorphological processes within the San Diego Bay WMA:

- Dominant Hydrologic Processes: A description of dominant hydrologic processes, such as areas where infiltration or overland flow likely dominates;
- Stream Characterization: A description of existing streams in the watershed, including bed material and composition, and if they are perennial or ephemeral;
- Land Uses: Current and anticipated future land uses;
- Potential Critical Coarse Sediment Yield Areas; and
- Physical Structures: Locations of existing flood control structures and channel structures, such as stream armoring, constrictions, grade control structures, and hydromodification or flood management basins.

These GIS layers can be used to:

- Identify the nature and distribution of key macro-scale watershed processes;
- Identify potential opportunities and constraints for regional and sub-regional storm water management facilities that can play a critical role in meeting water quality, hydromodification, water supply, and/or habitat goals within the watershed;
- Assist with determining the most appropriate management actions for specific portions of the watershed; and
- Suggest where further study is appropriate.

2.1. Dominant Hydrologic Processes

The Regional MS4 Permit identifies in the provisions related to the WMAA that a description of dominant hydrologic processes within the watershed must be developed, with GIS layers (maps) as output. The Permit specifically calls for processes "*such as areas where infiltration or overland flow likely dominates*." These particular aspects of the hydrological mechanics of watersheds are particularly important when attempting to understand the macro-scale opportunities for locating projects that take advantage of either capturing overland flow for treatment or for infiltration.

Investigation of the dominant hydrologic processes in the San Diego-area watersheds indicates that evapotranspiration (ET) is the most dominant hydrologic process for the region based on review of a published study (Sanford and Selnick, 2013). ET is the sum of evaporation and plant transpiration in the hydrologic cycle that transports water from land surfaces to the atmosphere. This is conclusion is supported by comparing the 30-year average annual rainfall for the study area (San Diego County east of the peninsular divide) of between 15 and 18 inches per year (San Diego County, 2005) to the average annual ET rates. According to the California Irrigation Management Information System (CIMIS) Reference Evapotranspiration Map (CIMIS, 1999), the study area (within Zones 4, 6, and 9) experiences annual reference ET of 46.6, 49.7 and 59.9 inches, respectively. Therefore, theoretically, if all of the annual precipitation for the San Diego-area watersheds remained stationary where it fell and did not either infiltrate or runoff to local waterbodies where it would be conveyed downstream ultimately to the ocean, it all would be consumed by ET. As such, the effect of ET on the overall hydrologic processes within the San Diego watersheds is a function of the temporal scale over which it acts. Precipitation events often produce runoff in these watersheds, particularly in the urbanized portions, based on the topography and land cover that tend to accelerate the conveyance of runoff downstream rather than collecting, storing, or spreading out that then would maximize the effect of ET.

Because this study is focused on developing information and mapping for the portion of the hydrologic process that informs watershed management decisions, i.e., locating beneficial projects in areas of greatest opportunity, the next tier of dominant hydrologic processes are studied and mapped by this project. As such, the study area was characterized, based on the methodology described in the following section, according to the predicted fate of runoff within the watersheds being either overland flow or infiltration after considering the effects of ET (as well as an intermediate category of interflow). Areas that were mapped as overland flow do not necessarily preclude infiltration but rather indicate the dominant expected process that runoff would experience if not intercepted for the express purpose of infiltrating storm water runoff. The Model BMP Design Manual will provide more detailed guidance and procedures for determining the potential for infiltrating captured storm water at the project level irrespective of the mapping produced in the WMAA. To reiterate, the WMAA mapping is to provide macro-scale processes for high-level analysis and to inform decisions affecting regional scales. Furthermore, the Model BMP Design Manual will indicate the degree to which site-scale BMPs can expect to benefit from ET or how ET is considered in the sizing of BMPs. In brief, typical storm water BMPs only store water for a few days and therefore are not really capable of significant volume disposal through ET. However, pervious area dispersion (i.e., directing storm water runoff to flat areas for spreading and infiltration) has appreciable benefits with regard to ET and is a practice promoted in the BMP Design Manual.

The processes of interest are further defined as follows:

Overland flow: This process can be thought of as the inverse of infiltration; precipitation reaching the ground surface that does not immediately soak in must run over the land surface (thus, "overland" flow). It reflects the relative rates of rainfall intensity and the soil's infiltration capacity: wherever and whenever the rainfall intensity exceeds the soil's infiltration capacity, some overland flow will occur. Most uncompacted, vegetated soils have infiltration capacities of one to several inches per hour at the ground surface, which exceeds the rainfall intensity of even unusually intense storms. In contrast, pavement and hard surfaces reduce the effective infiltration capacity of the ground surface to zero, ensuring overland flow regardless of the meteorological attributes of a storm, together with a much faster rate of runoff relative to vegetated surfaces.

Infiltration and groundwater recharge: These closely linked hydrologic processes are most apparent near ephemeral and perennial conveyances in the San Diego region. Their widespread occurrence is expressed by the common absence of surface-water channels on even steep (undisturbed) hillslopes. Thus, on virtually any geologic material on all but the steepest slopes (or bare rock), infiltration of rainfall into the soil is inferred to be widespread, if not ubiquitous. With urbanization, changes to the process of infiltration are also quite simple to characterize: some (typically large) fraction of that once infiltrating water is now converted to overland flow.

Interflow: Interflow takes place following storm events as shallow subsurface flow (usually within 3 to 6 feet of the surface) occurring in a more permeable soil layer above a less permeable substrate. In the storm response of a stream, interflow provides a transition between the rapid response from surface runoff and much slower stream discharge from deeper groundwater. In some geologic settings, the distinction between "interflow" and "deep groundwater" is artificial and largely meaningless; in others, however, there is a strong physical discrimination between "shallow" and "deep" groundwater movement. Development reduces infiltration and thus interflow as discussed previously, as well as reducing the footprint of the area supporting interflow volume.

The datasets used, methodology for creating the dominant hydrologic processes maps, and the results are described in the sections below.

2.1.1. Datasets Used for identifying dominant hydrologic processes

The following datasets were used in the analysis:

Dataset	Source	Year	Description
Elevation	USGS	2013	1/3rd Arc Second (~10 meter cells) digital elevation model for San Diego County
Soils Data	SanGIS	2013	NRCS (SSURGO) Database for San Diego County downloaded from SanGIS
Land Cover	SanGIS	2013	Ecology-Vegetation layer for San Diego County downloaded from SanGIS
Geology	Kennedy, M.P., and Tan, S.S.	2002	Geologic Map of the Oceanside 30'x60' Quadrangle, California, California Geological Survey, Regional Geologic Map No. 2, 1:100,000 scale.

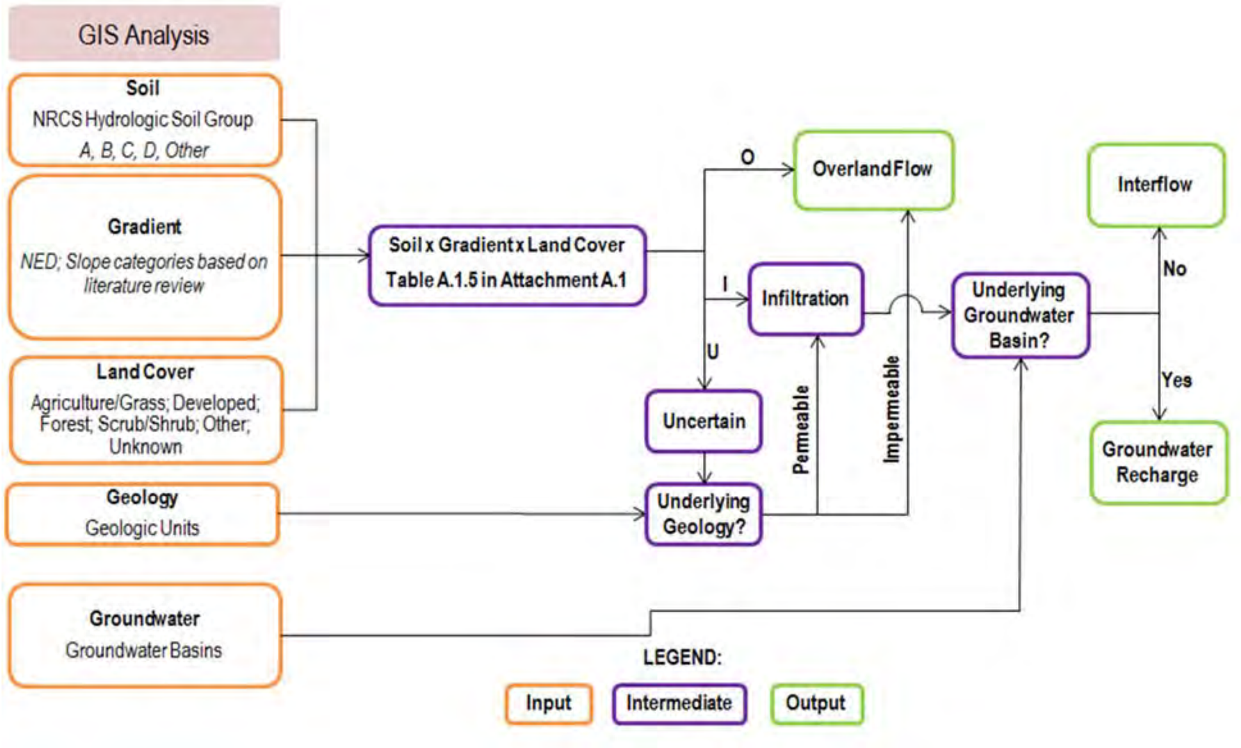
Dataset	Source	Year	Description
	Kennedy, M.P., and Tan, S.S.	2008	Geologic Map of the San Diego 30'x60' Quadrangle, California, California Geological Survey, Regional Geologic Map No. 3, 1:100,000 scale.
	Todd, V.R.	2004	Preliminary Geologic Map of the El Cajon 30'x60' Quadrangle, Southern California, United States Geological Survey, Southern California Aerial Mapping Project (SCAMP), Open File Report 2004-1361, 1:100,000 scale.
	Jennings et al.	2010	"Geologic Map of California," California Geological Survey, Map No. 2 – Geologic Map of California, 1:750,000 scale
Groundwater Basins	SanGIS	2013	Groundwater Basins in San Diego County downloaded from SanGIS

2.1.2. Methodology/Assumptions/Criteria for identifying dominant hydrologic processes

The methodology used to describe dominant hydrologic processes is based on recommendations included in the Southern California Coastal Water Research Project's (SCCWRP) Technical Report 605 titled "Hydromodification Screening Tools: GIS-Based Catchment Analyses of Potential Changes in Runoff and Sediment Discharge" (SCCWRP, 2010). The foundation for this analysis was to incorporate the Report's concept of grouping common hydrologic attributes into Hydrologic Response Units (HRUs). The report states the following:

> *"Grouping common hydrologic attributes across a watershed into a tractable number of Hydrologic Response Units (HRUs: a term first used by England and Holtan 1969) has become a well-established approach for condensing the near-infinite variability of a natural watershed into a tractable number of different elements. The normal procedure for developing HRUs is to identify presumptively similar rainfall–runoff characteristics across a watershed by combining spatially distributed climate, geology, soils, land use, and topographic data into areas that are approximately homogeneous in their hydrologic properties (Green and Cruise 1995, Becker and Braun 1999, Beven 2001, Haverkamp et al. 2005). As noted by Beighley et al (2005), this process of merging the landscape into discrete HRUs is a common and effective method for reducing model complexity and data requirements. Using watershed characteristics to predict runoff is the explicit task of hydrologic models, and there is a host of such models available for application to hydromodification evaluation. For purposes of "screening," however, the goal is simplicity and ease of application even if the precision of the resulting analysis is crude."*

The following process describes the methodology used to define Hydrologic Response Units (HRUs) and then relate the HRUs to the dominant hydrologic processes (i.e., overland flow, interflow, and groundwater recharge) in the San Diego Bay WMA.



The first step is to define the HRUs. Once these are defined, the remaining steps determine the dominant hydrologic process.

1. **Integrate data sets used to determine HRU**: Categories for soil type, gradient, and land cover were defined based on readily available GIS datasets for the region and classifications found in relevant literature, as indicated below. The different combinations of these three categories comprise the distinct HRUs.

   - **Soil Categories**: based on National Resource Conservation Service (NRCS) Hydrologic Soil Group (HSG) classifications, which are commonly used to describe runoff/infiltration potential of soils on a regional scale. These categories include: A, B, C, and D. HSG A soils have the lowest runoff potential, while HSG D soils have the highest runoff potential.

   - **Gradient Categories**: based on slope ranges found in a review of relevant literature identified in Chapter 6. The spatial processing of the slope categories utilized the United States Geologic Survey (USGS) National Elevation Dataset (NED). Slopes were grouped (bins) into the following ranges: 0% to 2%; 2% to 6%; 6% to 10%; and greater than 10%. The 2% and 6% slope thresholds were based on slope ranges included in Table A.1.1 (McCuen, 2005) presented in Attachment A.1. This table provides runoff coefficients as a function of slope, soil group, land cover, and return period and was used for subsequent steps in the mapping effort. The 10% slope threshold was used in SCCWRP's Technical Report 605 (SCCWRP, 2010) and is a logical cutoff since slopes steeper than 10% are assumed to be dominated by overland flow.

- **Land Cover Categories**: were defined using the Ecology Vegetation GIS map layer developed by the City of San Diego, the County of San Diego and SANDAG and downloaded from SanGIS (2013). The vegetation categories in the GIS layer were grouped (Table A.1.2 in Attachment A.1) to match the following categories used in SCCWRP's Technical Report 605 (SCCWRP, 2010): Agriculture/Grass; Developed; Forest; Scrub/Shrub, Other (Water), and Unknown.

2. **Evaluate Land Cover**: Land cover categories for Agriculture/Grass, Forest, Scrub/Shrub and Other were related to land use categories defined in Table A.1.1 as shown in Table A.1.3 in Attachment A.1. Relating a land use category for the Developed land cover category was not necessary because all Developed cover was assumed to have overland flow as its dominant hydrologic process.

3. **Determine Hydrology Characteristics for Land Covers**: For each of the land cover/land use categories listed in Table A.1.3, the ratio of precipitation lost to evapotranspiration (i.e. an evapotranspiration coefficient) was estimated using Table A.1.1 using the process described below. Since precipitation is considered to be the sum of the resulting runoff, infiltration, and evapotranspiration, the coefficients for these three hydrologic pathways sum to one, as indicated below.

   Runoff Coefficient + Infiltration Coefficient + Evapotranspiration Coefficient = 1

   i) **Estimate Evapotranspiration**: To estimate the evapotranspiration (ET) coefficient for each land cover, first the runoff coefficient was identified in Table A.1.1 for the highest runoff potential (i.e., Group D soil and 6%+ slope) and most common storm conditions (i.e., storm recurrence intervals less than 25 years). The infiltration for these high runoff conditions was assumed to be negligible, resulting in an infiltration coefficient of zero. Since the sum of the three coefficients should sum to one, the ET coefficient was assumed to be the remaining difference (i.e., ET Coefficient = 1 – Runoff Coefficient). The ET coefficient calculated for the highest runoff potential was then applied to all soil types and slopes within that land use category. The calculated ET coefficient for each applicable HRU is provided in Table A.1.4 in Attachment A.1. The ET coefficient for HRUs that have a Developed land cover or a gradient greater than 10% were not calculated since these HRUs were assumed to have overland flow as the dominant hydrologic process.

   ii) **Estimate Infiltration**: The infiltration coefficient for each applicable HRU (i.e., combination of soil, gradient, and land cover) was estimated by subtracting both the runoff coefficient, provided in Table A.1.1, and the ET coefficient, calculated in step 3(i), from one (i.e., Infiltration Coefficient = 1 – Runoff Coefficient – ET Coefficient). The calculated infiltration coefficient for each applicable HRU is provided in Table A.1.4 in Attachment A.1.

   iii) **Estimate Runoff**: For each applicable HRU, the runoff coefficient was divided by the infiltration coefficient to obtain a ratio representing the potential for runoff or infiltration. The higher the ratio, the greater the potential for runoff to be a more dominant hydrologic process than infiltration. Similarly, the lower the ratio, the greater the potential for infiltration to be a more dominant hydrologic process than runoff. The calculated runoff to infiltration ratios are provided in Table A.1.4 in Attachment A.1.

4. **Associate Runoff and Infiltration to HRUs**: The following designations were assigned to each applicable HRU based on the runoff to infiltration ratio (i.e., runoff coefficient/infiltration coefficient). These designations were based on best engineering judgment with the underlying assumption that if a runoff or infiltration coefficient is more than 50% greater than its counterpart, then the prevailing process is considered dominant.

   - HRUs with runoff to infiltration ratios greater than 1.5 (3:2 ratio) were assumed to have relatively high runoff and overland flow was considered its dominant hydrologic process. These HRUs are designated by the letter “O” (Overland flow is dominant process) in Tables A.1.4 and A.1.5 in Attachment A.1.

   - HRUs with runoff to infiltration ratios less than 0.67 (2:3 ratio) were assumed to have relatively high infiltration and its dominant hydrologic process was either interflow or groundwater recharge, based on analysis described in subsequent steps. These HRUs are designated by the letter “I” (Interflow is dominant process) in Tables A.1.4 and A.1.5.

   - For HRUs with runoff to infiltration ratios between, and including, 1.5 and 0.67 it was uncertain whether it was dominated by overland flow or infiltration. These HRUs are designated by the letter “U” (Dominant process is uncertain) in Tables A.1.4 and A.1.5.

   - For HRUs that have a Developed land cover or a gradient greater than 10%, the runoff to infiltration ratios were not calculated because these HRUs were assumed to have overland flow as the dominant hydrologic process. These HRUs are designated by the letter “O” (Overland flow is dominant process) in Table A.1.5.

5. **Uncertain HRUs Assignment**: For HRUs with an uncertain designation (“U”) in Table A.1.5 in Attachment A.1, the underlying regional geology (Kennedy and Tan, 2002 & 2008; Todd, 2004 and Jennings et al., 2010) was used to evaluate whether overland flow or infiltration were dominant. If the underlying geology was considered impermeable, then these uncertain areas were considered to have overland flow as its dominant hydrologic process. If the underlying geology was considered permeable, then these uncertain areas were considered to be dominated by infiltration. The determination of whether a geologic unit is impermeable or permeable was based on desktop evaluation and the best professional judgment of a Certified Engineering Geologist (CEG). This analysis was performed in GIS and is illustrated in the flowchart above.

6. **Associate Infiltration HRUs with Known Groundwater Basins**: For HRUs with relatively high infiltration and have a designation of “I” in Table A.1.5 in Attachment A.1,

the presence or absence of a regional groundwater basin (SanGIS, 2013) underlying these areas determined whether the dominant hydrologic process was designated as interflow or groundwater recharge. The groundwater recharge hydrologic process was assigned as dominant for those applicable areas which had an underlying groundwater basin. The interflow hydrologic process was assigned as dominant for those applicable areas which did not have an underlying groundwater basin directly below it. This analysis was performed in GIS and is illustrated in the flowchart above.

7. **Resulting HRU Data:** The resulting GIS map of dominant hydrologic processes was reviewed by engineering professionals familiar with the hydrology in the County of San Diego to confirm that the mapping is consistent with their experience working in the region.

2.1.3. Results for identifying dominant hydrologic processes

The resulting GIS map showing the spatial distribution of dominant hydrologic processes (i.e., overland flow, interflow, and groundwater recharge) within the San Diego Bay WMA is provided in Attachment A.1. An ArcMap document file which presents the results from each step of the methodology is included in Attachment C, as well as a Google Earth KMZ file. Based on this analysis, overland flow is the predominant hydrologic process in all this WMA, which is consistent with the experience of engineering professionals familiar with the hydrology of the County of San Diego.

Summary of Deliverables for Dominant Hydrologic Processes

<table>
<tr><th>Format</th><th>Item</th><th>Description</th><th>Location</th></tr>
<tr><td>Report</td><td>Figure</td><td>"Dominant Hydrologic Processes"</td><td>Attachment A.1</td></tr>
<tr><td rowspan="6">GIS</td><td>Map Group Title</td><td>Hydrologic Processes</td><td rowspan="6">Attachment C.1</td></tr>
<tr><td>Map Layer Title</td><td>Soil
Land Cover
Slope
Hydrologic Response Unit
Initial Rating
Permeability
Groundwater Basin
Dominant Hydrologic Processes</td></tr>
<tr><td>Geodatabase Feature Dataset</td><td>HydrologicProcesses</td></tr>
<tr><td>Geodatabase Feature Class</td><td>HRUAnalysis</td></tr>
<tr><td>Geodatabase Geometry Type</td><td>Polygon</td></tr>
<tr><td>KMZ [1]</td><td>KMZ File Name</td><td>Dominant Hydrologic Processes</td><td>Attachment C.2</td></tr>
<tr><td colspan="4">[1] To enhance the utilization of this data, the Dominant Hydrological Processes map is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zipped) file that can be viewed with the free download version of Google Earth (http://www.google.com/earth/).</td></tr>
</table>

2.1.4. Limitations for identifying dominant hydrologic processes

The resulting GIS map layer only lists the dominant hydrological process (i.e., an HRU assigned a dominant process of overland flow can also experience small amounts of infiltration) and provides a useful, rapid framework to perform screening-level analysis that is appropriate for watershed-scale planning studies. When more precise estimates are required for a particular site and subarea it is recommended that this analysis be augmented with site-specific analysis.

2.2. Stream Characterization

For the purpose of WMAA, the Regional MS4 Permit requires a description of existing streams in the watershed, including bed material and composition, and if they are perennial or ephemeral. Under the Regional WMAA, this analysis was prepared for 27 streams throughout the San Diego Region agreed upon by the consultant team and Copermittees. Within the San Diego Bay WMA, stream characterization and detailed mapping is provided for Chollas Creek, Sweetwater River – Reach 1 (San Diego Bay to Sweetwater Reservoir), Sweetwater River – Reach 2 (Sweetwater Reservoir to Loveland Reservoir), Otay River, and Jamul / Dulzura Creek as shown on the exhibit titled "Watershed Management Area Streams" located in Attachment A.2.

2.2.1. Datasets Used for stream characterization

The following data were referenced for the purpose of stream characterization:

- USGS National Hydrography Dataset, downloaded from USGS November 2013
- USGS 7.5-minute quadrangles, compiled image of quadrangles covering San Diego County, various dates
- Floodplains: "National Flood Hazard Layer," provided by Federal Emergency Management Agency October 2012
- Various datasets provided by Copermittees depicting existing storm water conveyance infrastructure within their jurisdictions.
- Aerial photography by Digital Globe dated 2012

2.2.2. Methodology/Assumptions/Criteria for stream characterization

The analysis was prepared by digitizing each of the 27 streams based on review of data listed above. Within the pre-existing datasets depicting streams, floodplains, or infrastructure, no single dataset included a complete, accurate alignment of each stream. Digitizing the streams based on review of all of the data listed above allowed creation of GIS linework with a continuous corrected alignment for each stream. The following data were recorded as GIS attributes for each stream as the stream was digitized:

- River name
- Reach type (engineered or natural, constrained or un-constrained)
- Bed material
- Bank material
- Hydrographic category (perennial or intermittent)

The attributes listed above were collected manually based on interpretation of the reference data. Assumptions used in making the interpretations are listed below. The ***Hydrographic Category*** section below will provide the rationale as to why perennial and intermittent were the hydrographic categories chosen for this WMAA and not perennial and ephemeral.

Note that stream classification was not prepared within areas of Federal/State/Indian lands unless data was readily available. Stream lines were prepared within these areas for continuity, but some data fields were not populated within these areas.

Reach Type

Streams were classified as either engineered or natural, and either constrained or un-constrained. See the exhibit titled, "Watershed Management Area Streams by Reach Type" in Attachment A.2. The purpose of this exercise was to identify whether the stream has been modified by human activity within the stream itself, which may include addition of crossing structures, stabilization of banks, dredging, or any other human activity. This aids the identification of physical structures including stream armoring, constrictions, grade control, and other modifications as required by the Regional MS4 Permit.

Classification of the streams as either "**engineered"** or **"natural"** was based on the following criteria:

<u>Engineered</u>

- A classification of "engineered" was assigned where the stream itself has been modified by human activity.
- All culvert/bridge/pipe crossings either provided in the Copermittes' storm water conveyance system data or clearly visible on the aerial photo have been assigned as engineered within the limits of the crossing.
- If the Copermittees did not provide storm water conveyance system data for the dirt road crossings/dip sections the streams have been assigned as engineered within the limits of the crossing. These crossings may or may not have culverts.
- If the Copermittees' storm water conveyance system data stated the facility is a detention or desilting basin, they were assigned as engineered.
- Golf courses have been assigned as engineered.
- If aerial photography showed large water bodies (lake, pond, irrigation pond, etc.) they were assigned as engineered.
- If the storm water conveyance system data provided by the Copermittees has identified the stream as "rockbs", the assumption has been made that these streams have rocks on their bottom and the sides ("bs"), and have been assigned as engineered.
- Sand mining operations have been assigned as engineered. Sand mining is an operation that is in continuous flux and does not typically result in a discrete, engineered geometry in any given channel cross section until restoration is implemented at the conclusion of the sand mining operation. It is assigned as engineered to acknowledge human alteration of the stream.

<u>Natural</u>

- Streams that have no apparent alteration within the stream itself by human activity have been assigned as natural.

Classification of the streams as either **"constrained"** or **"un-constrained"** was based on the following criteria:

<u>Constrained</u>

- All culvers/bridge/pipe crossings either provided in the Copermittes' storm water conveyance system data or clearly visible on the aerial photo have been assigned as constrained.
- If the Copermittees did not provide storm water conveyance system data for the dirt road crossings/dip sections the streams have been assigned as constrained. These crossings may or may not have culverts.
- If the Copermittees' storm water conveyance system data stated the facility is a detention or desilting basin, they were assigned as constrained.
- Golf courses have been assigned as constrained if located within the Federal Emergency Management Agency (FEMA) floodway based on the "National Flood Hazard Layer" data.
- The USGS National Hydrographic Dataset in their hydrographic category had assigned some reaches as artificial paths. In these situations and if the aerial photography shows large water bodies (lake, pond, irrigation pond, etc.) these streams have been assigned as constrained.
- Sand mining operations located within the FEMA floodway based on the "National Flood Hazard Layer" have been assigned as constrained.

<u>Un-constrained</u>

- Golf courses have been assigned as un-constrained if not located within the FEMA floodway based on the "National Flood Hazard Layer" data.
- Sand mining operations not located within the FEMA floodway based on the "National Flood Hazard Layer" data have been assigned un-constrained.
- If the stream is located within the FEMA floodway based on the "National Flood Hazard Layer" and there is available land in the floodway fringe (the area between the floodway and the 100-yeaer floodplain) the area has been assigned un-constrained. Note that there may be only one side or both sides of the stream with available land in the floodway fringe therefore a note was added as to which side of the stream is constrained and un-constrained.
- If the stream is located within a FEMA 100-year floodplain based on the "National Flood Hazard Layer" data with no floodway and the FEMA floodplain width is not within an existing development or bordered by roads have been assigned as un-constrained.

Bed Material and Bank Material

The following bed and bank materials were identified:

- Concrete
- Riprap
- Pipe / culvert
- Earth

The assumptions made to identify the streams bed and bank materials were based on the following criteria:

- If the data provided by the Copermittees provided information about the stream bed and bank material, the provided data was used for the bed and bank material.
- Generally the data provided by the Copermittees did not identify the crossing type (pipe, box culvert, bridge with or without piers, etc.) or the material (RCP, RCB, earth, riprap, concrete, etc.). In that case, all culvert/bridge/pipe crossings were assigned as pipe/culvert for the bed and bank material.
- If the Copermittees did not provide data for the dirt road crossings/dip sections the bed and bank material have been assigned as pipe/culvert. These crossings may or may not have culverts.
- If the Copermittees' storm water conveyance system data stated the facility is a detention or desilting basin, the bed and bank material have been assigned as earth.
- If aerial photography showed large water bodies (lake, pond, irrigation pond, etc.) they were assigned as earth bed and bank material. The USGS National Hydrographic Dataset in their hydrographic category had assigned some of these types of reaches as artificial paths.
- Sand mining operations within the stream have been assigned as earth for bed and bank material.
- If the Copermittees did not provide data for the stream material the bed and bank material have been assigned based on the aerial photography.

See exhibits titled, "Watershed Management Area Streams by Bed Material" in Attachment A.2.

After stream bed and bank material was classified, earthen reaches were further classified by geologic group. This was accomplished by intersecting the streams with the geologic group layer that had been prepared for use in the dominant hydrologic process and potential coarse sediment yield analyses. The result is displayed in exhibits titled, "Watershed Management Area Streams by Geologic Group" in Attachment A.2.

Hydrographic Category

Streams were classified as "perennial" or "intermittent." See exhibits titled, "Watershed Management Area Streams by Hydrographic Category" in Attachment A.2. Classification was obtained from the USGS National Hydrography Dataset (NHD). The definitions of these categories in the USGS National Hydrography Dataset are:

- **Perennial**: Contains water throughout the year, except for infrequent periods of severe drought.
- **Intermittent**: Contains water for only part of the year, but more than just after rainstorms and at snowmelt.

While the specific Regional MS4 Permit language requested classification of perennial or ephemeral, rather than perennial or intermittent, the data that was referenced in order to classify streams did not include "ephemeral" streams. For reference, the USGS National Hydrography

Dataset definition of "ephemeral" is: "contains water only during or after a local rainstorm or heavy snowmelt." None of the stream reaches in the study were classified as ephemeral in the NHD dataset, therefore none are classified as ephemeral in the WMAA product. The City of San Diego provided a map titled “City of San Diego Stream Survey” dated April 3, 2013 prepared by AMEC that shows streams that are “dry” and streams that are “flowing”. This information in conjunction with the other parameters listed in this section was used to determine if a stream was perennial or intermittent.

USGS NHD includes hydrographic category classification for many of the streams. However data was not available for all reaches of all streams. In order to classify reaches of streams that did not already contain this data in NHD, these assumptions were made:

- The USGS NHD information for the stream hydrographic category has been used when available.
- When USGS NHD has “artificial paths” for portions of the stream, the hydrographic category of the upstream portion of the stream have been assigned to the stream unless other assumptions took precedence.
- If aerial photography shows large waterbody (lake, pond, irrigation pond, etc.) perennial has been assumed for the hydrographic category.
- For ponded areas shown on the aerial photography and if the USGS 7.5-minute quadrangles shows cross hatching for the area, intermittent has been assigned unless the upstream portion of the stream was assigned as perennial pursuant to the USGS National Hydrography Dataset then assigned perennial for the ponded area.
- USGS has a dashed line for intermittent streams. USGS has a solid line for perennial streams. In some situations this information was used to assist in the determination of assigning perennial or intermittent to a stream.

2.2.3. Results for stream characterization

The 27 streams and data are contained in a GIS file titled "SD_Regional_WMAA_Streams" located in Attachment C. The streams are shown in watershed maps included in Attachment A.2.

Summary of Deliverables for Stream Characterization

Format	Item	Description	Location
Report	Title of Figures	• "Watershed Management Area Streams" • "Watershed Management Area Streams by Hydrographic Category" • "Watershed Management Area Streams by Bed Material" • "Watershed Management Area Streams by Geologic Group" • "Watershed Management Area Streams by Reach Type"	Attachment A.2
GIS	Map Group Title	Not Grouped	Attachment C.1
	Map Layer Title	SD_Regional_WMAA_Streams	

Format	Item	Description	Location
	Geodatabase Feature Dataset	Streams	
	Geodatabase Feature Class	SD_Regional_WMAA_Streams	
	Geodatabase Geometry Type	Line	
KMZ [1]	KMZ File Name	SD_Regional_WMAA_Streams	Attachment C.2
[1] To enhance the utilization of this data, the Stream Characterization map is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zipped) file that can be viewed with the free download version of Google Earth (http://www.google.com/earth/).			

In addition to the 27 streams that were subject of detailed analysis, NHD streams have been included on maps and within the geodatabase for reference. The NHD stream alignments have not been corrected and in some cases may be inconsistent with the existing infrastructure. The NHD streams are contained in a GIS file titled, "SD_NHD_Streams."

2.2.4. Limitations for stream characterization

- Only a desktop analysis was performed and no field verification was conducted.
- Infrastructure is only based on storm water conveyance system data provided by Copermittees or clearly visible on aerial photography. If the Copermittee used a numbering or lettering system for describing bed and bank material for example, since the metadata was not provided the bed and bank material could not be verified.
- In some instances concrete channels cannot be identified on aerial photography if it is filled with sediment and/ or vegetation.

2.3.Land Uses

For the purpose of the WMAA, the Regional MS4 Permit requires a description of current and anticipated future land uses. This is presented in the final GIS deliverable as "Land Use Planning" and includes the following representations of land uses in the watersheds: existing land uses, planned land uses, developable lands, redevelopment and infill areas, floodplains, Multiple Species Conservation Program (MSCP) designated areas, and areas not within the Copermittees' jurisdictions (tribal lands, state lands, and federal lands).

2.3.1. Datasets Used for land uses

The following existing regional datasets were referenced to meet this requirement:

- Municipal boundaries: "Municipal_Boundaries" dated August 2012, available from SanGIS/SANDAG
- Ownership: "Parcels" dated December 2013, available from SanGIS/SANDAG
- Existing land use: "SANGIS.LANDUSE_CURRENT" dated December 2012, available from SanGIS/SANDAG (existing land use)
- Planned land use: "PLANLU" (Planned Land Use for the Series 12 Regional Growth Forecast (2050)), dated December 2010, available from SanGIS/SANDAG
- Developable land: "DEVABLE" (Land available for potential development for the Series 12 Regional Growth Forecast), dated December 2010, available from SanGIS/SANDAG
- Redevelopment and infill areas: "REDEVINF" (Redevelopment and infill areas for the Series 12 Regional Growth Forecast), dated December 2010, available from SanGIS/SANDAG
- Floodplains: "National Flood Hazard Layer" provided by Federal Emergency Management Agency October 2012
- Multiple Species Conservation Program (MSCP), total of four datasets available from SanGIS/SANDAG: "MHPA_SD," dated 2012, (Multiple Habitat Planning Areas for City of San Diego); "MSCP_CN," dated 2009 (designations of the County of San Diego's Multiple Species Conservation Program South County Subregional Plan); "MSCP_EAST_DRAFT_CN," dated 2009 (draft East County MSCP Plan); and "Draft_North_County_MSCP_Version_8.0_Categories," dated 2008 (draft North County MSCP Plan)

2.3.2. Methodology/Assumptions/Criteria for land uses

The existing regional datasets for existing land use, planned land use, developable land, redevelopment and infill areas, floodplains, and MSCP designated areas were referenced with no modifications. Areas not within the Copermittees' jurisdictions (tribal lands, state lands, and federal lands) were compiled from SanGIS parcel data (December 2013) based on the "ownership" value. The owners listed below were excluded from the Copermittees jurisdictions and represent the "Federal/State/Indian" layer, which is displayed on various maps included in Attachment A.2.

- Bureau of Land Management
- California Department of Fish and Game
- Indian Reservations
- Military Reservations
- Other Federal

- State
- State of California Land Commission
- State Parks
- U.S. Fish and Wildlife Service
- U.S. Forest Service

When available, relevant data from these areas was included in analyses (e.g., developable land areas within Federal/State/Indian areas). Stream lines were prepared within these areas for continuity. However, stream classification (e.g., bed and bank material) was not prepared within these areas unless data was readily available (e.g., hydrographic category data available from NHD)

2.3.3. Results for land uses

The existing regional datasets are compiled into the Geodatabase in a group titled, "Land Use Planning." Current and anticipated future land uses are depicted in watershed maps included in Attachment C. Federal/State/Indian Lands are also referenced on all other map exhibits included in Attachment A.2.

Summary of Deliverables for Land Uses

Format	Item	Description	Location
Report	Title of Figures	• "Existing Land Use" • "Planned Land Use" • "Developable Land" • "Redevelopment and Infill Areas"	Attachment A.3
GIS	Map Group Title	Land Use Planning	Attachment C.1
	Map Layer Title	Municipal Boundaries Federal/State/Indian Lands SanGIS_ExistingLandUse SanGIS_PlannedLandUse SanGIS_DevelopableLand SanGIS_RedevelopmentandInfill FEMA Floodplain MHPA_SD MSCP_CN MSCP_EAST_DRAFT_CN Draft_North_County_MSCP_Version_8_Categories	
	Geodatabase Feature Dataset	LandUsePlanning	
	Geodatabase Feature Class	SanGIS_MunicipalBoundaries Federal_State_Indian_Lands SanGIS_ExistingLandUse SanGIS_PlannedLandUse SanGIS_DevelopableLand	

Format	Item	Description	Location
		SanGIS_RedevelopmentandInfill FEMA_NFHL SanGIS_MHPA_SD SanGIS_MSCP_CN SanGIS_MSCP_EAST_DRAFT_CN SanGIS_Draft_North_County_MSCP_Version_8_Categories	
	Geodatabase Geometry Type	Polygon	
KMZ [1]	KMZ File Name	Municipal Boundaries Federal/State/Indian Lands Floodplains Due to file size limitations, SanGIS land use datasets were not converted to KMZ.	Attachment C.2

[1] To enhance the utilization of this data, the Land Uses map is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zipped) file that can be viewed with the free download version of Google Earth (http://www.google.com/earth/).

2.3.4. Limitations

Some jurisdictions may have compiled GIS land use layers that include more detailed or more current information than the regional datasets available from SanGIS. SanGIS layers were selected for the Regional WMAA to provide consistent land use characterization region-wide, and to provide for repeatability of GIS analyses when a land use layer is required for input data. The definition of non-Copermittee areas identified in this document as "Federal/State/Indian Lands" is for the Regional WMAA. Some WQIPs may define non-Copermittee areas differently.

2.4.Potential Critical Coarse Sediment Yield Areas

The Regional MS4 Permit identifies in the provisions related to the WMAA that potential coarse sediment yield areas within the watershed be identified, with GIS layers (maps) as output. With regard to the function and importance of coarse sediment, SCCWRP Technical Report 667 titled "Hydromodification Assessment and Management in California" states the following:

"Coarse sediment functions to naturally armor the stream bed and reduce the erosive forces associated with high flows. Absence of coarse sediment often results in erosion of in-channel substrate during high flows. In addition, coarse sediment contributes to formation of in-channel habitats necessary to support native flora and fauna."

This report identifies the potential critical coarse sediment yield areas for the San Diego Bay WMA in compliance with this permit provision. The applied datasets and methodologies for identifying the coarse sediment yield areas, along with their respective results, are described in the sections below.

2.4.1. Datasets Used for identifying potential critical coarse sediment yield areas

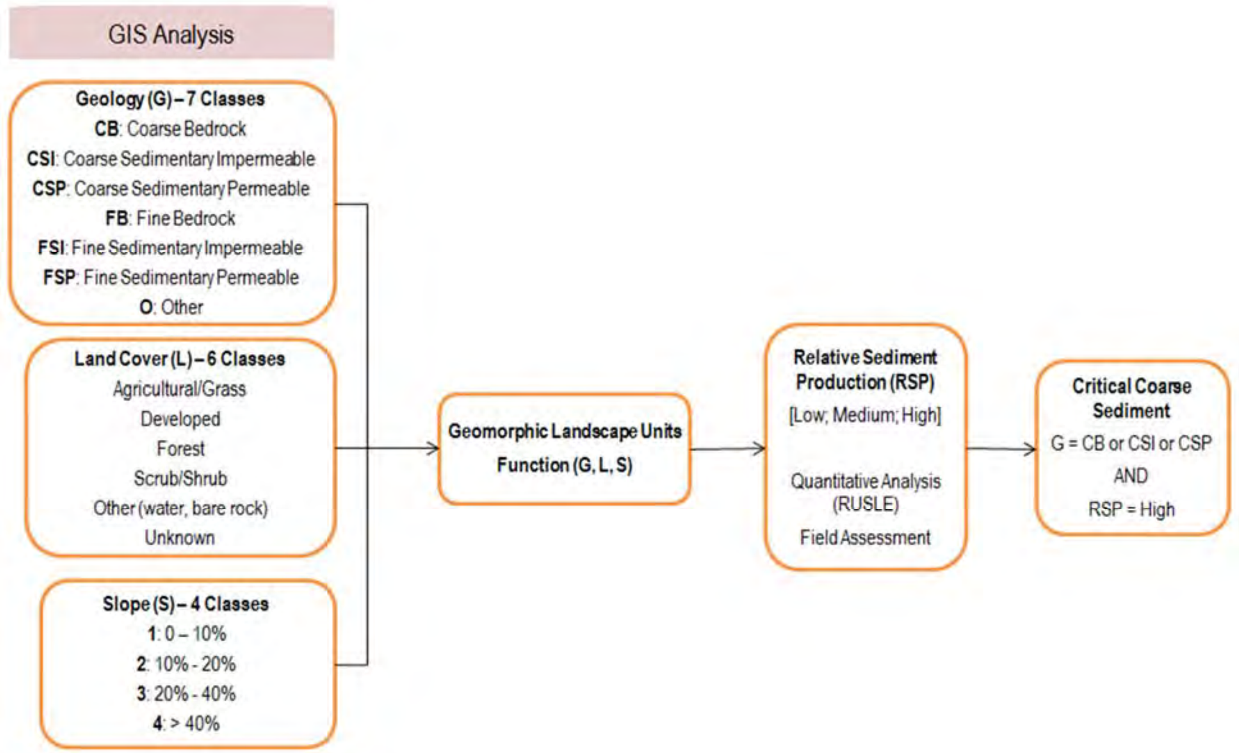
The following datasets were used in the analysis

Dataset	Source	Year	Description
Elevation	USGS	2013	1/3rd Arc Second (~10 meter cells) digital elevation model for San Diego County
Land Cover	SanGIS	2013	Ecology-Vegetation layer for San Diego County downloaded from SanGIS
Geology	Kennedy, M.P., and Tan, S.S.	2002	Geologic Map of the Oceanside 30'x60' Quadrangle, California, California Geological Survey, Regional Geologic Map No. 2, 1:100,000 scale.
	Kennedy, M.P., and Tan, S.S.	2008	Geologic Map of the San Diego 30'x60' Quadrangle, California, California Geological Survey, Regional Geologic Map No. 3, 1:100,000 scale.
	Todd, V.R.	2004	Preliminary Geologic Map of the El Cajon 30'x60' Quadrangle, Southern California, United States Geological Survey, Southern California Areal Mapping Project (SCAMP), Open File Report 2004-1361, 1:100,000 scale.
	Jennings et al.	2010	"Geologic Map of California," California Geological Survey, Map No. 2 – Geologic Map of California, 1:750,000 scale

2.4.2. Methodology/Assumptions/Criteria for identifying potential critical coarse sediment yield areas

The methodology used to identify coarse sediment yield areas is based on Geomorphic Landscape

Unit (GLU) methodology presented in the SCCWRP Technical Report 605 titled "Hydromodification Screening Tools: GIS-Based Catchment Analyses of Potential Changes in Runoff and Sediment Discharge" (SCCWRP, 2010). Geomorphic Landscape Units characterize the magnitude of sediment production from areas through three factors judged to exert the greatest influence on the variability on sediment-production rates: geology types, hillslope gradient, and land cover. The GLU approach provides a useful, rapid framework to identify sediment-delivery attributes of the watershed. The process to integrate these factors into GLUs is indicated in the flow chart below.



The following steps were used to define Geomorphic Landscape Units (GLUs), which were then related to the coarse sediment and critical coarse sediment yield areas in the San Diego Bay WMA.

1. **Integrate data sets used to determine GLU:** Categories for geology, gradient, and land cover were defined based on readily available GIS datasets for the region and classifications found in relevant literature listed in Chapter 6. The different combinations of these categories make up distinct GLUs.

   - **Geologic Categories**: based on methodology listed in Attachment A.4.1 of Attachment A.4. Resulting geologic categories from this analysis are: Coarse Bedrock (CB), Coarse Sedimentary Impermeable (CSI), Coarse Sedimentary Permeable (CSP), Fine Bedrock (FB), Fine Sedimentary Impermeable (FSI), Fine Sedimentary Permeable (FSP), and Other (O). An exhibit showing the regional geology groupings is presented in Attachment A.4.

   - **Land cover categories**: defined using the Ecology Vegetation GIS map layer developed by the City of San Diego, the County of San Diego and SANDAG which were downloaded from SanGIS (2013). The vegetation categories in the GIS layer were grouped (Table A.1.2 in Attachment A.1) to match the following categories used in SCCWRP's Technical Report 605 (SCCWRP, 2010): Agriculture/Grass; Developed; Forest; Scrub/Shrub, Other (Water) and Unknown.

- **Gradient Categories**: based on slope ranges found in a review of relevant literature (GLU methodology applied in California) listed in Chapter 6. The spatial processing of the slope categories utilized the USGS National Elevation Dataset (NED). Slope ranges used include: 0% to 10%, 10% to 20%, 20% to 40%, and greater than 40%.

2. **GLU Union Results**: GIS mapping exercise for the study area resulted in 166 GLUs within the 9 WMAs in San Diego County. Table A.4.2 in Attachment A.4 provides the list of the 166 GLUs.

For implementing hydromodification management performance standards in the Regional MS4 Permit, the Copermittees need to identify Critical Coarse Sediment Yield areas in the study region. To provide information on the identification of Critical Coarse Sediment yield, the study assumed that critical coarse sediment would be generated from GLUs that are composed of geologic units likely to generate coarse sediment (based on the methodology listed in Step 3) and have the potential for high relative sediment production (as estimated using the methodology listed in Step 4).

3. **Define Pertinent Geologic groups**: the geologic groups (Attachment A.4.1) considered in this study to have the potential to generate coarse sediment are Coarse Bedrock (CB), Coarse Sedimentary Impermeable (CSI), and Coarse Sedimentary Permeable (CSP). An exhibit showing the regional geologic grouping is presented in Attachment A.4.

4. **Relate GLU to Sediment Production**: For assigning GLUs with a relative sediment production, the following methodology was utilized:

    - Conducted quantitative analysis to assign relative sediment production. Analysis was performed based on the assumption that sediment production from an area is proportional to the soil loss from the area, as evaluated using standard soil loss equation. Detailed analysis steps are documented in Attachment A.4.2;

    - To validate the quantitative assignment above, a qualitative field assessment was conducted for 40 sites. Site selection and findings from the field assessment is documented in Attachment A.4.3.

    - The result of the field assessment indicated a 65% match between field conditions and the quantitative assignments. The mismatches are attributed to differences in percent land cover as assumed for the quantitative analysis and those observed in the field. As such, the quantitative assignments were considered to be valid for the purposes of assigning relative sediment production.

2.4.3. Results for identifying potential critical coarse sediment yield areas

The resulting GIS maps showing the spatial distribution of geologic grouping and critical coarse sediment yield areas within the San Diego Bay WMA are provided in Attachment A.4. An ArcMap document which presents the results from each step of the methodology is included in Attachment C. Based on this analysis it was estimated that 9.9 % of the study area is a potential critical coarse sediment yield area.

As a result of the regional-scale datasets, and commensurate data resolution, used to map the potential critical coarse sediment yield areas, some areas may have been mapped that in reality do not produce critical coarse sediment as they are existing developed areas. As such, an opportunity for jurisdictions to incorporate more refined data into the preliminary WMAA GIS dataset based on local knowledge and review of current aerial images was provided. The City of National and the County of San Diego provided augmented data in the San Diego Bay WMA for their respective jurisdictional areas.

Summary of Deliverables for Potential Critical Coarse Sediment Yield Areas

Format	Item	Description	Location
Report	Figures	"Geologic Grouping" "Potential Critical Coarse Sediment Yield Areas"	Attachment A.4
GIS	Map Group Layer Name	Potential Coarse Sediment Yield	Attachment C.1
	Map Layer Title	Geologic Grouping Land Cover Slope Category Geomorphic Landscape Unit Potential Coarse Sediment Yield Area Relative Sediment Production Potential Critical Coarse Sediment Yield Area	
	Geodatabase Feature Dataset	PotentialCoarseSedimentYield	
	Geodatabase Feature Class	GLUAnalysis PotentialCoarseSedimentYieldAreas PotentialCriticalCoarseSedimentYieldAreas	
	Geodatabase Geometry Type	Polygon	
KMZ [1]	KMZ File Name	Potential Critical Coarse Sediment Yield Areas	Attachment C.2

[1] To enhance the utilization of this data, the Geomorphic Landscape Unit Analysis is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zipped) file that can be viewed with the free download version of Google Earth (http://www.google.com/earth/).

2.4.4. Limitations for identifying potential critical coarse sediment yield areas

The resulting GIS layers were developed using regional datasets and provide a useful, rapid framework to perform screening-level analysis that is appropriate for watershed-scale planning studies. The methodology used to identify potential coarse sediment yield areas does not account for instream sediment supply and sediment production from mass failures like landslides which are difficult to estimate on a regional scale without performing extensive field investigation. This data set also does not account for potential existing impediments that may hinder delivery of coarse sediment to receiving waters or downstream locations within the watershed as this was beyond the scope of a regional study. Where more precise estimates are required for a particular site or subarea it is recommended that this analysis be augmented with site-specific analysis. It is also recognized that this regional data set is a function of the inherent data resolution and therefore may not conform to all site conditions, or does not reflect changes to particular areas that have occurred since the underlying data was developed. As such, the WMAA data for the potential critical coarse sediment yield areas should be verified in the field according to the procedures outlined in the Model BMP Design Manual and/or jurisdiction specific BMP Design Manual.

2.5. Physical Structures

The Regional MS4 Permit requires the Copermittees to identify information regarding locations of existing flood control structures and channel structures, such as stream armoring, constrictions, grade control structures, and hydromodification or flood management basins with GIS layers (maps) as output, for each WMA being analyzed for the purpose of developing watershed-specific requirements for structural BMP implementation. This study identified the physical structures using a desktop-level analysis for the stream(s) identified in Section 2.2 in compliance with this permit provision.

2.5.1. Approach for identifying physical structures

The intent of this portion of the WMAA project was to provide an initial assessment of the structures of interest for the stream(s) identified in Section 2.2. This desktop-level analysis was conducted primarily as a visual survey of aerial imagery and FEMA flood insurance study (FIS) profiles where available. The collected information was entered into a GIS layer for inclusion into the overall WMAA geodatabase containing the characterization layers required by the Regional MS4 Permit. To support overall WMA characterization, the information derived in this task provides insight into water and sediment movement through the watershed (SCCWRP, 2012), the opportunities and limitations for infrastructure retrofits and also informs efforts to identify appropriate locations for habitat or riparian area rehabilitation in relation to proximate infrastructure. Specific information regarding how the survey was performed and the attributes of the generated data is presented in Attachment A.5. Note that concrete channels, pipes/culverts, riprap or other artificial stream armoring, and basins have also been identified in the linework generated for the streams (see Section 2.2).

2.5.2. Results for identifying physical structures

The resulting GIS mapping provided in Attachment A.5 shows the spatial locations of the physical structures within the mapped stream(s).

Summary of Deliverables for Physical Structures

Format	Item	Description	Location
Report	Figure	Watershed Management Area Streams by Reach Type with Channel Structures	Attachment A.5
GIS	Map Group Layer Name	Channel Structures	Attachment C.1
	Map Layer Title	Channel Structures	
	Geodatabase Feature Dataset	ChannelStructures	
	Geodatabase Feature Class	ChannelStructures	
	Geodatabase Geometry Type	Point	
KMZ [1]	Kmz File Name	ChannelStructures	Attachment C.2

[1] To enhance the utilization of this data, the Physical Structures map is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zipped) file that can be viewed with the free download version of Google Earth (http://www.google.com/earth/).

3. Template for Candidate Project List

The Regional MS4 Permit requires each WMA to use the results from the WMA characterization to compile a list of candidate projects that could potentially be used as alternative compliance options for Priority Development Projects should an agency or jurisdiction opt to develop an alternative compliance program. Copermittees must first conclude that implementing such a candidate project would provide greater overall benefit to the watershed than requiring implementation of structural BMPs onsite prior to implementing these candidate projects as alternative compliance projects.

The Copermittees elected to identify potential candidate projects as a separate effort from this regional project, and therefore the process for identifying candidate projects is not documented in this report. Instead, this project only developed a template, in a spreadsheet format, for use by the Copermittees to compile lists of potential candidate projects. The template is intended to enhance regional consistency of the information that is gathered for candidate projects. The template spreadsheet file was distributed to the Copermittees on January 28, 2014. A table of the template components is indicated below:

Column	Primary Heading	Secondary Heading	Guidance for Completing the Project List
A	Project Identifier	-	Unique identifier for the project.
B	Watershed Management Area	-	Dropdown menu to select the watershed management area the project is located in
C	Hydrologic Area (HA)	-	Dropdown menu to select the hydrologic area the project is located in Select a WMA in column B for HA (Column C) dropdown menu to activate.
D	Hydrologic Subarea (HSA)	-	Dropdown menu to select the hydrologic subarea the project is located in. Select a HA in column C for HSA (Column D) dropdown menu to activate.
E	Jurisdiction	-	Dropdown menu to select the jurisdiction the project is located in. Select a HSA in column D for Jurisdiction (Column E) dropdown menu to activate.
F	Project Name	-	Indicate the name of the project.
G	Ownership	Type	Dropdown menu to select if the project is a public project, private project, or public-private partnership.
H	Ownership	Ownership Information	List the details for the owner.
I	Project Location	Address	List the address of the project site.
J	Project Location	APN	List the APN of the parcel.
K	Project Location	Latitude	List the latitude of the project site.
L	Project Location	Longitude	List the longitude of the project site.
M	Project Origination/ Originator	Name	List the name of the report/organization/individual that provided the idea for the project. Potential origination sources: WQIP, WMAA, JURMPs, WURMPs, CLRPs, IRWM, MSCP, MHPA, Other.

Column	Primary Heading	Secondary Heading	Guidance for Completing the Project List
N	Project Origination/ Originator	Contact Information	Link or report title if the proposed project is from a report [or] contact information if from an organization/individual.
O	Project Category	-	Drop Down menu to select the project category; In addition to the 6 project categories explicitly listed in the Regional MS4 Permit, the drop down menu also has a category "Other project types allowed by the MS4 Permit". Example for “Other” project types are agency CIP programs such as Green Streets, LID conversions (medians, parks), agency filter installation, etc.
P	Specific Project Type	-	List the subcategory of the project; for example, list Regional BMP type (i.e. infiltration basin, wetland, etc.).
Q	Potential Pollutant	-	Identify the potential pollutant(s) that can be treated by the proposed project.
R	Project Size & Parameters	Contributing Drainage Area (acres)	List the contributing drainage area to the project.
S	Project Size & Parameters	Parcel Size (acres)	List the size of the parcel the project is located on.
T	Project Size & Parameters	Project Footprint (acres)	List the size of the project footprint.
U	Project Size & Parameters	Parameters (with units as necessary)	Parameters needed to quantify benefits from the project; i.e. for an infiltration basin, list the water quality volume, long-term infiltration rate, depth of the basin, etc.
V	Regulatory Requirement	-	Indicate if the project is proposed to meet particular regulatory requirement such as TMDL, etc.
W	Project Timeline	-	Indicate if a project must be implemented by certain date to meet a grant deadline or other time commitment.
X	Other Notes	-	List any other relevant notes; for example, when retrofitting existing infrastructure project category is selected, input parameters needed to quantify benefits from existing infrastructure into this column as these will be needed to estimate additional benefits that can be used for alternative compliance. If N/A is selected in any dropdown menus, add additional explanation in here

4. Hydromodification Management Applicability/Exemptions

Hydromodification, which is caused by both altered storm water flow and altered sediment flow regimes, is largely responsible for degradation of creeks, streams, and associated habitats in the San Diego Region. The purpose of the hydromodification management requirements in the Regional MS4 Permit is to maintain or restore more natural hydrologic flow regimes to prevent accelerated, unnatural erosion in downstream receiving waters.

In some cases, priority development projects may be exempt from hydromodification management requirements if the project site discharges runoff to receiving waters that are not susceptible to erosion (e.g., a lake, bay, or the Pacific Ocean) either directly or via hardened systems including concrete-lined channels or existing underground storm drain systems.

The March 2011 Final Hydromodification Management Plan (HMP) identified certain exemptions from hydromodification management requirements by presenting "HMP applicability criteria." The Regional MS4 Permit maintains some of these HMP applicability criteria. However, some of the applicability criteria are not included under the Regional MS4 Permit unless the area or receiving water is mapped in the WMAA. The intent of this Section is to provide mapping of areas exempt from hydromodification management requirements, and provide supporting technical analyses for exemptions that are recommended by the WMAA.

4.1. Additional Analysis for Hydromodification Management Exemptions

This section documents additional analysis performed to further evaluate the following exemptions that were already approved by the San Diego Regional Board with the 2011 Final HMP. This study only provides additional analysis, data, and rationale for supporting or eliminating the following existing exemptions and does not propose or study any new exemptions.

- Exempt River Reaches
- Stabilized Conveyance Systems Draining to Exempt Water Bodies
- Highly Impervious Watersheds and Urban Infill and
- Tidally Influenced Lagoons

4.1.1. Exempt River Reaches

4.1.1.1. History

The March 2011 Final HMP, approved by the SDRWQCB under the 2007 MS4 Permit, provided a potential exemption from hydromodification management requirements for projects discharging runoff directly to certain major river reaches, including a reach of the Otay River and a reach of the Sweetwater River, provided that the outlet elevation of the project's outfall(s) to an identified exempt river reach are between the river bottom elevation and the 100-year floodplain elevation, and properly sized energy dissipation is provided at the outfall(s).

Exempt river systems/reaches from the 2011 Final HMP:

River	Downstream Limit	Upstream Limit
Otay River	Outfall to San Diego Bay	Lower Otay Reservoir Dam
Sweetwater River	Outfall to San Diego Bay	Sweetwater Reservoir Dam

Exemptions related to runoff discharging directly to the above river reaches were based on the flow duration analysis performed for the San Diego River in the Final HMP and the Technical Advisory Committee (formed to provide input on the development of the Final HMP) members' opinion (based on field observations and years of historical perspective) that the above river reaches have very low gradients, were depositional (aggrading), have very wide floodplain areas when in the natural condition and that the effects of cumulative watershed impacts to these reaches is minimal provided that properly sized energy dissipation is provided at outfalls to the rivers.

4.1.1.2. Status under 2013 Regional MS4 Permit

Under the Regional MS4 Permit, exempt river reaches would not qualify for exemption from hydromodification management controls unless the optional WMAA is developed with additional rationale/analyses to support reinstating exemptions to these river reaches. Additional analysis performed as part of the WMAA to evaluate hydromodification management control exemptions to the previously exempt reaches is presented below.

4.1.1.3. Research, Approach and Results

Hydromodification impacts can be caused due to increase in flows, changes in sediment transport capacity and changes in sediment supply to the streams (SCCWRP, 2012). In order to evaluate the cumulative impacts due to development and determine if hydromodification management exemptions can be reinstated for the river reaches that were exempt in the previous permit term erosion potential (Ep) analysis was used to evaluate the increase in flows and changes in sediment transport capacity. In addition, sediment supply potential (Sp) analysis was used to evaluate the changes in sediment supply in this study. In regards to Ep analysis SCCWRP Technical Report 667 "Hydromodification Assessment and Management in California" states:

> *"The underlying premise of the erosion potential approach advances the concept of flow duration control by addressing in-stream processes related to sediment transport. An erosion potential calculation combines flow parameters with stream geometry to assess long term (decadal) changes in the sediment transport capacity. The cumulative distribution of shear stress, specific stream power and sediment transport capacity across*

the entire range of relevant flows can be calculated and expressed using an erosion potential metric, Ep (e.g., Bledsoe, 2002)."

The approach used in this study is explained in detail in Attachment B.1.1.1. The following WMA characterization maps developed in Section 2 were used to select inputs for the exempt river reach analysis:

- Planning land use layers from Section 2.3 were used to estimate the existing impervious area and identify the developable parcels in each watershed. A GIS exercise was performed to identify the developable parcels in each watershed that will be exempt from hydromodification management requirements if the exemption is granted.
- Stream type classification analysis from Section 2.2 was used to select a conservative cross section (segments that are assigned naturally constrained) to be used in analysis for each watershed
- GLU analysis and its associated quantitative analysis described in Section 2.4 were used to determine Sp metric for each watershed. In this study coarse sediment supply changes were limited to changes in hill slope erosion between existing condition and future condition (for parcels that are proposed to be exempt from hydromodification management) of the watershed. It was assumed that the changes in instream sediment supply between existing and future condition for these large depositional river systems are very minimal.

Selection of inputs for the analysis is explained in detail in Attachment B.1.1.2 and results from the analysis are presented in Attachment B.1.1.3 in tabular format. The Ep analysis performed in this study does not account for the following Regional MS4 permit requirements as a conservative assumption. If accounted for, it will result in a smaller Ep than what is currently reported in Attachment B.1.1.3:

- New development priority development projects including projects that are proposed to be exempt from hydromodification management requirements through this WMAA study must implement retention BMPs to the extent feasible if alternative compliance option is not selected or not available.
- Redevelopment priority development projects must mitigate to the pre-developed condition

4.1.1.4. Recommendation

Based on the results from this study reported in Attachment B.1.1.3, the flow duration analysis performed in the Final HMP, and the Technical Advisory Committee (TAC) recommendations provided during the Final HMP development, it is recommended that hydromodification management exemption be reinstated for projects discharging runoff directly to ~~the following~~ two exempt river reaches.

Additionally, subsequent to the publication of the final WMAA for San Diego Bay, a technical study, including hydrologic modeling and an erosion potential analysis supporting a proposed hydromodification management requirements exemption for a portion of the Otay River, was prepared and submitted to the RPs on behalf of developers. The specific portion of the Otay River that the study considered is between the Lower Otay Reservoir Dam and I-805; the RPs with jurisdictional area that drains to this reach are the cities of Chula Vista and San Diego and the County of San Diego. These three agencies commissioned a third-party review of the submitted study, which indicated that the study appeared to meet the relevant Municipal Permit requirements for a hydromodification management exemption. The study prepared by developers and the third-party review of the study were provided to the San Diego Bay Consultation Panel for review and comment. A public Consultation Panel meeting was also held on August 23, 2016 to discuss comments on the study. No comments objecting to the proposed exemption from hydromodification requirements were submitted by the Consultation Panel. Accordingly, the exemption for the Otay River between Lower Otay Reservoir Dam and I-805 has been incorporated into the San Diego Bay WMAA, subject to final approval by the San Diego Regional Water Quality Control Board. The technical study submitted in support of the exemption is included as Attachment B.3.

Exempt river reaches in the San Diego Bay WMA are listed below.~~:~~

River	Downstream Limit	Upstream Limit	Basis
Otay River	Outfall to San Diego Bay	Interstate 805	Original WMAA Analysis
Otay River	Interstate 805	Lower Otay Reservoir Dam	Additional Analysis (See Attachment B.3)
Sweetwater River	Outfall to San Diego Bay	Sweetwater Reservoir Dam	Original WMAA Analysis

Each municipality must define/approve “direct discharge” based on the project site conditions. To qualify for the potential exemption, the outlet elevation must be between the river bottom elevation and the 100-year floodplain elevation and properly designed energy dissipation must be provided. Mapping of these exempt river reaches is presented in Attachment B.2.

~~Additional studies to establish a site-specific allowable Ep metric for the Otay River from East of Interstate 805 to Lower Otay Reservoir Dam, more closely representing actual measured and observed characteristics of this river system, may result in allowing hydromodification management exemptions not currently supported by this desktop assessment which was based on an allowable Ep metric from literature. However, a~~Any future proposed HMP exemptions would need to be approved through the WQIP Annual Update process (Regional MS4 Permit Section F.1.2.c.).

4.1.1.5. Limitations

The analysis and associated recommendations as presented above were based on instream erosion as the primary consideration to support reinstatement of exemptions from hydromodification management controls for discharges directly to these river reaches. While it is recognized that other factors contribute to adverse impacts (e.g., salinity imbalance, pollutants) to instream habitat and resulting biotic integrity, hydromodification management control has traditionally been considered an “umbrella process” that encompasses most of the highest risk stressors (percent sands and fines present, channel alteration, and riparian disturbance) to physical habitat. Beyond demonstrating that instream erosion is not anticipated as a result of reinstating hydromodification management control exemptions for discharges to these river reaches, a focused method for correlating physical and biotic integrity to modified hydrological conditions has not been performed in this analysis, as an assessment method has not yet been developed.

The current assessment methods may yield inconclusive results when attempting to identify causal relationships between degraded instream habitat solely due to increased flows and erosive force from hydromodification. A causal assessment recently conducted in the lower reaches of the San Diego River, conducted as a partnership between the Southern California Coastal Water Research Project (SCCWRP), the City of San Diego, the County of San Diego, and the San Diego RWQCB, focused on stressors potentially responsible for known biological impairment of the river. Once the data of the causal assessment become available, it may be useful in classifying the potential stressors such as altered physical habitat as likely, unlikely, or an uncertain cause to biological impairment.

With respect to adverse impacts to habitat as a result of pollutants entrained in storm water discharges, these areas will still be subject over time to the pollutant control requirements of the Regional MS4 Permit as areas develop or redevelop. The current requirements obligate development to maximize retention of the design storm volume which will mitigate a portion of the volume that would otherwise be controlled with hydromodification management BMPs. In some cases, this offsetting of volume reduction through pollutant control BMPs may exceed the HMP volumes. In addition, the development that occurs within the exempted watershed areas is still required to provide any applicable flood control measures. Risk of flooding as a result of exemption from hydromodification controls is unlikely as the control thresholds are significantly lower (order of magnitude) than flood control requirements implemented to protect life and property.

4.1.2. Stabilized Conveyance Systems Draining to Exempt Water Bodies

There are no stabilized conveyance systems currently recommended for exemption from hydromodification management requirements in the San Diego Bay WMA. If engineered conveyance systems that are stabilized with materials other than concrete, such as riprap, turf reinforcement mat, or vegetation, including rehabilitated stream systems, are identified as potential candidates for exemption, they may be studied and may be recommended exempt if they meet specific criteria presented in the Regional WMAA for this exemption. Refer to the Regional WMAA for the criteria and an example study that was prepared for Forester Creek in the San Diego River WMA. However, any future proposed HMP exemptions would need to be approved through the WQIP Annual Update process (Regional MS4 Permit Section F.1.2.c.).

4.1.3. Highly Impervious/Highly Urbanized Watersheds and Urban Infill

Based on evaluation of the highly impervious/highly urbanized watershed and urban infill exemptions presented in the March 2011 Final HMP, and comparison with more recent research prepared for the Ventura County Hydromodification Control Plan (Ventura County HCP) (Final Draft dated September 2013), resurrection of these exemptions from the March 2011 Final HMP was not recommended by the Regional WMAA. The research prepared in support of the Ventura County HCP determined lower thresholds of additional impervious area (ranging from 0.44% to 1.65%) than the limit presented in the San Diego County Final HMP dated March 2011 (3%). No areas within the San Diego Bay WMA are currently recommended for highly impervious/highly urbanized watershed or urban infill exemption.

4.1.4. Tidally Influenced Lagoons

There are no tidally influenced lagoons recommended for exemption from hydromodification management requirements in the San Diego Bay WMA. Refer to the Regional WMAA for further information regarding this exemption.

5. Conclusions

5.1. Watershed Management Area Characterization

The WMA Characterization data was developed using available regional data to further understand the macro-scale watershed characteristics and processes in the San Diego Bay WMA. The Regional MS4 Permit allows for flexibility in complying with land development requirements when using the information developed in the WMAA to improve water quality planning and implementation associated with land development. This dataset will assist with identifying the opportunities and constraints for projects and management decisions based on a watershed-scale (rather than piecemeal project identification without context within the watershed) and provides Copermittees the ability to exercise the option to create an alternative compliance program that offers the opportunity to develop watershed-specific alternatives to universal onsite structural BMP implementation. The characterization data includes:

Characterization Data	Utilization Potential
Dominant Hydrologic Process: • Overland flow • Infiltration • Interflow	• Identify areas for enhanced infiltration or collection of storm water for treatment • Implement management measures that correspond to pre-development conditions – promotes long-term channel stability and health • Increases understanding of the natural functioning of the watershed and what has been (or is at risk of being) altered by urbanization.
Stream Characterization: • Reach type • Bed material • Bank material • Hydrographic category • Channel Structures	• Preliminary dataset that can be used to conduct stream power evaluations • Identify channel systems for preservation or restoration • Identification of appropriate space for channel processes to occur (e.g., flood plain connectivity) • Insight to sensitivity of receiving stream reach • Indicates the features within channels that affect water and sediment movement through the watershed

Characterization Data	Utilization Potential
Land Use: • Existing • Future	• Foresight (identifies relative risks, opportunities, or constraints) in comparing future to existing land uses, i.e., areas that may be more/less vulnerable to adverse impacts to changes in storm water runoff associated with development • Encourage infill development
Potential Critical Coarse Sediment Yield Areas	• Preservation of areas or function that contributes critical sediment within the watershed to stream armoring/stability • Assist with identifying potentially susceptible stream reaches that require uninterrupted coarse sediment supplies to remain stable • Dual goal of open space conservation

Regarding the identification of the potential critical coarse sediment yield areas in the WMAA using readily available regional datasets, it is anticipated that when more precise estimates for potential critical coarse sediment yield areas are required for a particular site or subarea that this regional study will be augmented with site-specific analysis. Development projects must avoid critical sediment yield areas or implement measures that allow critical coarse sediment to be discharged to receiving waters, such that there is no net impact to the receiving water to meet the requirements of the Regional MS4 permit. As such, projects should consult the Model BMP Design Manual and/or jurisdiction specific BMP Design manual for options to meet the Regional MS4 Permit requirements. It is anticipated that the data will not be static but will be enhanced over time through future studies or field assessments that will refine what is currently a macro-level data set.

5.2. Template for Candidate Project List

It is anticipated the Copermittees that elect to develop alternative compliance programs will conduct a separate exercise to nominate potential candidate projects for inclusion into the WQIPs using the template developed for this project.

5.3. Hydromodification Management Exemptions

Attachment B.2 presents hydromodification management applicability/exemption mapping for the San Diego Bay WMA. The mapping includes receiving waters that are exempt based on the Regional MS4 Permit or recommended exempt based on studies.

Receiving waters that are **exempt** based on the Regional MS4 Permit include:

- The Pacific Ocean
- San Diego Bay
- Lakes and Reservoirs
- Existing underground storm drains or concrete-lined channels draining directly to San Diego Bay or the ocean

Receiving waters or conveyance systems that are **recommended exempt** in the San Diego Bay WMA based on studies that were prepared as part of the Regional WMAA or prepared by others and provided for this purpose include:

- Otay River from Outfall at San Diego Bay to Interstate 805
- Sweetwater River from San Diego Bay to Sweetwater Reservoir Dam
- Existing underground storm drains or concrete-lined channels discharging directly to the above receiving waters. These systems were identified based on MS4 data provided by the Copermittees via the data call. These systems may not represent all discharges to the above receiving waters. Additional systems may be considered exempt if there is no evidence of erosion at the outfall of the conveyance system, and any other criteria determined by the local jurisdiction.

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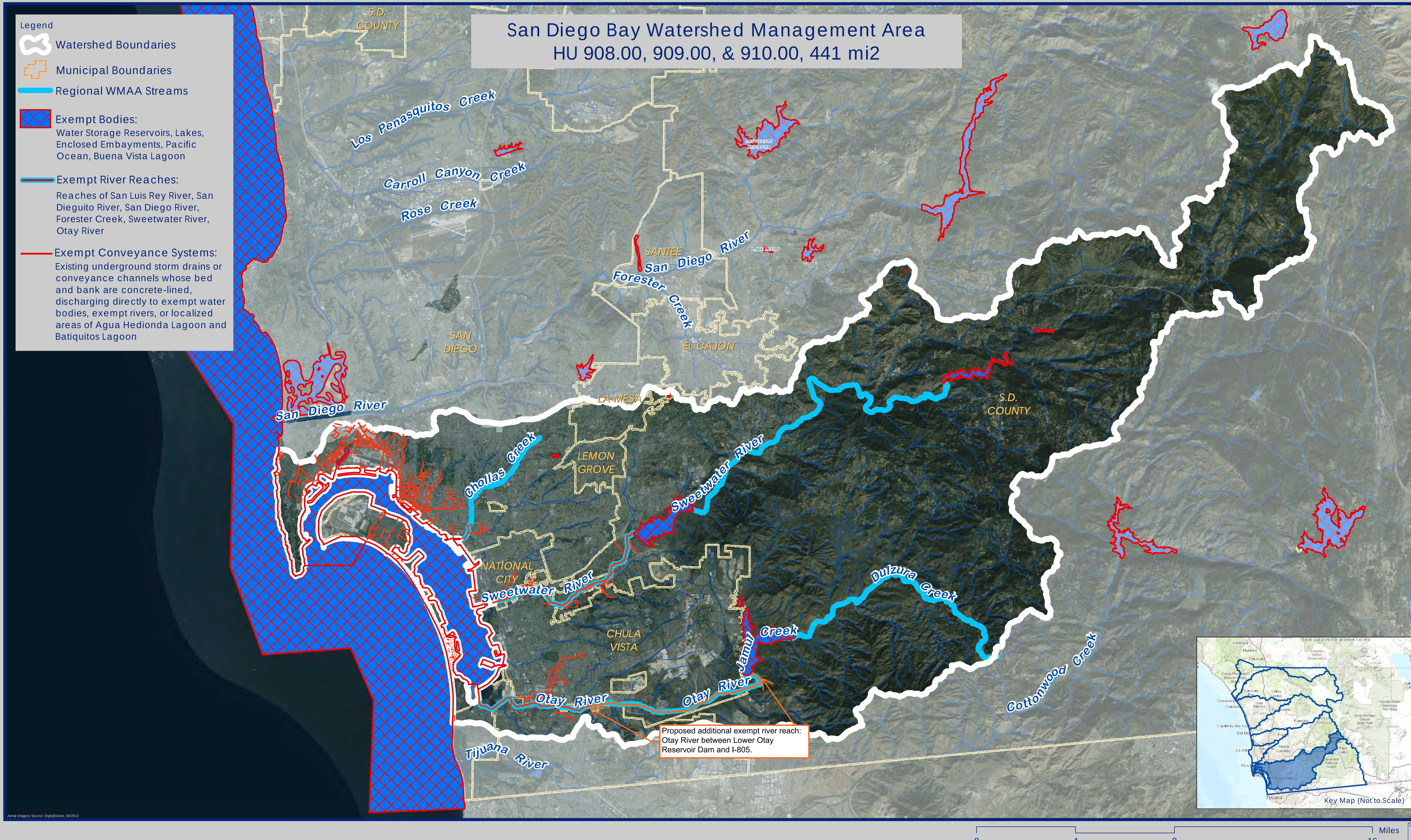
ATTACHMENT B.2

HYDROMODIFICATION MANAGEMENT EXEMPTION MAPPING



Receiving Waters and Conveyance Systems Exempt from Hydromodification Management Requirements

Exhibit Date: Sept. 8, 2014

Geosyntec consultants
RICK ENGINEERING COMPANY

ATTACHMENT B.3

TECHNICAL STUDIES OF THE OTAY RIVER BETWEEN LOWER OTAY RESERVOIR DAM AND I-805

ATTACHMENT B.3.1

TORY R. WALKER ENGINEERING OTAY RIVER EROSION POTENTIAL ANALYSIS (TRWE STUDY)

December 18, 2015

Boushra Salem
Storm Water Management Section
City of Chula Vista
1800 Maxwell Road
Chula Vista, CA 91911

SUBJECT: OTAY RIVER EROSION POTENTIAL ANALYSIS

Dear Boushra:

Tory R. Walker Engineering (TRWE) has thoroughly analyzed the Erosion Potential (Ep) methodology used to support the proposed hydromodification management exemption for projects directly discharging to the Otay River from west of Interstate 805 (I-805) to San Diego Bay. Results of that study are presented in Appendix J of the September 2015 Revised Water Quality Improvement Plan for the San Diego Bay Watershed Management Area (San Diego Bay WQIP). This methodology, and its results (herein referred to as the WMAA Ep Analysis), did not include reinstatement of an exemption for the river reach upstream of I-805 to Lower Otay Reservoir.

TRWE conducted a more detailed Ep analysis that uses watershed-specific hydrologic modeling, historical imagery review, and field investigation of existing channel conditions to either invalidate, support, or build upon the WMAA Ep Analysis. Our collective efforts (herein referred to as the Otay Ep Analysis) sought to provide a clearer picture of the potential morphological impacts that may or may not result from granting hydromodification exemptions to projects directly discharging to the Otay River when analyzed more scrupulously. We tested the hypothesis that the effects of Savage Dam and the 1916 dam failure have a more profound impact on river morphology than any proposed directly discharging development downstream of Lower Otay Reservoir—an approach that has not yet been taken by any study. We also revised the WMAA Ep Analysis to account for the natural resiliency of the system due to the re-establishment of vegetation over the past 100 years. The Otay Ep Analysis considered the entire Otay River, from the Lower Otay Reservoir to San Diego Bay, and made the following major conclusions:

1. **The Otay River flow duration curve (FDC) demonstrates that the river will not experience significant erosion for the range of storms considered to be geomorphically significant if exemptions are granted for projects directly discharging into the river system;**

2. **Aerial imagery from 1928, 1953, and 2015 demonstrate that the Otay River has remained stable (i.e., in a steady state of dynamic equilibrium) throughout the rapid urbanization of Otay Valley over the past 87 years and has become progressively more stable through the re-establishment of heavy vegetation throughout the system;**

3. **The revised WMAA Ep Analysis demonstrates that no significant erosion occurs within the range of storms considered to be geomorphically significant when critical shear stress values representative of the in-stream conditions are considered.**

Based upon these findings, we recommend that hydromodification exemptions be reinstated for projects directly discharging to the Otay River, from the Lower Otay Reservoir to San Diego Bay. We propose that this study be included as an attachment to the San Diego Bay WMAA, revising the San Diego Bay WQIP.

This recommendation carefully considers the unique nature of the Otay River and directly deals with the erosion potential for the range of storms considered to be geomorphically significant, as is consistent with the both the mission and the desire of the San Diego Regional Water Quality Control Board (Walsh, 2015). We appreciate your time in reviewing our study, and trust you will find that our methods and conclusions are presented in a clear, concise, and understandable fashion.

Sincerely,

Tory R. Walker

Tory R. Walker, PE, CFM, LEED GA
Principal

[1] Walsh, L. (2015, August 5). General Comments on Final Water Quality Improvement Plans and Notice of Noncompliance.

Natural Watershed versus Developed Watershed with Exemptions

The WMAA Ep Analysis is based on one type of model, and as with all hydrologic models, is most appropriately used in conjunction with field verification and comparison to a watershed-specific hydrologic model. It is further understood that the methodology behind the WMAA Ep Analysis sought to establish a clear and repeatable desktop-based process to analyze the potential of erosion for the range of storms considered to be geomorphically significant. From our review of the WMAA Ep Analysis, we determined that the methodology can indeed be a useful initial screening tool to conservatively assess the possibility of accelerated river channel erosion; it is not, however, a standalone metric for assessing the large, highly urbanized, impounded Otay River system—especially since the WMAA Ep methodology was not developed using data from impounded watersheds (Hawley, Bledsoe, & Stein, 2011). Savage Dam has had, and continues to have, a major influence on the Otay River morphology, yet no accepted exemption analysis has yet fully considered the extent of its effect, nor of its historic failure in 1916. Therefore, TRWE tested the first hypothesis: the *presence* of Savage Dam has a more profound impact on river morphology than any proposed, directly-discharging development downstream of Lower Otay Reservoir.

In order for the San Diego Regional Water Quality Control Board (San Diego Water Board) to accept a conclusion that a conveyance system can be exempt from hydromodification management BMP requirements, the report must include an analysis demonstrating that the natural channel under review would not experience erosion for the range of storms considered to be geomorphically significant (Walsh, 2015), as presented in Attachment 5. It is also the belief of the San Diego Water Board that using a hydrologic baseline that approximates an undeveloped, natural watershed is the only way to facilitate the return of more natural hydrologic conditions to already built-out watersheds, and ultimately improve stream health (San Diego Regional Water Quality Control Board, 2015). Therefore, TRWE used the United States Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) to model the Otay Hydrologic Unit under two unique scenarios: the first scenario approximated the hydrology of the impounded, fully built out Otay Valley watershed (drainage area downstream of Savage Dam) with hydromodification exemptions in place for proposed development areas directly discharging to the Otay River (herein referred to as the Exemption Scenario); the second scenario approximated the hydrology of the *natural, unimpounded* Otay hydrologic unit (herein referred to as the Natural Scenario). The study areas are presented in Figure 1.

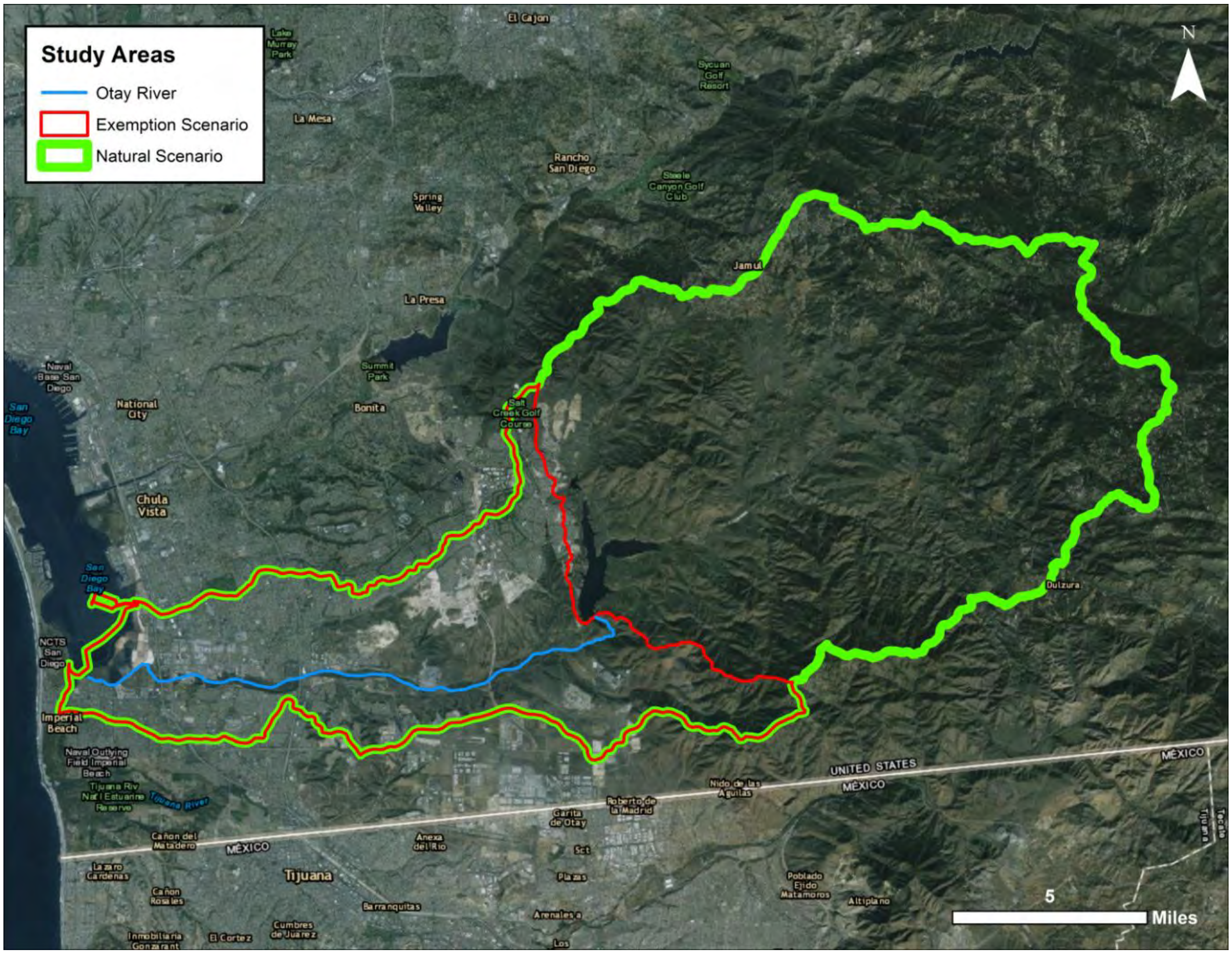


Figure 1: SWMM Study Areas

The Natural Scenario was used as the baseline condition and compared to the Exemption Scenario in order to determine if the latter would produce peak flows and durations that exceed the approximated natural hydrology by more than 10 percent for the range of flows considered to be geomorphically significant (from 10% of Q_2 to Q_{10}), as prescribed by Provision E.3.c.(2)(a) of the 2013 Regional MS4 Permit for all Priority Development Projects (San Diego Regional Water Quality Control Board, 2015). If the model demonstrated that the proposed exemptions would produce neither peak flows nor durations that exceed those of the approximated natural range of geomorphically significant flows by more than 10 percent, then the proposed exemption would meet the Permit's hydromodification management requirements on a watershed-wide scale. If the proposed exemption satisfies the Permit's hydromodification management requirements, then the flows may be considered as non-erosive and therefore warrant exemption as presented by the data.

To generate our model scenarios, we used a combination of geographic information system (GIS) data from the San Diego Geographic Information Source (SanGIS) Regional Data Warehouse (sangis.org), the United States Geological Survey (USGS) National Elevation Dataset (NED) (ned.usgs.gov), and the National Resource Conservation Service (NRCS) Web Soil Survey (WSS) (websoilsurvey.nrcs.usda.gov). First, the drainage areas downstream of Savage Dam were developed for the Exemption Scenario. With Savage Dam in place, areas upstream of Lower Otay Reservoir were neglected in the Exemption Scenario because, for the geomorphically significant range, they do not and will not contribute flows to the Otay River. Areas were first classified as either “Exempt,” “Non Exempt,” or “Developed” for modeling purposes. Exempt and Non Exempt areas are subsets of currently undeveloped areas having planned land uses (SanGIS “Developable_Land” layer) that either directly (Exempt) or indirectly (Non Exempt) discharge into the Otay River. These areas were projected to directly or indirectly discharge based upon a plan set review conducted by the WMAA consultant team. The remaining area that did not classify as either Exempt or Non Exempt was classified as Developed. These three classifications were finally subdivided into lumped hydrologic soil groups to produce the SWMM subcatchment areas, each having area-weighted parameter inputs for percent impervious and slope based upon planned land use (SanGIS “LANDUSE_PLANNED” layer), County of San Diego imperviousness coefficients (County of San Diego, 2010), and USGS 10-meter Digital Elevation Models (DEMs). The width parameter was used as a calibration parameter equal to roughly 18% of the area-to-length ratio using the methodology presented by Smith et al., (2015), provided in Attachment 3. The remaining subcatchment parameters were assigned in accordance with Appendix G of the San Diego Region Model BMP Design Manual (Geosyntec Consultants & Rick Engineering, 2015). For the Natural Scenario, an additional “Impounded” classification was added to the Exempt, Non Exempt, and Developed classifications. Impounded areas are the areas upstream of the dam, subdivided only by hydrologic soil group. Full model parameters are provided in Attachment A.

To simulate the effect of hydromodification management control, we performed research within the San Diego Region in the work documented by Smith et al. (2015). This research determined that geomorphically significant peak flows (Q_2 to Q_{10}), on average, are reduced 43% from the post-developed unmitigated condition to post-developed mitigated condition when hydromodification management controls are implemented. Therefore, in order to simulate hydromodification controls within the model, flows were reduced by 43% where appropriate. In the Exemption Scenario, flow reduction was only applied to the Non Exempt drainage areas in order to allow Exempt areas to produce unmitigated post-developed runoff. In the Natural Scenario, flow reduction was applied to all drainage areas in order to approximate the pre-development flows as would be achieved by implementation of designed hydromodification management control systems. Given that the San Diego Water Board understands that the pre-development hydrology of an area cannot be precisely known, nor do they expect modelers to estimate historical conditions (San Diego Regional Water Quality Control Board, 2015), our approach in approximating the watershed’s pre-development hydrology by using the best available data (projected land use and regional peak flow reductions) is an appropriate methodology that holds the regulatory standard as the baseline condition.

The resulting FDC (Figure 2) illustrates that, for the range of storms considered to be geomorphically significant, flow rates are larger in magnitude and duration for the approximated natural, undeveloped watershed condition than those produced for the impounded, developed watershed condition, even when the hydromodification exemptions are in place for all developable areas directly discharging to the Otay River. It should be noted that these results are conservative in nature due to the fact that the 1916 breach of Savage Dam significantly altered the Otay River morphology, as large segments of the river were scoured to bedrock (Patterson, 1970)—our Natural scenario does not account for flows nor durations that contend with those produced during this catastrophic event. The results demonstrate that Savage Dam has a more significant effect on Otay River's morphology than any proposed development downstream of the reservoir. Therefore, our FDC serves as quantifiable evidence to validate the same conclusion made by the well-versed Technical Advisory Committee (TAC), whom was tasked with providing technical input to the scientific approach and interpretation of results integral to the establishment of numerical flow control standards for the 2011 Hydromodification Management Plan (HMP) (Brown and Caldwell, 2011). The peak flow comparison is provided in Table 1. The flow duration data summary is provided in Attachment A.

Table 1: SWMM Otay River Peak Flow Rate Comparison for the Natural and Exemption Scenarios

Return Period (years)	Natural Scenario Q (cfs)	Exemption Scenario Q (cfs)	Difference (cfs)
10	2567	2272	294
9	2470	2167	303
8	2356	2139	217
7	2239	2008	231
6	2118	1914	204
5	2074	1847	227
4	2021	1730	291
3	1918	1590	328
2	1691	1409	283

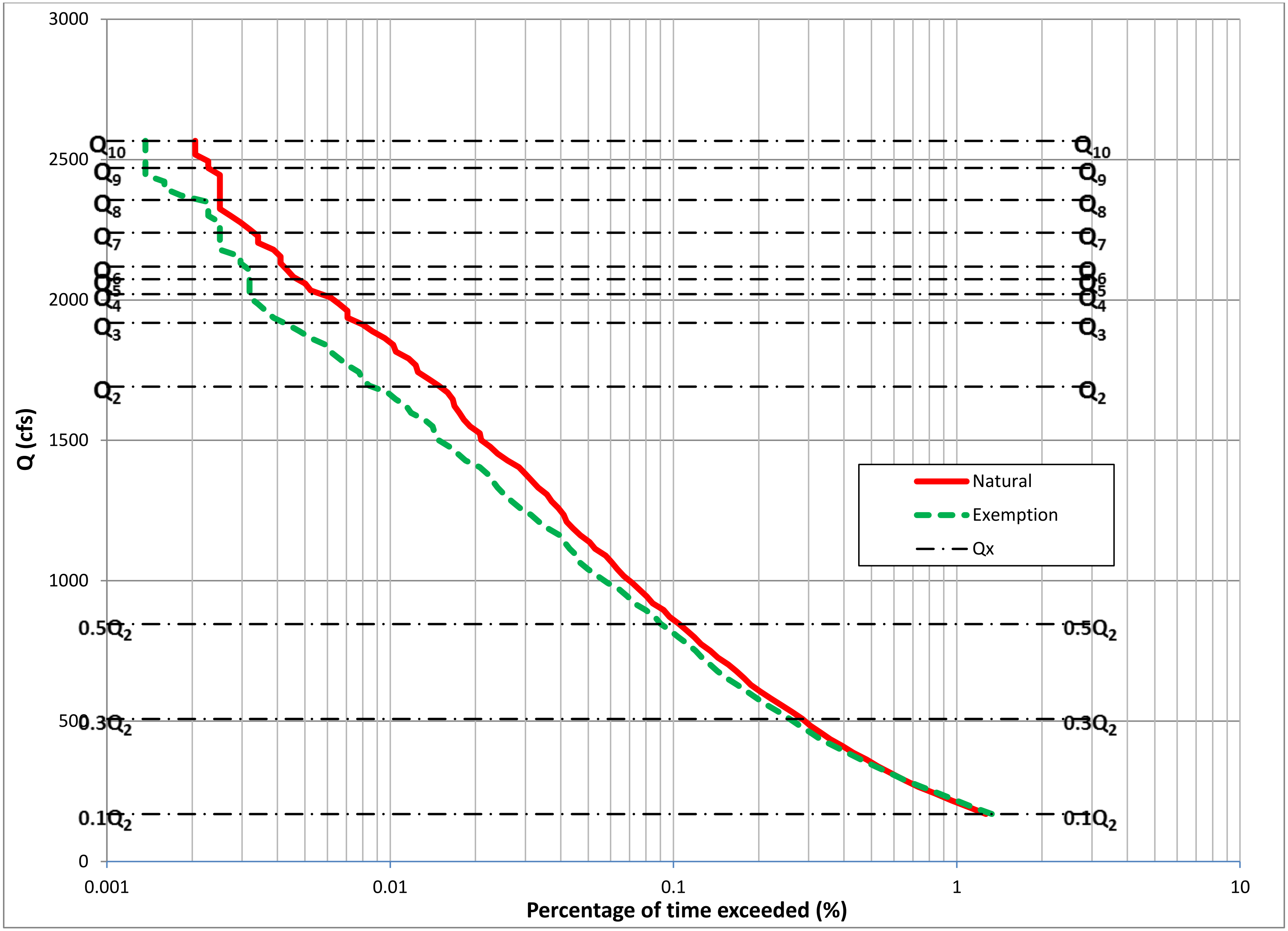


Figure 2: SWMM Otay River Flow Duration Curves for the Natural and Exemption Scenarios

1916 Savage Dam Failure and Historical Photographic Comparisons

We sought to establish multiple lines of evidence to either validate or invalidate our findings. In order to more accurately assess the exemption, we considered not only the *presence* of Savage Dam, but the *effect of its catastrophic failure* in 1916. Therefore, we tested the next hypothesis: the *historic failure* of Savage Dam has a more profound impact on river morphology than any proposed, directly-discharging development downstream of Lower Otay Reservoir. In order to do so, we conducted a historical image review to observe the relationship between urbanization and river morphology dating back to the earliest available aerial imagery (1928) provided by the County of San Diego Department of Public Works. We were also able to obtain stereoscope photographs taken in 1953 from the University of California, Santa Barbara's Aerial Imagery Research Service and a high-resolution 2015 image from Esri. We hypothesized that, due to the 1916 dam failure, the Otay River was extremely hydromodified and therefore has become significantly desensitized to changes in land use. If the photos demonstrate that the river has remained in a steady state of dynamic equilibrium during the course of Otay Valley's urbanization over the past 87 years, then it would be reasonable to acknowledge the river's proper equilibrium state and its resiliency to post-dam failure land use alterations.

The Savage Dam failure is a well-documented catastrophe. The flood of January 27, 1916 caused the rock-fill dam to fail, discharging over 1.7 billion cubic feet into Otay Valley over the course of 2.5 hours. An account of the events leading up to the dam breach and the aftermath in Otay Valley is given by Roy A. Silent (1916):

> Prior to January 15 [1916] the water surface in the Otay reservoir was 96.5 feet above zero contour. From Jan. 16 to 21 at 7 a.m. it had risen 11.8 ft. to a height of 122 ft. 8 in. At this time, water began to run over the spillway. ***From Jan. 21 on, the level continued to rise in spite of the discharge through the spillway. On the morning of Jan. 27 the reservoir was at 124 ft. 9 in., and the spillway was probably discharging in the neighborhood of 1,500*** [cfs] [emphasis added].
>
> The rain on Jan. 27 was extremely heavy, and by noon the water had risen so high that Mr. Weuste, in charge at the dam, deemed it advisable to open the outlet gate. This failed to check the rise, and it was realized that the dam would probably be overtopped before evening. Men were accordingly dispatched to warn residents in the valley to move to higher ground. Word to this effect was also sent out from the telephone exchange at National City. Most of the inhabitants took advantage of this warning.
>
> At 4:45 p.m. the water had reached the top of the dam and had seeped through and filled the boxes that were sunk in the top to allow an examination of the steel core. Water began running down the lower face on the east side of the dam at approximately 4:50 p.m. About this time several spouts or small streams of water appeared on the lower face of the dam, in one instance loosening a large boulder which rolled down to the bottom. From this time on, the destruction was very rapid. The lower face of the fill quickly melted away, thus removing the support from the core wall. At 5:05 p.m. the tension was so great that the steel diaphragm tore from the top at the center, and the

dam opened outward like a pair of gates. The released water rushed through and filled the canyon to a point approximately 20 feet below the top of the dam. The draw-down area extended possibly 200 ft. behind the dam. ***It required 2 ½ hr. for the reservoir to empty*** [emphasis added].

A huge wall of water, variously described as from 6 to 20 ft. high, rushed down the valley, covering the distance from the damsite to Palm City [located just upstream of San Diego Bay]***, about 10 mi., in 48 min., carrying all before it*** [emphasis added]. The total loss of life has amounted to 14 at the present writing (Feb. 8), but there are still several persons missing. The property damage is estimated at $250,000.

A thorough examination of the damsite was made on Jan. 31 and Feb. 1. Practically all the fill was washed completely away. The steel core was deposited in varying-sized sections along the valley, a large part ***being found at Palm City, 10 mi. below the dam*** [emphasis added]. The core wall had torn itself loose from both of the side walls, the foundations remaining intact. An examination of the bottom was impossible, as water to a depth of 8 feet was flowing through a constricted channel in the bottom of the cañon.

Three-quarters of a mile below where the dam had stood a piece of the diaphragm was observed, to which the angle iron forming the bottom of the steel plate was riveted, showing that the extreme bottom had been torn loose. On the west side, behind the remaining core wall, was a small part of the fill, composed of rock of small sizes, none of which was over 1 ½ ft. in diameter and grading from that size to coarse gravel. If this may be considered a fair example of the remainder of the fill, it is easy to understand its melting away as rapidly as described.

The cañon below the dam, prior to the failure, was considerably restricted and filled with large boulders. The action of the water removed all the loose rock and thoroughly stripped to bedrock both sides of the canyon as high as the water reached, the line of demarcation being clearly defined. The stripping was done in a most thorough manner, no particle of soil remaining in any of the niches or crevasses. This area was heavily wooded with brush [emphasis added].

An interesting feature was observed in that for half a mile below the dam in practically every pocket or niche in the rock was to be found a rivet head. An examination of the remaining parts of the steel core showed it to be in a perfect state of preservation, no rust or corrosion being noticeable. The destruction of the plate had taken place for the most part along the riveted seams, though one or two cases in which the sheets had torn were observed.

The reservoir above the dam showed a deposit of silt to a depth of from 5 to 6 ft. in most places, through which the present flow of the river is cutting a channel. The amount of silt deposited cannot be taken as a fair average for reservoirs in this section

> of the country, as much of the water passing into the reservoir was carried by a conduit and was comparatively clear. (Silent, 335-336)

A photograph accommodating Mr. Silent's original narrative is provided in Figure 3.

Figure 3: Canyon Immediately Below Dam, Showing Stripping Action of Water (Silent, 1916)

In addition to Mr. Silent's account, the former Assistant City Manager of San Diego, John L. Bacon, on February 1, 1916 (Baker, 1916):

> The heaviest rainstorm ever recorded in this part of California caused the destruction of the Lower Otay dam at about 5 p.m. on Jan. 27. The rain began on Jan. 14 and continued for six days, with an average precipitation of 1 in. daily. Upon the ground thus thoroughly saturated a second and much heavier rainstorm fell on Jan. 25. The rain gages were inadequate to measure this storm, and the actual rainfall record at the dam is not available. The precipitation on Jan. 27, however, is estimated at about 5 in., a cloudburst occurring about 4 p.m.
>
> The level of the water in the reservoir rose 9 ½ ft. from 7 a.m. to 5 p.m., at which time the dam overflowed. It began to give way about 5 min. later. The destruction was completed in 15 min., the dam being washed away to its foundations all around. The failure evidently started by the water overflowing the crest, washing out the backing of the central core. The break started near the center of the dam, the plates holding back for a time against the sides. Part of the plate was crumpled up and washed down the valley for several miles.

> The floor of the spillway was at an elevation of 124 ft. above the original stream bed, and the elevation of the top of the dam was 134 ft. The spillway was 38 ft. wide at the bottom and 45 ft. wide at the elevation of the dam crest. ***The estimated flow through the spillway when the dam overflowed was 2,000,000,000 gal. daily*** [emphasis added]. The spillway was not blocked in any way. The ¼-in. steel plate core in the dam, with 12 in. of concrete on each side, stopped 2 ft. below the dam crest. The length of the dam crest was 560 ft. and the width of the top 16 ft. The thickness of the dam at the bottom was 400 ft. ***The valley below the dam was swept clear of soil to bedrock, and the banks of the valley show that a wave about 50 ft. high passed down*** [emphasis added]. About 30 lives were lost in the flood.
>
> It is estimated that to replace the dam will cost about half a million dollars. There is ample water for the city's supply stored behind several other dams. Part of the Sweetwater dam was washed out. The Upper Otay dam, an arched concrete structure of horseshoe shape, had a depth of 3 ft. of water flowing over its crest on Thursday, but is safe. The City of San Diego has been cut off from the outside world except by water. No telegraph, telephone or railway lines were in operation. All bridges were washed out, and roads were impassable. (239)

As conveyed by these first-hand accounts, the magnitude of the dam failure was not limited to only areas immediately downstream of the breach but all the way to the mouth. The USGS documented the impacts of the 1916 flood across Southern California and reported the following damages incurred by businesses within Otay Valley (McGlashan & Ebert, 1918):

> *San Diego Consolidated Gas & Electric Co.*—The transmission lines and distribution system along San Diego River were washed out from El Monte to False Bay. There were also ***extensive washouts*** along Sweetwater River at Jamacho and from Sweetwater dam to San Diego Bay, ***on Otay River from Otay dam to San Diego Bay***, and along Tia Juana River from Tia Juana to the Pacific Ocean [emphasis added]. The principal damage was the loss of wood pole lines, copper wire, transformers, and miscellaneous electric-line material. The service in San Diego and immediate vicinity was not seriously interrupted. The lines to the more important towns were reestablished within two weeks, but some of the remote farming districts were without electric service for six weeks or more. The total damage to the gas and electric departments, corrected for value of salvaged material, was $70,527.
>
> *Western Salt Co.*—The losses consisted of ***170 acres of salt ground (which was covered with a deep deposit of silt), 2,500 tons of salt, a large quantity of brine in the ponds***, and injury to machinery [emphasis added]. The total damage was given as $85,500.
>
> *Fenton-Sumpton-Barnes Co.*—The company operates a gravel-washing plant ***in Otay Valley, about a mile from San Diego Bay. This plant was a complete loss, for after the flood there was not an indication on the surface to show its location*** [emphasis added]. The value of this equipment was $35,000. ***In addition, the soil was entirely removed***

> ***from 100 acres of bottom land*** which had been purchased for about $450 per acres [emphasis added]. The business loss was complete from January 27 to May 1. (34)

To put the magnitude of the dam breach into perspective with regard to the geomorphically significant range of flows, we look to the data provided by Silent, Baker, and USGS. In the five days leading up to the dam breach (starting on January 22 to 7 a.m. on January 27, 1916) flows ranging up to approximately 1,600 cfs were *constantly* released through the spillway—a rate that is 33% greater than the FEMA-published instantaneous Q_{10} value for the Otay River at Otay Valley Road (Federal Emergency Management Agency, 2012). Then, for ten straight hours up until the moment the dam breached, flowrates rapidly increased up to 4,700 cfs. Based upon the defined geomorphically significant flow range of Q_2 to Q_{10}, these *pre*-breach spillway flows and durations alone had enough energy to alter the river's morphology in an unnatural way (and likely did so). The morphological impacts caused by these pre-breach spillway flows were unquestionably eclipsed by the 20-50 foot high wall of water caused by the dam failure. When the dam breached at 5:05 p.m. on January 27, 1916, 1.7 billion cubic feet of water were released in 2.5 hours. The mere average flowrate during this 2.5 hour period equates to over 193,000 cfs—a rate that is nearly four times the 500-year FEMA flowrate for the aforementioned location (Federal Emergency Management Agency, 2012). The unnatural force exerted on the river system by these massive flows was devastating to all within the river system, as presented by the firsthand accounts and now confirmed by the hydrologic context. The USGS post-breach photograph is provided in Figure 4.

For additional context, the USGS report also documents that just before failure, the flows entering the reservoir through Jamul Creek reached 18,100 cfs. They describe the 150 foot wide creek as being composed of sand, gravel, and boulders before the flood and rendered "practically clean" afterwards (McGlashan & Ebert, 1918). A photograph of Jamul Creek's devastating scour is provided in Figure 5.

Without question, the 1916 Savage Dam breach had a profound impact on the Otay River, from the reservoir to San Diego Bay. The extent to which the system remains impaired by this catastrophic event is best evidenced through the historic aerial photograph review. Photographs from 1928, 1953, and 2014 are provided in Figure 6, Figure 7, and Figure 8, respectively. These photos are best viewed by scrolling between single page displays in Adobe Acrobat Reader (View → Page Display → Single Page View).

Figure 4: View Downstream at Site of Lower Otay Dam, After Failure (McGlashan & Ebert, 1918)

Figure 5: View Upstream on Jamul Creek after Flood of January 1916 (McGlashan & Ebert, 1918)

Figure 6: 1928 Aerial Photograph of the Otay River (Upstream of I-805) (County of San Diego)

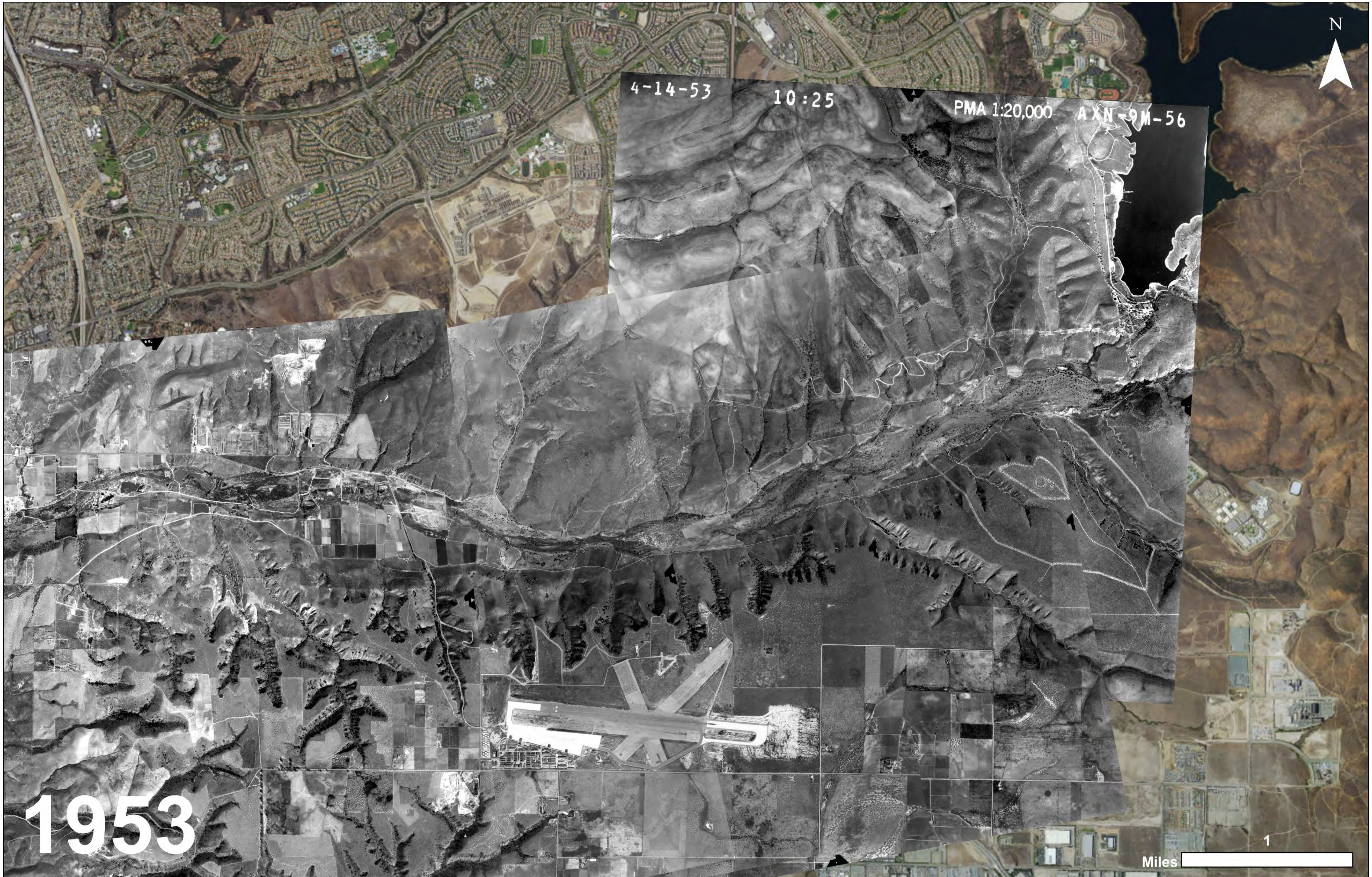


Figure 7: 1953 Aerial Photograph of the Otay River (Upstream of I-805) (University of California, Santa Barbara)

Figure 8: 2015 Aerial Photograph of the Otay River (Upstream of I-805) (Esri)

The aerial image comparison provides valuable insights into the post-failure river morphology. In 1928 (12 years after the breach), the effects of the dam failure are clearly seen: an incised, barren river mostly devoid of vegetation. In the absence of field data, it is reasonable to gather that the old Savage Dam fill material (rocks ranging in size up to 1.5 feet and some boulders) cover the channel bed, with some light re-establishing of brush toward the bank and thalweg. In 1953, the re-establishment of vegetation continues to be clearly seen, as most of the river reach has become covered. Vegetation has migrated from the thalweg toward the floodplain in many areas.

The hydrologic activity occurring between these two instances in time provides several pieces of notable data. First, during the 25 years from 1928 to 1953, San Diego experienced two of its wettest seven years on record: 1940-41 (24.74 inches) and 1951-52 (18.16 inches) to date (San Diego Union-Tribune, 2005). Second, the Lower Otay Reservoir hourly precipitation data from the National Oceanic and Atmospheric Administration (NOAA) recorded hourly rainfall depths of 1.24 inches in 1951 and 1.08 inches in 1952, which are totals equal to the estimated 200 and 100 year hourly rainfall depth for that station, respectively (National Oceanic and Atmospheric Administration, 2014). Lastly, Jamul Creek (the closest available stream station data during this time) discharged a peak of 4,000 cfs in December 1947, which is its second highest peak on record to date (United States Geological Survey, 2015). The fact that the river system did not widen, meander, or scour during that time would suggest that it would take greater than the wettest conditions on record to impact the river channel morphology or degrade the in-stream habitat—conditions certainly outside the Q_2 to Q_{10} flow range.

When these two historic photographs are compared with the modern-day condition, it is evident that the same trend has continued for 87 years: the channel remains stable, while vegetation continues to populate through the riverbed. While the Lower Otay Reservoir hourly precipitation data shows that the area continued to experience wet years from 1953 to 2015 (hourly precipitation depths equal to the 200, 50, and 25 year frequency in 1963, 1964, and 1955, respectively), the channel demonstrates no morphologic changes over the 62 year span. The 1928 river perfectly aligns with the 2015 river at stream bed angle points, ridgelines, boulders, and other geologic features; constricted areas have remained constricted, wide areas have remained wide, and no meandering or incising is evident. Furthermore, contrasting the most recent San Diego County land use data with the earliest available data from 1986, we find that the watershed in these photos (upstream of I-805 to Lower Otay Reservoir) has increased from 11% to 20% impervious cover over the past 30 years. Despite the extreme rainfall events and rapid urbanization, the Otay River has remained in a steady state of dynamic equilibrium and continues to reinforce its bed and bank material *and* support beneficial uses through the re-emergence of vegetation. Therefore, it would be reasonable to presume that the overall river health would benefit from the continued inflows of clean water. We conclude that the dam breach altered the channel in such a way that the more typical range of geomorphic flows has not adversely affected the river morphology, nor degraded the system's beneficial uses, as evidenced by the unwavering channel alignment and progressive re-habitation of natural vegetative species.

Field Investigation and Revised WMAA Ep Analysis

Thus far, the two working hypotheses have been tested and found to be correct: the *presence* and *historic failure* of Savage Dam have had, and continue to have, a more profound impact on river morphology than any proposed directly discharging development downstream of Lower Otay Reservoir. Through the testing of the second hypothesis, we observed the re-establishment of the river's vegetation. As previously stated, hydrologic models are most appropriately used in conjunction with field verification to either validate or invalidate their findings. Therefore, as a final measure, we sought to assess our findings by conducting a field investigation. Field conditions were documented and used to revise the clear and repeatable WMAA Ep Analysis with *field-specific* inputs.

The WMAA Ep Analysis conservatively assumed a highly sensitive relationship between watershed imperviousness and in-channel shear stress. The methodology behind the analysis assumes that accelerated erosion ensues and thus the river system will begin to unravel if the cumulative work performed on any given channel section in the watershed's post-developed condition exceeds the pre-developed condition by more than 5% (Erosion Potential, or Ep > 1.05). This sensitive relationship is likely attributable to the fact that the WMAA Ep methodology was not developed using data from impounded watersheds, and the data that was used did not come from urbanized (>25%) impervious watersheds, but rather from urbanizing (0 to 25% impervious) watersheds. Due to these factors, the erosion potential analysis is implicitly conservative for an impounded system and depends heavily on the watershed imperviousness and the selection of a threshold value at which particle motion occurs at any point along the channel boundary, known as the critical shear stress (τ_c). In the WMAA Ep Analysis, the critical shear stress was conservatively assumed to occur at a flow rate equal to 50% of the 2-year peak flow (Q_2). This "low flow threshold" critical shear stress, which equates to the in-channel shear produced at a flow of $0.5Q_2$, is based upon an assumption of the river channel having "low susceptibility" to accelerated erosion. This very conservative approach assumes a degree of susceptibility to hydromodification within the range of geomorphically significant flows *before* any consideration is given to the river's physical properties, such as soil cohesion, vegetation, or other factors that are to be evaluated in the proper determination of the critical shear stress value (Fischenich, 2001). As a macro-level initial screening of a major river system, the WMAA Ep Analysis includes this implicit factor of safety to an already conservative analysis. The field investigation also sought to investigate this assumption, in addition to testing our initial findings.

On October 21, 2015, the TRWE team investigated the Otay River from just downstream of 27th Street (approximately ¾ mile upstream of Interstate 5) to the confluence with Salt Creek (approximately 2 miles downstream of Savage Dam), with special attention given to three critical cross sections along the reach. These three sections were identified as areas of concern by the WMAA consultant team due to their narrow geometry. We documented the channel boundary conditions at each location. These cross sections (1, 2, and 3) are presented in Figure 9:

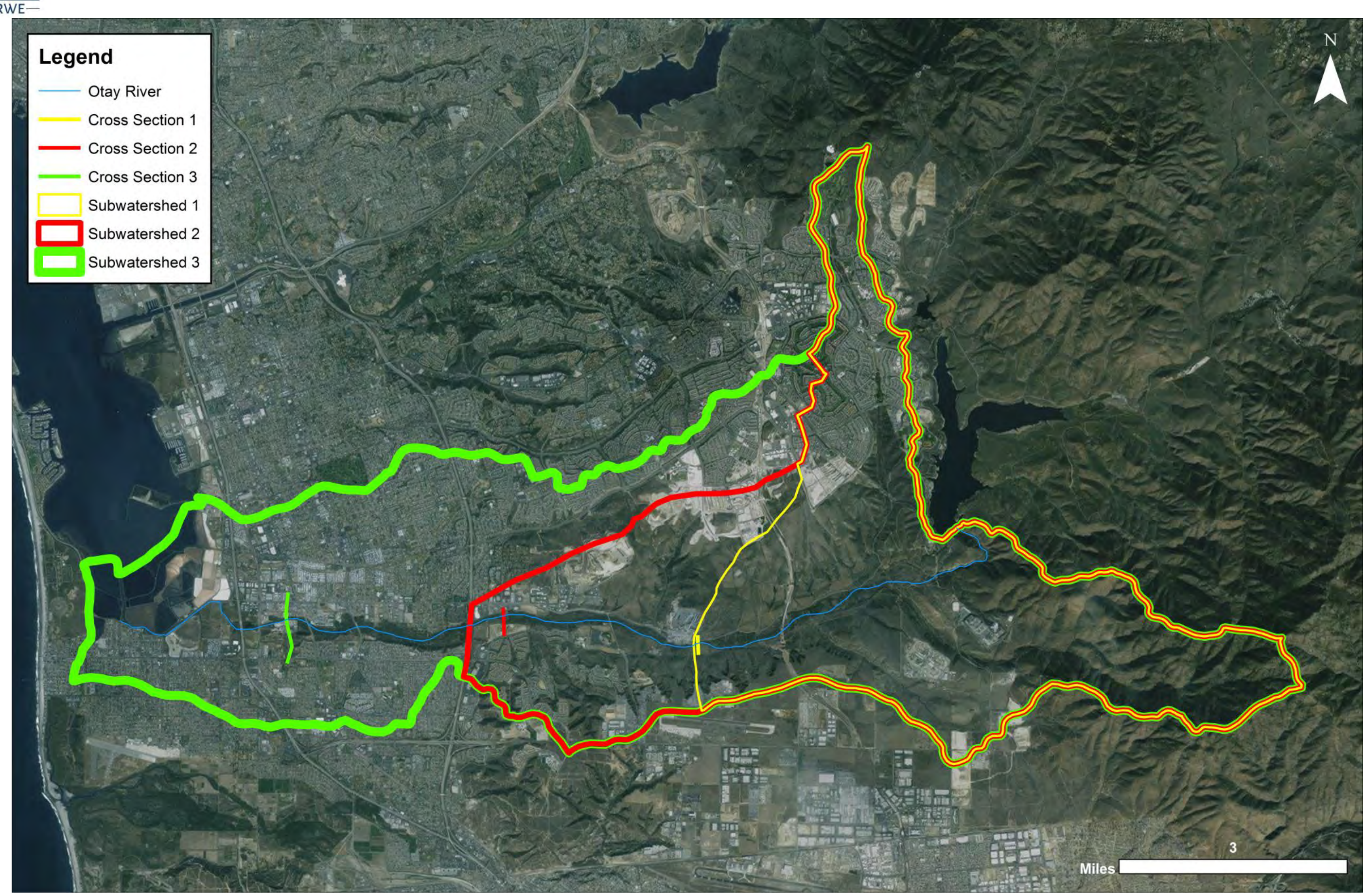


Figure 9: Locations of Cross Sections 1, 2, and 3, Including Upstream Subwatershed Areas

We investigated the boundary conditions at all three cross sections, including additional review at sections in between. We found at all three cross sections, and the areas in between, the river was heavily vegetated with grassland, scrub, meadow, and marsh. Some areas remain scoured to bedrock and still do not support vegetation 100 years after the dam failure, as was the case with Cross Section 1. In all cases, we found no evidence of active scour. Field photos are provided in Figures 10 through 18.

Many of the modern critical shear stress values for uniform, noncohesive channel boundary materials were estimated in 1936 through a series of laboratory flume experiments by A. Shields in his development of what is now known as the Shields criterion. While Shields' estimates are useful for predominantly alluvial or nonvegetated river systems, these theoretical values have little value in assessing the stability of vegetated systems. According to Dr. Craig Fischenich of the U.S. Army Corps Engineer Research and Development Center (ERDC) (2001):

> The presence of vegetation does not render underlying soils immune from erosion, but the critical condition for erosion of a vegetated bank is usually the threshold of failure of the plant stands by snapping, stem scour, or uprooting, rather than for detachment and entrainment of the soils themselves; vegetation failure usually occurs at much higher levels of flow intensity than for soil erosion. (4)

It is well documented that when vegetation establishes itself in a channel, then that channel is capable of handling flow velocities far in excess of that handled by the soil lining alone (1992). A number of recent research efforts have suggested that root systems physically and chemically bind bank soils in place, increasing the critical shear stress (Wynn, 2004). As the research continues, river and stream restoration efforts have produced valuable insight into a wide range of critical shear stress values for different channel materials, including vegetated channels. A prominent study by Dr. Fischenich documents how to assess a channel's stability and also provides a range of critical shear stress values for vegetation-lined channels such as the Otay River (included in Attachment 4). Critical shear stress values of 0.67 pounds per square foot (psf) (shales and hardpan), 0.35 psf (average reeds), and 0.70 psf (short native and bunch grass) are more appropriate assignments for the Otay River based upon the field conditions (Fischenich, 2001); the WMAA Ep Analysis assumed a very conservative critical shear stress value of 0.135 psf not based on the actual boundary conditions. The revised critical shear stress estimates are still fairly conservative, considering that low to average values were selected within the published range.

The MS4 Permit speaks to the significance of a proper critical shear stress assignment in Provision E.3.c.(2)(a)(i) where it states that the channel's low-flow threshold "*must* correspond with the critical channel flow that produces the critical shear stress" (San Diego Regional Water Quality Control Board, 2015). Therefore, we conclude that the revised critical shear stress estimates meet the Permit criteria, as they are appropriate for a wide, vegetated Otay River segment. The revised WMAA Ep Analysis shows that no work occurs at any of the three cross sections for the range of geomorphically significant flows, which is consistent with our observations, the watershed-specific hydrologic modeling and the historical imagery review. The revised WMAA Ep Analysis spreadsheets are provided in Attachment 2.

Figure 10: Cross Section 1 (view south)

Figure 11: Cross Section 1 – Scoured to Bedrock

Figure 12: Cross Section 1 – Immediately Downstream (view south)

Figure 13: Cross Section 2 (view south)

Figure 14: Cross Section 2 (in channel; north bank; view south)

Figure 15: Cross Section 2 (in channel; north bank; view southwest)

Figure 16: Cross Section 3 – Just Upstream (view west)

Figure 17: Cross Section 3 (in channel; view south; north bank)

Figure 18: Cross Section 3 (in channel; view southeast; north bank)

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Attachment 1

SWMM Model Inputs and Outputs

Otay Watershed SWMM Parameters

Table 2: Exempt Subcatchments

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	10.44	1	5.94%	80%	0.012	0.15	0.05	0.10	25%
B	0.00								
C	299.03	24	6.60%	61%	0.012	0.15	0.05	0.10	25%
D	1001.41	80	7.73%	60%	0.012	0.15	0.05	0.10	25%

Table 3: Non Exempt Subcatchments

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	4.08	0.3	6.09%	71%	0.012	0.15	0.05	0.10	25%
B	0.00								
C	143.79	12	6.37%	64%	0.012	0.15	0.05	0.10	25%
D	2851.20	228	6.75%	64%	0.012	0.15	0.05	0.10	25%

Table 4: Developed Subcatchments

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	1024.99	82	19.46%	29%	0.012	0.15	0.05	0.10	25%
B	162.69	13	24.86%	13%	0.012	0.15	0.05	0.10	25%
C	2143.79	172	17.87%	32%	0.012	0.15	0.05	0.10	25%
D	20882.06	1673	16.41%	34%	0.012	0.15	0.05	0.10	25%

Table 5: Impounded Subcatchments

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	2993.07	240	16.47%	9%	0.012	0.15	0.05	0.10	25%
B	3016.93	242	21.43%	8%	0.012	0.15	0.05	0.10	25%
C	8658.65	694	20.59%	10%	0.012	0.15	0.05	0.10	25%
D	48588.71	3892	22.59%	8%	0.012	0.15	0.05	0.10	25%

Flow Duration Curve Data for Otay River Natural versus Exemption Scenarios

Q2 =	1691.48	cfs	Fraction	10 %
Q10 =	2566.55	cfs		
Step =	24.2161	cfs		
Count =	438959	hours		
	50.08	years		

Interval	Natural Scenario			Exemption Scenario			Pass or
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	Fail?
1	169.148	5566	1.27E+00	5835	1.33E+00	105%	Pass
2	193.364	4863	1.11E+00	5019	1.14E+00	103%	Pass
3	217.580	4209	9.59E-01	4374	9.96E-01	104%	Pass
4	241.796	3691	8.41E-01	3806	8.67E-01	103%	Pass
5	266.012	3216	7.33E-01	3302	7.52E-01	103%	Pass
6	290.228	2865	6.53E-01	2873	6.55E-01	100%	Pass
7	314.444	2575	5.87E-01	2555	5.82E-01	99%	Pass
8	338.661	2318	5.28E-01	2268	5.17E-01	98%	Pass
9	362.877	2115	4.82E-01	2017	4.59E-01	95%	Pass
10	387.093	1895	4.32E-01	1804	4.11E-01	95%	Pass
11	411.309	1736	3.95E-01	1621	3.69E-01	93%	Pass
12	435.525	1570	3.58E-01	1448	3.30E-01	92%	Pass
13	459.741	1449	3.30E-01	1334	3.04E-01	92%	Pass
14	483.957	1336	3.04E-01	1225	2.79E-01	92%	Pass
15	508.174	1250	2.85E-01	1127	2.57E-01	90%	Pass
16	532.390	1151	2.62E-01	1033	2.35E-01	90%	Pass
17	556.606	1058	2.41E-01	943	2.15E-01	89%	Pass
18	580.822	969	2.21E-01	866	1.97E-01	89%	Pass
19	605.038	890	2.03E-01	799	1.82E-01	90%	Pass
20	629.254	823	1.87E-01	738	1.68E-01	90%	Pass
21	653.471	779	1.77E-01	675	1.54E-01	87%	Pass
22	677.687	732	1.67E-01	628	1.43E-01	86%	Pass
23	701.903	685	1.56E-01	591	1.35E-01	86%	Pass
24	726.119	630	1.44E-01	554	1.26E-01	88%	Pass
25	750.335	592	1.35E-01	526	1.20E-01	89%	Pass
26	774.551	549	1.25E-01	493	1.12E-01	90%	Pass
27	798.767	520	1.18E-01	457	1.04E-01	88%	Pass
28	822.984	488	1.11E-01	427	9.73E-02	88%	Pass
29	847.200	458	1.04E-01	395	9.00E-02	86%	Pass
30	871.416	425	9.68E-02	377	8.59E-02	89%	Pass
31	895.632	405	9.23E-02	350	7.97E-02	86%	Pass
32	919.848	371	8.45E-02	319	7.27E-02	86%	Pass
33	944.064	353	8.04E-02	302	6.88E-02	86%	Pass
34	968.280	333	7.59E-02	283	6.45E-02	85%	Pass

Flow Duration Curve Data for Otay River Natural versus Exemption Scenarios

Q2 =	1691.48	cfs	Fraction	10	%
Q10 =	2566.55	cfs			
Step =	24.2161	cfs			
Count =	438959	hours			
	50.08	years			

Interval	Natural Scenario			Exemption Scenario			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
35	992.497	314	7.15E-02	257	5.85E-02	82%	Pass
36	1016.713	293	6.67E-02	237	5.40E-02	81%	Pass
37	1040.929	278	6.33E-02	219	4.99E-02	79%	Pass
38	1065.145	266	6.06E-02	205	4.67E-02	77%	Pass
39	1089.361	253	5.76E-02	200	4.56E-02	79%	Pass
40	1113.577	232	5.29E-02	189	4.31E-02	81%	Pass
41	1137.793	222	5.06E-02	181	4.12E-02	82%	Pass
42	1162.010	206	4.69E-02	174	3.96E-02	84%	Pass
43	1186.226	194	4.42E-02	158	3.60E-02	81%	Pass
44	1210.442	184	4.19E-02	147	3.35E-02	80%	Pass
45	1234.658	180	4.10E-02	138	3.14E-02	77%	Pass
46	1258.874	172	3.92E-02	126	2.87E-02	73%	Pass
47	1283.090	163	3.71E-02	118	2.69E-02	72%	Pass
48	1307.306	157	3.58E-02	111	2.53E-02	71%	Pass
49	1331.523	146	3.33E-02	105	2.39E-02	72%	Pass
50	1355.739	139	3.17E-02	101	2.30E-02	73%	Pass
51	1379.955	132	3.01E-02	97	2.21E-02	73%	Pass
52	1404.171	125	2.85E-02	91	2.07E-02	73%	Pass
53	1428.387	114	2.60E-02	81	1.85E-02	71%	Pass
54	1452.603	105	2.39E-02	76	1.73E-02	72%	Pass
55	1476.819	99	2.26E-02	71	1.62E-02	72%	Pass
56	1501.036	92	2.10E-02	65	1.48E-02	71%	Pass
57	1525.252	91	2.07E-02	63	1.44E-02	69%	Pass
58	1549.468	84	1.91E-02	62	1.41E-02	74%	Pass
59	1573.684	80	1.82E-02	58	1.32E-02	73%	Pass
60	1597.900	77	1.75E-02	52	1.18E-02	68%	Pass
61	1622.116	74	1.69E-02	50	1.14E-02	68%	Pass
62	1646.333	73	1.66E-02	46	1.05E-02	63%	Pass
63	1670.549	70	1.59E-02	43	9.80E-03	61%	Pass
64	1694.765	65	1.48E-02	37	8.43E-03	57%	Pass
65	1718.981	60	1.37E-02	35	7.97E-03	58%	Pass
66	1743.197	55	1.25E-02	34	7.75E-03	62%	Pass
67	1767.413	54	1.23E-02	31	7.06E-03	57%	Pass

Flow Duration Curve Data for Otay River Natural versus Exemption Scenarios

Q2 =	1691.48	cfs	Fraction	10 %
Q10 =	2566.55	cfs		
Step =	24.2161	cfs		
Count =	438959	hours		
	50.08	years		

Interval	Natural Scenario			Exemption Scenario			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
68	1791.629	51	1.16E-02	29	6.61E-03	57%	Pass
69	1815.846	46	1.05E-02	27	6.15E-03	59%	Pass
70	1840.062	45	1.03E-02	26	5.92E-03	58%	Pass
71	1864.278	42	9.57E-03	23	5.24E-03	55%	Pass
72	1888.494	38	8.66E-03	21	4.78E-03	55%	Pass
73	1912.710	35	7.97E-03	19	4.33E-03	54%	Pass
74	1936.926	31	7.06E-03	17	3.87E-03	55%	Pass
75	1961.142	31	7.06E-03	16	3.64E-03	52%	Pass
76	1985.359	29	6.61E-03	15	3.42E-03	52%	Pass
77	2009.575	27	6.15E-03	14	3.19E-03	52%	Pass
78	2033.791	23	5.24E-03	14	3.19E-03	61%	Pass
79	2058.007	22	5.01E-03	14	3.19E-03	64%	Pass
80	2082.223	20	4.56E-03	14	3.19E-03	70%	Pass
81	2106.439	19	4.33E-03	14	3.19E-03	74%	Pass
82	2130.655	18	4.10E-03	13	2.96E-03	72%	Pass
83	2154.872	18	4.10E-03	13	2.96E-03	72%	Pass
84	2179.088	17	3.87E-03	11	2.51E-03	65%	Pass
85	2203.304	15	3.42E-03	11	2.51E-03	73%	Pass
86	2227.520	15	3.42E-03	11	2.51E-03	73%	Pass
87	2251.736	14	3.19E-03	11	2.51E-03	79%	Pass
88	2275.952	13	2.96E-03	11	2.51E-03	85%	Pass
89	2300.168	12	2.73E-03	10	2.28E-03	83%	Pass
90	2324.385	11	2.51E-03	10	2.28E-03	91%	Pass
91	2348.601	11	2.51E-03	10	2.28E-03	91%	Pass
92	2372.817	11	2.51E-03	8	1.82E-03	73%	Pass
93	2397.033	11	2.51E-03	7	1.59E-03	64%	Pass
94	2421.249	11	2.51E-03	7	1.59E-03	64%	Pass
95	2445.465	11	2.51E-03	6	1.37E-03	55%	Pass
96	2469.681	10	2.28E-03	6	1.37E-03	60%	Pass
97	2493.898	10	2.28E-03	6	1.37E-03	60%	Pass
98	2518.114	9	2.05E-03	6	1.37E-03	67%	Pass
99	2542.330	9	2.05E-03	6	1.37E-03	67%	Pass
100	2566.546	9	2.05E-03	6	1.37E-03	67%	Pass

Otay River Exemption Analysis - Exemption Scenario

```
[TITLE]
Otay River Exemption Analysis - Exemption Scenario

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           02/01/1965
START_TIME           00:00:00
REPORT_START_DATE    02/01/1965
REPORT_START_TIME    00:00:00
END_DATE             02/28/2015
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .14    .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
Bonita+SWRes     INTENSITY 1:00   1.0    TIMESERIES OTAY

[SUBCATCHMENTS]
;;                                                 Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
EX-A             Bonita+SWRes     EXEMPT           10.44    80       1        5.94     0
EX-C             Bonita+SWRes     EXEMPT           299.03   61       24       6.6      0
EX-D             Bonita+SWRes     EXEMPT           1001.41  60       80       7.73     0
DEV-A            Bonita+SWRes     DEVELOPED        1024.99  29       82       19.46    0
DEV-B            Bonita+SWRes     DEVELOPED        162.69   13       13       24.86    0
DEV-C            Bonita+SWRes     DEVELOPED        2143.79  32       172      17.87    0
DEV-D            Bonita+SWRes     DEVELOPED        20882.06 34       1673     16.41    0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
EX-A             .012       .15        .05        .1         25         OUTLET
EX-C             .012       .15        .05        .1         25         OUTLET
EX-D             .012       .15        .05        .1         25         OUTLET
DEV-A            .012       .15        .05        .1         25         OUTLET
DEV-B            .012       .15        .05        .1         25         OUTLET
DEV-C            .012       .15        .05        .1         25         OUTLET
DEV-D            .012       .15        .05        .1         25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
EX-A             1.5        .225       .33
EX-C             6          .075       .31
```

Otay River Exemption Analysis - Exemption Scenario

```
EX-D            9          .01875     .3
DEV-A           1.5        .225       .33
DEV-B           3          .15        .32
DEV-C           6          .075       .31
DEV-D           9          .01875     .3

[JUNCTIONS]
;;              Invert     Max.       Init.      Surcharge  Ponded
;;Name          Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
EXEMPT          0          0          0          0          0
NOT_EXEMPT      0          0          0          0          0
DEVELOPED       0          0          0          0          0

[OUTFALLS]
;;              Invert     Outfall    Stage/Table      Tide
;;Name          Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
RIVER_OUTFALL   0          FREE                        NO

[CONDUITS]
;;              Inlet            Outlet                      Manning    Inlet      Outlet     Init.      Max.
;;Name          Node             Node             Length     N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
PE              EXEMPT           RIVER_OUTFALL    400        0.01       0          0          0          0
NE              NOT_EXEMPT       RIVER_OUTFALL    400        0.01       0          0          0          0
NOTDEV          DEVELOPED        RIVER_OUTFALL    400        0.01       0          0          0          0

[XSECTIONS]
;;Link          Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
PE              DUMMY        0                0          0          0          1
NE              DUMMY        0                0          0          0          1
NOTDEV          DUMMY        0                0          0          0          1

[LOSSES]
;;Link          Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------

[INFLOWS]
;;                                                 Param    Units    Scale    Baseline Baseline
;;Node          Parameter        Time Series      Type     Factor   Factor   Value    Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
NOT_EXEMPT      FLOW             NotExempt        FLOW     1.0      .57

[TIMESERIES]
;;Name          Date       Time       Value
;;-------------- ---------- ---------- ----------
OTAY            FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\Precip\Otay.txt"

NotExempt       FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\NotExempt.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EXEMPT          3627.451           4537.815
NOT_EXEMPT      5042.017           5084.034
DEVELOPED       6750.700           4523.810
```

Otay River Exemption Analysis - Exemption Scenario

```
RIVER_OUTFALL    5056.022           3613.445

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EX-A             2871.148           5672.269
EX-C             3291.317           5434.174
EX-D             3697.479           5126.050
DEV-A            6526.611           6036.415
DEV-B            6848.739           5798.319
DEV-C            7156.863           5532.213
DEV-D            7422.969           5322.129

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Bonita+SWRes     5126.050           7016.807
```

Otay River Exemption Analysis - Exemption Scenario

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

Otay River Exemption Analysis - Exemption Scenario

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ FEB-01-1965 00:00:00
Ending Date .............. FEB-28-2015 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 01:00:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 60.00 sec


WARNING 04: minimum elevation drop used for Conduit PE

WARNING 04: minimum elevation drop used for Conduit NE

WARNING 04: minimum elevation drop used for Conduit NOTDEV

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......   1072329.228       504.143
Evaporation Loss .........    155292.347        73.009
Infiltration Loss ........    659843.766       310.218
Surface Runoff ...........    261955.114       123.155
Final Surface Storage ....         5.545         0.003
Continuity Error (%) .....        -0.445


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......    261955.108     85361.985
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........     28077.362      9149.428
External Outflow .........    290032.470     94511.413
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


********************************
Highest Flow Instability Indexes
********************************
All links are stable.
```

Otay River Exemption Analysis - Exemption Scenario

```
************************
Routing Time Step Summary
************************
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
```

```
**************************
Subcatchment Runoff Summary
**************************
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
EX-A	504.14	0.00	165.69	100.74	238.17	67.52	2.60	0.472
EX-C	504.14	0.00	124.76	194.87	185.38	1505.24	64.61	0.368
EX-D	504.14	0.00	128.74	188.46	188.48	5125.13	234.25	0.374
DEV-A	504.14	0.00	46.70	357.70	100.55	2798.49	265.16	0.199
DEV-B	504.14	0.00	19.16	437.76	48.38	213.74	35.50	0.096
DEV-C	504.14	0.00	55.63	339.81	110.17	6413.17	549.69	0.219
DEV-D	504.14	0.00	73.04	311.45	122.10	69232.37	5326.65	0.242

```
*****************
Node Depth Summary
*****************
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00
NOT_EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00
DEVELOPED	JUNCTION	0.00	0.00	0.00	0 00:00
RIVER_OUTFALL	OUTFALL	0.00	0.00	0.00	0 00:00

```
******************
Node Inflow Summary
******************
```

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
EXEMPT	JUNCTION	301.47	301.47	6768 19:00	6697.879	6697.879
NOT_EXEMPT	JUNCTION	384.40	384.40	6768 19:00	9148.748	9148.748
DEVELOPED	JUNCTION	6177.00	6177.00	6768 18:00	78657.767	78657.767
RIVER_OUTFALL	OUTFALL	0.00	6741.68	6768 18:00	0.000	94504.394

```
********************
Node Surcharge Summary
********************
```

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet

Otay River Exemption Analysis - Exemption Scenario

```
EXEMPT               JUNCTION   438959.02          0.000        0.000
NOT_EXEMPT           JUNCTION   438959.02          0.000        0.000
DEVELOPED            JUNCTION   438959.02          0.000        0.000


*********************
Node Flooding Summary
*********************

No nodes were flooded.


***********************
Outfall Loading Summary
***********************

-----------------------------------------------------------
                      Flow       Avg.       Max.       Total
                      Freq.      Flow       Flow      Volume
Outfall Node          Pcnt.       CFS        CFS    10^6 gal
-----------------------------------------------------------
RIVER_OUTFALL         12.76      62.64    6741.68   94504.394
-----------------------------------------------------------
System                12.76      62.64    6741.68   94504.394


********************
Link Flow Summary
********************

-----------------------------------------------------------------------------
                               Maximum  Time of Max   Maximum    Max/    Max/
                                |Flow|   Occurrence   |Veloc|    Full    Full
Link                 Type          CFS  days hr:min    ft/sec    Flow   Depth
-----------------------------------------------------------------------------
PE                   DUMMY      301.47  6768  19:00
NE                   DUMMY      384.40  6768  19:00
NOTDEV               DUMMY     6177.00  6768  18:00


*************************
Conduit Surcharge Summary
*************************

----------------------------------------------------------------------------
                                                           Hours        Hours
                       --------- Hours Full --------   Above Full   Capacity
Conduit                Both Ends  Upstream  Dnstream   Normal Flow   Limited
----------------------------------------------------------------------------
PE                          0.01       0.01      0.01  438959.02         0.01
NE                          0.01       0.01      0.01  438959.02         0.01
NOTDEV                      0.01       0.01      0.01  438959.02         0.01


Analysis begun on:  Fri Dec 18 16:42:35 2015
Analysis ended on:  Fri Dec 18 16:43:30 2015
Total elapsed time: 00:00:55
```

Otay River Exemption Analysis - Natural Scenario

```
[TITLE]
Otay River Exemption Analysis - Natural Scenario

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           02/01/1965
START_TIME           00:00:00
REPORT_START_DATE    02/01/1965
REPORT_START_TIME    00:00:00
END_DATE             02/28/2015
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .14    .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
Bonita+SWRes     INTENSITY 1:00   1.0    TIMESERIES OTAY

[JUNCTIONS]
;;               Invert     Max.       Init.      Surcharge  Ponded
;;Name           Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
EXEMPT           0          0          0          0          0
NOT_EXEMPT       0          0          0          0          0
DEVELOPED        0          0          0          0          0
DAM              0          0          0          0          0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
RIVER_OUTFALL    0          FREE                        NO

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.      Max.
;;Name           Node             Node             Length     N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
PE               EXEMPT           RIVER_OUTFALL    400        0.01       0          0          0          0
NE               NOT_EXEMPT       RIVER_OUTFALL    400        0.01       0          0          0          0
NOTDEV           DEVELOPED        RIVER_OUTFALL    400        0.01       0          0          0          0
4                DAM              RIVER_OUTFALL    400        0.01       0          0          0          0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
PE               DUMMY        0                0          0          0          1
```

```
NE               DUMMY        0                0          0          0          1
NOTDEV           DUMMY        0                0          0          0          1
4                DUMMY        0                0          0          0          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------

[INFLOWS]
;;                                                Param    Units    Scale    Baseline Baseline
;;Node           Parameter        Time Series     Type     Factor   Factor   Value    Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
EXEMPT           FLOW             Exempt           FLOW     1.0      0.57
NOT_EXEMPT       FLOW             NotExempt        FLOW     1.0      0.57
DEVELOPED        FLOW             Developed        FLOW     1.0      0.57
DAM              FLOW             Impounded        FLOW     1.0      0.57

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
OTAY             FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\Precip\Otay.txt"

Exempt           FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\Exempt.txt"

NotExempt        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\NotExempt.txt"

Developed        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\Developed.txt"

Impounded        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\Impounded.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EXEMPT           3492.063           6507.937
NOT_EXEMPT       4790.765           7012.987
DEVELOPED        5945.166           6883.117
DAM              6652.237           6392.496
RIVER_OUTFALL    5098.039           5392.157

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Bonita+SWRes     5382.395           8903.319
```

Otay River Exemption Analysis - Natural Scenario

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

Otay River Exemption Analysis - Natural Scenario (via HMP applied to built-out watershed, including impounded drainage

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ FEB-01-1965 00:00:00
Ending Date .............. FEB-28-2015 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Routing Time Step ........ 60.00 sec


WARNING 04: minimum elevation drop used for Conduit PE

WARNING 04: minimum elevation drop used for Conduit NE

WARNING 04: minimum elevation drop used for Conduit NOTDEV

WARNING 04: minimum elevation drop used for Conduit 4

**************************        Volume         Volume
Flow Routing Continuity        acre-feet       10^6 gal
**************************      ---------      ---------
Dry Weather Inflow .......          0.000          0.000
Wet Weather Inflow .......          0.000          0.000
Groundwater Inflow .......          0.000          0.000
RDII Inflow ..............          0.000          0.000
External Inflow ..........     284576.467      92733.493
External Outflow .........     284576.467      92733.493
Internal Outflow .........          0.000          0.000
Storage Losses ...........          0.000          0.000
Initial Stored Volume ....          0.000          0.000
Final Stored Volume ......          0.000          0.000
Continuity Error (%) .....          0.000


********************************
Highest Flow Instability Indexes
********************************
All links are stable.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     60.00 sec
Average Time Step           :     60.00 sec
Maximum Time Step           :     60.00 sec
Percent in Steady State     :      0.00
Average Iterations per Step :      1.00
```

Otay River Exemption Analysis - Natural Scenario

```
******************
Node Depth Summary
******************

  ------------------------------------------------------------------
                                 Average  Maximum  Maximum  Time of Max
                                   Depth    Depth      HGL   Occurrence
  Node                 Type         Feet     Feet     Feet  days hr:min
  ------------------------------------------------------------------
  EXEMPT               JUNCTION     0.00     0.00     0.00     0  00:00
  NOT_EXEMPT           JUNCTION     0.00     0.00     0.00     0  00:00
  DEVELOPED            JUNCTION     0.00     0.00     0.00     0  00:00
  DAM                  JUNCTION     0.00     0.00     0.00     0  00:00
  RIVER_OUTFALL        OUTFALL      0.00     0.00     0.00     0  00:00


*******************
Node Inflow Summary
*******************

  -------------------------------------------------------------------------------------
                                  Maximum  Maximum                  Lateral       Total
                                  Lateral    Total  Time of Max      Inflow      Inflow
                                   Inflow   Inflow   Occurrence      Volume      Volume
  Node                 Type           CFS      CFS  days hr:min    10^6 gal    10^6 gal
  -------------------------------------------------------------------------------------
  EXEMPT               JUNCTION    171.84   171.84  6768  19:00    3817.791    3817.791
  NOT_EXEMPT           JUNCTION    384.40   384.40  6768  19:00    9148.748    9148.748
  DEVELOPED            JUNCTION   3520.89  3520.89  6768  18:00   44834.927   44834.927
  DAM                  JUNCTION   6285.41  6285.41  6768  18:00   34925.140   34925.140
  RIVER_OUTFALL        OUTFALL       0.00 10263.22  6768  18:00       0.000   92726.606


**********************
Node Surcharge Summary
**********************

  Surcharging occurs when water rises above the top of the highest conduit.
  ---------------------------------------------------------------------
                                              Max. Height   Min. Depth
                                  Hours       Above Crown    Below Rim
  Node                 Type      Surcharged           Feet         Feet
  ---------------------------------------------------------------------
  EXEMPT               JUNCTION   438959.02          0.000        0.000
  NOT_EXEMPT           JUNCTION   438959.02          0.000        0.000
  DEVELOPED            JUNCTION   438959.02          0.000        0.000
  DAM                  JUNCTION   438959.02          0.000        0.000


*********************
Node Flooding Summary
*********************

  No nodes were flooded.


***********************
Outfall Loading Summary
***********************

  -----------------------------------------------------------
                         Flow       Avg.       Max.       Total
                         Freq.      Flow       Flow      Volume
  Outfall Node           Pcnt.       CFS        CFS    10^6 gal
  -----------------------------------------------------------
  RIVER_OUTFALL          12.75     61.51   10263.22   92726.606
  -----------------------------------------------------------
  System                 12.75     61.51   10263.22   92726.606


********************
```

Otay River Exemption Analysis - Natural Scenario

Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
PE	DUMMY	171.84	6768 19:00			
NE	DUMMY	384.40	6768 19:00			
NOTDEV	DUMMY	3520.89	6768 18:00			
4	DUMMY	6285.41	6768 18:00			

****
Conduit Surcharge Summary
****

Conduit	--------- Hours Full -------- Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
PE	0.01	0.01	0.01	438959.02	0.01
NE	0.01	0.01	0.01	438959.02	0.01
NOTDEV	0.01	0.01	0.01	438959.02	0.01
4	0.01	0.01	0.01	438959.02	0.01

Analysis begun on: Fri Dec 18 16:53:03 2015
Analysis ended on: Fri Dec 18 16:54:25 2015
Total elapsed time: 00:01:22

Attachment 2

Revised WMAA Ep Analysis

Erosion Potential Analysis for Otay River - Cross Section 1

*Erosion Potential (Ep)	**#DIV/0!**

Channel Slope	0.0053	ft/ft
Critical Shear	0.670	lb/sq. ft
γ	62.4	lb/ft^3

			Existing Condition	Future Condition
Tributary Area	*A*	sq mi	19	19
Mean Annual Precip	*MAP*	in/yr	12.0	12.0
Length of Daily Flow Record	*Yr*	yr	30	30
Imperviousness	*Impav*	mi^2/mi^2	0.17598	0.21312
Maximum Flow of Record	*Qmax*	cfs	529.9	529.9
Minimum Flow of Record	*Qmin*	cfs	0.01	0.01
10-year peak flow	*Q10*	cfs	1605.8	1605.8
Coefficient of DDF	*day1*	days & cfs	1147.68	1916.11
Exponent of DDF	*day2*	days & cfs	-0.78	-0.83
Number of Bins	N_B	--	25	25
Bin Size	$H_{B\text{-}log}$	--	0.453	0.453

Bin Number	Lower Bound of Bin Number	Upper Bound of Bin Number	Flow	Hydraulic Radius	Flow Velocity	Shear Stress	Work	Duration	Cumulative Work	Duration	Cumulative Work
B	$B_{lwr\text{-}log\ (cfs)}$	$B_{upr\text{-}log\ (cfs)}$	*Q (cfs)*	*R (ft)*	*v (ft/s)*	τ (psf)	*W*		*W*duration*		*W*duration*
1	0.006	0.010	0.01	0.01	0.13	0.003	0.000	49104	0.00	101283	0.00
2	0.010	0.016	0.01	0.01	0.13	0.003	0.000	34458	0.00	69670	0.00
3	0.016	0.025	0.02	0.01	0.16	0.003	0.000	24180	0.00	47924	0.00
4	0.025	0.039	0.03	0.02	0.18	0.007	0.000	16968	0.00	32966	0.00
5	0.039	0.061	0.05	0.02	0.20	0.007	0.000	11907	0.00	22676	0.00
6	0.061	0.096	0.08	0.02	0.23	0.007	0.000	8355	0.00	15598	0.00
7	0.096	0.152	0.12	0.03	0.25	0.010	0.000	5863	0.00	10730	0.00
8	0.152	0.239	0.20	0.03	0.29	0.010	0.000	4114	0.00	7381	0.00
9	0.239	0.376	0.31	0.04	0.32	0.013	0.000	2887	0.00	5077	0.00
10	0.376	0.591	0.48	0.05	0.36	0.017	0.000	2026	0.00	3492	0.00
11	0.591	0.930	0.76	0.06	0.40	0.020	0.000	1422	0.00	2402	0.00
12	0.930	1.463	1.20	0.07	0.47	0.023	0.000	998	0.00	1652	0.00
13	1.463	2.302	1.88	0.09	0.55	0.030	0.000	700	0.00	1137	0.00
14	2.302	3.622	2.96	0.12	0.65	0.040	0.000	491	0.00	782	0.00
15	3.622	5.698	4.66	0.15	0.76	0.050	0.000	345	0.00	538	0.00
16	5.698	8.966	7.33	0.19	0.89	0.063	0.000	242	0.00	370	0.00
17	8.966	14.107	11.54	0.24	1.04	0.079	0.000	170	0.00	254	0.00
18	14.107	22.196	18.15	0.30	1.21	0.099	0.000	119	0.00	175	0.00
19	22.196	34.924	28.56	0.37	1.39	0.122	0.000	84	0.00	120	0.00
20	34.924	54.949	44.94	0.45	1.60	0.149	0.000	59	0.00	83	0.00
21	54.949	86.457	70.70	0.55	1.82	0.182	0.000	41	0.00	57	0.00
22	86.457	136.031	111.24	0.70	2.12	0.232	0.000	29	0.00	39	0.00
23	136.031	214.032	175.03	0.87	2.47	0.288	0.000	20	0.00	27	0.00
24	214.032	336.758	275.39	1.08	2.85	0.357	0.000	14	0.00	19	0.00
25	336.758	529.856	433.31	1.33	3.27	0.440	0.000	10	0.00	13	0.00
									0.00		0.00

***(No work occurs in existing of future condition for the range of geomorphically significant flows)**

Ep **#DIV/0!**

Erosion Potential Analysis for Otay River - Cross Section 2

*Erosion Potential (Ep)	**#DIV/0!**

Channel Slope	0.0033	ft/ft
Critical Shear	0.350	lb/sq. ft
γ	62.4	lb/ft^3

			Existing Condition	Future Condition
Tributary Area	*A*	sq mi	28	28
Mean Annual Precip	*MAP*	in/yr	12.0	12.0
Length of Daily Flow Record	*Yr*	yr	30	30
Imperviousness	*Impav*	mi^2/mi^2	0.20473	0.24473
Maximum Flow of Record	*Qmax*	cfs	744.3	744.3
Minimum Flow of Record	*Qmin*	cfs	0.01	0.01
10-year peak flow	*Q10*	cfs	2170.4	2170.4
Coefficient of DDF	*day1*	days & cfs	2157.91	3747.65
Exponent of DDF	*day2*	days & cfs	-0.80	-0.85
Number of Bins	N_B	--	25	25
Bin Size	$H_{B\text{-}log}$	--	0.467	0.467

Bin Number	Lower Bound of Bin Number	Upper Bound of Bin Number	Flow	Hydraulic Radius	Flow Velocity	Shear Stress	Work	Duration	Cumulative Work	Duration	Cumulative Work
B	$B_{lwr\text{-}log\ (cfs)}$	$B_{upr\text{-}log\ (cfs)}$	*Q (cfs)*	*R (ft)*	*v (ft/s)*	τ (psf)	*W*		*W*duration*		*W*duration*
1	0.006	0.010	0.01	0.01	0.11	0.002	0.000	100346	0.00	218891	0.00
2	0.010	0.016	0.01	0.01	0.11	0.002	0.000	69108	0.00	147449	0.00
3	0.016	0.025	0.02	0.02	0.13	0.004	0.000	47595	0.00	99324	0.00
4	0.025	0.041	0.03	0.02	0.15	0.004	0.000	32779	0.00	66906	0.00
5	0.041	0.065	0.05	0.02	0.17	0.004	0.000	22575	0.00	45069	0.00
6	0.065	0.104	0.08	0.03	0.19	0.006	0.000	15547	0.00	30359	0.00
7	0.104	0.165	0.13	0.03	0.21	0.006	0.000	10707	0.00	20450	0.00
8	0.165	0.264	0.21	0.04	0.24	0.008	0.000	7374	0.00	13776	0.00
9	0.264	0.421	0.34	0.04	0.27	0.008	0.000	5078	0.00	9280	0.00
10	0.421	0.671	0.55	0.05	0.30	0.010	0.000	3498	0.00	6251	0.00
11	0.671	1.071	0.87	0.07	0.35	0.014	0.000	2409	0.00	4211	0.00
12	1.071	1.710	1.39	0.09	0.42	0.019	0.000	1659	0.00	2836	0.00
13	1.710	2.728	2.22	0.11	0.49	0.023	0.000	1142	0.00	1911	0.00
14	2.728	4.354	3.54	0.14	0.58	0.029	0.000	787	0.00	1287	0.00
15	4.354	6.948	5.65	0.18	0.68	0.037	0.000	542	0.00	867	0.00
16	6.948	11.087	9.02	0.23	0.80	0.047	0.000	373	0.00	584	0.00
17	11.087	17.694	14.39	0.29	0.93	0.060	0.000	257	0.00	393	0.00
18	17.694	28.236	22.97	0.35	1.07	0.072	0.000	177	0.00	265	0.00
19	28.236	45.061	36.65	0.44	1.23	0.091	0.000	122	0.00	179	0.00
20	45.061	71.909	58.49	0.41	1.19	0.084	0.000	84	0.00	120	0.00
21	71.909	114.756	93.33	0.48	1.31	0.099	0.000	58	0.00	81	0.00
22	114.756	183.132	148.94	0.51	1.36	0.105	0.000	40	0.00	55	0.00
23	183.132	292.248	237.69	0.64	1.58	0.132	0.000	27	0.00	37	0.00
24	292.248	466.381	379.31	0.80	1.83	0.165	0.000	19	0.00	25	0.00
25	466.381	744.268	605.32	1.00	2.14	0.206	0.000	13	0.00	17	0.00
									0.00		0.00

***(No work occurs in existing of future condition for the range of geomorphically significant flows)**

Ep **#DIV/0!**

Erosion Potential Analysis for Otay River - Cross Section 3

*Erosion Potential (Ep)	#DIV/0!

Channel Slope	0.0026	ft/ft
Critical Shear	0.700	lb/sq. ft
γ	62.4	lb/ft^3

			Existing Condition	Future Condition
Tributary Area	*A*	sq mi	46	46
Mean Annual Precip	*MAP*	in/yr	12.0	12.0
Length of Daily Flow Record	*Yr*	yr	30	30
Imperviousness	*Impav*	mi^2/mi^2	0.3188	0.3441
Maximum Flow of Record	*Qmax*	cfs	1236.9	1236.9
Minimum Flow of Record	*Qmin*	cfs	0.01	0.01
10-year peak flow	*Q10*	cfs	3405.1	3405.1
Coefficient of DDF	*day1*	days & cfs	14796.19	20982.62
Exponent of DDF	*day2*	days & cfs	-0.91	-0.94
Number of Bins	N_B	--	25	25
Bin Size	$H_{B\text{-}log}$	--	0.489	0.489

Bin Number	Lower Bound of Bin Number	Upper Bound of Bin Number	Flow	Hydraulic Radius	Flow Velocity	Shear Stress	Work	Duration	Cumulative Work	Duration	Cumulative Work
B	$B_{lwr\text{-}log\,(cfs)}$	$B_{upr\text{-}log\,(cfs)}$	*Q (cfs)*	*R (ft)*	*v (ft/s)*	τ (psf)	*W*		*W*duration*		*W*duration*
1	0.006	0.010	0.01	0.03	0.18	0.005	0.000	1169806	0.00	1916824	0.00
2	0.010	0.016	0.01	0.03	0.18	0.005	0.000	751154	0.00	1212931	0.00
3	0.016	0.027	0.02	0.04	0.22	0.006	0.000	482330	0.00	767520	0.00
4	0.027	0.043	0.03	0.05	0.24	0.008	0.000	309713	0.00	485672	0.00
5	0.043	0.071	0.06	0.06	0.29	0.010	0.000	198872	0.00	307324	0.00
6	0.071	0.115	0.09	0.07	0.32	0.011	0.000	127699	0.00	194469	0.00
7	0.115	0.188	0.15	0.08	0.36	0.013	0.000	81998	0.00	123056	0.00
8	0.188	0.306	0.25	0.10	0.41	0.016	0.000	52653	0.00	77868	0.00
9	0.306	0.498	0.40	0.12	0.46	0.019	0.000	33809	0.00	49273	0.00
10	0.498	0.812	0.66	0.14	0.52	0.023	0.000	21709	0.00	31179	0.00
11	0.812	1.324	1.07	0.17	0.59	0.028	0.000	13940	0.00	19730	0.00
12	1.324	2.158	1.74	0.21	0.67	0.034	0.000	8951	0.00	12485	0.00
13	2.158	3.517	2.84	0.25	0.75	0.041	0.000	5748	0.00	7900	0.00
14	3.517	5.733	4.62	0.30	0.85	0.049	0.000	3691	0.00	4999	0.00
15	5.733	9.344	7.54	0.36	0.96	0.058	0.000	2370	0.00	3163	0.00
16	9.344	15.230	12.29	0.43	1.08	0.070	0.000	1522	0.00	2002	0.00
17	15.230	24.825	20.03	0.52	1.22	0.084	0.000	977	0.00	1267	0.00
18	24.825	40.465	32.64	0.62	1.38	0.101	0.000	627	0.00	801	0.00
19	40.465	65.956	53.21	0.75	1.56	0.122	0.000	403	0.00	507	0.00
20	65.956	107.507	86.73	0.94	1.82	0.153	0.000	259	0.00	321	0.00
21	107.507	175.233	141.37	1.18	2.11	0.191	0.000	166	0.00	203	0.00
22	175.233	285.626	230.43	1.46	2.44	0.237	0.000	107	0.00	129	0.00
23	285.626	465.563	375.59	1.80	2.81	0.292	0.000	68	0.00	81	0.00
24	465.563	758.856	612.21	2.15	3.16	0.349	0.000	44	0.00	51	0.00
25	758.856	1236.916	997.89	2.57	3.56	0.417	0.000	28	0.00	33	0.00
									0.00		0.00

***(No work occurs in existing of future condition for the range of geomorphically significant flows)**

Ep **#DIV/0!**

Attachment 3

Hydrologic Review and Analysis of San Diego County Hydromodification Exemption for Five River Reaches

Smith et al. (2015)

Hydrologic Review and Analysis of San Diego County Hydromodification Exemption for Five River Reaches

Prepared by:

TORY R. WALKER ENGINEERING, INC.
122 Civic Center Drive, Suite 206
Vista, CA 92084
(760) 414-9212

Authors:
Alex J. Smith, MS, EIT

Alicia M. Kinoshita, Ph.D.
Assistant Professor, San Diego State University
Department of Civil, Construction, and Environmental Engineering

Sonya R. Lopez, Ph.D.
Assistant Professor, California State University, Los Angeles
Department of Civil Engineering

Tory R. Walker, PE, CFM, LEED GA

Date:
July 22, 2015

Executive Summary

The purpose of this study is to use a strict hydrologic assessment to either justify or invalidate the renewal of the current hydromodification exemption for projects draining directly to five river reaches (Otay River, San Diego River, San Dieguito River, San Luis Rey River, and Sweetwater River). These reaches have been exempted by the San Diego County Hydromodification Management Plan (HMP) (San Diego County, 2011), based on the wide-spread perception that existing large upstream reservoirs reduce river discharge and erosion potential to a larger extent than potential increases attributed to downstream land developments. In 2013, the San Diego Regional Water Quality Control Board (SDRWQCB) issued a new Permit that now requires justification of exemptions with further hydrologic analysis.

Accordingly, this study evaluates the hydrology of these five watersheds to determine if the continuance of the exemptions may be justified. A rigorous two-step approach is used to describe the effects of either renewing or revoking the 2011 HMP Exemptions through: (1) Statistical Peak Flow Analysis and (2) US Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) Peak Flow Analysis. The Statistical Peak Flow Analysis uses a combination of observed streamflow measurements and USGS Linear Regression Equations to estimate the 2-year, 5-year, and 10-year peak flows at the mouth of each exempt river reach and describe the influence of the upstream impoundments for “dam-in-place” and theoretical “no dam” conditions. The Statistical Peak Flow Analysis characterizes flow reductions as a result of upstream impoundments and serves as a preface for more detailed peak flow simulations. EPA SWMM is used to determine the relative numerical influence of storm water runoff from project development on peak flows and durations, using continuous rainfall-runoff simulation to estimate the 2-year, 5-year, and 10-year peak flows at the mouth of each exempt river reach. Hydromodification flow controls are simulated for all non-directly discharging developable lands and are conditionally simulated for directly discharging developable lands in order to assess the impact of the hydromodification exemptions on the watershed-wide peak flows. The simulated hydromodification controls are modeled both with and without the presence of the dams to assess the influence of impoundment versus land development.

Both analyses resolve that the upstream impoundment is a very significant factor in peak flow alteration for each watershed. The Statistical Peak Flow Analysis results suggest a 29 to 65% peak flow reduction for each watershed due to upstream impoundment. The SWMM Peak Flow Analysis results suggest that peak flows for each watershed, if exemptions are granted, will remain 22 to 79% less than peak flows corresponding to an undammed watershed condition. These pre- to post-dam ratios are consistent with flow impoundment behavior found in other semi-arid, Mediterranean systems. The SWMM results further suggest that the areas directly discharging to exempt river reaches are less than significant, as evidenced by the near-0% peak flow increase granted by the proposed HMP exemption. Therefore, it is recommended that the exemptions be reinstated along all five river reaches for projects directly discharging to the rivers, due to confirmation of significant impoundment effects and the negligible peak flow increase attributable to those directly discharging developable lands.

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ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practice
DEM	Digital Elevation Model
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
GIS	Geographic Information System
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
JURMP	Jurisdictional Urban Runoff Management Plan
MS4	Municipal Separate Storm Sewer System
NED	National Elevation Dataset
OTAY	Otay River
PDP	Priority Development Project
PRISM	Parameter-elevation Regressions on Independent Slopes Model Monthly Climate Data for the Continental United States
SDCFCD	San Diego County Flood Control District
SDGTO	San Dieguito River
SDR	San Diego River
SLR	San Luis Rey River
SW	Sweetwater River
SWMM	Storm Water Management Model
TAC	Technical Advisory Committee
USGS	United States Geological Survey
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan
WY	Water Year (October 1st to September 30th)

1. BACKGROUND & CONTEXT FOR STUDY

A watershed's natural hydrologic state may become severely altered due to land use changes. Hydrologic alterations may include fluctuations to natural stream discharge rates, durations and sediment transport behavior. A stream's physical response to changes in watershed runoff and sediment yield is collectively referred to as hydromodification. The confidence that most hydromodification is highly attributable to changes in land surface—namely urbanization and other development—has recently led to more focused efforts in an attempt to understand and manage these processes.

Hydromodification is occurring in many Southern California creeks and waterways and has become a key element of most stormwater programs in California (Southern California Coastal Water Research Project, 2010). In San Diego, Orange, and Riverside counties, recent storm water regulations have imposed discharge flow and duration control requirements on certain new development and redevelopment projects. As evidenced in 2007 by the San Diego Regional Water Quality Control Board Order No. R9-2007-0001 (the "2007 Municipal Separate Storm Sewer System (MS4) Permit"), the Municipal Copermittees were required to implement a Hydromodification Management Plan (HMP) "...to manage increases in runoff discharge rates and durations from all Priority Development Projects, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force" (San Diego Regional Water Quality Control Board, 2007). Consequently, in 2007 the Copermittees began to prepare the San Diego County HMP (Brown and Caldwell, 2011). The San Diego County HMP effort continued over the span of two years, consisted of a 14 member Technical Advisory Committee (TAC), and received input from a gamut of private and public stakeholders. The total HMP development effort exceeded one million dollars. The Final 2011 HMP was adopted by the San Diego Regional Water Quality Control Board (San Diego Water Board) on July 14, 2010 through Resolution No. R9-2010-0066 (San Diego Regional Water Quality Control Board, 2010).

The 2011 HMP provides San Diego Copermittees with guidance on hydromodification methods, technical approach, requirements, standards, best management practice (BMP) selection and implementation, monitoring, and exemptions. One such HMP applicability requirement provided exemption rationale for Priority Development Projects (PDPs) directly discharging to five large river reaches in San Diego County (developable lands that directly discharge to the exempt river reaches are herein referred to as Project Lands). The Project Lands within each watershed equate to a considerably small fraction of the total watershed area (less than 5%, as summarized in Table 1). The exempt river reaches are summarized in Table 2 and are shown in Figure 1.

Table 1: Watershed Land Use Distribution (Downstream of Dam)

Reach	Total (ac)	[1]Developable (ac)	[2]Project Lands (ac)	% Developable	%Project Lands
Otay	29,571	4,310	1,412	15%	5%
San Diego	111,014	13,667	1,196	12%	1%
San Dieguito	28,710	4,653	1,055	16%	4%
San Luis Rey	118,846	77,180	4,151	65%	3%
Sweetwater	25,135	1,332	255	5%	1%

[1]Acreages were determined using "Developable Land" GIS data from the SanGIS Regional Data Warehouse.
[2]Acreages were determined through desktop analysis using available MS4 GIS data provided by Copermittees.

Table 2: Summary of Exempt River Reaches as Defined by the 2011 HMP

River	Downstream Limit	Upstream Limit
Otay River	Outfall to San Diego Bay	Lower Otay Reservoir Dam
San Diego River	Outfall to Pacific Ocean	Confluence with San Vicente Creek
San Dieguito River	Outfall to Pacific Ocean	Lake Hodges Dam
San Luis Rey River	Outfall to Pacific Ocean	Upstream river limit of Basin Plan subwatershed 903.1 upstream of Bonsall and near Interstate 15
Sweetwater River	Outfall to San Diego Bay	Sweetwater Reservoir Dam

For all proposed exempt river reaches supported by the 2011 HMP, each has:

- a drainage area in excess of 100 square miles;
- a 100-year flow in excess of 20,000 cubic feet per second;
- significant upstream reservoir flow regulation;
- predominantly wide floodplains and/or stabilized channel areas, and;
- low gradients (less than 1 %)

These factors concurred with field observations and were backed by years of historical perspective and practice from the TAC members (Bowling, Grey, Parra, Walker, & Weeden, 2013). There was a conditional requirement for the river reach exemption: a properly-sized energy dissipation feature must be existing or installed at the respective outfall location. Using the exemption rationale provided within the 2011 HMP, Copermittees were permitted to exempt PDPs from the hydromodification management BMP performance requirements prescribed by the 2007 MS4 Permit (herein referred to as the 2011 HMP Exemptions) so long as said PDPs were listed in the Development Planning section of the Copermittees' Jurisdictional Urban Runoff Management Program Annual Report (JURMP).

The current and succeeding municipal storm water permit, the 2013 MS4 Permit, was adopted on May 8, 2013. Similar to the preceding 2007 MS4 Permit, the 2013 MS4 Permit presents a list of criteria that must all be satisfied in order to grant hydromodification management BMP performance requirement exemptions. However, the 2013 MS4 Permit revised the hydromodification management BMP performance requirement exemption language from the 2007 MS4 Permit as follows:

- The project would discharge into channels that are significantly hardened (e.g., with rip-rap, sackcrete, etc.) downstream to their outfall in bays or the ocean;
- The project would discharge to a channel where the watershed areas below the project's discharge points are highly impervious (e.g. >70%).

The 2013 MS4 Permit conditionally excludes the five exempt river reaches justified by the 2011 HMP—exemptions that were based on prior studies of these rivers, the consensus of the TAC, an extensive public review process, and were approved by the San Diego Regional Board. However, the adopted language within the 2013 MS4 Permit does provide an opportunity to grant hydromodification management BMP performance requirement exemptions. A PDP may be exempt from hydromodification management BMP performance requirements when the project discharges storm water runoff to an area identified by the Copermittees as appropriate for an exemption by the optional Watershed Management Area Analysis (WMAA) incorporated into the Water Quality Improvement Plan (WQIP) pursuant to Provision B.3.b.(4).

This language was included to allow further evaluation of these previously exempt channels, rivers, or highly impervious watershed areas for continued exemption under a WQIP. Thus, a complete new analysis is required under the Watershed Management Area Analysis (Bowling, Grey, Parra, Walker, & Weeden, 2013). The Copermittees have since elected to perform the optional Watershed Management Area Analysis, represented by the County of San Diego (Geosyntec Consultants & Rick Engineering, 2015). The April 2015 San Diego County Regional WMAA uses a geomorphic assessment to evaluate the relationship between Erosion Potential (Ep) and Sediment Supply Potential (Sp). Based upon the instream erosion assessment, the Draft Regional WMAA recommends hydromodification management BMP performance requirement exemptions for PDPs directly discharging to the following river reaches:

Table 3: Summary of Exempt River Reaches as Proposed by the Regional WMAA

River	Downstream Limit	Upstream Limit
Otay River	Outfall to San Diego Bay	Interstate 805*
San Diego River	Outfall to Pacific Ocean	Confluence with San Vicente Creek
San Dieguito River	Upstream edge of the railroad crossing*	Lake Hodges Dam
San Luis Rey River	Outfall to Pacific Ocean	Upstream river limit of Basin Plan subwatershed 903.1 upstream of Bonsall and near Interstate 15
Sweetwater River	Outfall to San Diego Bay	Sweetwater Reservoir Dam

*limit changed from 2011 HMP recommendation

The Copermittees will now be able to grant hydromodification management BMP performance requirement exemptions offered by the 2013 MS4 Permit so long as the exemptions are approved via the WMAA and are incorporated into the WQIP—both of which are subject to the vetted public review and San Diego Water Board approval process.

1.1 Impoundment Characteristics

It is well understood that a river is in dynamic equilibrium with its geomorphic components: quantity of sediment, particle size, water discharge, and slope (Lane, 1955). This relationship, known as the Lane relation, is commonly expressed as:

$$Q_s d_s \propto Q_w S_o$$

Where Q_s is the quantity of sediment, d_s is the sediment particle diameter, Q_w is the water discharge, and S_o is the stream bed slope. This relationship is used to describe the qualitative balance between stream power and the discharge of bed material sediment and not intended to be used as an equation (Bowling, Grey, Parra, Walker, & Weeden, 2013).

Generally, long-term channel forms are naturally defined by frequent bankfull floods, approximately 1 to 2-year events in many cases (Wolman & Miller, 1960; Andrews, 1980). However, anthropogenic disturbances in natural systems invalidate assumptions of stationarity (Milly, et al., 2008). An alteration to one or more of the river equilibrium components will usually result in a feedback response to re-establish river equilibrium. A considerable amount of time may be required to achieve a new equilibrium condition; therefore, the effects of hydromodification may not be immediately observable (Trimble, 1997). In the context of all five exempt river reaches, the common denominators are sediment and flow sequestration due to upstream impoundments. The exact rate of sediment and flow sequestration accomplished by the upstream reservoirs is not well known at the desired temporal resolution. Sedimentation processes in a reservoir are quite complex because of the wide variation in many of the influencing factors (United States Bureau of Reclamation, 1987). Nonetheless, a significant reduction in sediment quantity and water discharge is reasonably assumed due to the steep and elevated nature of the impounded watershed drainage areas.

The exempt river reach impoundment summary is summarized as follows:

Table 4: Exempt River Reach Impoundment Summary

River	Major Impoundment[1]	Constructed	Owner	Miles from Mouth	Capacity (acre-ft)	Impounded Area (mi^2)	Percent Impounded[2]
Otay River	Lower Otay Reservoir	1919[a]	City of San Diego	13.1	49,849	100	70%
San Diego River	El Capitan Reservoir	1935	City of San Diego	28.0	112,807	185	61%
	San Vicente Reservoir	1943	City of San Diego	24.6	242,000[b]	75[b]	
San Dieguito River	Hodges Reservoir	1918	City of San Diego	11.0	30,251	245	89%
	Sutherland Reservoir	1954	City of San Diego	22.0	29,508	55	
San Luis Rey River	Lake Henshaw	1923	Vista Irrigation District	53.6	53,160	205	39%
Sweetwater River[3]	Sweetwater Reservoir	1888	Sweetwater Authority	8.2	28,079	85	82%
	Loveland Reservoir	1945	Sweetwater Authority	28.4	25,387	95	

[1] This study defines a Major Impoundment as a reservoir having storage capacity in excess of 25,000 acre feet and able to spill to the river reach
[2] percentage of total area impounded above downstream-most dam
[3] linear reservoir sequence
[a] originally constructed in 1897; reconstructed in 1919 after 1916 dam breach
[b] project recently completed to double reservoir capacity; overflows through tributary to main reach

1.2 Study Objectives

The objective of this study is to perform a rigorous hydrologic analysis to either justify or invalidate the renewal of the 2011 HMP Exemptions for PDPs on Project Lands using highly relevant and available tools, methods, and data. Due to the strict hydrologic focus of this study, sediment transport is not evaluated. This study used a two-step approach to describe the effects of either renewing or revoking the 2011 HMP Exemptions through: (1) Statistical Peak Flow Analysis, and (2) US Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) Peak Flow Analysis. The analyses are summarized below.

1.2.1 Statistical Peak Flow Analysis

The Statistical Peak Flow Analysis seeks to provide a frame of reference for the SWMM Peak Flow Analysis and to describe the general influence of the upstream impoundments on peak flows by using measured flow gage discharge, peak flow estimation, and reservoir overflow data, where possible, to estimate the 2-year, 5-year, and 10-year peak flows at the mouth of the exempt river reach during:

- the ”dam-in-place” condition, which includes the existence of the upstream reservoir(s);
- the hypothetical “no dam” condition, which seeks to remove the significant impoundment effects induced by the upstream reservoir(s)

1.2.2 SWMM Peak Flow Analysis

As hydromodification is a complex phenomenon established in a large scale range, two possible outcomes can occur: (1) the combined effect of the impoundment and potential development may be more similar to the hypothetical and natural peak flow than simply including hydromodification control for an area already modified by a dam, or (2) the combined effect of the impoundment and potential development could improve the situation in a portion of the range of analysis, but be detrimental in another portion of the range of analysis, in which case an exemption to hydromodification is not recommended. The Statistical Peak Flow Analysis serves as a preface to the more detailed SWMM Peak Flow Analysis and seeks to provide a general agreement between impoundment and peak flow behavior on a watershed-by-watershed basis.

The SWMM Peak Flow Analysis seeks to reinforce the Statistical Peak Flow Analysis. The SWMM Analysis will determine the relative change in peak flows from PDPs on Project Lands using EPA SWMM continuous simulation modeling to estimate the 2-year, 5-year, and 10-year peak flows at the mouth of the exempt river reach during:

- the dam-in-place HMP exemption scenario, which accounts for river impoundment and subjects only non-directly discharging developable lands to hydromodification management BMP performance requirements;
- the dam-in-place full HMP scenario, which accounts for river impoundment and subjects all directly and non-directly discharging developable lands to hydromodification management BMP performance requirements;
- the hypothetical “no dam” HMP exemption scenario, which removes the effect of river impoundment and subjects only non-directly discharging developable lands to hydromodification management BMP performance requirements;

- the hypothetical "no dam" full HMP scenario, which removes the effect of river impoundment and subjects all directly and non-directly discharging developable lands to hydromodification management BMP performance requirements.

If the SWMM Peak Flow Analysis demonstrates that the flows and durations of those flows contributed by the exempt Project Lands are insignificant, then the exemptions are justifiable. Contrarily, if the SWMM Peak Flow Analysis demonstrates that the flows and durations of those flows contributed by the exempt Project Lands are significant, then the exemptions are not justifiable and should be revoked.

2. METHODOLOGIES

2.1 Statistical Peak Flow Analysis

The United States Geological Survey (USGS) records and maintains stream station data for locations along each of the exempt river reaches. The period, quality, and availability of data vary significantly depending upon the river. Instantaneous stream flow measurements are desired in order to most accurately assess the true peak flows occurring within the river channel. Often, reliable flow data recorded prior to impounded flow conditions are not available. Therefore, the best available local USGS instantaneous stream stations were selected to represent earlier conditions.

Typical peak flow estimates (2-, 5-, and 10-year) are derived from annual maximum series data. Accurate peak flow assessment requires knowledge of the river's behavior throughout the water year and over a sufficient period of record, with consideration to the prevailing climate. Southern California's semi-arid Mediterranean climate is characterized by a unique seasonal precipitation, with wet winters and warm, dry summers that can produce multiple low-frequency events within the same year, or none at all. Due to this phenomenon, peak flow analyses developed upon single peak annual events will inevitably omit flows that have a significant influence on Mediterranean river morphology. The ultimate result of using the annual maximum series to determine peak flows for high-frequency events (the 2 and 5-year peaks) in a Mediterranean climate is a gross underestimation of the more probable peak flow frequency. This underestimation is likely more pronounced for the higher frequency events (i.e., the 2 and 5-year peak flows (Brown and Caldwell, 2011)). Therefore, a partial-duration series analysis is used to estimate the 2 and 5-year peak flows in this Statistical Peak Flow Analysis. A partial duration series contains "N" values from "N" years of data. For the 10-year peak flow, the annual maximum series will be used, unless the instantaneous data is found to be erroneous, in which case the partial duration will be used.

The USGS began to record instantaneous (15 minute) flow data in water year (WY) 1988 to present. The present-day instantaneous flow data are used to quantify the peak flow events for each reach by partial duration and annual series analyses. A set of peak flow regression equations are applied to the same drainage area recorded by the USGS stream station to develop a ratio of the measured post-dam peak flow to the peak flow estimation equation value; this ratio is named the flood peak ratio (FPR) in this study.

With the flood peak ratio (FPR) established, the 2-, 5-, and 10-year pre-dam peak flow events are estimated by multiplying the FPR by the regression peak flow estimate derived for the entire watershed-wide area. The process is repeated for each watershed to produce impoundment-free 2-, 5-, and 10-year peak flow estimates. For validation, the impoundment-free peak flows are compared with the measured peak flows for those watersheds with USGS stream stations located at or near the river mouth. For additional reference, the impoundment-free 10-year peak flow is compared to the 10-year peak flow estimates published by the 2012 Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) to roughly quantify the relative impact of the upstream impoundments.

USGS regional flood-frequency equations, originally introduced by Waananen and Crippen (1977), are used to estimate flood frequencies in six regions in California (Table 5). These equations relate flood magnitudes of selected frequency to drainage area, precipitation, and altitude (Waananen & Crippen, 1977). These equations (herein referred to as the 1977 USGS Equations) were regressed using available annual peak flow data from 778 USGS stream stations throughout California, 148 of which are located within the South Coast Region concerned with San Diego County. The 1977 USGS Equations are not applicable to sites where the usable storage within the basin exceeds 103 acre feet per square mile, to sites just downstream from large reservoirs, or to streams in urban areas affected substantially by urban development. The relations are primarily used to determine peak discharge values for flow under natural conditions (Waananen & Crippen, 1977). It is noted by a 2004 USGS study of Northern California watersheds that the 1977 USGS Regression equations produce the greatest errors at lower recurrence intervals (2-, 5-, and 10-year) peak flows, which is likely attributable to the lack of more than two decades of peak-flow data at the time of the study (Mann, Rizzardo, & Satkowski, 2004). It is expected that the underestimation would be even more pronounced for southern California's Mediterranean semi-arid climate for the reasons previously discussed.

The 1977 USGS Regression Equations were revised by Gotvald, Barth, Veilleux, & Parrett (2012). These equations (herein referred to as the 2012 USGS Equations) incorporated 30 years of additional annual peak flow data, among other improvements (Gotvald, Barth, Veilleux, & Parrett, 2012). Similarly, the 2012 USGS Regression Equations are specific to one of six hydrologic regions in California. San Diego County is located in the South Coast hydrologic region (Region 5), which was used for the 2-, 5-, and 10-year flood peak analysis. A comparison between the 1977 and 2012 USGS Equations are summarized in Table 5 as follows:

Table 5. 1977 and 2012 USGS Regression Equations for Region 5

Peak Flow	1977 USGS Equation	2012 USGS Equation
2-year	$0.14(DRNAREA)^{0.72}(PRECIP)^{1.62}$	$3.60(DRNAREA)^{0.672}(PRECIP)^{0.753}$
5-year	$0.40(DRNAREA)^{0.77}(PRECIP)^{1.69}$	$7.43(DRNAREA)^{0.739}(PRECIP)^{0.872}$
10-year	$0.63(DRNAREA)^{0.79}(PRECIP)^{1.75}$	$6.56(DRNAREA)^{0.783}(PRECIP)^{1.07}$

DRNAREA, drainage area, in square miles; *PRECIP*, mean annual precipitation, in inches

Drainage area values are estimated with USGS Digital Elevation Map (DEM) analysis using Esri ArcMap. Mean annual precipitation values were estimated using the Parameter-elevation Regressions on Independent Slopes Model Monthly Climate Data for the Continental United States (PRISM) areal statistics for water years 1988-2013 (October 1, 1987 to September 30, 2013) (Daly, 1994, 1997, 2001). PRISM provides an estimation of mean annual precipitation and is noted to have some bias at the monthly scale; however, this product is continuously updated to incorporate point data, a digital elevation model, and expert knowledge of complex climatic extremes, including rain shadows, coastal effects, and temperature inversions. Conterminous U.S. precipitation products can be downloaded from the PRISM Climate Group (http://www.prism.oregonstate.edu/); this study extracted and averaged monthly 4 km pixels for each watershed domain.

The USGS instantaneous stream station data are analyzed to identify individual peak flow events. Individual peak flow events are distinguished by satisfying the following criteria (United States Geological Survey, 1982):

1. Events must be separated by at least five days plus the natural logarithm of the square miles of the drainage area, and;
2. Intermediate flows must drop below 75 percent of the lower of the two separate maximum flows.

For any given time period where a recorded reservoir spill occurred and would have likely influenced the corresponding stream station flow measurement, the potential impacted data is omitted from the instantaneous stream flow record and analysis.

Two of the five river reaches (namely, the San Diego and San Luis Rey rivers) have instantaneous stream gage flow data near the mouth to the Pacific Ocean, where the Statistical Peak Flow Analysis provides an empirical relationship between the urbanized watershed-specific drainage area and partial duration peak flow events downstream of the impoundments. For the three remaining river reaches (namely, the Otay, San Dieguito, and Sweetwater rivers), the USGS stream stations are located upstream of the major impoundments, where the Statistical Peak Flow Analysis provides an empirical relationship between the sparsely developed, watershed-specific drainage area and partial duration peak flow events upstream of the impoundments. For both cases then, the watershed-wide drainage areas are not entirely represented, due to the impoundment in all cases, and due to the absence of a stream station near the mouth in three cases. Hence, these empirical relationships are used in combination with the 2012 USGS regional flood-frequency equations for rural ungaged streams in California to develop a relationship between the empirical and regression estimates on a watershed-wide scale; thus, a methodology is developed for estimating the peak flows at or near the river mouth. This simplified relationship is therefore used to scale the estimated regional flood-frequencies to the watershed-wide extent for each river by developing flood peak ratios (FPRs), defined as:

$$FPR = \frac{Q_{PDS}}{Q_{USGS}} \tag{1}$$

Where:

Q_{PDS} is the partial duration series T-year peak flow, as determined from the stream station instantaneous data record;

Q_{USGS} is the T-year peak flow, as determined by application of the T-year 2012 USGS regression equation to the equivalent stream station drainage area

Assuming a linear watershed-wide relationship between the stream station drainage area peak flows and 2012 USGS Regression peak flows:

$$\frac{Q_{PDS}}{Q_{USGS}} = \frac{Q_{ND}}{Q_{WS}} \tag{2}$$

Where:

Q_{ND} is the T-year estimated “no dam” statistical series peak at the river mouth

Q_{WS} is the 2012 USGS T-year annual peak applied to the entire watershed area

Therefore, the estimated “no dam” peak flow at the river mouth is:

$$Q_{ND} = FPR \times Q_{WS} \tag{3}$$

Figure 1 and Table 6 summarize the information pertinent to this methodology.

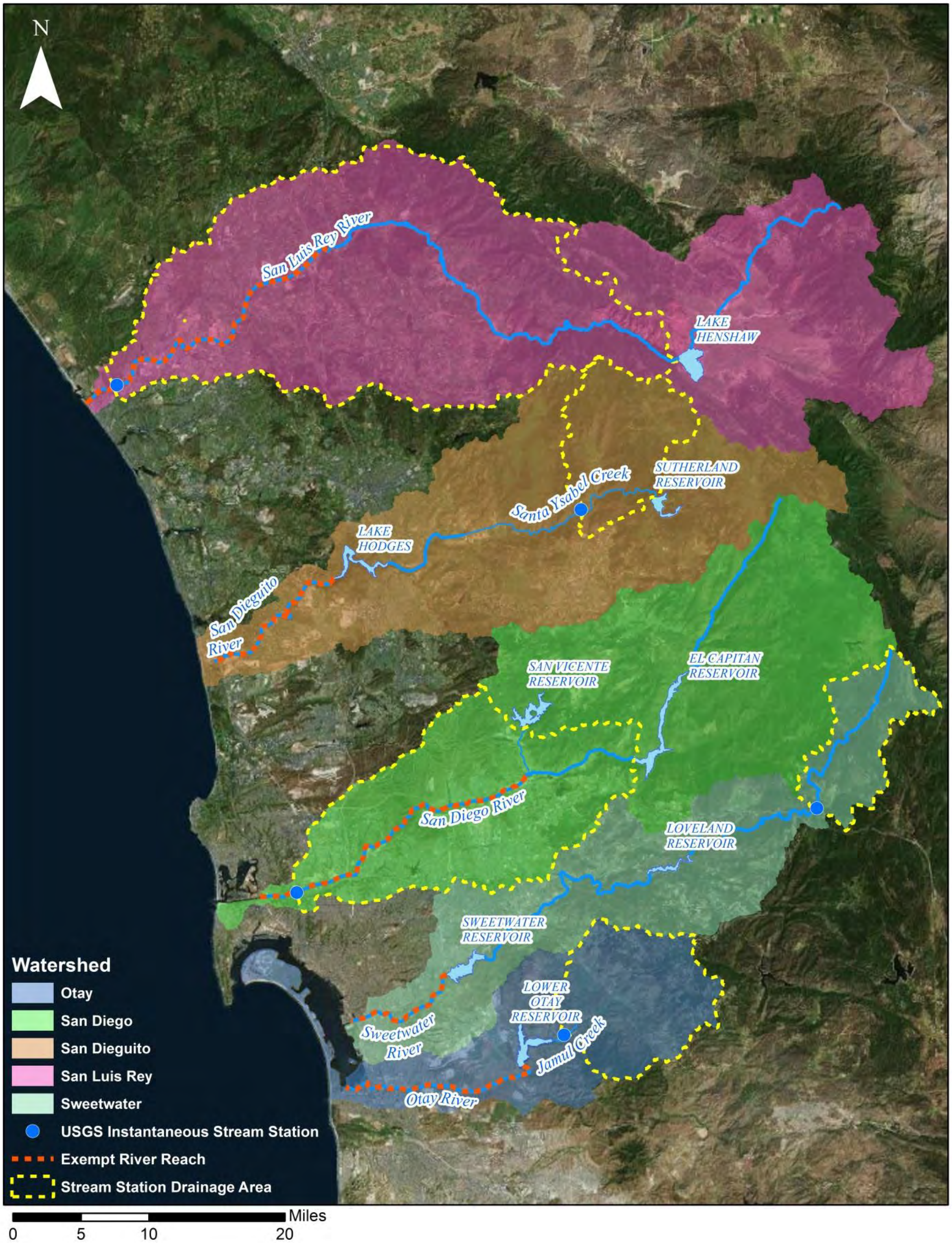

Figure 1. USGS Instantaneous Stream Stations

Table 6: USGS Instantaneous Stream Station Data Summary

River	Stream Station	Date Range (WY)	Month(s) Missing from Flow Record	Spill(s) During Flow Record
Otay River (OTAY)	USGS 11014000 JAMUL C NR JAMUL CA	1988-2014	Dec 1990 Mar 2002	Jan-Mar 1993* Feb-Apr 1994* Feb-Mar 2005* Sep 2005*
San Diego River (SDR)	USGS 11023000 SAN DIEGO R A FASHION VALLEY AT SAN DIEGO CA	1988-2014	-	Feb-Apr 1993 Mar-May 1995
San Dieguito River (SDGTO)	USGS 11025500 SANTA YSABEL C NR RAMONA CA	1988-2014	Dec 1992 Apr 1993 Jul 1994	Feb-Apr 1993 Mar-May 1995
San Luis Rey River (SLR)	USGS 11042000 SAN LUIS REY R A OCEANSIDE CA	1988-2014	Jul-Dec 1992 Jan-Jul 1993 Aug-Dec 1997 Jan-Mar 1998 Oct-Dec 2001 Jan-Dec 2002 Jan-Sep 2003	Feb-Apr 1993
Sweetwater River (SWTR)	USGS 11015000 SWEETWATER R NR DESCANSO CA	1988-2014	-	Jan 1993* Apr 1995* May 1998*

*spills have no influence on USGS stream station

2.2 SWMM Peak Flow Analysis

The SWMM Peak Flow Analysis is used to assess the contribution of storm water runoff discharging from Project Lands to the exempt river reaches. Using available USGS and SanGIS land use data, SWMM models the rainfall-runoff relationship for each watershed under a set of different scenarios. The watersheds were modeled under the planned land use (PLU) condition in order to analyze the developed hydrology. Each watershed is modeled to evaluate the direct runoff from Project Lands, both with and without hydromodification management BMP performance requirements in place, and also without the effect of upstream impoundment.

As stated earlier, only PDPs on land directly discharging to the exempt river reaches (Project Lands) could qualify for the 2011 HMP Exemption. Using the “LANDUSE_PLANNED” SanGIS shapefile, developable lands were classified as such if they were geographically contained within the present-day “Developable_Land” SanGIS shapefile. These developable lands were then sub-classified as either directly-discharging (Project Lands) or non-directly discharging (non-exempt developable). Drainage behavior was assessed based upon available storm drain infrastructure databases and best professional judgment. In all likelihood, not all areas classified as Project Lands by this study would be named as such due to site-specific post development hydrology, jurisdictional requirements, and other related factors. When the effect of the dam was to be considered, the total watershed area upstream of the lower-most impoundment was introduced into the model. Areas upstream of the dam were conservatively assumed to be in a fully built-out condition and subject to hydromodification flow control. Since hydromodification management BMPs, when properly designed, effectively maintain the pre-development hydrology, this conservative assumption effectively models the impounded area as having a “natural” overland flow behavior. For all lumped land classification groups, the area was further divided into four sub-areas based upon hydrologic soil group (HSG) as A, B, C, or D.

To simulate the effects of hydromodification management BMPs, we averaged the percent flow reduction achieved by 25 separate hydromodification design projects performed by TRWE for our clients throughout San Diego County. The 25 projects all met the hydromodification management BMP volume and time-based performance requirements, as prescribed in the 2013 MS4 Permit. The average percent flow reduction for the 2-year to the 10-year peak flow was 43%. In nearly all cases, a hydromodification design project will not perfectly match the pre-development flow duration curve. It would not be practical to produce such a finely-tuned design. In order to safely meet hydromodification BMP performance requirements, the final design will typically produce less runoff than the pre-development hydrologic condition. Therefore, a 43% flow reduction is a conservative expectation for the unmitigated to mitigated post-development scenario. Furthermore, given that the 43% flow reduction estimate was developed from projects that met the hydromodification flow duration requirement, the 43%

flow reduction, when applied, can be assumed to satisfy the post-development flow duration component as well.

In order to simulate the effect of hydromodification on a given land use group, the 43% flow reduction was applied via the inflow scale factor for the respective junction node in SWMM. A conceptual SWMM model schematic is provided in Figure 2.

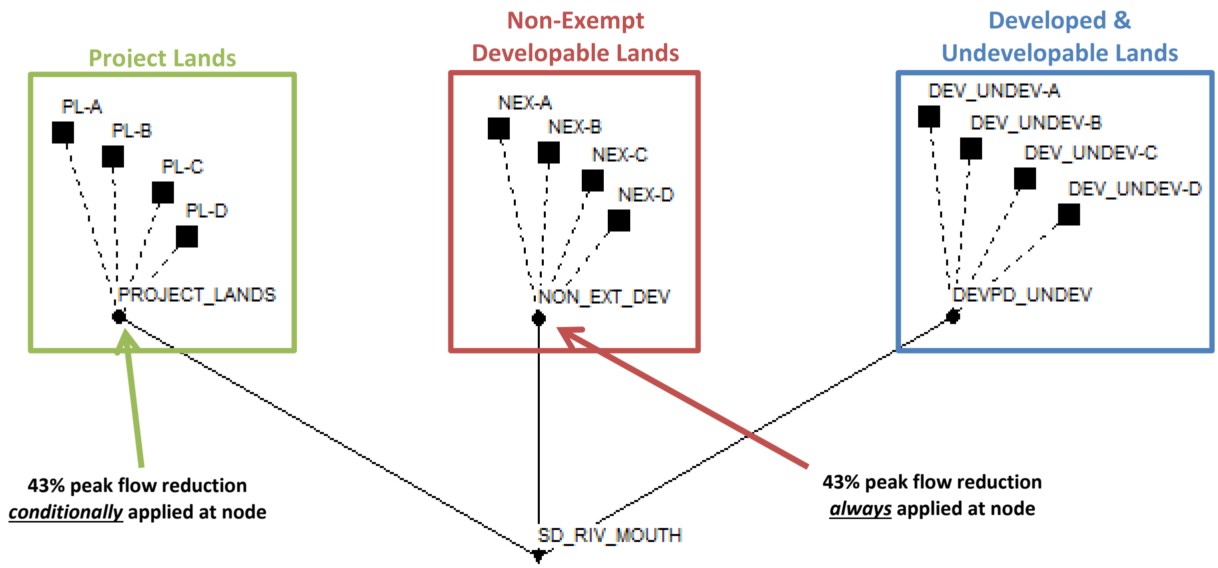

Figure 2: SWMM Model Conceptual Schematic for the San Diego River "Dam-In-Place" Scenario

The rainfall time series provided by the County of San Diego as a work product of the 2011 Final HMP have been analyzed for their accuracy in other studies. It was found that the disaggregation process artificially increases the frequency of the high intensity values (Parra-Rosales, Walker, & Ponce, 2012). Of the 19 rainfall stations produced by the Final 2011 HMP, Parra et al. found Lindbergh and Oceanside to be the most acceptable stations due to the completeness of the original data and quality of data from external stations used to fill data gaps. Therefore, this study used the Oceanside rainfall data for the San Luis Rey Watershed and the Lindbergh rainfall data for the San Diego Watershed. For all other watersheds, an alternate rainfall data source was used, as described below.

Available rainfall data was obtained through coordination with Rand Allan of the San Diego County Flood Control District (SDCFCD). Rainfall stations were selected based on their time format (hourly or finer) and proximity to the study watersheds. Collocated historical hourly and ALERT event-based rainfall stations were combined to make a continuous 50 year record. Natural variability in hourly and daily data exists between stations. Thus, annual values provide a reliable means to estimate precipitation patterns between nearby gages and gages with similar elevation and climatological attributes. To develop continuous precipitation records, a linear regression between SDCFCD stations was used to estimate missing precipitation values and validated on a separate subset of data, where available data exists for both gages. The correlation value (R^2) indicates the ability of the independent variable to predict the dependent variable and ranges from 0 to 1. Only correlations greater than 0.7 were used to guide interpolation of precipitation data. Table 7 summarizes the developed regression equations, the correlation coefficient, and values estimated at each station:

Table 7: Rainfall Station Regression Equations Used for Data Gaps

Independent Station (x)	Dependent Station (y)	Regression Equation[a-h]	Correlation
Kearny Mesa	La Mesa	[1] $y = 0.9813x$	$R^2 = 0.8815$
Poway	Kearny Mesa	[2] $y = 0.9371x$	$R^2 = 0.7993$
Encinitas	San Marcos	[3] $y = 1.0574x$	$R^2 = 0.7260$
Bonita	Sweetwater	[4] $y = 1.0942x$	$R^2 = 0.8734$
Kearny Mesa	Sweetwater	[5] $y = 0.9007x$	$R^2 = 0.7520$
Encinitas	Escondido	[6] $y = 1.3275x$	$R^2 = 0.7720$

a. Kearny Mesa data was used to estimate missing values in **La Mesa**[1] for the period of record for 8/10/1969-3/1/2015. A total of 9447 values (hourly time step) were filled. Note that La Mesa ALERT tipping bucket record begins 9/15/1982, which may account for the number of values filled.
b. Available data from Kearny Mesa was used to estimate missing values in **Poway**[2] for 1/23/1964-2/28/2015. A total of 3278 values (hourly time step) were filled. Note that Poway ALERT tipping bucket record begins 7/19/1982, which may account for the number of values filled. Now, a complete record is available for Poway from 11/1/1962-2/28/2015.
c. Poway data was used to estimate missing values in **Kearny Mesa**[2] for the period of record for 1/22/1964-2/28/2015. A total of 36 values (hourly time step) were filled.
d. Available data from Encinitas was used to estimate missing values in **San Marcos**[3] for 7/1/1963-2/28/2015. A total of 17 values (hourly time step) were filled during this time period. Note that San Marcos ALERT tipping bucket record begins 5/28/1981-3/3/2006 during which, there was 217135 missing values (hourly time step). These values were filled with data from Encinitas. Now, a complete record is available for San Marcos from 11/16/1962-2/28/2015.
e. Kearny Mesa data was used to estimate missing values in **Sweetwater**[5] for the period of record for 2/1/1965-10/30/1992. A total of 765 values (hourly time step) were filled.
f. Available data from Escondido was used to estimate missing values in **Encinitas**[6] for 11/19/1964-2/28/2015. A total of 1862 values (hourly time step) were filled. Now, a complete record is available for Encinitas from 7/1/1963-2/28/2015.
g. Encinitas data was used to estimate missing values in **Escondido**[6] for the period of record for 11/19/1964-2/28/2015. A total of 7761 values (hourly time step) were filled. Note that Encinitas ALERT tipping bucket record begins 7/1/1984, which may account for the number of values filled.

Rainfall data assignment and sources for each watershed are shown in Table 8

Table 8: Select Rainfall Stations for SWMM Peak Flow Analysis

Watershed	Rainfall Station	Record	Elevation (ft)	Source
Otay[1]	Bonita	1975-2015	139	SDCFCD
	Sweetwater[2]	1965-1992	310	SDCFCD
San Diego	Lindbergh[3]	1948-2005	15	Project Clean Water
San Dieguito[1]	Encinitas	1963-2015	250	SDCFCD
	Escondido	1964-2015	660	SDCFCD
	San Marcos	1962-2015	580	SDCFCD
San Luis Rey	Oceanside[3]	1951-2008	30	Project Clean Water
Sweetwater[1]	Bonita	1975-2015	139	SDCFCD
	Sweetwater	1965-1992	310	SDCFCD

[1]Rainfall station rainfall intensity was averaged between rainfall stations and applied uniformly to the entire modeled watershed
[2]No collocated ALERT station
[3]Data downloaded directly from Project Clean Water (http://www.projectcleanwater.org)

The spatial distribution of TRWE sample HMP projects and SDCFCD rainfall stations are illustrated in Figure 3.

2.2.1 Parameters

Physical watershed parameters were estimated using available land use geographic information system (GIS) data from SanGIS. Planned land use classifications were used for all SWMM peak flow analyses, including areas upstream of the dams, which were conservatively assumed to reflect the pre-development hydrology through application of hydromodification flow reduction to the outlet node. Percent imperviousness was determined by using area-weighted averages based upon those values presented in a 2010 County of San Diego imperviousness study. Percent slope was determined by using area-weighted averages based upon relationships between SanGIS land use and the latest USGS National Elevation Dataset (NED) 1/3 arc-second DEM for greater Southern California. The width parameter served as a general calibration parameter for the model using the best available USGS instantaneous stream flow data. Using the relationship between watershed area and river length, a factor was applied to this ratio to match the 5-year peak flow value. The San Diego River station was used to develop this factored relationship due to the completeness of the dataset, the least number of upstream dam overflow events, and location near the river mouth. The remaining SWMM parameters were taken from the San Diego Model BMP Design Manual. General watershed parameters are outlined in Table 9. Specific watershed parameters are provided in Appendix A.

Table 9: SWMM Parameters Used in SWMM Peak Flow Analysis

SWMM Parameter	Description[1]	Value				Source
Area (ac)	Area of the subcatchment.	Watershed-specific				GIS analysis
Width (ft)	Characteristic width of the overland flow path for sheet flow runoff.	Calibrated by factoring the ratio of entire river length to full watershed area to match the PDS-derived San Diego River 5-year peak flow, taken as: $W_{HSG} = 0.184\frac{A_{HSG}}{L_R}$ where: W_{HSG} is the width of the given HSG subcatchment; A_{HSG} is the area of the given HSG subcatchment; L_R is the length of the entire river reach				TRWE
% Slope	Average percent slope of the subcatchment.	Area-weighted average of percent slope by land use				USGS NED 1/3 arc-second DEM
% Imperv	Percent of the land area which is impervious.	Area-weighted average of percent imperviousness by land use				County of San Diego, 2010
N-Imperv	Manning's n for overland flow over the impervious portion of the subcatchment.	0.012				SD Model BMP Design Manual
N-Perv	Manning's n for overland flow over the pervious portion of the subcatchment.	0.15				SD Model BMP Design Manual
D store-Imperv (in)	Depth of depression storage on the impervious portion of the subcatchment.	0.05				SD Model BMP Design Manual
D store-Perv (in)	Depth of depression storage on the pervious portion of the subcatchment.	0.10				SD Model BMP Design Manual
% Zero-Imperv	Percent of the impervious are with no depression storage.	25%				SD Model BMP Design Manual
Subarea Routing	Choice of internal routing of runoff between pervious and impervious areas	OUTLET				SD Model BMP Design Manual
Percent Routed	Percent of runoff routed between subareas.	100%				SD Model BMP Design Manual
Infiltration	Infiltration parameters for the subcatchment.	GREEN_AMPT				SD Model BMP Design Manual
		HSG A	HSG B	HSG C	HSG D	
	GREEN_AMPT: Suction Head (in)	1.5	3.0	6.0	9.0	SD Model BMP Design Manual
	GREEN_AMPT: Initial Deficit (in/hr)	0.33	0.32	0.31	0.30	SD Model BMP Design Manual
	GREEN_AMPT: Developed Conductivity (in/hr)	0.225	0.15	0.075	0.01875	SD Model BMP Design Manual

[1]Defined by the SWMM User Manual
D/S = downstream; U/S/ = upstream

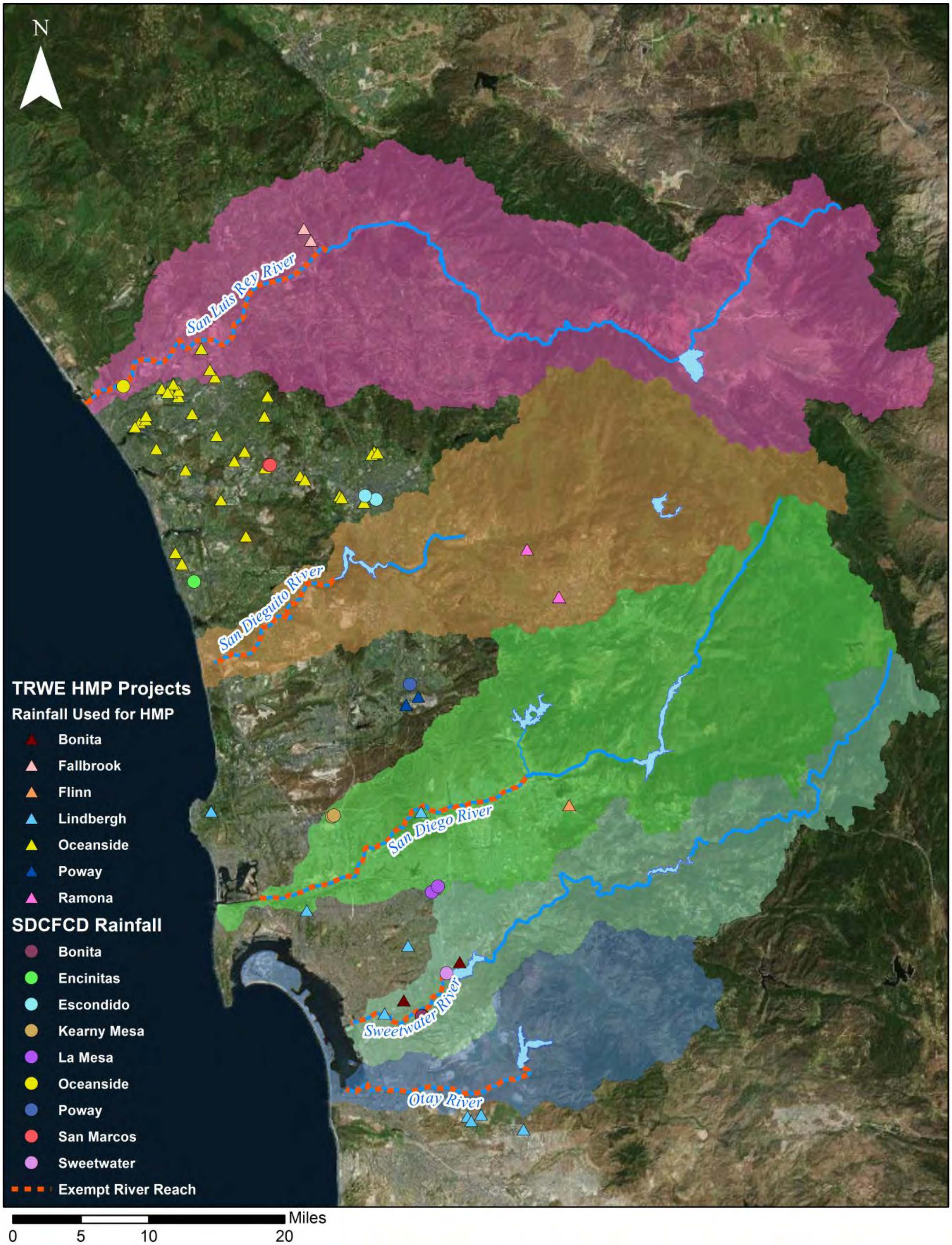

Figure 3. TRWE HMP Project and SDCFCD Rainfall Station Distribution

3. RESULTS

3.1 Statistical Peak Flow Results

Results provided herein are not intended to be used for design purposes, or serve as an exact measurement. The results are solely intended to provide a relative change in peak flow and demonstrate the impact of the upstream impoundment on the peak flow events in each river. The Statistical Peak Flow Analysis results are summarized in Table 10. For those rivers with stream stations located at or near the mouth, the statistical peak flow is compared with the "no dam" peak flows (Table 10, column "Peak[1]"). For those rivers without stream stations located at or near the mouth, the downstream-most available FEMA FIS 10-year peak flows are compared with the "no dam" peak flows. The percent difference or the reduction between the "no dam" and FEMA FIS 10-year peak flows are provided in Table 11. The flow reduction estimates are approximate in nature and are only shown to illustrate significant effects of impoundment on the peak flow events. In developing peak flows for the FIS, FEMA uses an annual series analysis, so it is expected that the percent reductions may be overestimated when used for comparison with a partial duration series analysis.

Table 10: Statistical Peak Flow Results Summary for "No Dam" Peak Flows

River	T-year	Peak[1] (cfs)	A* (mi^2)	P* (in)	Q_{USGS}[b] (cfs)	FPR	A** (mi^2)	P** (in)	Q_{WS}[c] (cfs)	Q_{ND}[d] (cfs)
OTAY	2	850	70	15.0	481	1.8	144	13.4	717	**1,267**
	5	2,265			1,822	1.2			2,811	**3,494**
	10	3,890[a]			3,315	1.2			5,163	**6,059**
SDR	2	2,693	168	12.6	759	3.6	429	16.9	1,778	**6,307**
	5	4,187			2,985	1.4			7,711	**10,813**
	10	7,980			5,454	1.5			15,558	**22,763**
SDGTO	2	930	58	20.5	533	1.7	336	16.6	1,488	**2,594**
	5	2,042			2,069	1.0			6,337	**6,255**
	10	4,434			3,971	1.1			12,605	**14,076**
SLR	2	1,040	350	16.4	1,516	0.7	557	17.2	2,147	**1,473**
	5	5,293			6,462	0.8			9,496	**7,777**
	10	11,461			12,847	0.9			19,450	**17,351**
SWTR	2	669	46	24.9	527	1.3	222	16.4	1,116	**1,417**
	5	2,544			2,059	1.2			4,616	**5,702**
	10	3,296			4,065	0.8			8,995	**7,293**

[1] partial duration series (PDS) value selected for 2-year and 5-year peak; annual maximum series selected for 10-year (unless otherwise specified)
[a] partial duration series value used due to unreasonably low 10-year peak flow; data "affected to unknown degree by Regulation or Diversion"
[b] equivalent drainage area peak flow; 2012 USGS Regression Equation calculation using drainage area parameters from A* (stream station drainage area) and P* (stream station drainage area mean annual precipitation)
[c] watershed-wide peak flow; 2012 USGS Regression Equation calculation using watershed parameters from A** (watershed-wide drainage area) and P** (watershed-wide mean annual precipitation)
[d] "no dam" watershed-wide peak flow estimate

Table 11: Comparison of "No Dam" Peak Flows with Available "Dam-in-Place" Peak Flows

River	T-year	Q_{ND} (cfs)	Peak[1] (cfs)	Reduction	FIS Peak[2] (cfs)	FIS Reduction
OTAY	2	**1,267**	-	-	-	-
	5	**3,494**	-		-	-
	10	**6,059**	-		1,200	80%
SDR	2	**6,307**	2,693	57%	-	-
	5	**10,813**	4,187	61%	-	-
	10	**22,763**	7,980	65%	3,100	86%
SDGTO	2	**2,594**	-	-	-	-
	5	**6,255**	-		-	-
	10	**14,076**	-		5,900	58%
SLR	2	**1,473**	1,040	29%	-	-
	5	**7,777**	5,293	32%	-	-
	10	**17,351**	11,461	34%	6,600	62%
SWTR	2	**1,417**	-	-	-	-
	5	**5,702**	-		-	-
	10	**7,293**	-		1,200	84%

[1]partial duration series value selected for 2-year and 5-year peak; annual maximum series selected for 10-year
[2] (Federal Emergency Management Agency, 2012)

The Statistical Peak Flow Analysis provides reasonable estimation of river impoundment peak flow reduction. For comparison, a 2005 study focused on the hydrological effects of dams on the Sacramento and San Joaquin Rivers in Northern California found that the 2-year peak flow declined anywhere between 35 to 95% of pre-dam values, while the 10-year peak flow was reduced from 2 to 78% (Kondolf & Batalla, 2005). For further comparison, a 2005 study of the hydrological effects of dams in semi-arid portions of north-eastern Spain (also a Mediterranean climate) found that 22 of 23 rivers showed reductions in 2 and 10-year peak flow by 31 and 33%, respectively, with effects more pronounced in the low-rainfall southern Mediterranean tributaries (Batalla, Gomez, & Kondolf, 2003). Therefore, the results (~29-65% reduction) provided in this study are consistent with flow impoundment behavior found in other semi-arid, Mediterranean systems and supports the assumption of significant flow sequestration in the five river reaches.

3.2 SWMM Peak Flow Results

Results from the SWMM Peak Flow Analysis are provided in Table 12 through Table 16 for the "dam-in-place" condition and Table 17 through Table 21 for the "no dam" condition. The results are estimates of peak flows and relative change for the exempt reaches using a simplified continuous modeling approach. These results are not intended to be used for design purposes.

The 2-, 5-, and 10-year flow rates are conservative estimates due to a number of underlying assumptions. First, the assumption of uniform rainfall over a large watershed may produce higher flows than what would actually be realized in each river. However, baseflow was not considered in peak flow determination. Also, the simple rainfall-runoff model is kinematic in nature, not accounting for complex overland flow behaviors such as runoff diffusion. Finally, the overland flow model does not consider channel routing and subsequent longitudinal spreading of the wave base for more mildly-sloped areas within the watershed, which ultimately produces a lower peak flow due to the attenuation and translation of the outflow hydrograph over space and time. Given these assumptions, it is important to note that the main objectives of this study do not require obtaining precise peak flow values. Instead, this study is focused on the relative change of discharges from Project Lands with and without hydromodification management BMP performance requirements.

Table 12: Otay River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	1,481	1,378	1,409	4.9%	**2.0%**	31
5-year	1,950	1,803	1,847	5.3%	**2.3%**	44
10-year	2,378	2,226	2,272	4.5%	**2.0%**	47

Table 13: San Diego River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	3,380	3,225	3,243	4.1%	**0.5%**	18
5-year	4,184	3,993	4,013	4.1%	**0.5%**	20
10-year	4,787	4,564	4,584	4.2%	**0.4%**	21

Table 14: San Dieguito River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	1,265	1,170	1,182	6.6%	**0.9%**	11
5-year	1,754	1,625	1,642	6.4%	**1.0%**	17
10-year	1,950	1,811	1,833	6.0%	**1.1%**	22

Table 15: San Luis Rey River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	6,441	5,731	5,781	10.3%	**0.8%**	50
5-year	8,652	7,630	7,697	11.0%	**0.8%**	67
10-year	10,135	9,031	9,111	10.1%	**0.8%**	80

Table 16: Sweetwater River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	751	739	741	1.3%	**0.4%**	3
5-year	1,092	1,073	1,077	1.4%	**0.4%**	4
10-year	1,273	1,251	1,256	1.3%	**0.4%**	5

Table 17: Otay River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	2,274	2,212	2,234	1.8%	**1.0%**	22
5-year	2,876	2,732	2,772	3.6%	**1.4%**	40
10-year	3,658	3,487	3,539	3.2%	**1.4%**	52

Table 18: San Diego River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	5,270	5,123	5,137	2.5%	**0.3%**	13
5-year	6,579	6,386	6,407	2.6%	**0.3%**	21
10-year	7,572	7,356	7,380	2.5%	**0.3%**	24

Table 19: San Dieguito River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	5,601	5,518	5,531	1.3%	**0.2%**	13
5-year	7,570	7,439	7,457	1.5%	**0.2%**	17
10-year	9,044	8,918	8,940	1.2%	**0.3%**	23

Table 20: San Luis Rey River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	8,199	7,488	7,538	8.1%	**0.6%**	50
5-year	11,159	10,151	10,218	8.4%	**0.6%**	67
10-year	12,856	11,746	11,824	8.0%	**0.6%**	78

Table 21: Sweetwater River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	2,050	2,039	2,041	0.4%	**0.1%**	2
5-year	2,735	2,718	2,722	0.5%	**0.1%**	4
10-year	3,283	3,265	3,269	0.4%	**0.1%**	4

The SWMM Peak Flow Analysis found that if the HMP exemptions were granted (as opposed to "Full HMP"—no exemptions granted), it would increase the 2-, 5-, and 10-year peak flow events by no more than 1.1% in all rivers except Otay, where at most, a 2.3% increase is predicted. It should be noted, in the case of Otay that, though minor, this additional flow has the potential to aid the many river restoration efforts identified in the 2006 Otay River Watershed Management Plan (Aspen Environmental Group, 2006). With the HMP exemptions in place, the SWMM Peak Flow Analysis applied hydromodification flow reduction to all non-directly discharging developable land to produce peak flow reductions ranging between 1.3 to 11% (as opposed to "No HMP"—no hydromodification flow control). This percent reduction is the peak flow "benefit" achieved through application of peak flow control. When modeled without the influence of the dam, the effects of Project Lands are further diminished—the primary reason for the original exemption. It is worth noting that both the modeled dam-in-place and no-dam peak flows produce reasonable matches with those peak flows presented in the Statistical Peak Flow Analysis.

The most notable comparisons are between the "dam-in-place" peak flows with the HMP exemption ("Dam-in-Place" HMP Exemption) versus the "no dam" peak flows with no HMP exemptions ("No Dam" Full HMP) presented in Table 22 through Table 26. These comparisons were made in order to simulate the impact of the proposed exemptions on peak flows versus the impact of the river impoundment on peak flows. These SWMM Peak Flow comparisons suggest that if, in their current impounded state, only Project Lands were exempt from hydromodification management BMP performance requirements, the resulting peak flows would be far less than the unimpounded, pre-development peak flows. The "No Dam" Full HMP scenario was considered to be the best representation of a pre-development watershed (in the absence of pre-Columbian watershed parameters) because the very nature of hydromodification management is to simulate the pre-development hydrologic condition. In other words, if the entire developed portion of a watershed is subject to hydromodification flow and duration control, then it is assumed to simulate the pre-development hydrologic condition.

Due to the conservative modeling approach, in actuality the "Dam-in-Place" HMP Exemption peak flows would likely be even less than those modeled herein due to strict interpretations on what constitutes a directly discharging developable land. An even greater difference between the HMP exemption peak flows and the pre-development peak flows would result. Therefore, the SWMM Peak Flow Analysis confirms that the major river impoundments are the primary source of peak flow reduction and clearly demonstrates that peak flows discharging from exempted Project Lands would remain considerably less than the natural, pre-development peak flows.

Table 22: Otay River SWMM Scenario Comparison

Peak	“Dam-in-Place" HMP Exemption (cfs)	"No Dam” Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	1,409	2,212	804	**36%**
5-year	1,847	2,732	885	**32%**
10-year	2,272	3,487	1,215	**35%**

Table 23: San Diego River SWMM Scenario Comparison

Peak	“Dam-in-Place" HMP Exemption (cfs)	"No Dam” Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	3,243	5,123	1,880	**37%**
5-year	4,013	6,386	2,373	**37%**
10-year	4,584	7,356	2,772	**38%**

Table 24: San Dieguito River SWMM Scenario Comparison

Peak	“Dam-in-Place" HMP Exemption (cfs)	"No Dam” Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	1,182	5,518	4,336	**79%**
5-year	1,642	7,439	5,797	**78%**
10-year	1,833	8,918	7,085	**79%**

Table 25: San Luis Rey River SWMM Scenario Comparison

Peak	“Dam-in-Place" HMP Exemption (cfs)	"No Dam” Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	5,781	7,488	1,707	**23%**
5-year	7,697	10,151	2,454	**24%**
10-year	9,111	11,746	2,635	**22%**

Table 26: Sweetwater River SWMM Scenario Comparison

Peak	“Dam-in-Place" HMP Exemption (cfs)	"No Dam” Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	741	2,039	1,298	**64%**
5-year	1,077	2,718	1,641	**60%**
10-year	1,256	3,265	2,009	**62%**

4. CONCLUSIONS

All five exempt river reaches are subjected to significant upstream impoundment and are rigorously analyzed with two hydrologic methods. The Statistical Peak Flow Analysis found that the major impoundments reduce peak flows anywhere from 29% to 65% of the unimpounded condition. Similarly, the SWMM Peak Flow Analysis found that the major impoundments reduce peak flows approximately 22% to 79%, depending on the reach and peak flow event. The original assumption of significant flow sequestration in the exempt river reaches made by the 2011 HMP is validated by both the Statistical Peak Flow Analysis and the SWMM Peak Flow Analysis in this study.

The benefit of proper hydromodification management BMP implementation is evidenced by comparison between various HMP scenarios. For all watersheds with more than 1,200 acres of Project Lands, HMP flow controls applied to only non-directly discharging developable lands are projected to achieve peak flow reductions of at least 4%. Furthermore, the projected “cost” of allowing the hydromodification exemptions to stand would increase peak flows by an extremely narrow margin in all reaches. It should be noted that the peak flow reduction estimates presented herein are conservative in nature since all non-directly discharging developed lands will be subject to hydromodification management BMPs in the event any re-development within these areas were to occur, further decreasing any peak flow influence from Project Lands. In reality, the percent peak flow reduction is expected to be even greater.

The results from this analysis suggest that the peak flows from areas directly discharging to exempt river reaches (Otay, San Diego, San Dieguito, San Luis Rey, and Sweetwater River) pose no threat to the erosion potential of the exempt river reaches. If these reaches undergo significant changes (i.e. removal of impoundments), it is recommended that a new hydrologic assessment should be made to determine the resulting implications and continual eligibility for exemption. However, under the current conditions defined in this study, it is clearly demonstrated that the existence of upstream impoundment is the principle factor in peak flow alteration—not developed Project Lands. Changes in peak flows from Project Lands are found to be less than significant. Therefore, it is recommended that the 2011 HMP Exemptions be reinstated for all developable lands directly discharging to the exempt river reaches, so long as the project provides properly designed energy dissipation controls at the outfalls. It is also recommended that hydromodification BMPs be required for non-Project Lands, as these areas account for the majority of the developable land within each watershed and will likely produce the greatest influence on peak flows on these rivers in their current impounded state.

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APPENDIX A

Otay Watershed SWMM Parameters

Table A-1: Otay River Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	10.44	1	5.94%	80%	0.012	0.15	0.05	0.10	25%
B	0.00								
C	299.03	24	6.60%	61%	0.012	0.15	0.05	0.10	25%
D	1001.41	80	7.73%	60%	0.012	0.15	0.05	0.10	25%

Table A-2: Otay River Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	4.08	0.3	6.09%	71%	0.012	0.15	0.05	0.10	25%
B	0.00								
C	143.79	12	6.37%	64%	0.012	0.15	0.05	0.10	25%
D	2851.20	228	6.75%	64%	0.012	0.15	0.05	0.10	25%

Table A-3: Otay River Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	1024.99	82	19.46%	29%	0.012	0.15	0.05	0.10	25%
B	162.69	13	24.86%	13%	0.012	0.15	0.05	0.10	25%
C	2143.79	172	17.87%	32%	0.012	0.15	0.05	0.10	25%
D	20882.06	1673	16.41%	34%	0.012	0.15	0.05	0.10	25%

Table A-4: Otay River Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	2993.07	240	16.47%	9%	0.012	0.15	0.05	0.10	25%
B	3016.93	242	21.43%	8%	0.012	0.15	0.05	0.10	25%
C	8658.65	694	20.59%	10%	0.012	0.15	0.05	0.10	25%
D	48588.71	3892	22.59%	8%	0.012	0.15	0.05	0.10	25%

San Diego Watershed SWMM Parameters

Table A-5: San Diego River Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	340.90	11	7.2%	68%	0.012	0.15	0.05	0.10	25%
B	111.56	4	8.7%	53%	0.012	0.15	0.05	0.10	25%
C	166.56	5	7.4%	63%	0.012	0.15	0.05	0.10	25%
D	675.39	21	8.1%	59%	0.012	0.15	0.05	0.10	25%

Table A-6: San Diego River Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	892.75	28	13.9%	25%	0.012	0.15	0.05	0.10	25%
B	1180.34	37	12.7%	21%	0.012	0.15	0.05	0.10	25%
C	1095.09	34	12.4%	23%	0.012	0.15	0.05	0.10	25%
D	9021.30	284	12.9%	22%	0.012	0.15	0.05	0.10	25%

Table A-7: San Diego River Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	9226.19	291	13.2%	35%	0.012	0.15	0.05	0.10	25%
B	6856.56	216	13.3%	38%	0.012	0.15	0.05	0.10	25%
C	9565.50	301	12.8%	39%	0.012	0.15	0.05	0.10	25%
D	67079.47	2113	17.0%	33%	0.012	0.15	0.05	0.10	25%

Table A-8: San Diego River Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	23826.07	751	16.7%	14%	0.012	0.15	0.05	0.10	25%
B	7266.39	229	16.9%	16%	0.012	0.15	0.05	0.10	25%
C	42292.04	1332	19.5%	13%	0.012	0.15	0.05	0.10	25%
D	94561.45	2979	19.8%	15%	0.012	0.15	0.05	0.10	25%

San Dieguito Watershed SWMM Parameters

Table A-9: San Dieguito River Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	304.92	30	16.35%	10%	0.012	0.15	0.05	0.10	25%
B	74.03	7	16.40%	10%	0.012	0.15	0.05	0.10	25%
C	5.41	1	16.50%	10%	0.012	0.15	0.05	0.10	25%
D	533.66	52	16.07%	11%	0.012	0.15	0.05	0.10	25%

Table A-10: San Dieguito River Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	32.72	3	11.90%	22%	0.012	0.15	0.05	0.10	25%
B	4.85	0.5	3.27%	42%	0.012	0.15	0.05	0.10	25%
C	257.06	25	9.39%	31%	0.012	0.15	0.05	0.10	25%
D	3247.43	315	9.16%	30%	0.012	0.15	0.05	0.10	25%

Table A-11: San Dieguito River Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	1640.99	159	14.67%	19%	0.012	0.15	0.05	0.10	25%
B	538.60	52	12.43%	21%	0.012	0.15	0.05	0.10	25%
C	1200.70	116	17.09%	25%	0.012	0.15	0.05	0.10	25%
D	16223.04	1571	17.49%	24%	0.012	0.15	0.05	0.10	25%

Table A-12: San Dieguito River Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	22792.85	2208	16.00%	16%	0.012	0.15	0.05	0.10	25%
B	12916.07	1251	14.50%	16%	0.012	0.15	0.05	0.10	25%
C	70226.09	6802	17.95%	15%	0.012	0.15	0.05	0.10	25%
D	86888.08	8416	26.80%	13%	0.012	0.15	0.05	0.10	25%

San Luis Rey Watershed SWMM Parameters

Table A-13: San Luis Rey River Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	882.77	19	13.01%	24%	0.012	0.15	0.05	0.10	25%
B	630.17	14	13.37%	24%	0.012	0.15	0.05	0.10	25%
C	801.92	17	14.55%	20%	0.012	0.15	0.05	0.10	25%
D	1831.81	40	13.74%	20%	0.012	0.15	0.05	0.10	25%

Table A-14: San Luis Rey River Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	11583.70	251	15.84%	12%	0.012	0.15	0.05	0.10	25%
B	3901.74	84	15.08%	14%	0.012	0.15	0.05	0.10	25%
C	22677.02	491	15.75%	13%	0.012	0.15	0.05	0.10	25%
D	34871.15	755	16.03%	12%	0.012	0.15	0.05	0.10	25%

Table A-15: San Luis Rey River Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	26968.00	584	15.40%	26%	0.012	0.15	0.05	0.10	25%
B	8036.86	174	15.21%	28%	0.012	0.15	0.05	0.10	25%
C	45902.52	993	15.58%	24%	0.012	0.15	0.05	0.10	25%
D	66408.60	1437	14.87%	29%	0.012	0.15	0.05	0.10	25%

Table A-16: San Luis Rey River Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	45012.92	974	19.29%	15%	0.012	0.15	0.05	0.10	25%
B	440.52	10	18.73%	12%	0.012	0.15	0.05	0.10	25%
C	20690.04	448	24.13%	8%	0.012	0.15	0.05	0.10	25%
D	65878.92	1426	20.82%	15%	0.012	0.15	0.05	0.10	25%

Sweetwater Watershed SWMM Parameters

Table A-17: Sweetwater Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	10.91	0.33	3.6%	48%	0.012	0.15	0.05	0.10	25%
B	0.25	0.01	3.3%	42%	0.012	0.15	0.05	0.10	25%
C	133.69	4	5.8%	45%	0.012	0.15	0.05	0.10	25%
D	109.99	3	5.2%	47%	0.012	0.15	0.05	0.10	25%

Table A-18: Sweetwater Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	4.60	0.1	3.6%	45%	0.012	0.15	0.05	0.10	25%
B	58.00	2	3.9%	40%	0.012	0.15	0.05	0.10	25%
C	141.55	4	5.6%	37%	0.012	0.15	0.05	0.10	25%
D	735.80	22	4.5%	42%	0.012	0.15	0.05	0.10	25%

Table A-19: Sweetwater Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	850.76	26	13.6%	29%	0.012	0.15	0.05	0.10	25%
B	748.45	23	10.1%	44%	0.012	0.15	0.05	0.10	25%
C	4827.23	147	13.0%	40%	0.012	0.15	0.05	0.10	25%
D	16715.79	511	12.1%	42%	0.012	0.15	0.05	0.10	25%

Table A-20: Sweetwater Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	10871.62	332	15.7%	16%	0.012	0.15	0.05	0.10	25%
B	9974.55	305	16.6%	16%	0.012	0.15	0.05	0.10	25%
C	24732.95	756	18.7%	14%	0.012	0.15	0.05	0.10	25%
D	70655.14	2160	21.5%	11%	0.012	0.15	0.05	0.10	25%

Attachment 4

Stability Thresholds for Stream Restoration Materials

Fischenich (2001)

Stability Thresholds for Stream Restoration Materials

by Craig Fischenich[1]

May 2001

Complexity	Value as a Planning Tool	Cost
Low Moderate High	Low Moderate High	Low Moderate High

OVERVIEW

Stream restoration projects usually involve some modification to the channel or the banks. Designers of stabilization or restoration projects must ensure that the materials placed within the channel or on the banks will be stable for the full range of conditions expected during the design life of the project. Unfortunately, techniques to characterize stability thresholds are limited. Theoretical approaches do not exist and empirical data mainly consist of velocity limits, which are of limited value.

Empirical data for shear stress or stream power are generally lacking, but the existing body of information is summarized in this technical note. Whereas shear thresholds for soils found in channel beds and banks are quite low (generally < 0.25 lb/sf), those for vegetated soils (0.5 – 4 lb/sf), erosion control materials and bioengineering techniques (0.5 – 8 lb/sf), and hard armoring (< 13 lb/sf) offer options to provide stability.

STABILITY CRITERIA

The stability of a stream refers to how it accommodates itself to the inflowing water and sediment load. In general, stable streams may adjust their boundaries but do not exhibit trends in changes to their geometric character. One form of instability occurs when a stream is unable to transport its sediment load (i.e., sediments deposited within the channel), leading to the condition referred to as aggradation.

When the ability of the stream to transport sediment exceeds the availability of sediments within the incoming flow, and stability thresholds for the material forming the boundary of the channel are exceeded, erosion occurs. This technical note deals with the latter case of instability and distinguishes the presence or absence of erosion (threshold condition) from the magnitude of erosion (volume).

Erosion occurs when the hydraulic forces in the flow exceed the resisting forces of the channel boundary. The amount of erosion is a function of the relative magnitude of these forces and the time over which they are applied. The interaction of flow with the boundary of open channels is only imperfectly understood. Adequate analytical expressions describing this interaction have not yet been developed for conditions associated with natural channels. Thus, means of characterizing erosion potential must rely heavily upon empiricism.

Traditional approaches for characterizing erosion potential can be placed in one of two categories: maximum permissible velocity, and tractive force (or critical shear stress). The former approach is advantageous in that velocity is a parameter that can be measured within the flow. Shear stress cannot be directly measured – it must be computed from other flow parameters. Shear stress is a better measure of the fluid force on the channel boundary than is velocity. Moreover, conventional guidelines, including ASTM standards, rely upon the shear stress as a

[1] USAE Research and Development Center, Environmental Laboratory, 3909 Halls Ferry Rd., Vicksburg MS 39180

means of assessing the stability of erosion control materials. Both approaches are presented in this paper.

Incipient Motion (Threshold Condition)

As flow over the bed and banks of a stream increases, a condition referred to as the threshold state is reached when the forces tending to move materials on the channel boundary are in balance with those resisting motion. The forces acting on a noncohesive soil particle lying on the bed of a flowing stream include hydrodynamic lift, hydrodynamic drag, submerged weight ($F_w - F_b$), and a resisting force F_r. as seen in Figure 1. The drag is in the direction of the flow and the lift and weight are normal to the flow. The resisting force depends on the geometry of the particles. At the threshold of movement, the resultant of the forces in each direction is zero. Two approaches for defining the threshold state are discussed herein, initial movement being specified in terms of either a critical velocity (v_{cr}) or a critical shear stress (τ_{cr}).

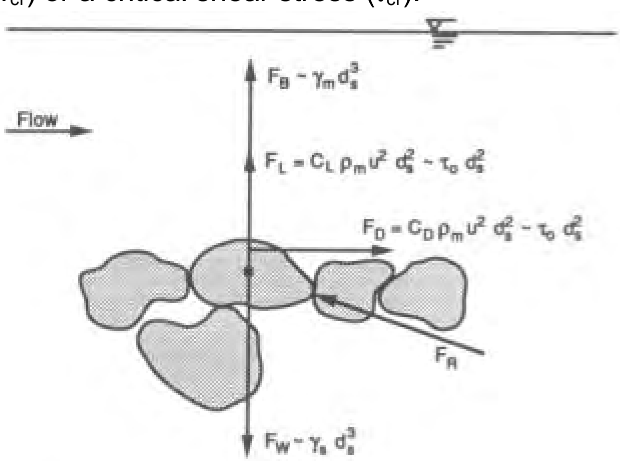

Figure 1. Forces acting on the boundary of a channel (adapted from Julien (1995)).

Critical Velocity

Figure 1 shows that both the lift and the drag force are directly related to the velocity squared. Thus, small changes in the velocity could result in large changes in these forces. The permissible velocity is defined as the maximum velocity of the channel that will not cause erosion of the channel boundary. It is often called the critical velocity because it refers to the condition for the initiation of motion. Early works in canal design and in evaluating the stability of waterways relied upon this method. Considerable empirical data exist relating maximum velocities to various soil and vegetation conditions.

However, this simple method for design does not consider the channel shape or flow depth. At the same mean velocity, channels of different shapes or depths may have quite different forces acting on the boundaries. Critical velocity is depth-dependent, and a correction factor for depth must be applied in this application. Despite these limitations, maximum permissible velocity can be a useful tool in evaluating the stability of various waterways. It is most frequently applied as a cursory analysis when screening alternatives.

Critical Shear Stress

The forces shown in Figure 1 can also be expressed in terms of the shear stress. Shear stress is the force per unit area in the flow direction. Its distribution in steady, uniform, two-dimensional flow in the channel can be reasonably described. An estimate of the average boundary shear stress (τ_o) exerted by the fluid on the bed is:

$$\tau_o = \gamma D S_f \qquad (1)$$

where γ is the specific weight of water, D is the flow depth (~ hydraulic radius), and S_f is the friction slope. Derived from consideration of the conservation of linear momentum, this quantity is a spatial average and may not provide a good estimate of bed shear at a point.

Critical shear stress (τ_{cr}) can be defined by equating the applied forces to the resisting forces. Shields (1936) determined the threshold condition by measuring sediment transport for values of shear at least twice the critical value and then extrapolating to the point vanishing sediment transport. His laboratory experiments have since served as a basis for defining critical shear stress. For soil grains of diameter d and angle of repose ϕ on a flat bed, the following relations can approximate the critical shear for various sizes of sediment:

$$\tau_{cr} = 0.5(\gamma_s - \gamma_w) d \, Tan\phi \quad \text{For clays} \qquad (2)$$

$$\tau_{cr} = 0.25 d_*^{-0.6} (\gamma_s - \gamma_w) d \, Tan\phi \quad \text{For silts and sands} \qquad (3)$$

$t_{cr} = 0.06(l_s - l_w)d\ Tan f$ For gravels and cobbles (4)

Where

$$d_* = d\left[\frac{(G-1)g}{n^2}\right]^{1/3} \qquad (5)$$

γ_s = the unit weight of the sediment
γ_w = the unit weight of the water/sediment mixture
G = the specific gravity of the sediment
G = gravitational acceleration
ν = the kinematic viscosity of the water/sediment mixture

The angle of repose ϕ for noncohesive sediments is presented in Table 1 (Julien 1995), as are values for critical shear stress. The critical condition can be defined in terms of shear velocity rather than shear stress (note that shear velocity and channel velocity are different). Table 1 also provides limiting shear velocity as a function of sediment size. The V_{*c} term is the critical shear velocity and is equal to

$$V_{*c} = \sqrt{gR_hS_f} \qquad (6)$$

Table 1. Limiting Shear Stress and Velocity for Uniform Noncohesive Sediments

Class name	*d_s (in)*	*f (deg)*	*t_{*c}*	*t_{cr} (lb/sf)*	*V_{*c} (ft/s)*
Boulder					
Very large	>80	42	0.054	37.4	4.36
Large	>40	42	0.054	18.7	3.08
Medium	>20	42	0.054	9.3	2.20
Small	>10	42	0.054	4.7	1.54
Cobble					
Large	>5	42	0.054	2.3	1.08
Small	>2.5	41	0.052	1.1	0.75
Gravel					
Very coarse	>1.3	40	0.050	0.54	0.52
Coarse	>0.6	38	0.047	0.25	0.36
Medium	>0.3	36	0.044	0.12	0.24
Fine	>0.16	35	0.042	0.06	0.17
Very fine	>0.08	33	0.039	0.03	0.12
Sands					
Very coarse	>0.04	32	0.029	0.01	0.070
Coarse	>0.02	31	0.033	0.006	0.055
Medium	>0.01	30	0.048	0.004	0.045
Fine	>0.005	30	0.072	0.003	0.040
Very fine	>0.003	30	0.109	0.002	0.035
Silts					
Coarse	>0.002	30	0.165	0.001	0.030
Medium	>0.001	30	0.25	0.001	0.025

Table 1 provides limits best applied when evaluating idealized conditions, or the stability of sediments in the bed. Mixtures of sediments tend to behave differently from uniform sediments. Within a mixture, coarse sediments are generally entrained at lower shear stress values than presented in Table 1. Conversely, larger shear stresses than those presented in the table are required to entrain finer sediments within a mixture.

Cohesive soils, vegetation, and other armor materials can be similarly evaluated to determine empirical shear stress thresholds. Cohesive soils are usually eroded by the detachment and entrainment of soil aggregates. Motivating forces are the same as those for noncohesive banks; however, the resisting forces are primarily the result of cohesive bonds between particles. The bonding strength, and hence the soil erosion resistance, depends on the physio-chemical properties of the soil and the chemistry of the fluids. Field and laboratory experiments show that intact, undisturbed cohesive soils are much less susceptible to flow erosion than are non-cohesive soils.

Vegetation, which has a profound effect on the stability of both cohesive and noncohesive soils, serves as an effective buffer between the water and the underlying soil. It increases the effective roughness height of the boundary, increasing flow resistance and displacing the velocity upwards away from the soil, which has the effect of reducing the forces of drag and lift acting on the soil surface. As the boundary shear stress is proportional to the square of the near-bank velocity, a reduction in this velocity produces a much greater reduction in the forces responsible for erosion.

Vegetation armors the soil surface, but the roots and rhizomes of plants also bind the soil and introduce extra cohesion over and above any intrinsic cohesion that the bank material may have. The presence of vegetation does not render underlying soils immune from erosion, but the critical condition for erosion of a vegetated bank is usually the threshold of failure of the plant stands by snapping, stem scour, or uprooting, rather than for detachment and entrainment of the soils themselves. Vegetation failure usually occurs at much higher levels of flow intensity than for soil erosion.

Both rigid and flexible armor systems can be used in waterways to protect the channel bed from erosion and to stabilize side slopes. A wide array of differing armor materials are available to accomplish this. Many manufactured products have been evaluated to determine their failure threshold. Products are frequently selected using design graphs that present the flow depth on one axis and the slope of the channel on the other axis. Thus, the design is based on the depth/slope product (i.e., the shear stress). In other cases, the thresholds are expressed explicitly in terms of shear stress. Notable among the latter group are the field performance testing results of erosion control products conducted by the TXDOT/TTI Hydraulics and Erosion Control Laboratory (TXDOT 1999).

Table 2 presents limiting values for shear stress and velocity for a number of different channel lining materials. Included are soils, various types of vegetation, and number of different commonly applied stabilization techniques. Information presented in the table was derived from a number of different sources. Ranges of values presented in the table reflect various measures presented within the literature. In the case of manufactured products, the designer should consult the manufacturer's guidelines to determine thresholds for a specific product.

Uncertainty and Variability

The values presented in Table 2 generally relate to average values of shear stress or velocity. Velocity and shear stress are neither uniform nor steady in natural channels. Short-term pulses in the flow can give rise to instantaneous velocities or stresses of two to three times the average; thus, erosion may occur at stresses much lower than predicted. Because limits presented in Table 2 were developed empirically, they implicitly include some off this variability. However, natural channels typically exhibit much more variability than the flumes from which these data were developed.

Sediment load can also profoundly influence the ability of flow to erode underlying soils. Sediments in suspension have the effect of damping turbulence within the flow. Turbulence is an important factor in entraining materials from the channel boundaries. Thus, velocity and shear stress thresholds are 1.5 to 3 times that presented in the table for flows carrying high sediment loads.

In addition to variability of flow conditions, variation in the channel lining characteristics can influence erosion predictions. Natural bed material is neither spherical nor of uniform size. Larger particles may shield smaller ones from direct impact so that the latter fail to move until higher stresses are attained. For a given grain size, the true threshold criterion may vary by nearly an order of magnitude depending on the bed gradation. Variation in the installation of erosion control measures can reduce the threshold necessary to cause erosion.

Table 2. Permissible Shear and Velocity for Selected Lining Materials[1]

Boundary Category	Boundary Type	Permissible Shear Stress (lb/sq ft)	Permissible Velocity (ft/sec)	Citation(s)
Soils	Fine colloidal sand	0.02 - 0.03	1.5	A
	Sandy loam (noncolloidal)	0.03 - 0.04	1.75	A
	Alluvial silt (noncolloidal)	0.045 - 0.05	2	A
	Silty loam (noncolloidal)	0.045 - 0.05	1.75 – 2.25	A
	Firm loam	0.075	2.5	A
	Fine gravels	0.075	2.5	A
	Stiff clay	0.26	3 – 4.5	A, F
	Alluvial silt (colloidal)	0.26	3.75	A
	Graded loam to cobbles	0.38	3.75	A
	Graded silts to cobbles	0.43	4	A
	Shales and hardpan	0.67	6	A
Gravel/Cobble	1-in.	0.33	2.5 – 5	A
	2-in.	0.67	3 – 6	A
	6-in.	2.0	4 – 7.5	A
	12-in.	4.0	5.5 – 12	A
Vegetation	Class A turf	3.7	6 – 8	E, N
	Class B turf	2.1	4 - 7	E, N
	Class C turf	1.0	3.5	E, N
	Long native grasses	1.2 – 1.7	4 – 6	G, H, L, N
	Short native and bunch grass	0.7 - 0.95	3 – 4	G, H, L, N
	Reed plantings	0.1-0.6	N/A	E, N
	Hardwood tree plantings	0.41-2.5	N/A	E, N
Temporary Degradable RECPs	Jute net	0.45	1 – 2.5	E, H, M
	Straw with net	1.5 – 1.65	1 – 3	E, H, M
	Coconut fiber with net	2.25	3 – 4	E, M
	Fiberglass roving	2.00	2.5 – 7	E, H, M
Non-Degradable RECPs	Unvegetated	3.00	5 – 7	E, G, M
	Partially established	4.0-6.0	7.5 – 15	E, G, M
	Fully vegetated	8.00	8 – 21	F, L, M
Riprap	6 – in. d_{50}	2.5	5 – 10	H
	9 – in. d_{50}	3.8	7 – 11	H
	12 – in. d_{50}	5.1	10 – 13	H
	18 – in. d_{50}	7.6	12 – 16	H
	24 – in. d_{50}	10.1	14 – 18	E
Soil Bioengineering	Wattles	0.2 – 1.0	3	C, I, J, N
	Reed fascine	0.6-1.25	5	E
	Coir roll	3 - 5	8	E, M, N
	Vegetated coir mat	4 - 8	9.5	E, M, N
	Live brush mattress (initial)	0.4 – 4.1	4	B, E, I
	Live brush mattress (grown)	3.90-8.2	12	B, C, E, I, N
	Brush layering (initial/grown)	0.4 – 6.25	12	E, I, N
	Live fascine	1.25-3.10	6 – 8	C, E, I, J
	Live willow stakes	2.10-3.10	3 – 10	E, N, O
Hard Surfacing	Gabions	10	14 – 19	D
	Concrete	12.5	>18	H

[1] Ranges of values generally reflect multiple sources of data or different testing conditions.

A. Chang, H.H. (1988).
B. Florineth. (1982)
C. Gerstgraser, C. (1998).
D. Goff, K. (1999).
E. Gray, D.H., and Sotir, R.B. (1996).
F. Julien, P.Y. (1995).
G. Kouwen, N.; Li, R. M.; and Simons, D.B., (1980).
H. Norman, J. N. (1975).
I. Schiechtl, H. M. and R. Stern. (1996).
J. Schoklitsch, A. (1937).
K. Sprague, C.J. (1999).
L. Temple, D.M. (1980).
M. TXDOT (1999)
N. Data from Author (2001)
O. USACE (1997).

al and instantaneous values for
ters. Guidance for making these
s presented in the section titled
below.

MAGNITUDE

g discussion dealt with the
bsence of erosion, but did not
xtent to which erosion might
en flow. If the thresholds
Table 2 are exceeded, erosion
ected to occur. In reality, even
resholds are not exceeded, some
w select locations may occur.
which this minor erosion could
nificant concern depends in large
he duration of the flow, and upon
he stream to transport those
ents.

n

stated, limits regarding erosion
shed by manufacturers for
cts are typically developed from
short flow durations. They do not
ential for severe erosion damage
t from moderate flow events over
. Studies have shown that
w reduces erosion resistance of
f erosion control products, as
res 2 - 4. A factor of safety
plied when flow duration exceeds
urs.

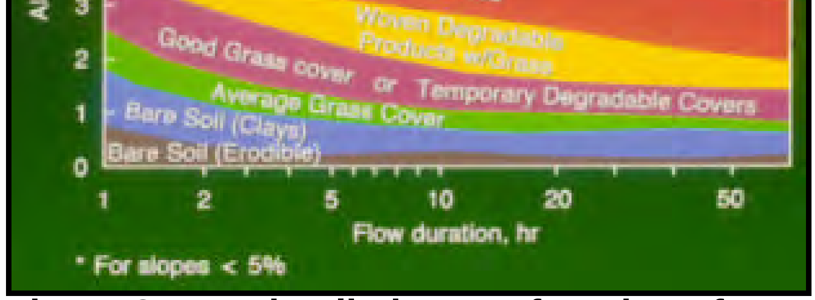

Figure 2. Erosion limits as a function of flow duration (from Fischenich and Allen (2000)).

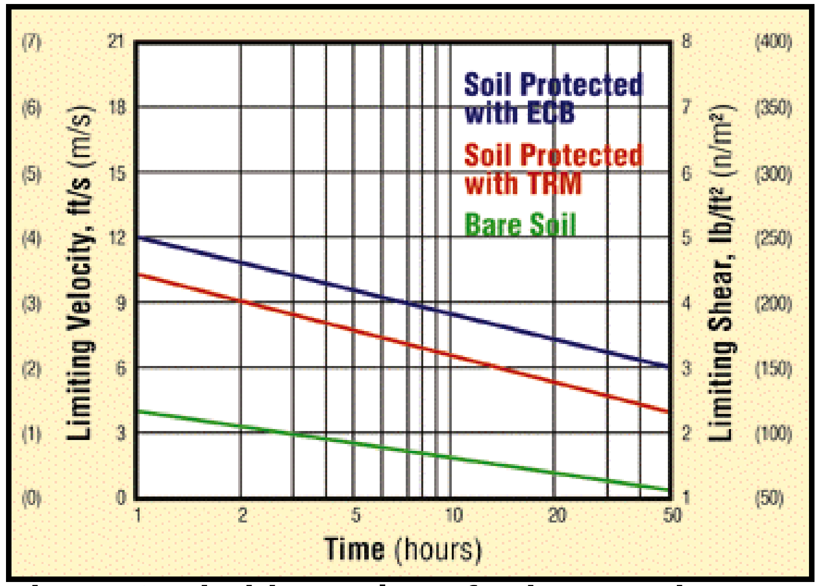

Figure 3. Limiting values for bare and TRM protected soils (from Sprague (1999))

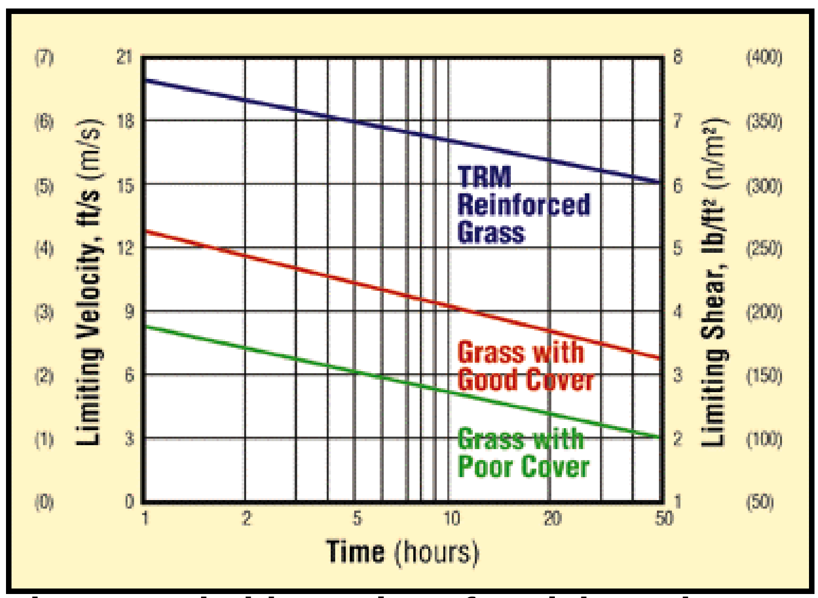

Figure 4. Limiting values for plain and TRM reinforced grass (from Sprague (1999))

Correlations between flow volume and amount of erosion tend to be poor. Multi-peaked flows may be more effective than single flows of comparable or greater magnitude because of the increased incidence of wetting. Flows with long durations often have a more significant effect on erosion than short-lived flows of higher magnitude. Sediment transport analysis can be used to gauge the magnitude of erosion potential in the channel design, but predictive capability is limited.

Sediment Transport

A number of flow measures can be used to assess the ability of a stream to transport sediment. The unit stream power (P_m) is one common approach, and is related to the earlier discussion in that stream power includes both velocity and shear stress as components. Sediment transport (Q_s) increases when the unit stream power (P_m) increases. Unit stream power in turn is controlled by both tractive stress and flow velocity:

$$P_m = v \cdot \tau = v \cdot \gamma_w \cdot D \cdot S_f \tag{7}$$

The total power (P_t) is the product of the unit power times the channel width (W):

$$P_t = P_m \cdot W = v \cdot W \cdot D \cdot \gamma_w \cdot S_f = v \cdot A \cdot \gamma_w \cdot S_f = Q_w \cdot \gamma_w \cdot S_f \tag{8}$$

Stream power assessments can be useful in evaluating sediment discharge within a stream channel and the deposition or erosion of sediments from the streambed. However, their utility for evaluating the stability of measures applied to prevent erosion is limited because of the lack of empirical data relating stream power to stability. The analysis of general streambank erosion is not a simple extension of the noncohesive bed case with an added downslope gravity component. Complication is added by other influencing variables, such as vegetation, whose root system can reinforce bank material and increase erosion resistance. Factors influencing bank erosion are summarized in Table 3.

Table 3. Factors Influencing Erosion

actor	*elevant characteristics*
low properties	lagnitude, frequency and variability of stream discharge; Magnitude and distribution of elocity and shear stress; Degree of turbulence
ediment composition	ediment size, gradation, cohesion and stratification
limate	ainfall amount, intensity and duration; Frequency and duration of freezing
ubsurface conditions	eepage forces; Piping; Soil moisture levels
hannel geometry	Vidth and depth of channel; Height and angle of bank; Bend curvature
iology	'egetation type, density and root character; Burrows
nthropogenic factors	Irbanization, flood control, boating, irrigation

APPLICATION

The stability of a waterway or the suitability of various channel linings can be determined by first calculating both the mean velocity and tractive stress (by the previous equations). These values can then be compared with allowable velocity and tractive stress for a particular ground cover or lining system under consideration (e.g., existing vegetation cover, an erosion control blanket, or bioengineering treatment). Allowable tractive stresses for various types of soil, linings, ground covers, and stabilization measures including soil bioengineering treatments, are listed in Table 2. Additionally, manufacturers' product literature can provide allowable tractive stresses or velocities for various types of erosion control products.

An iterative procedure may be required when evaluating channel stability because various linings will affect the resistance coefficient, which in turn may change the estimated flow conditions. A general procedure for the application of information presented in this paper is outlined in the following paragraphs.

Step 1-Estimate Mean Hydraulic Conditions. Flow of water in a channel is governed by the discharge, hydraulic gradient, channel geometry, and roughness coefficient. This functional relationship is most frequently evaluated using normal depth or backwater computations that take into account principles of conservation of linear momentum. The latter is preferable because it accounts for variations in momentum slope, which is directly related to shear stress. Several models are available to aid the hydraulic engineer in assessing hydraulic conditions. Notable examples include HEC-2, HEC-RAS, and WSP2. Channel cross sections, slopes, and Manning's coefficients should be determined based upon surveyed data and observed or predicted channel boundary conditions. Output from the model should be used to compute main channel velocity and shear stress at each cross section.

Step 2- Estimate Local/Instantaneous Flow Conditions. The computed values for velocity and shear stress may be adjusted to account for local variability and instantaneous values higher than mean. A number of procedures exist for this purpose. Most commonly applied are empirical methods based upon channel form and irregularity. Several references at the end of this paper present procedures to make these adjustments. Chang (1988) is a good example. For straight channels, the local maximum shear stress can be assumed from the following simple equation:

$$t_{\max} = 1.5t \qquad (9)$$

for sinuous channels, the maximum shear stress should be determined as a function of the planform characteristics using Equation 10:

$$t_{\max} = 2.65\, t \left(\frac{R_c}{W}\right)^{-0.5} \qquad (10)$$

where R_c is the radius of curvature and W is the top width of the channel. Equations 9 and 10 adjust for the spatial distribution of shear stress; however, temporal maximums in turbulent flows can be 10 – 20 percent higher, so an adjustment to account for instantaneous maximums should be added as well. A factor of 1.15 is usually applied.

Step 3- Determine Existing Stability. Existing stability should be assessed by comparing estimates of local and instantaneous shear and velocity to values presented in Table 2. Both the underlying soil and the soil/vegetation condition should be assessed. If the existing conditions are deemed stable and are in consonance with other project objectives, then no further action is required. Otherwise, proceed to step 4.

Step 4- Select Channel Lining Material. If existing conditions are unstable, or if a different material is needed along the channel perimeter to meet project objectives, a lining material or stabilization measure should be selected from Table 2, using the threshold values as a guideline in the selection. Only material with a threshold exceeding the predicted value should be selected. The other project objectives can also be used at this point to help select from among the available alternatives. Fischenich and Allen (2000) characterize attributes of various protection measures to help in the selection.

Step 5- Recompute Flow Values. Resistance values in the hydraulic computations should be adjusted to reflect the selected channel lining, and hydraulic condition should be recalculated for the channel. At this point, reach- or section-averaged hydraulic conditions should be adjusted to account for local and instantaneous extremes.
Table 4 presents velocity limits for various channel boundaries conditions. This table is useful in screening alternatives, or as an alternative to the shear stress analysis presented in the preceding sections.

Table 4. Stability of Channel Linings for Given Velocity Ranges

Lining	0 – 2 fps	2 – 4 fps	4 – 6 fps	6 – 8 fps	> 8 fps
Sandy Soils	Use Caution	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate
Firm Loam	Use Caution	Use Caution	Not Appropriate	Not Appropriate	Not Appropriate
Mixed Gravel and Cobbles	Appropriate	Use Caution	Use Caution	Not Appropriate	Not Appropriate
Average Turf	Appropriate	Use Caution	Use Caution	Not Appropriate	Not Appropriate
Degradable RECPs	Appropriate	Use Caution	Use Caution	Use Caution	Not Appropriate
Stabilizing Bioengineering	Appropriate	Use Caution	Use Caution	Use Caution	Not Appropriate
Good Turf	Appropriate	Appropriate	Use Caution	Use Caution	Use Caution
Permanent RECPs	Appropriate	Appropriate	Appropriate	Appropriate	Use Caution
Armoring Bioengineering	Appropriate	Appropriate	Appropriate	Appropriate	Use Caution
CCMs & Gabions	Appropriate	Appropriate	Appropriate	Appropriate	Use Caution
Riprap	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
Concrete	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate

Key:

(green)	Appropriate
(yellow)	Use Caution
(red)	Not Appropriate

Step 6– Confirm Lining Stability.
The stability of the proposed lining should be assessed by comparing the threshold values in Table 2 to the newly computed hydraulic conditions. These values can be adjusted to account for flow duration using Figures 2-4 as a guide. If computed values exceed thresholds, step 4 should be repeated. If the threshold is not exceeded, a factor of safety for the project should be determined from the following equations:

$$FS = \frac{t_{\max}}{t_{est}} \quad or \quad FS = \frac{V_{\max}}{V_{est}} \qquad (11)$$

In general, factors of safety in excess of 1.2 or 1.3 should be acceptable. The preceding five steps should be conducted for every cross section used in the analysis for the project. In the event that computed hydraulic values exceed thresholds for any desirable lining or stabilization technique, measures must be undertaken to reduce the energy within the flow. Such measures might include the installation of low-head drop structures or other energy-dissipating devices along the channel. Alternatively, measures implemented within the watershed to reduce total discharge could be employed.

APPLICABILITY AND LIMITATIONS

Techniques described in this technical note are generally applicable to stream restoration projects that include revegetation of the riparian zone or bioengineering treatments.

ACKNOWLEDGEMENTS

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POINTS OF CONTACT

For additional information, contact the author, Dr. Craig Fischenich, (601-634-3449, fischec@wes.army.mil), or the manager of the Ecosystem Management and Restoration Research Program, Dr. Russell F. Theriot (601-634-2733, therior@wes.army.mil). This technical note should be cited as follows:

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USACE TR EL 97-8

Attachment 5

General Comments on Final Water Quality Improvement Plans and Notice of Noncompliance

Walsh (2015)

August 5, 2015 **Via Email Only**

San Diego County Principal Watershed Copermittees

In reply refer to / attn:
PIN :786088:LWalsh

Subject: General Comments on Final Water Quality Improvement Plans and Notice of Noncompliance

San Diego County Principal Watershed Copermittees:

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) received the Water Quality Improvement Plans (Plans) from the San Diego County Copermittees (Copermittees) on or before June 26, 2015, as required pursuant to Provision F.1.b.(1) of Order No. R9-2013-0001, *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region* (Order).

The Plans are the product of more than two years of concentrated Plan development efforts by the Copermittees. These Plans were prepared in phases and the Copermittees received regular input from the San Diego Water Board, industry professionals, non-governmental environmental organizations, and community members as part of feedback from the Water Quality Improvement Consultation Panel groups and the public at large during multiple public workshops. While the San Diego Water Board recognizes this is the first time the Copermittees have prepared such Plans and acknowledges their efforts to comply with the requirements of the Order, some of the Plans did a better job of meeting the requirements of the Order than others.

The San Diego Water Board is confident that once the Plans are in compliance with the requirements of the Order and accepted by the San Diego Water Board, the Copermittees' jurisdictional runoff management programs (JRMPs) will have the greatest potential to achieve significant reductions in pollutant loads in MS4 discharges and improvements in receiving water quality to the level supportive of beneficial uses within the shortest possible time.

In addition to reviewing the Plans for compliance with the requirements of the Order, the San Diego Water Board reviewed the acceptability of the Plans. The Order allows the Copermittees to develop Plans that prioritize the water quality conditions to address sooner rather than later, and to set numeric goals and schedules to address the highest priorities. However, not all proposed priorities, goals, and schedules will be determined acceptable, especially if the San Diego Water Board determines that a Plan will not achieve water quality improvements within a reasonable period of time. While the elements of a Plan may meet the requirements of the Order, those elements must also meet the intent of the Order which is instrumental to achieving the goals of the San Diego Water Board's Practical Vision.

The San Diego Water Board has not yet completed a detailed review of each Plan. At this time, the San Diego Water Board is providing general comments for all the Plans because there are several issues of concern already identified that make the Plans unacceptable, as well as noncompliant with the requirements of the Order. When the detailed reviews are completed the San Diego Water Board staff will schedule a time to meet with the Copermittees for each Watershed Management Area, as soon as practicable and anticipated to be before the end of August 2015, to discuss specific issues that need to be addressed in each Plan. At the meetings, the San Diego Water Board may have Plan-specific comments in addition to the issues identified below.

Until then, the issues identified below must be adequately addressed for the Plans to be considered acceptable by the San Diego Water Board, and to be in compliance with the requirements of Order. Not all of the following comments and areas of noncompliance are applicable to every Plan or to every Copermittee, so the San Diego County Copermittees should review the Plans to determine where the following issues are applicable to their watershed and their jurisdiction.

PRIORITY WATER QUALITY CONDITIONS

1. *Identification of Priority Water Quality Conditions*

Requirements: Provisions B.2.a through B.2.c of the Order require the Copermittees to identify the priority water quality conditions that will be evaluated to determine which of those conditions will be the highest priorities to be addressed by the Plan. Provisions B.2.a through B.2.c require the Copermittees to consider several sources of data and information to identify priority water quality conditions within the Watershed Management Area, and whether there is a potential that MS4 discharges may be causing or contributing to those conditions.

Issues of Concern: Each Plan includes a description of the process to review different sources of data and information, including input from the public, to identify priority water quality conditions. The San Diego Water Board, however, has found the following general issues of concern:

a) In several Plans, the San Diego Water Board did not find a fully inclusive list of all priority water quality conditions (i.e. pollutants, stressors, receiving water conditions) that should have been identified in data and information that were required to be considered pursuant to Provisions B.2.a and B.2.b. Pursuant to

Provision B.2.c.(1), a fully inclusive list was required to be evaluated to identify which of those conditions were the highest threat to receiving water quality, or most adversely affect the quality of receiving waters.

b) In at least one Plan, there was not enough description or information that allowed the San Diego Water Board to determine if all the factors under Provisions B.2.a and B.2.b were adequately considered or not.

c) A few Plans have identified bacteria as a highest priority water quality condition based on the Revised Total Maximum Daily Loads (TMDLs) for Indicator Bacteria, Project I – Twenty Beaches and Creek in the San Diego Region (Beaches and Creeks Bacteria TMDLs), but the segment which the highest priority water quality condition is based on is no longer identified as impaired on the Clean Water Act Section 303(d) List (303(d) List).

Noncompliant Priority Water Quality Conditions: In several Plans, there was a notable absence of one or more pollutants or conditions of concern known to the San Diego Water Board (e.g. trash, hydromodification, benthic alteration, stream or riparian habitat degradation) that were also identified in reports, plans, and data cited and reviewed by the Copermittees (e.g. 2011 Long Term Effectiveness Assessment). In a few Plans, there was also a notable absence of pollutants or conditions of concern identified by the public at workshops or Water Quality Improvement Plan Consultation Panel meetings, and in written comments from stakeholders and the public. The lists developed pursuant to Provision B.2.c.(1) that do not acknowledge and include these notably absent pollutants and conditions of concern are not in compliance with the requirements of Provisions B.2.a-c.

Unacceptable Priority Water Quality Conditions: A few Plans have bacteria as a highest priority water quality condition only because of the Beaches and Creeks Bacteria TMDLs, but there is no longer an impairment identified on the 303(d) List. If there are no strategies proposed to be implemented other than the requirements of Provisions E.2 through E.7 to address bacteria, or there are no load reductions quantified for other pollutants in addition to bacteria, or both, the Plans are not acceptable to the San Diego Water Board.

WATER QUALITY IMPROVEMENT GOALS

2. Final Numeric Goals

Requirements: Provision B.3.a.(1)(a) of the Order requires the Copermittees to include final numeric goals in the Plan to address the highest priority water quality conditions. Each final numeric goal must either demonstrate the discharges from the Copermittees' MS4s will not cause or contribute to exceedances of water quality standards in receiving waters, or the receiving waters are protected from the Copermittees' MS4 discharges, or both (see Provisions B.3.a.(1)(a)(i)-(iii)).

Issues of Concern: Each Plan includes final numeric goals for the highest priority water quality conditions. The San Diego Water Board, however, has found the following general issues of concern:

a) Several Plans include proposed final numeric goals expressed in a manner that is difficult for the San Diego Water Board to determine the final numeric goal is a criterion or indicator capable of demonstrating one or more of the criteria given in Provisions B.3.a.(1)(a)(i)-(iii). In addition, the San Diego Water Board questions how some of these proposed final numeric goals could be measured by the Copermittees.

b) Several proposed final numeric goals appear to be in conflict with the prohibitions and limitations in Provision A of the Order. For example, there are Plans with proposed final numeric goals associated with reducing non-storm water discharges from the MS4s, but the San Diego Water Board cannot determine how achievement of the proposed final numeric goal is in compliance with the requirement to effectively prohibit non-storm water discharges to the MS4 (Provision A.1.b).

c) There are proposed final numeric goals that are difficult for the San Diego Water Board to establish a link between achieving the final numeric goal and addressing the highest priority water quality condition. For example, there are Plans with proposed final numeric goals associated with reducing non-storm water discharges from the MS4s to achieve reductions of pollutants in MS4 discharges (e.g. bacteria) during wet weather and dry weather conditions; however, the MS4 discharge reduction metric (e.g. flow) does not quantify the pollutant reduction that will be achieved during wet weather or dry weather conditions.

d) Some proposed final numeric goals did not meet the criteria of Provision B.3.a.(1)(a), but could be acceptable interim numeric goals.

Noncompliant Final Numeric Goals: Final numeric goals that are not numeric, AND measureable, AND capable of demonstrating the Copermittees' MS4s will not cause or contribute to exceedances of receiving water limitations, or the receiving waters are protected from the Copermittees' MS4 discharges, or both, are not in compliance with the requirements of Provision B.3.a.(1)(a).

Unacceptable Final Numeric Goals: The following proposed final numeric goals are not acceptable to the San Diego Water Board:

a) Final numeric goals that are not consistent or do not demonstrate compliance with the prohibitions and limitations of the Provision A.

b) Final numeric goals with a metric that is unclear about how it will be measured, and lacks any description of, or reference to the data that will be collected to measure the metric.

c) Final numeric goals that do not clearly demonstrate achievement of the final numeric goal will result in MS4 discharges that do not cause or contribute to exceedances of water quality standards in receiving waters, or the receiving waters are protected from the Copermittees' MS4 discharges, or both.

d) Final numeric goals that do not have a metric that clearly demonstrates a link to addressing the highest priority water quality conditions.

3. *Interim Numeric Goals*

Requirements: Provision B.3.a.(1)(b) of the Order requires the Copermittees to include interim numeric goals in the Plan for each final numeric goal. The Copermittees are allowed to propose as many interim numeric goals for each final numeric goal as they determine appropriate (Provision B.3.a.(b)(i)), but must include at least one interim numeric goal that is expressed as a reasonable increment of the final numeric goal. This interim numeric goal is expected to be in the same or a similar metric as the final numeric goal (Provision B.3.a.(b)(ii)). At least one interim numeric goal is required to be established during each 5 year period between the acceptance of the Plan and the achievement of the final numeric goal (Provision B.3.a.(b)(iii)).

Issues of Concern: In at least one Plan, the San Diego Water Board has found proposed final numeric goals that do not have interim numeric goals that are expressed in the same or similar metric as the final numeric goals.

Noncompliant Interim Numeric Goals: Final numeric goals that do not have at least one interim numeric goal expressed as a reasonable increment in the same or similar metric as the final numeric goal are not in compliance with Provision B.3.a.(1)(b)(ii).

WATER QUALITY IMPROVEMENT STRATEGIES

4. *Identification of Potential Water Quality Improvement Strategies*

Requirements: Provision B.2.e of the Order requires the Copermittees to identify potential strategies that can result in improvements to water quality. Provision F.1.a.(2)(f) requires the Copermittees consider revisions to potential water quality improvement strategies they propose in the Plan based on public comments.

Issues of Concern: Most Plans include lists of water quality improvement strategies that may be implemented by the Copermittees. The San Diego Water Board, however, has found the following general issues of concern:

a) In at least one Plan, the San Diego Water Board was not able to locate the list of potential water quality improvement strategies developed during the public participation process in the Plan.

b) In at least one Plan, the San Diego Water Board could not find all the potential water quality improvement strategies suggested or recommended in public comments.

Noncompliant Potential Water Quality Improvement Strategies: Plans that do not identify all potential strategies that were considered for implementation to improve water quality are not in compliance with the requirements of Provision B.2.e. Plans that did not consider all the potential water quality improvement strategies submitted in public comments are also not in compliance with the requirements of Provision B.2.e.

5. Optional Jurisdictional Strategies

Requirements: Provision B.3.b.(1)(b) of the Order requires each Copermittee to identify the optional jurisdictional strategies that will be implemented within its jurisdiction, as necessary, to achieve final numeric goals. Each Copermittee is required to identify water quality improvement strategies that are in addition to the best management practice (BMP) implementation, inspection, enforcement, and education activities that are already required by Provisions E.2 through E.7 (Provision B.3.b.(1)(b)(i)). Optional jurisdictional strategies to encourage or implement retrofit projects and channel and habitat rehabilitation projects are also required to be provided (Provisions B.3.b.(1)(b)(ii) and (iii)). For each optional jurisdictional strategy that a Copermittee includes in the Plan, descriptions of the funds and/or resources needed, and the circumstances needed to trigger implementation of the strategy are also required (Provisions B.3.b.(1)(b)(iv) and (v), respectively).

Issues of Concern: All the Plans lacked enough information for the San Diego Water Board to make a determination that all the requirements of Provision B.3.b.(1)(b) have been met. The San Diego Water Board has found the following general issues of concern:

a) Several Copermittees did not include any proposed optional jurisdictional strategies to be implemented within their jurisdictions, as necessary, to effectively prohibit non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the maximum extent practicable (MEP), protect beneficial uses of receiving waters from MS4 discharges, or achieve proposed interim and final numeric goals.

b) Most Copermittees did not include an incentive or program to encourage or implement projects to retrofit areas of existing development within its jurisdiction.

Pursuant to Provision E.5.e.(1)(a), every Copermittee is required to identify areas of existing development within its jurisdiction as candidates for retrofitting. Therefore, every Copermittee should have some incentive or program to encourage implementation of retrofit projects in the areas of existing development identified in its JRMP document pursuant to Provision E.5.e.(1)(a), unless there is an acceptable rationale in the Plan describing why it is infeasible to encourage or implement such retrofit projects.

c) Most Copermittees did not include an incentive or program to encourage or implement projects that will rehabilitate the conditions of channels or habitats within its jurisdiction. Pursuant to Provision E.5.e.(2)(a), every Copermittee is required to identify streams, channels, and/or habitats in areas of existing development within its jurisdiction as candidates for rehabilitation. Therefore, every Copermittee should have some incentive or program to encourage implementation of projects to rehabilitate the conditions of channels or habitats within its jurisdiction identified in JRMP document pursuant to Provision E.5.e.(2)(a), unless there is an acceptable rationale in the Plan describing why it is infeasible to encourage or implement such rehabilitation projects.

d) Of the Copermittees that did include proposed optional jurisdictional strategies, adequate information about the funds and/or resources needed to implement the strategy (e.g. plans to be developed, studies to be conducted, data to be collected, personnel needed, equipment needed, administrative structures required, contracts needed, land to be acquired, etc.) was not provided.

e) Of the Copermittees that did include proposed optional jurisdictional strategies, adequate information about the circumstances necessary to trigger implementation of the strategy (e.g. funding availability, obtain approval from city councils, findings from assessments or studies, etc.) was not provided.

f) Many proposed optional jurisdictional strategies did not appear to be a BMP, an incentive, or a program that could be implemented to effectively prohibit non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the MEP, protect beneficial uses of receiving waters from MS4 discharges, or achieve proposed interim and final numeric goals. Implementation of an optional jurisdictional strategy is expected to result in an improvement of water quality.

Noncompliant Optional Jurisdictional Strategies: The San Diego Water Board found that the proposed optional jurisdictional strategies in the Plans do not comply with the requirements of Provision B.3.b.(1)(b) as follows:

a) A Copermittee that did not propose any optional jurisdictional strategies to be implemented within its jurisdiction, as necessary, to effectively prohibit non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the MEP, protect beneficial uses of receiving waters from MS4 discharges, or achieve proposed interim and final numeric goals, in addition to the BMP implementation, inspection, enforcement, and education activities that are already required by Provisions E.2 through E.7 is not in compliance with the requirements of Provision B.3.b.(1)(b)(i).

b) Unless acceptable data or rationale are provided in the Plan, a Copermittee that did not propose any incentives or programs to encourage or implement projects to retrofit areas of existing development within its jurisdiction as optional jurisdictional strategies is not in compliance with the requirements of Provision B.3.b.(1)(b)(ii). A Copermittee that has not identified areas of existing development within its jurisdiction as candidates for retrofitting in its JRMP document also is not in compliance with Provision E.5.e.(1)(a), unless acceptable data or rationale is provided.

c) Unless acceptable data or rationale are provided in the Plan, a Copermittee that did not propose any incentives or programs to encourage or implement projects to rehabilitate channels or habitats within its jurisdiction as optional jurisdictional strategies is not in compliance with the requirements of Provision B.3.b.(1)(b)(iii). A Copermittee that has not identified projects to rehabilitate the conditions of channels or habitats within its jurisdiction in its JRMP document also is not in compliance with Provision E.5.e.(2)(a), unless acceptable data or rationale are provided.

d) A Copermittee that does not have any optional jurisdictional strategies in the Plan or has proposed an optional jurisdictional strategy without an adequate description of the funds and/or resources needed to implement the strategy is not in compliance with the requirements of Provision B.3.b.(1)(b)(iv).

e) A Copermittee that does not have any optional jurisdictional strategies in the Plan or has proposed an optional jurisdictional strategy without an adequate description of the circumstances needed to trigger implementation of the strategy is not in compliance with the requirements of Provision B.3.b.(1)(b)(v).

Unacceptable Optional Jurisdictional Strategies: The following proposed optional jurisdictional strategies are not acceptable to the San Diego Water Board:

a) Many proposed optional jurisdictional strategies are described using terms such as “consider”, “evaluate”, “investigate”, or “develop” a BMP, incentive, or program. These terms indicate to the San Diego Water Board that the Copermittee is only preparing for the implementation of a BMP, incentive, or program. Provision B.3.b.(1)(b) requires each Copermittee identify that optional jurisdictional strategies that ***will be*** implemented. Preparation for a strategy does not meet the requirement of a strategy that will be implemented.

b) Many proposed optional jurisdictional strategies describe development of a plan, conducting a special study or an assessment, or collecting data. Plans, special studies, assessments, and data collection are necessary steps to implement a strategy, but are not in and of themselves a strategy that will result in the effective prohibition of non-storm water discharges to the MS4, reduction of pollutants in storm water discharges from the MS4 to the MEP, protection of beneficial uses of receiving waters from MS4 discharges, or achievement of proposed interim and final numeric goals.

c) Several proposed optional jurisdictional strategies appear to be BMP implementation, inspection, enforcement, and education activities that are already being implemented or required to be implemented by the Copermittee pursuant to Provisions E.2 through E.7. Optional jurisdictional strategies are required in addition to the requirements of Provisions E.2 through E.7.

6. ***Watershed Management Area Strategies***

Requirements: Provision B.3.b.(2) of the Order requires the Copermittees to identify Watershed Management Area strategies that will be implemented, as necessary, to achieve final numeric goals. The Copermittees are required to identify regional or multi-jurisdictional scale water quality improvement strategies (Provision B.3.b.(2)(a)). Watershed Management Area strategies to encourage or implement retrofit projects and channel and habitat rehabilitation projects are also required to be provided in the Plan (Provisions B.3.b.(2)(b) and (c)). For each Watershed Management Area strategy that the Copermittees includes in the Plan, descriptions of the funds and/or resources needed, and the circumstances needed to trigger implementation of the strategy are also required (Provisions B.3.b.(2)(d) and (e), respectively).

Issues of Concern: All the Plans lacked enough information about Watershed Management Area strategies to meet the requirements of Provision B.3.b.(2).

Noncompliant Watershed Management Area Strategies: The San Diego Water Board found that the Watershed Management Area strategies in the Plans do not comply with the requirements of Provision B.3.b.(2) as follows:

a) A Plan that did not propose any Watershed Management Area strategies to be implemented on a regional or multi-jurisdictional scale, as necessary, to effectively prohibit non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the MEP, protect beneficial uses of receiving waters from MS4 discharges, or achieve proposed interim and final numeric goals is not in compliance with the requirements of Provision B.3.b.(2)(a).

b) Unless acceptable data or rationale are provided in the Plan, a Plan that did not propose any incentives or programs to encourage or implement projects to retrofit areas of existing development as a Watershed Management Area strategy is not in compliance with the requirements of Provision B.3.b.(2)(b).

c) Unless acceptable data or rationale are provided in the Plan, a Plan that did not propose any incentives or programs to encourage or implement projects to rehabilitate channels, streams, or habitats as a Watershed Management Area strategy is not in compliance with the requirements of Provision B.3.b.(2)(c).

d) A Plan without Watershed Management Area strategies or a Plan that has a proposed Watershed Management Area strategy without information about the funds and/or resources needed to implement a Watershed Management Area strategy is not in compliance with the requirements of Provision B.3.b.(2)(d).

e) A Plan without Watershed Management Area strategies or a Plan that has a proposed Watershed Management Area strategy without a description of the circumstances needed to trigger implementation of Watershed Management Area strategy is not in compliance with the requirements of Provision B.3.b.(2)(e).

WATER QUALITY IMPROVEMENT SCHEDULES

7. ***Schedules for Achieving Numeric Goals***

Requirement: Provision B.3.a.(2) of the Order requires the Copermittees to develop and incorporate schedules for achieving interim and final numeric goals. Provision B.3.a.(2) requires the schedules to incorporate TMDL compliance dates, incorporate ASBS compliance schedules, and be designed to achieve the interim and final numeric goals in the shortest time practicable taking into account the time required to implement water quality improvement strategies.

Issues of Concern: Each Plan includes schedules to achieve interim and final numeric goals. The San Diego Water Board, however, has found the following general issues of concern:

a) For Plans where the Beaches and Creeks Bacteria TMDLs are applicable and bacteria is the only highest priority water quality condition identified, and only final numeric goals are established for bacteria, the Plan is a Bacteria Load Reduction Plan (BLRP) not a Comprehensive Load Reduction Plan (CLRP). According to the Beaches and Creeks Bacteria TMDLs, the wet weather and dry weather dates for compliance with the final wasteload allocations (WLAs) must be no later than 10 years after the effective date of the TMDLs, which is April 4, 2021. For the Copermittees to have until April 4, 2031 (i.e. 20 years after the effective date of the TMDLs) to achieve the Beaches and Creeks Bacteria TMDLs WLAs, the Plan needs to be a CLRP and incorporate load reduction programs with quantified load reductions for other pollutants of concern in addition to bacteria.

b) Several Plans propose more than 20 years from the date the Plan was submitted to achieve final numeric goals if there are no applicable TMDL compliance dates. Schedules proposing to achieve final numeric goals in more than 20 years appear to be relying primarily on BMP implementation, inspection, enforcement, and education activities that are required to be implemented by the Copermittees pursuant to Provisions E.2 through E.7, with few, if any, commitments to implement optional jurisdictional strategies within the first 10 or more years.

Noncompliant Schedules for Achieving Numeric Goals: There are several Plans that have a proposed date to achieve compliance with the Beaches and Creeks Bacteria TMDLs by April 4, 2031. Unless the Plan includes quantified load reductions for pollutants in addition to bacteria, the April 4, 2031 date to achieve the final numeric goals for bacteria is not in compliance with the requirement to incorporate CLRPs into the Plan pursuant to Attachment E, Specific Provision 6.b.(2)(c)(i).

Unacceptable Schedules for Achieving Numeric Goals: The following proposed schedules to achieve numeric goals are not acceptable to the San Diego Water Board:

a) Schedules of 10 years or more to address only one highest priority water quality condition are not acceptable, unless there is information provided that allows the San Diego Water Board to make a determination that the schedules are clearly based on the time reasonably required to implement proposed optional jurisdictional strategies.

b) Schedules of 10 years or more to achieve final numeric goals without optional jurisdictional strategies proposed to be implemented within the next 5 years are not acceptable.

c) Schedules of 5 years or more to achieve final numeric goals for only addressing one highest priority water quality condition by eliminating unauthorized non-storm water discharges to and from the MS4 without optional jurisdictional strategies proposed to be implemented within the next 5 years are not acceptable.

8. *Schedules for Implementing Strategies*

Requirements: Provision B.3.b.(3) of the Order requires the Copermittees to develop reasonable schedules for implementing the jurisdictional, optional jurisdictional, and Watershed Management Area strategies to achieve interim and final numeric goals. Provision B.3.b.(3) requires the schedules for implementing strategies to describe: 1) when jurisdictional strategies required pursuant to Provisions E.2 through E.7 will be implemented (Provision B.3.b.(3)(a)(i) and (ii)), 2) the shortest practicable time to secure funds and procure resources to initiate implementation of each optional jurisdictional strategy (Provision B.3.b.(3)(a)(iii)), and the shortest practicable time to secure funds and procure resources to initiate implementation of each Watershed Management Area strategy (Provision B.3.b.(3)(b)(i)). The schedules are also required to provide information about whether a strategy is expected to be a continuously implemented strategy (Provisions B.3.b.(3)(a)(iv) and B.3.b.(3)(b)(ii)) or strategy to be completed within a schedule (Provisions B.3.b.(3)(a)(v) and B.3.b.(3)(b)(iii)).

Issues of Concern: Each Plan includes schedules to implement strategies. The San Diego Water Board, however, has found the following general issues of concern:

a) In most Plans there were several proposed strategies that did not have any schedules associated with them, other than "to be determined."

b) Most Plans lacked enough information about the shortest practicable time to secure funds and procure resources of initiate implementation of optional jurisdictional strategies and Watershed Management Area strategies.

c) For several strategies that appeared to be limited timeframe or structural projects, they lacked the information about the anticipated time to complete the project based on a realistic assessment of the shortest practicable time required.

Noncompliant Schedules for Implementing Strategies: The San Diego Water Board found that the schedules in the Plans for implementing strategies do not comply with the requirements of Provision B.3.b.(3) as follows:

a) Strategies that do not have a schedule are not in compliance with the requirements of Provision B.3.b.(3).

b) A Copermittee that does not have any optional jurisdictional strategies or has proposed an optional jurisdictional strategy without a description of the shortest practicable time to secure funds and procure resources to initiate implementation of the optional jurisdictional strategy is not in compliance with the requirements of Provision B.3.b.(3)(a)(iii).

c) A Plan without Watershed Management Area strategies or has a proposed Watershed Management Area strategy without a description of the shortest practicable time to secure funds and procure resources to initiate implementation of the optional jurisdictional strategy is not in compliance with the requirements of Provision B.3.b.(3)(b)(i).

d) Strategies that are expected to be completed within a limited timeframe without information about the anticipated time to complete the project based on a realistic assessment of the shortest practicable time required are not in compliance with the requirements of Provision B.3.b.(3)(a)(v) or B.3.b.(3)(b)(iii).

OTHER ISSUES

9. *Hydromodification Management Exemptions*

Requirements: Provision E.3.c.(2)(d) of the Order describes situations where the Copermittees have the discretion to exempt Priority Development Projects from the hydromodification management BMP performance requirements. Exemptions may be granted to projects that discharge to 1) existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean, or 2) conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. The Copermittees may also propose additional exemptions via the optional Watershed Management Area Analysis.

Issues of Concern: Most Plans proposed additional exemptions via the optional Watershed Management Area Analysis. The San Diego Water Board, however, has found issues of concern with proposed exemptions in Plans for two different Watershed Management Areas:

a) As part of the Watershed Management Area Analysis, the City of Carlsbad included a report entitled "*Hydromodification Exemption Analysis for Select Carlsbad Watersheds*" (Report). Based on the Report, the Copermittees in the Carlsbad Watershed Management Area proposed to add drainage areas upstream of the Buena Vista, Agua Hedionda, and Batiquitos Lagoons as exempt from hydromodification management BMP requirements. Instead of evaluating the drainage areas leading to the lagoons using an erosion potential (or equivalent) analysis, the Report studies the lagoons using the criteria for exemptions outlined in the Hydromodification Management Plan for the San Diego Region (HMP) that was approved by the San Diego Water Board in July, 2010. However, the HMP is predicated on requirements of the previous MS4 permit. When the Order was adopted in 2013, the only exemptions retained were those cited in Provision E.3.c.(2)(d), meaning exemptions are essentially limited to concrete-lined or underground drainage channels. Any additional exemptions, including "non-erodible drainage networks" as described in the Report, must be evaluated from an erosion potential (or equivalent) point of view and included in the optional Watershed Management Area Analysis.

   The Report describes rationale for exempting areas draining to Agua Hedionda and Batiquitos Lagoon, and different rationale for exemptions for areas draining to Buena Vista Lagoon. The discussions regarding the areas draining to Agua Hedionda and Batiquitos Lagoons indicate that these areas may meet the Order's requirement of being concrete lined all the way from the point of discharge to an enclosed embayment (lagoon). However, whether or not drainage conveyances from these areas act like "concrete lined channels" is unclear because the discussion is centered on criteria applicable to the HMP and not the Order.

For Buena Vista Lagoon, the Report states that: "*As long as a project discharges into a non-erodible drainage network that is continuous to a lagoon outlet, it is potentially eligible for a hydromodification exemption*." The Report continues to explain that in drainage areas upstream of Buena Vista Lagoon, "… *the intervening ground is densely vegetated and or naturally armored. The City Engineer found no evidence of erosion at or near the water's edge of the lagoon. Consequently, this area is identified as exempt*…."

In order for the San Diego Water Board to accept a conclusion that a conveyance system can be exempt from hydromodification management BMP requirements, the Report must include an analysis demonstrating that the natural area under review would not experience erosion for the range of storms considered to be geomorphically significant. Although these areas are presented as "naturally armored," because they are not concrete-lined, the systems must be evaluated from an erosion potential (or equivalent) point of view to determine if an exemption is appropriate.

b) In the San Diego River Water Quality Improvement Plan, the Watershed Management Area Analysis includes a proposed methodology for demonstrating that hydromodification management BMPs are not needed upstream of Forrester Creek, a channel stabilized with materials other than concrete. The proposed methodology includes a process for classifying additional channels as "stabilized," and thus allowing exemptions for areas upstream of these channels. The San Diego Water Board is supportive of allowing exemptions for such stabilized channels, provided that the exemptions are supported and the proposed process is clear and repeatable.

The Watershed Management Area Analysis includes a discussion of erosion potential in Forrester Creek under several different flow rates, all of which suggest that Forrester Creek would not experience erosion caused by land development occurring in the upstream watershed, even in a fully built-out condition. The discussion includes analyses using various methods to verify the assertion that the channel is stable in the range of flows considered to be geomorphically significant. Because the discussion includes several lines of evidence, the San Diego Water Board agrees that Forrester Creek can be considered stable and therefore the proposed exemption is appropriate.

The Watershed Management Area Analysis appears to rationalize a more succinct and less rigorous analysis for including exemptions for future proposed channel segments. Absent a similar, thorough, and multiple lines of evidence approach analysis as was included for Forrester Creek, the San Diego Water Board disagrees and cannot support the less rigorous analysis. The San Diego Water Board supports the concept of introducing additional stabilized channel reaches that are exempt from hydromodification management BMP requirements, but only if an erosion potential analysis using continuous simulation modeling demonstrates that the channel segment would not erode in the range of flows determined to be geomorphically significant. Additionally, the analysis would need to include flows expected from a fully-built out watershed condition, and would have to consider erosion potential at the channel's most susceptible location(s). Finally, the criteria and process to qualify for an exemption should be clear so that future proposals for exemptions for additional channel segments include all the required elements.

Unacceptable Hydromodification Management Exemptions: The following proposed exemptions are not acceptable to the San Diego Water Board:

a) Without an appropriate and acceptable analysis of the potential of erosion for the range of storms considered to be geomorphically significant, the additional exemptions proposed for Agua Hedionda Lagoon, Batiquitos Lagoon, and Buena Vista Lagoon are not acceptable.

b) Without an erosion potential analysis using continuous simulation modeling that shows a channel will not erode in the range of geomorphically significant flows for the fully built out condition of the drainage area at the most sensitive channel segment(s) included in the Watershed Management Area Analysis, future proposals for exemptions from the hydromodification management BMP requirements will not be acceptable.

10. *Loma Alta Slough Resolution Implementation Requirements*

Requirements: Provision A.1.b of the Order requires the Copermittees to effectively prohibit non-storm water discharges into the MS4. Provision B.3.a requires the Copermittees to develop interim and final numeric goals and schedules to achieve those goals for the highest priority water quality conditions. Resolution No. R9-2014-0020, a *Resolution of Commitment to an Alternative Process for Achieving Water Quality Objectives for Biostimulatory Substances in Loma Alta Slough* (Resolution), was adopted by the San Diego Water Board on June 26, 2014. The Resolution includes numeric targets, a compliance schedule, and monitoring which are expected to be implemented through the Carlsbad Watershed Management Area Water Quality Improvement Plan (Carlsbad WMA Plan).

Issues of Concern: A number of items in the Carlsbad WMA Plan are not consistent with the Resolution. The San Diego Water Board chose to adopt the Resolution as a practical, measureable, and timely approach for directing actions to remedy the Slough through a productive collaboration with the community to address an important water quality challenge. The Copermittees must implement the elements of the Resolution, or the San Diego Water Board will reinitiate the process of considering adoption of the Phosphorus TMDL for Loma Alta Slough. The San Diego Water Board has found the following issues of concern:

a) The Resolution includes numeric targets for both surface water macroalgal biomass and surface water macroalgal cover, which represent attainment of the biostimulatory water quality objective for Loma Alta Slough. These numeric targets were developed through a multi-year stakeholder process, and were based on special studies specific to the Slough and water quality modeling. The numeric targets are to be achieved by 2023.

According to the source and linkage analysis for which the numeric targets are based, the primary sources of the impairment in Loma Alta Slough are dry-weather discharges from irrigation runoff and other illicit dry weather discharges conveyed by the MS4 to Loma Alta Slough. Nutrient loading, specifically phosphorus, into the Slough from dry weather flows results in excessive algal growth. Further, modeling results cited in the staff report (which served as the technical basis for the Resolution) suggests that reductions of dry weather flows in excess of 96 percent are needed to achieve the targeted reductions in phosphorus loading. As such, the Resolution relies on the Order, specifically the prohibitions of dry weather non-storm water discharges, and development and implementation of a Plan that includes the Loma Alta Creek watershed, to achieve the necessary reductions in phosphorus loading and restore the beneficial uses.

In contrast to the approach for which the Resolution is based, the Carlsbad WMA Plan proposes interim numeric goals that fall short of achieving the prohibitions on dry weather discharges. The Carlsbad WMA Plan describes the interim goals as:

- 50 percent reduction in anthropogenic persistent dry weather flows at the three outfalls addressed through 2018, and
- 25 percent reduction in additional (other outfalls in watershed) anthropogenic persistent flows identified during dry weather monitoring program implemented in 2015 and in subsequent years.

The interim goals as expressed in the Carlsbad WMA Plan are not consistent with the Resolution because there is no mention in the Resolution that the City of Oceanside would only first reduce flows by 50 percent, followed by an additional 25 percent in subsequent years, and no explicit attempt to comply with the requirement to effectively eliminate non-storm water discharges into the MS4. Additionally, Finding 20 of the Resolution states that the City of Oceanside, in a comment letter dated May 5, 2014 committed to:

- Using the numeric targets, developed through the stakeholder process as numeric goals in the Water Quality Improvement Plan for the Loma Alta Creek watershed, and
- Develop and implement a Water Quality Improvement Plan to effectively prohibit the City's non-storm water discharges into the MS4 system.

The San Diego Water Board expects the City of Oceanside to honor its commitment as stated in the letter dated May 5, 2014, and therefore expected the interim and final numeric goals in the Carlsbad WMA Plan to incorporate the prohibition of dry weather non-storm water discharges into the MS4 for reducing phosphorus loading to Loma Alta Slough. Further, there must also be interim numeric goals expressed as an increment toward achieving the final numeric goals.

b) The Carlsbad WMA Plan does not include the required Loma Alta Slough Monitoring Plan. Table 2 of Resolution No. R9-2014-0022 describes the City of Oceanside's *Tentative Proposed Schedule to Address the Eutrophication Impairment in Loma Alta Slough*. According to this Table, in 2015, "*the City was to submit a Water Quality Improvement Plan, including the Loma Alta Slough Monitoring Plan, to the San Diego Water Board.*"

   Section 3.1.4 of the Carlsbad WMA Plan describes a special study whose objectives are "*to develop a water quality monitoring program for the Loma Alta Slough (Slough Monitoring Plan) that will allow the City of Oceanside to track progress toward reducing nutrient discharges into the Slough and eliminate the eutrophication impairment*." The monitoring is to occur every summer from 2016 to 2022.

   In a letter dated May 5, 2014, the City of Oceanside indicated that it would incorporate the slough monitoring requirements proposed in Tentative Investigative Order No. R9-2014-0022 into the Carlsbad WMA Plan[1]. The San Diego Water Board's expectation was that the Slough Monitoring Plan would be fully developed and included in the Carlsbad WMA Plan, as stated in the City's letter and described in Table 2 of the Resolution. The City of Oceanside has not submitted any correspondence to the San Diego Water Board suggesting a need to amend the schedule described in Table 2 since Resolution No. R9-2014-0020 was adopted on June 26, 2014.

Noncompliant Loma Alta Slough Resolution Implementation Requirements: The San Diego Water Board found that the Carlsbad WMA Plan does not comply with the requirements of Provisions A.1.b and B.3.a.(1) as follows:

a) The interim numeric goals as expressed are not consistent with the Resolution and not in compliance with the requirements of Provisions A.1.b and B.3.a.(1)(b).

b) Each final numeric goal that does not have an interim numeric goal expressed as a reasonable increment in the same or similar metric as the final numeric goal is not in compliance with Provision B.3.a.(1)(b)(ii).

Unacceptable Loma Alta Slough Resolution Implementation Requirements: The City of Oceanside committed to incorporating slough monitoring requirements proposed in Tentative Investigative Order No. R9-2014-0022 into the Carlsbad WMA Plan. Without the slough monitoring requirements proposed in Tentative Investigative Order No. R9-2014-0022 in the monitoring and assessment program for the Carlsbad Watershed Management Area, the Carlsbad WMA Plan is not acceptable to the San Diego Water Board.

[1] Tentative Investigative Order No. R9-2014-0022 was replaced by Resolution No. R9-2014-0020.

11. __Items of Additional Concern__

Pursuant to Provision F.1.b.(2), the Copermittees are required to consider revisions to the Plans based on written comments received by the close of the public comment period. Pursuant to Provision F.1.b.(3), the Copermittees are required to submit any revisions to the Plans no later than 60 days after the close of the comment period, or by September 29, 2015.

Pursuant to Provisions E and F.2.a.(2) of the Order each Copermittee was required to update its JRMP document to incorporate the requirements of Provision E concurrently with the submittal of the Plans. Pursuant to Provisions E.3.d and F.2.b.(1) of the Order each Copermittee was also required to update its BMP Design Manual to incorporate the requirements of Provisions E.3.a-d. Each Copermittee's JRMP document updated with the requirements of Provision E became effective with the submittal of the Plans. In addition, each Copermittee must begin implementing its updated BMP Design Manual within 180 days of submittal of the Plans, unless directed otherwise by the San Diego Water Board.

Until the Plans are accepted by the San Diego Water Board, any exemptions to the hydromodification management BMP requirements of Provisions E.3.c.(2)(a)-(c), proposed in the Plans pursuant to Provision B.3.b.(4)(c), are not authorized to be applied to any Priority Development Projects within a Copermittee's jurisdiction. Likewise, a Copermittee is not authorized to implement an Alternative Compliance Program (pursuant to Provision E.3.c.(3)) for any Priority Development Project within its jurisdiction until the optional Watershed Management Area Analysis developed pursuant to Provision B.3.b.(4) has been accepted as part of the Plans.

12. __Potential Future Enforcement Options__

The areas of noncompliance identified herein began on the due date to submit the Plans (June 26, 2015) and may be subject to additional future enforcement by the San Diego Water Board or State Water Resources Control Board, including a potential civil liability assessment of up to $10,000 per day of violation (Water Code section 13385) until the violations are corrected and/or pursue any of the following enforcement actions:

Other Potential Enforcement Options	**Applicable Water Code Sections**
Technical or Investigative Order	Sections 13267 or 13383
Cleanup and Abatement Order	Section 13304
Cease and Desist Order	Sections 13301-13303
Time Schedule Order	Sections 13300, 13308

In addition, the San Diego Water Board may consider revising or rescinding applicable waste discharge requirements, if any, referring the matter to other resource agencies, or referring the matter to the State Attorney General for injunctive relief, as applicable.

The San Diego Water Board is available to assist the Copermittees with refining the Plans to become acceptable, and to be in compliance with the requirements of the Order. In the subject line of any response, please include the information located in the heading of this letter: "in reply refer to." Please contact Wayne Chiu at (619) 521-3354 or Wayne.Chiu@waterboards.ca.gov., or Christina Arias at (619) 521-3351 or Christina.Arias@waterboards.ca.gov with any questions or concerns.

Respectfully,

Laurie Walsh, P.E.
Senior Water Resource Control Engineer
Storm Water Management Unit

Tech Staff Info & Use	
Order No.	R9-2013-0001
Party (CIWQS) ID	536787
NPDES No.	CAS0109266
Reg. Measure ID	387335
PIN ID	786088

ATTACHMENT B.3.2

THIRD PARTY REVIEW OF TRWE STUDY

June 29, 2016

City of Chula Vista, Storm Water Management Section
1800 Maxwell Road
Chula Vista, CA 91911

Attention: Boushra Salem

Subject: Review of TRW Otay River Erosion Potential Analysis Technical Memo For the City of Chula Vista, City of San Diego, and County of San Diego

Dear Boushra:

Amec Foster Wheeler has completed a review of the Otay River Erosion Potential Analysis technical memorandum (Otay EP Analysis) that was produced by Tory R. Walker Engineering (TRWE). The Otay EP Analysis, dated December 18, 2015 (included as Attachment A), was supplemented by a clarification e-mail dated June 6, 2016 (Attachment B) and a letter dated May 25, 2016 (Attachment C). The Otay EP Analysis supports a proposed hydromodification management exemption for development projects discharging to the Otay River. The review consisted of the following functions:

1. Review and verify the methodology used for flow analysis and validate the proposed peak flows for pre and post development scenarios;
2. Perform a spot check on GIS data and maps and verify the validity of the data;
3. Review the EPA-Storm Water Management (SWM) Model setup, check the input files and perform a test run for the model. Review the model output files and verify that the output results match the report information; and,
4. Compare the Otay EP Analysis to the San Diego Bay WQIP Watershed Management Area Analysis (WMAA) requirement for an additional study "to establish a site-specific allowable EP metric for the Otay River from East of Interstate 805 to Lower Otay Reservoir Dam, more closely representing actual measured and observed characteristics of this river system".

In addition to the Otay EP Analysis document, the following backup files were obtained for review:

- Digital GIS files used in the document;
- The electronic input and output files for the EPA-SWMM model runs; and
- Electronic copies of spreadsheets for statistical flow analysis, or inputs and outputs for flow data.

Environment & Infrastructure
9177 Sky Park Court • San Diego, CA 92123-4341 USA
Tel: +1 858.278.3600 • Fax: +1 858.278.5300

The review was conducted by Amec Foster Wheeler Principal Water Resource Engineers: Seth Jelen, P.E. (OR), CFM and Habib Matin, Ph.D, P.E. (OR) and reviewed by Yvana Hrovat, P.E. (CA).

METHODOLOGY, DATA AND SWMM REVIEW

The methodology used for the Otay EP Analysis was reviewed and found to be valid. GIS data and calculated areas, including watershed basin delineations upstream and downstream of Savage Dam, and other attributes were appropriate for the values checked. Subcatchment areas within the watershed were appropriately classified for the SWM models according to the runoff pathway for discharges to the Otay River. Calculations for peak flows were performed on the data and the results agreed with values used in the analysis.

The Otay EP Analysis methodology for flow analysis using the SWM model was in accordance with standard practices. The hydrology of the watershed was modeled under two scenarios: fully developed under the proposed exemption ("exempt condition model"), and pre-development, prior to construction of the Savage Dam ("natural condition model"). Assumptions for the two modeling scenarios were consistent with U.S. EPA guidance and local studies and historical practices.

The exempt condition model used the exempt, non-exempt, and developed subcatchments to model the peak flows from below the Savage Dam to the San Diego Bay under the assumption that exempt areas would not incorporate hydromodification mitigation. The natural condition model used the same subcatchments and added the Otay Reservoir drainage basin (without effects of Savage Dam) as a runoff source.

The models incorporated approximately 50 years of continuous precipitation data to assess runoff flows from each of the specified subcatchment areas. A constant reduction in runoff relative to developed areas of 43 percent (%) was used for all non-exempt and natural subcatchment areas.

On June 6, 2016, TRWE provided clarification of the Otay EP Analysis (Attachment B). According to this clarification, the 43% reduction is the average percent reduction for the Q_2, Q_5, and Q_{10} flow rates, when comparing the post-developed, mitigated (i.e., with hydromodification control) flow rate to the post-developed, unmitigated flow rate observed in actual hydromodification management projects throughout San Diego County. Low-flow (Q_2) and high-flow (Q_{10}) rates at or near 110% were observed during hydromodification management facility design, and these rates constrained the design. High and low flow values near 100% will cause the flow duration curve (FDC) to sag below the pre-developed FDC. The June 6 clarification states, "Since, from a practical design standpoint, the normal behavior of the FDC does not usually allow for the post-developed FDC to mirror the pre-developed FDC closely (due to the unique hydraulics of outflow

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passing through the outlet structure, causing a "sag" appearance between low and high flow thresholds), it is unlikely that the 110% threshold along the entire curve would change [the design approach.]" To verify that 43% represents a conservative estimate, the SWM model was also run (by TRWE but not verified for this review) using a 20% reduction for non-exempt and natural subcatchments. According to the June 6 clarification, this test run indicated the same conclusions (described below) as the 43% estimate.

The GIS data used to populate the SWM model were reviewed for accuracy. The delineations of the Otay River centerline and Otay Reservoir were validated by comparison to a combination of satellite and aerial imagery included as a part of a 2016 ESRI World Imagery basemap. The watershed delineation was validated by comparison to a topographic baselayer. Land uses provided by the City of San Diego (e.g., schools, residential, Olympic training facility, golf courses, etc.) were checked against aerial imagery in approximately 50 cases.

Exempt, non-exempt, and developed subcatchment delineations were also validated by comparison to the 2016 ESRI World Imagery basemap of satellite and aerial imagery. Exempt parcels were generally located adjacent to the river and did not appear to be fully developed. Non-exempt areas were typically undeveloped and located further from the river, as would be expected for areas that do not directly discharge directly to the river (in contrast to exempt areas). The remaining area was classified as developed. The sum of the subcatchment areas was equal to the total Otay River drainage boundary area.

The Otay EP Analysis included spreadsheets as the input and output files for the SWM model. The input files were appropriately formatted, and were spot-checked for accuracy against the GIS data. For this review, both the natural and exempt condition SWM models were executed using the original input files. The results were compared to the original output files, and were found to be in agreement. The output files for both the Otay EP Analysis and the validation models are included in Attachment D.

As described in the Otay EP Analysis, the SWM models indicated that peak flows under a pre-development scenario (i.e., the natural condition model) were greater than peak flows under an exempt, post-development scenario. Consequently, the analysis indicates that development under the hydromodification exemption would not subject the Otay River to erosion greater than pre-development conditions.

WMAA REQUIREMENTS

The WMAA included in the San Diego Bay WQIP states (Section 4.1.1.4):

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"Additional studies to establish a site-specific allowable Ep metric for the Otay River from East of Interstate 805 to Lower Otay Reservoir Dam, more closely representing actual measured and observed characteristics of this river system, may result in allowing hydromodification management exemptions…"

The Otay EP Analysis asserts that the construction of the Savage Dam, and its failure in 1916, permanently altered the hydrology of the Otay River. Evidence presented in the analysis includes: (1) historical photos and accounts of the dam failure, and (2) an erosion potential analysis based on a field investigation and following the methodology described in the WMAA. The evidence indicates that since the 1916 dam failure, the Otay River has adapted to a different morphology and has remained stable despite more than 55 years of development.

The MS4 Permit states (E.3.c.(2)(a)(i)), *"In evaluating the range of flows that results in increased potential for erosion of natural (non-hardened) channels, the lower boundary must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks."* Critical shear stress is the measure of the minimum stress required to move sediment. Hydraulic shear stress is a measure of the shear stress imparted upon the sediment bed by the flow within the channel, and is related to the velocity, turbulence and other hydraulic factors. If the hydraulic shear stress imparted by the flow of the river does not exceed the critical shear stress, then erosion will not occur. The WMAA (WMAA Attachment B.1.1) methodology used a critical shear stress value of 0.135 pounds per square foot (psf) in its evaluation of Otay River west of I-805. Critical shear stress is based on the Reynold's number and characteristics of the sediment properties. Values are presented in a Shield's diagram and typically range from 0.03 to 0.15 (Sedimentation Engineering, Figure 2.46, Manuals and Reports on Sedimentation Engineering Practice- NO 54, American Society of Civil Engineers, 1977). Shield's research was based solely on sediment particles movement, and did not account for the stabilizing effect of vegetation.

The Otay EP Analysis includes spreadsheets that detail the EP analysis following the format of the WMAA. The spreadsheets summarize critical shear stress values, estimated flow rates, durations, watershed acreage, imperviousness, and annual average rainfall depth. The Otay EP Analysis varies from the WMAA analysis by revising the critical shear stress used to evaluate the cross-sections. The Otay EP Analysis conducted a field investigation of three critical cross-sections to determine critical shear stress values that are more applicable to the in-stream condition, and also includes a 2001 "Stability Thresholds for Stream Restoration Materials" publication by Craig Fischenich, which presents ranges of critical shear stresses for given boundary conditions (e.g., vegetation, etc.). The Otay EP Analysis states, "Critical shear stress

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values of 0.67 pounds per square foot (psf) (shales and hardpan), 0.35 psf (average reeds), and 0.70 psf (short native and bunch grass) are more appropriate assignments for the Otay River based upon the field conditions (Fischenich, 2001)." The analysis concluded that the critical shear stress values are consistent with referenced methodology and literature values, and appear to be appropriate for the vegetated conditions in the existing Otay River. Thus, the Otay EP Analysis demonstrates that a hydromodification exemption is not expected to result in significant erosion within the geomorphically significant range of storms.

In a supplemental letter dated May 25, 2016, TRWE provided the results of a Sediment Supply Potential (Sp) Analysis for the Otay River. An Sp analysis evaluates the quantity of sediment that is potentially available to the river under existing conditions and compares that loading rate to a proposed scenario where exempt parcels would contribute sediment to a lesser degree. The letter describes methodology that matches the WMAA, and provides results in the same format. The Sp Analysis reduced the soil loss estimate under an exemption ("post" soil loss) from 24,364 tons/year to 22,288 tons/year due to an increase in exempt acreage. The Sp number provided in the letter, Sp = 0.91, meets the criteria established in, "Hydromodification Screening Tools: GIS-based Catchment Analyses of Potential Changes in Runoff and Sediment Discharge (SCCWRP Technical Report 605, 2010). The Sp Analysis appears to have been appropriately performed following the WMAA guidelines, however, Amec Foster Wheeler did not verify the calculations because no data were provided with the letter.

Table 1 below summarizes the steps for the exempt river reach analysis in the WMAA. The table briefly describes the requirements for each step, identifies the input data and assumptions, the methodology used in the Otay EP Analysis, and the results of the Amec Foster Wheeler's review.

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Table 1 - Exempt River Reach Analysis Review

Exemption Analysis Step	WMAA Requirements	Key Input Data / Assumptions	Tory R. Walker Engineering Analysis	Amec Foster Wheeler Review
1 – Hydrologic Analysis	Develop flow histogram for existing and future conditions.	Flow duration curve, land use cover & classification, channel slope, and mean annual precipitation.	Hydrologic analysis conducted using SWMM and GIS data, as described in report.	TRWE completed statistical analysis and SWMM modeling to obtain peak flows. Hydrologic evaluation conducted appropriately and in accordance with engineering standards.
2 – Hydraulic Analysis	Critical flow rate of 50% of Q2 for critical shear stress.	Selected critical cross-sections and reach type classification.	Critical shear stress was determined for three cross-sections based on field visits and 2001 “Stability Thresholds for Stream Restoration Materials” (Fischenich, 2001).	TRWE conducted field investigation of the critical cross-sections and provided evidence of the vegetated cover. Cross-section selection and rationale for increased critical shear stress based on vegetated conditions and 2001 Fischenich publication was appropriate.
3 – Work Analysis	Use simplified effective Work equation.	Critical shear stress, effective shear stress, flow velocity, max flow of record, and channel geometry.	Calculated shear stress within each bin was smaller than cross-section critical shear stress; therefore no Work was done in any flow bins.	Calculations verified for specified critical shear stresses. Methodology matched process presented in WMAA report.
4 – Cumulative Work Analysis	Cumulative value of bin analysis for total Work.	Discharge magnitude, range of flows, and flow duration curve.	As describe in Step #3, cumulative work is zero because no Work is done in any individual bin.	Calculations verified for specified critical shear stresses. Methodology matched process presented in WMAA report.
5 – EP Analysis	EP post- / pre-development < 1.05.	Cumulative Work analysis for pre- and post-development conditions.	Determined no change in Erosion Potential between natural and exempt conditions based on results from Step 4.	Concur that no significant erosion would occur within the range of storms considered to be geomorphically significant based on WMAA methodology.
6 – SP Analysis	SP post- / pre-development > 0.90.	RUSLE equation, GLU analysis, and the use of WMAA results for Section 2.4.	SP analysis results in a ratio of 0.91; a value greater than the minimum criteria of 0.90.	Amec Foster Wheeler was unable to verify the input data, but based on the description provided, the SP analysis meets the requirements of the WMAA.

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amec
foster
wheeler

Conclusions

The Otay EP Analysis was prepared in accordance with accepted engineering practices and appears to comply with the requirements of the WMAA. The data used in the analysis appeared to be valid, and the SWMM assumptions and output were verified. The historical research and field verification performed for the analysis demonstrate the permanent changes to the Otay River since the 1916 failure of the Savage Dam. The Otay EP Analysis demonstrates that a hydromodification exemption is not expected to result in significant erosion within the geomorphically significant range of storms. The supplemental Sp Analysis appears to have been appropriately performed, however, Amec Foster Wheeler was unable to verify the calculations. Thus, the Otay EP Analysis and supplemental documents demonstrate that the Otay River meets the requirements for a hydromodification exemption.

We appreciate the opportunity to contribute to this research, and look forward to providing you continued assistance as you address the water quality issues in the San Diego Bay.

Sincerely,

Amec Foster Wheeler
Environment & Infrastructure, Inc.

Matt Rich
Project Manager

Yvana Hrovat, P.E.
Senior Engineer

Cc: Jim Harry, City of San Diego
Ruth De La Rosa, County of San Diego

Attachments

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Appendix A

Otay River Erosion Potential Analysis Technical Memorandum

December 18, 2015

Boushra Salem
Storm Water Management Section
City of Chula Vista
1800 Maxwell Road
Chula Vista, CA 91911

SUBJECT: OTAY RIVER EROSION POTENTIAL ANALYSIS

Dear Boushra:

Tory R. Walker Engineering (TRWE) has thoroughly analyzed the Erosion Potential (Ep) methodology used to support the proposed hydromodification management exemption for projects directly discharging to the Otay River from west of Interstate 805 (I-805) to San Diego Bay. Results of that study are presented in Appendix J of the September 2015 Revised Water Quality Improvement Plan for the San Diego Bay Watershed Management Area (San Diego Bay WQIP). This methodology, and its results (herein referred to as the WMAA Ep Analysis), did not include reinstatement of an exemption for the river reach upstream of I-805 to Lower Otay Reservoir.

TRWE conducted a more detailed Ep analysis that uses watershed-specific hydrologic modeling, historical imagery review, and field investigation of existing channel conditions to either invalidate, support, or build upon the WMAA Ep Analysis. Our collective efforts (herein referred to as the Otay Ep Analysis) sought to provide a clearer picture of the potential morphological impacts that may or may not result from granting hydromodification exemptions to projects directly discharging to the Otay River when analyzed more scrupulously. We tested the hypothesis that the effects of Savage Dam and the 1916 dam failure have a more profound impact on river morphology than any proposed directly discharging development downstream of Lower Otay Reservoir—an approach that has not yet been taken by any study. We also revised the WMAA Ep Analysis to account for the natural resiliency of the system due to the re-establishment of vegetation over the past 100 years. The Otay Ep Analysis considered the entire Otay River, from the Lower Otay Reservoir to San Diego Bay, and made the following major conclusions:

1. **The Otay River flow duration curve (FDC) demonstrates that the river will not experience significant erosion for the range of storms considered to be geomorphically significant if exemptions are granted for projects directly discharging into the river system;**

2. **Aerial imagery from 1928, 1953, and 2015 demonstrate that the Otay River has remained stable (i.e., in a steady state of dynamic equilibrium) throughout the rapid urbanization of Otay Valley over the past 87 years and has become progressively more stable through the re-establishment of heavy vegetation throughout the system;**

3. **The revised WMAA Ep Analysis demonstrates that no significant erosion occurs within the range of storms considered to be geomorphically significant when critical shear stress values representative of the in-stream conditions are considered.**

Based upon these findings, we recommend that hydromodification exemptions be reinstated for projects directly discharging to the Otay River, from the Lower Otay Reservoir to San Diego Bay. We propose that this study be included as an attachment to the San Diego Bay WMAA, revising the San Diego Bay WQIP.

This recommendation carefully considers the unique nature of the Otay River and directly deals with the erosion potential for the range of storms considered to be geomorphically significant, as is consistent with the both the mission and the desire of the San Diego Regional Water Quality Control Board (Walsh, 2015). We appreciate your time in reviewing our study, and trust you will find that our methods and conclusions are presented in a clear, concise, and understandable fashion.

Sincerely,

Tory R. Walker

Tory R. Walker, PE, CFM, LEED GA
Principal

[1]Walsh, L. (2015, August 5). General Comments on Final Water Quality Improvement Plans and Notice of Noncompliance.

Natural Watershed versus Developed Watershed with Exemptions

The WMAA Ep Analysis is based on one type of model, and as with all hydrologic models, is most appropriately used in conjunction with field verification and comparison to a watershed-specific hydrologic model. It is further understood that the methodology behind the WMAA Ep Analysis sought to establish a clear and repeatable desktop-based process to analyze the potential of erosion for the range of storms considered to be geomorphically significant. From our review of the WMAA Ep Analysis, we determined that the methodology can indeed be a useful initial screening tool to conservatively assess the possibility of accelerated river channel erosion; it is not, however, a standalone metric for assessing the large, highly urbanized, impounded Otay River system—especially since the WMAA Ep methodology was not developed using data from impounded watersheds (Hawley, Bledsoe, & Stein, 2011). Savage Dam has had, and continues to have, a major influence on the Otay River morphology, yet no accepted exemption analysis has yet fully considered the extent of its effect, nor of its historic failure in 1916. Therefore, TRWE tested the first hypothesis: the *presence* of Savage Dam has a more profound impact on river morphology than any proposed, directly-discharging development downstream of Lower Otay Reservoir.

In order for the San Diego Regional Water Quality Control Board (San Diego Water Board) to accept a conclusion that a conveyance system can be exempt from hydromodification management BMP requirements, the report must include an analysis demonstrating that the natural channel under review would not experience erosion for the range of storms considered to be geomorphically significant (Walsh, 2015), as presented in Attachment 5. It is also the belief of the San Diego Water Board that using a hydrologic baseline that approximates an undeveloped, natural watershed is the only way to facilitate the return of more natural hydrologic conditions to already built-out watersheds, and ultimately improve stream health (San Diego Regional Water Quality Control Board, 2015). Therefore, TRWE used the United States Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) to model the Otay Hydrologic Unit under two unique scenarios: the first scenario approximated the hydrology of the impounded, fully built out Otay Valley watershed (drainage area downstream of Savage Dam) with hydromodification exemptions in place for proposed development areas directly discharging to the Otay River (herein referred to as the Exemption Scenario); the second scenario approximated the hydrology of the *natural, unimpounded* Otay hydrologic unit (herein referred to as the Natural Scenario). The study areas are presented in Figure 1.

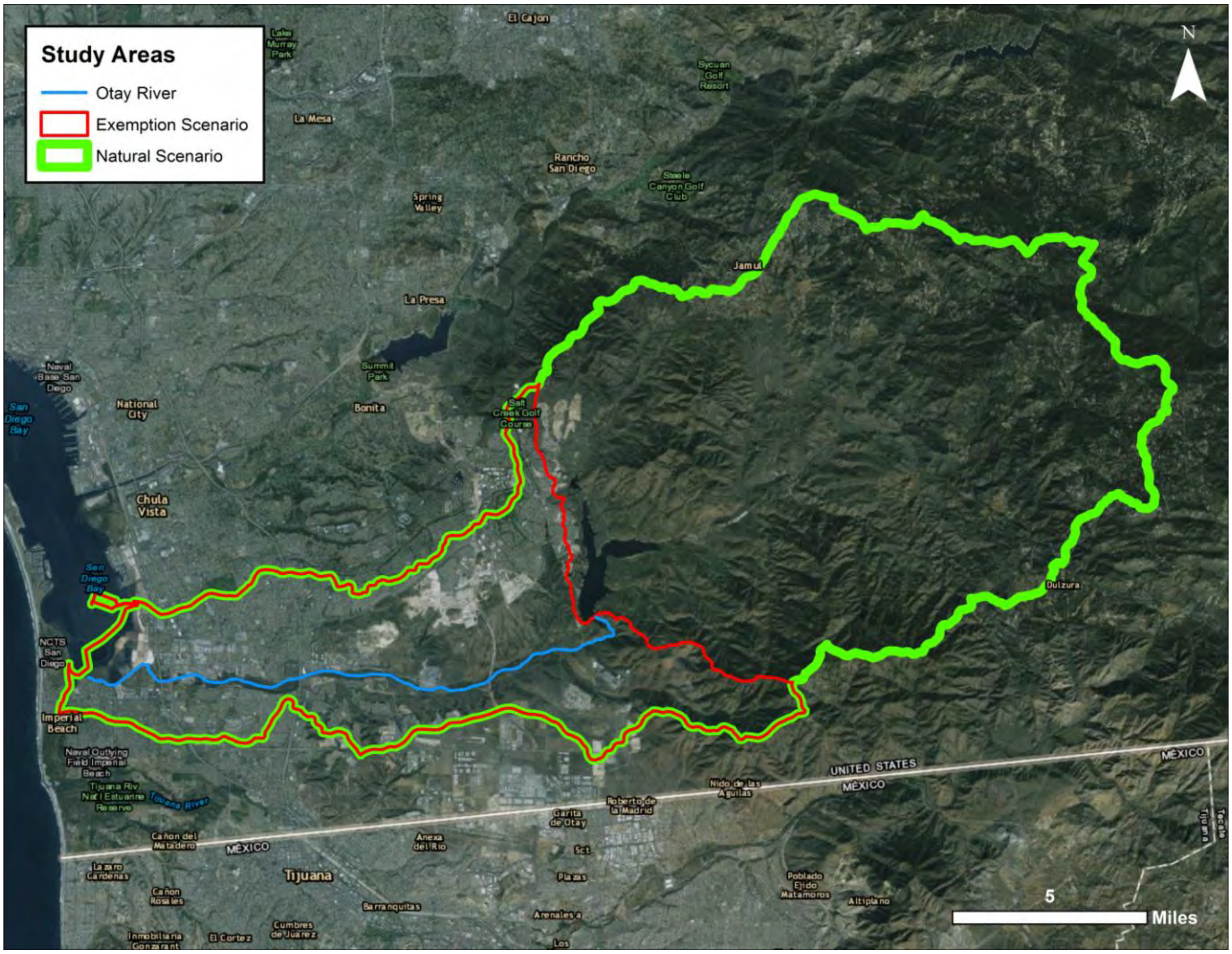

Figure 1: SWMM Study Areas

The Natural Scenario was used as the baseline condition and compared to the Exemption Scenario in order to determine if the latter would produce peak flows and durations that exceed the approximated natural hydrology by more than 10 percent for the range of flows considered to be geomorphically significant (from 10% of Q_2 to Q_{10}), as prescribed by Provision E.3.c.(2)(a) of the 2013 Regional MS4 Permit for all Priority Development Projects (San Diego Regional Water Quality Control Board, 2015). If the model demonstrated that the proposed exemptions would produce neither peak flows nor durations that exceed those of the approximated natural range of geomorphically significant flows by more than 10 percent, then the proposed exemption would meet the Permit's hydromodification management requirements on a watershed-wide scale. If the proposed exemption satisfies the Permit's hydromodification management requirements, then the flows may be considered as non-erosive and therefore warrant exemption as presented by the data.

To generate our model scenarios, we used a combination of geographic information system (GIS) data from the San Diego Geographic Information Source (SanGIS) Regional Data Warehouse (sangis.org), the United States Geological Survey (USGS) National Elevation Dataset (NED) (ned.usgs.gov), and the National Resource Conservation Service (NRCS) Web Soil Survey (WSS) (websoilsurvey.nrcs.usda.gov). First, the drainage areas downstream of Savage Dam were developed for the Exemption Scenario. With Savage Dam in place, areas upstream of Lower Otay Reservoir were neglected in the Exemption Scenario because, for the geomorphically significant range, they do not and will not contribute flows to the Otay River. Areas were first classified as either "Exempt," "Non Exempt," or "Developed" for modeling purposes. Exempt and Non Exempt areas are subsets of currently undeveloped areas having planned land uses (SanGIS "Developable_Land" layer) that either directly (Exempt) or indirectly (Non Exempt) discharge into the Otay River. These areas were projected to directly or indirectly discharge based upon a plan set review conducted by the WMAA consultant team. The remaining area that did not classify as either Exempt or Non Exempt was classified as Developed. These three classifications were finally subdivided into lumped hydrologic soil groups to produce the SWMM subcatchment areas, each having area-weighted parameter inputs for percent impervious and slope based upon planned land use (SanGIS "LANDUSE_PLANNED" layer), County of San Diego imperviousness coefficients (County of San Diego, 2010), and USGS 10-meter Digital Elevation Models (DEMs). The width parameter was used as a calibration parameter equal to roughly 18% of the area-to-length ratio using the methodology presented by Smith et al., (2015), provided in Attachment 3. The remaining subcatchment parameters were assigned in accordance with Appendix G of the San Diego Region Model BMP Design Manual (Geosyntec Consultants & Rick Engineering, 2015). For the Natural Scenario, an additional "Impounded" classification was added to the Exempt, Non Exempt, and Developed classifications. Impounded areas are the areas upstream of the dam, subdivided only by hydrologic soil group. Full model parameters are provided in Attachment A.

To simulate the effect of hydromodification management control, we performed research within the San Diego Region in the work documented by Smith et al. (2015). This research determined that geomorphically significant peak flows (Q_2 to Q_{10}), on average, are reduced 43% from the post-developed unmitigated condition to post-developed mitigated condition when hydromodification management controls are implemented. Therefore, in order to simulate hydromodification controls within the model, flows were reduced by 43% where appropriate. In the Exemption Scenario, flow reduction was only applied to the Non Exempt drainage areas in order to allow Exempt areas to produce unmitigated post-developed runoff. In the Natural Scenario, flow reduction was applied to all drainage areas in order to approximate the pre-development flows as would be achieved by implementation of designed hydromodification management control systems. Given that the San Diego Water Board understands that the pre-development hydrology of an area cannot be precisely known, nor do they expect modelers to estimate historical conditions (San Diego Regional Water Quality Control Board, 2015), our approach in approximating the watershed's pre-development hydrology by using the best available data (projected land use and regional peak flow reductions) is an appropriate methodology that holds the regulatory standard as the baseline condition.

The resulting FDC (Figure 2) illustrates that, for the range of storms considered to be geomorphically significant, flow rates are larger in magnitude and duration for the approximated natural, undeveloped watershed condition than those produced for the impounded, developed watershed condition, even when the hydromodification exemptions are in place for all developable areas directly discharging to the Otay River. It should be noted that these results are conservative in nature due to the fact that the 1916 breach of Savage Dam significantly altered the Otay River morphology, as large segments of the river were scoured to bedrock (Patterson, 1970)—our Natural scenario does not account for flows nor durations that contend with those produced during this catastrophic event. The results demonstrate that Savage Dam has a more significant effect on Otay River's morphology than any proposed development downstream of the reservoir. Therefore, our FDC serves as quantifiable evidence to validate the same conclusion made by the well-versed Technical Advisory Committee (TAC), whom was tasked with providing technical input to the scientific approach and interpretation of results integral to the establishment of numerical flow control standards for the 2011 Hydromodification Management Plan (HMP) (Brown and Caldwell, 2011). The peak flow comparison is provided in Table 1. The flow duration data summary is provided in Attachment A.

Table 1: SWMM Otay River Peak Flow Rate Comparison for the Natural and Exemption Scenarios

Return Period (years)	Natural Scenario Q (cfs)	Exemption Scenario Q (cfs)	Difference (cfs)
10	2567	2272	294
9	2470	2167	303
8	2356	2139	217
7	2239	2008	231
6	2118	1914	204
5	2074	1847	227
4	2021	1730	291
3	1918	1590	328
2	1691	1409	283

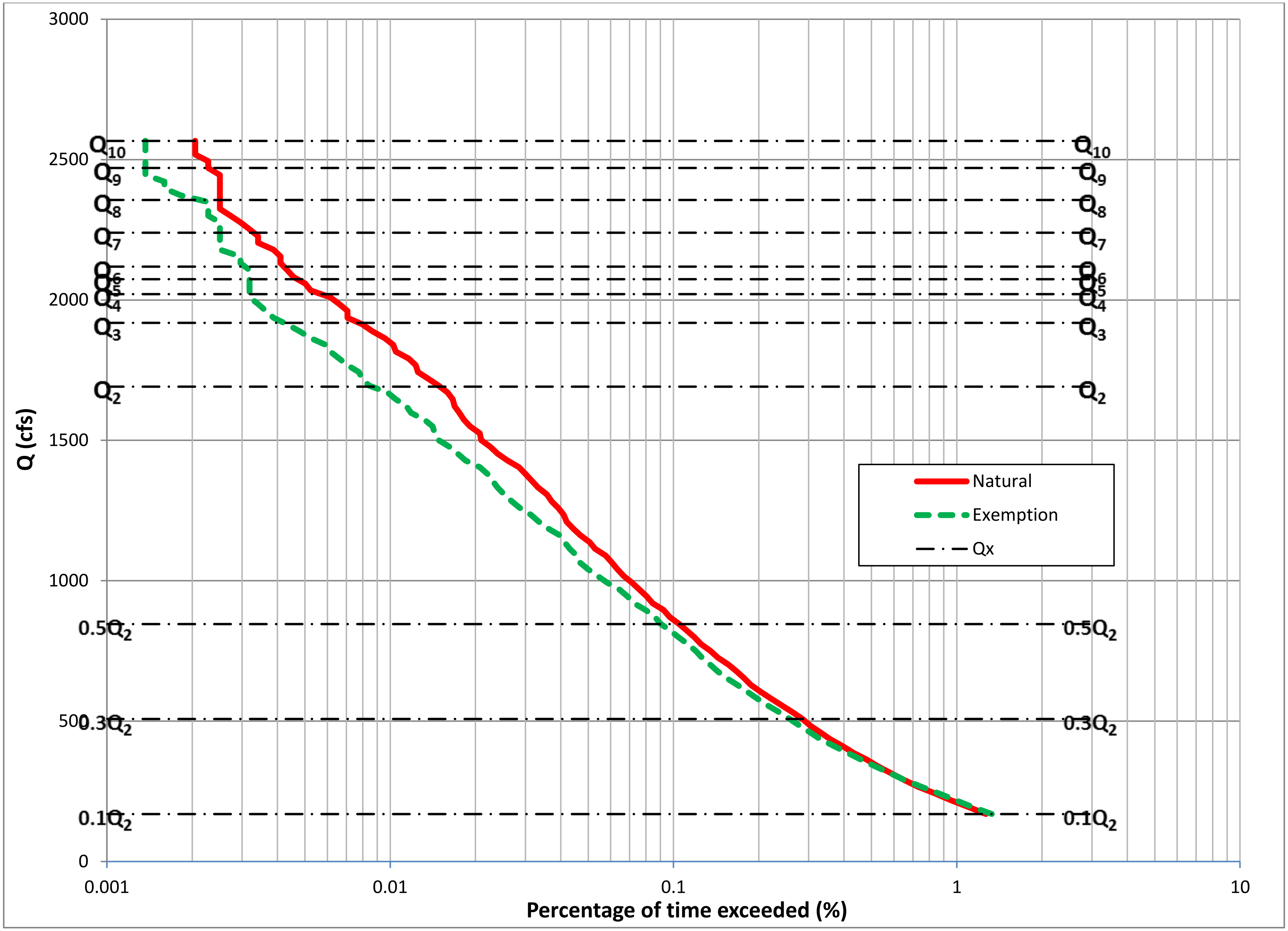

Figure 2: SWMM Otay River Flow Duration Curves for the Natural and Exemption Scenarios

1916 Savage Dam Failure and Historical Photographic Comparisons

We sought to establish multiple lines of evidence to either validate or invalidate our findings. In order to more accurately assess the exemption, we considered not only the *presence* of Savage Dam, but the *effect of its catastrophic failure* in 1916. Therefore, we tested the next hypothesis: the *historic failure* of Savage Dam has a more profound impact on river morphology than any proposed, directly-discharging development downstream of Lower Otay Reservoir. In order to do so, we conducted a historical image review to observe the relationship between urbanization and river morphology dating back to the earliest available aerial imagery (1928) provided by the County of San Diego Department of Public Works. We were also able to obtain stereoscope photographs taken in 1953 from the University of California, Santa Barbara's Aerial Imagery Research Service and a high-resolution 2015 image from Esri. We hypothesized that, due to the 1916 dam failure, the Otay River was extremely hydromodified and therefore has become significantly desensitized to changes in land use. If the photos demonstrate that the river has remained in a steady state of dynamic equilibrium during the course of Otay Valley's urbanization over the past 87 years, then it would be reasonable to acknowledge the river's proper equilibrium state and its resiliency to post-dam failure land use alterations.

The Savage Dam failure is a well-documented catastrophe. The flood of January 27, 1916 caused the rock-fill dam to fail, discharging over 1.7 billion cubic feet into Otay Valley over the course of 2.5 hours. An account of the events leading up to the dam breach and the aftermath in Otay Valley is given by Roy A. Silent (1916):

> Prior to January 15 [1916] the water surface in the Otay reservoir was 96.5 feet above zero contour. From Jan. 16 to 21 at 7 a.m. it had risen 11.8 ft. to a height of 122 ft. 8 in. At this time, water began to run over the spillway. ***From Jan. 21 on, the level continued to rise in spite of the discharge through the spillway. On the morning of Jan. 27 the reservoir was at 124 ft. 9 in., and the spillway was probably discharging in the neighborhood of 1,500*** [cfs] [emphasis added].
>
> The rain on Jan. 27 was extremely heavy, and by noon the water had risen so high that Mr. Weuste, in charge at the dam, deemed it advisable to open the outlet gate. This failed to check the rise, and it was realized that the dam would probably be overtopped before evening. Men were accordingly dispatched to warn residents in the valley to move to higher ground. Word to this effect was also sent out from the telephone exchange at National City. Most of the inhabitants took advantage of this warning.
>
> At 4:45 p.m. the water had reached the top of the dam and had seeped through and filled the boxes that were sunk in the top to allow an examination of the steel core. Water began running down the lower face on the east side of the dam at approximately 4:50 p.m. About this time several spouts or small streams of water appeared on the lower face of the dam, in one instance loosening a large boulder which rolled down to the bottom. From this time on, the destruction was very rapid. The lower face of the fill quickly melted away, thus removing the support from the core wall. At 5:05 p.m. the tension was so great that the steel diaphragm tore from the top at the center, and the

dam opened outward like a pair of gates. The released water rushed through and filled the canyon to a point approximately 20 feet below the top of the dam. The draw-down area extended possibly 200 ft. behind the dam. ***It required 2 ½ hr. for the reservoir to empty*** [emphasis added].

A huge wall of water, variously described as from 6 to 20 ft. high, rushed down the valley, covering the distance from the damsite to Palm City [located just upstream of San Diego Bay]***, about 10 mi., in 48 min., carrying all before it*** [emphasis added]. The total loss of life has amounted to 14 at the present writing (Feb. 8), but there are still several persons missing. The property damage is estimated at $250,000.

A thorough examination of the damsite was made on Jan. 31 and Feb. 1. Practically all the fill was washed completely away. The steel core was deposited in varying-sized sections along the valley, a large part ***being found at Palm City, 10 mi. below the dam*** [emphasis added]. The core wall had torn itself loose from both of the side walls, the foundations remaining intact. An examination of the bottom was impossible, as water to a depth of 8 feet was flowing through a constricted channel in the bottom of the cañon.

Three-quarters of a mile below where the dam had stood a piece of the diaphragm was observed, to which the angle iron forming the bottom of the steel plate was riveted, showing that the extreme bottom had been torn loose. On the west side, behind the remaining core wall, was a small part of the fill, composed of rock of small sizes, none of which was over 1 ½ ft. in diameter and grading from that size to coarse gravel. If this may be considered a fair example of the remainder of the fill, it is easy to understand its melting away as rapidly as described.

The cañon below the dam, prior to the failure, was considerably restricted and filled with large boulders. The action of the water removed all the loose rock and thoroughly stripped to bedrock both sides of the canyon as high as the water reached, the line of demarcation being clearly defined. The stripping was done in a most thorough manner, no particle of soil remaining in any of the niches or crevasses. This area was heavily wooded with brush [emphasis added].

An interesting feature was observed in that for half a mile below the dam in practically every pocket or niche in the rock was to be found a rivet head. An examination of the remaining parts of the steel core showed it to be in a perfect state of preservation, no rust or corrosion being noticeable. The destruction of the plate had taken place for the most part along the riveted seams, though one or two cases in which the sheets had torn were observed.

The reservoir above the dam showed a deposit of silt to a depth of from 5 to 6 ft. in most places, through which the present flow of the river is cutting a channel. The amount of silt deposited cannot be taken as a fair average for reservoirs in this section

> of the country, as much of the water passing into the reservoir was carried by a conduit and was comparatively clear. (Silent, 335-336)

A photograph accommodating Mr. Silent's original narrative is provided in Figure 3.

Figure 3: Canyon Immediately Below Dam, Showing Stripping Action of Water (Silent, 1916)

In addition to Mr. Silent's account, the former Assistant City Manager of San Diego, John L. Bacon, on February 1, 1916 (Baker, 1916):

> The heaviest rainstorm ever recorded in this part of California caused the destruction of the Lower Otay dam at about 5 p.m. on Jan. 27. The rain began on Jan. 14 and continued for six days, with an average precipitation of 1 in. daily. Upon the ground thus thoroughly saturated a second and much heavier rainstorm fell on Jan. 25. The rain gages were inadequate to measure this storm, and the actual rainfall record at the dam is not available. The precipitation on Jan. 27, however, is estimated at about 5 in., a cloudburst occurring about 4 p.m.
>
> The level of the water in the reservoir rose 9 ½ ft. from 7 a.m. to 5 p.m., at which time the dam overflowed. It began to give way about 5 min. later. The destruction was completed in 15 min., the dam being washed away to its foundations all around. The failure evidently started by the water overflowing the crest, washing out the backing of the central core. The break started near the center of the dam, the plates holding back for a time against the sides. Part of the plate was crumpled up and washed down the valley for several miles.

> The floor of the spillway was at an elevation of 124 ft. above the original stream bed, and the elevation of the top of the dam was 134 ft. The spillway was 38 ft. wide at the bottom and 45 ft. wide at the elevation of the dam crest. ***The estimated flow through the spillway when the dam overflowed was 2,000,000,000 gal. daily*** [emphasis added]. The spillway was not blocked in any way. The ¼-in. steel plate core in the dam, with 12 in. of concrete on each side, stopped 2 ft. below the dam crest. The length of the dam crest was 560 ft. and the width of the top 16 ft. The thickness of the dam at the bottom was 400 ft. ***The valley below the dam was swept clear of soil to bedrock, and the banks of the valley show that a wave about 50 ft. high passed down*** [emphasis added]. About 30 lives were lost in the flood.
>
> It is estimated that to replace the dam will cost about half a million dollars. There is ample water for the city's supply stored behind several other dams. Part of the Sweetwater dam was washed out. The Upper Otay dam, an arched concrete structure of horseshoe shape, had a depth of 3 ft. of water flowing over its crest on Thursday, but is safe. The City of San Diego has been cut off from the outside world except by water. No telegraph, telephone or railway lines were in operation. All bridges were washed out, and roads were impassable. (239)

As conveyed by these first-hand accounts, the magnitude of the dam failure was not limited to only areas immediately downstream of the breach but all the way to the mouth. The USGS documented the impacts of the 1916 flood across Southern California and reported the following damages incurred by businesses within Otay Valley (McGlashan & Ebert, 1918):

> *San Diego Consolidated Gas & Electric Co.*—The transmission lines and distribution system along San Diego River were washed out from El Monte to False Bay. There were also ***extensive washouts*** along Sweetwater River at Jamacho and from Sweetwater dam to San Diego Bay, ***on Otay River from Otay dam to San Diego Bay***, and along Tia Juana River from Tia Juana to the Pacific Ocean [emphasis added]. The principal damage was the loss of wood pole lines, copper wire, transformers, and miscellaneous electric-line material. The service in San Diego and immediate vicinity was not seriously interrupted. The lines to the more important towns were reestablished within two weeks, but some of the remote farming districts were without electric service for six weeks or more. The total damage to the gas and electric departments, corrected for value of salvaged material, was $70,527.
>
> *Western Salt Co.*—The losses consisted of ***170 acres of salt ground (which was covered with a deep deposit of silt), 2,500 tons of salt, a large quantity of brine in the ponds***, and injury to machinery [emphasis added]. The total damage was given as $85,500.
>
> *Fenton-Sumpton-Barnes Co.*—The company operates a gravel-washing plant ***in Otay Valley, about a mile from San Diego Bay. This plant was a complete loss, for after the flood there was not an indication on the surface to show its location*** [emphasis added]. The value of this equipment was $35,000. ***In addition, the soil was entirely removed***

> ***from 100 acres of bottom land*** which had been purchased for about $450 per acres [emphasis added]. The business loss was complete from January 27 to May 1. (34)

To put the magnitude of the dam breach into perspective with regard to the geomorphically significant range of flows, we look to the data provided by Silent, Baker, and USGS. In the five days leading up to the dam breach (starting on January 22 to 7 a.m. on January 27, 1916) flows ranging up to approximately 1,600 cfs were *constantly* released through the spillway—a rate that is 33% greater than the FEMA-published instantaneous Q_{10} value for the Otay River at Otay Valley Road (Federal Emergency Management Agency, 2012). Then, for ten straight hours up until the moment the dam breached, flowrates rapidly increased up to 4,700 cfs. Based upon the defined geomorphically significant flow range of Q_2 to Q_{10}, these *pre*-breach spillway flows and durations alone had enough energy to alter the river's morphology in an unnatural way (and likely did so). The morphological impacts caused by these pre-breach spillway flows were unquestionably eclipsed by the 20-50 foot high wall of water caused by the dam failure. When the dam breached at 5:05 p.m. on January 27, 1916, 1.7 billion cubic feet of water were released in 2.5 hours. The mere average flowrate during this 2.5 hour period equates to over 193,000 cfs—a rate that is nearly four times the 500-year FEMA flowrate for the aforementioned location (Federal Emergency Management Agency, 2012). The unnatural force exerted on the river system by these massive flows was devastating to all within the river system, as presented by the firsthand accounts and now confirmed by the hydrologic context. The USGS post-breach photograph is provided in Figure 4.

For additional context, the USGS report also documents that just before failure, the flows entering the reservoir through Jamul Creek reached 18,100 cfs. They describe the 150 foot wide creek as being composed of sand, gravel, and boulders before the flood and rendered "practically clean" afterwards (McGlashan & Ebert, 1918). A photograph of Jamul Creek's devastating scour is provided in Figure 5.

Without question, the 1916 Savage Dam breach had a profound impact on the Otay River, from the reservoir to San Diego Bay. The extent to which the system remains impaired by this catastrophic event is best evidenced through the historic aerial photograph review. Photographs from 1928, 1953, and 2014 are provided in Figure 6, Figure 7, and Figure 8, respectively. These photos are best viewed by scrolling between single page displays in Adobe Acrobat Reader (View → Page Display → Single Page View).

Figure 4: View Downstream at Site of Lower Otay Dam, After Failure (McGlashan & Ebert, 1918)

Figure 5: View Upstream on Jamul Creek after Flood of January 1916 (McGlashan & Ebert, 1918)

Figure 6: 1928 Aerial Photograph of the Otay River (Upstream of I-805) (County of San Diego)

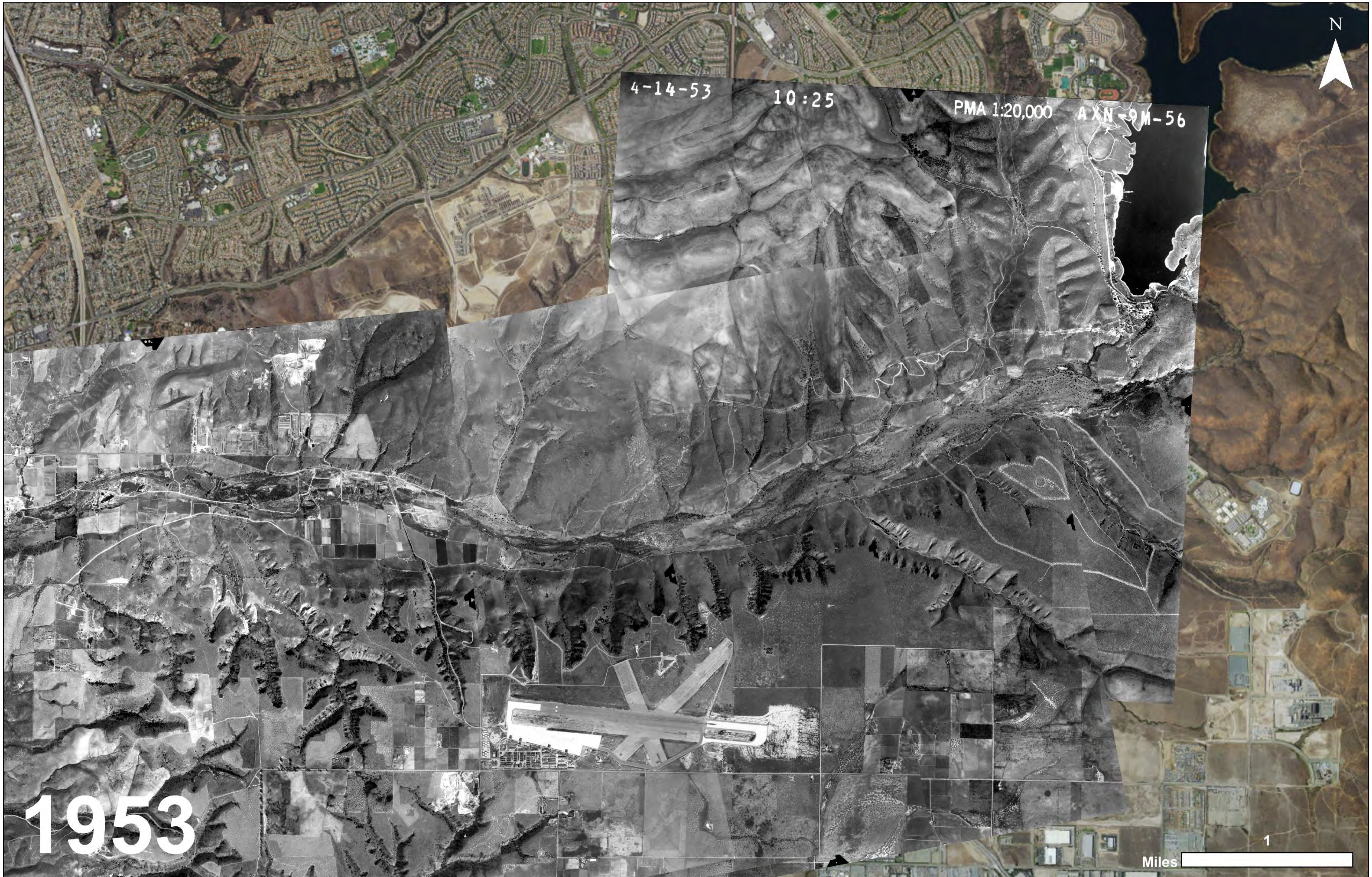

Figure 7: 1953 Aerial Photograph of the Otay River (Upstream of I-805) (University of California, Santa Barbara)

Figure 8: 2015 Aerial Photograph of the Otay River (Upstream of I-805) (Esri)

The aerial image comparison provides valuable insights into the post-failure river morphology. In 1928 (12 years after the breach), the effects of the dam failure are clearly seen: an incised, barren river mostly devoid of vegetation. In the absence of field data, it is reasonable to gather that the old Savage Dam fill material (rocks ranging in size up to 1.5 feet and some boulders) cover the channel bed, with some light re-establishing of brush toward the bank and thalweg. In 1953, the re-establishment of vegetation continues to be clearly seen, as most of the river reach has become covered. Vegetation has migrated from the thalweg toward the floodplain in many areas.

The hydrologic activity occurring between these two instances in time provides several pieces of notable data. First, during the 25 years from 1928 to 1953, San Diego experienced two of its wettest seven years on record: 1940-41 (24.74 inches) and 1951-52 (18.16 inches) to date (San Diego Union-Tribune, 2005). Second, the Lower Otay Reservoir hourly precipitation data from the National Oceanic and Atmospheric Administration (NOAA) recorded hourly rainfall depths of 1.24 inches in 1951 and 1.08 inches in 1952, which are totals equal to the estimated 200 and 100 year hourly rainfall depth for that station, respectively (National Oceanic and Atmospheric Administration, 2014). Lastly, Jamul Creek (the closest available stream station data during this time) discharged a peak of 4,000 cfs in December 1947, which is its second highest peak on record to date (United States Geological Survey, 2015). The fact that the river system did not widen, meander, or scour during that time would suggest that it would take greater than the wettest conditions on record to impact the river channel morphology or degrade the in-stream habitat—conditions certainly outside the Q_2 to Q_{10} flow range.

When these two historic photographs are compared with the modern-day condition, it is evident that the same trend has continued for 87 years: the channel remains stable, while vegetation continues to populate through the riverbed. While the Lower Otay Reservoir hourly precipitation data shows that the area continued to experience wet years from 1953 to 2015 (hourly precipitation depths equal to the 200, 50, and 25 year frequency in 1963, 1964, and 1955, respectively), the channel demonstrates no morphologic changes over the 62 year span. The 1928 river perfectly aligns with the 2015 river at stream bed angle points, ridgelines, boulders, and other geologic features; constricted areas have remained constricted, wide areas have remained wide, and no meandering or incising is evident. Furthermore, contrasting the most recent San Diego County land use data with the earliest available data from 1986, we find that the watershed in these photos (upstream of I-805 to Lower Otay Reservoir) has increased from 11% to 20% impervious cover over the past 30 years. Despite the extreme rainfall events and rapid urbanization, the Otay River has remained in a steady state of dynamic equilibrium and continues to reinforce its bed and bank material *and* support beneficial uses through the re-emergence of vegetation. Therefore, it would be reasonable to presume that the overall river health would benefit from the continued inflows of clean water. We conclude that the dam breach altered the channel in such a way that the more typical range of geomorphic flows has not adversely affected the river morphology, nor degraded the system's beneficial uses, as evidenced by the unwavering channel alignment and progressive re-habitation of natural vegetative species.

Field Investigation and Revised WMAA Ep Analysis

Thus far, the two working hypotheses have been tested and found to be correct: the *presence* and *historic failure* of Savage Dam have had, and continue to have, a more profound impact on river morphology than any proposed directly discharging development downstream of Lower Otay Reservoir. Through the testing of the second hypothesis, we observed the re-establishment of the river's vegetation. As previously stated, hydrologic models are most appropriately used in conjunction with field verification to either validate or invalidate their findings. Therefore, as a final measure, we sought to assess our findings by conducting a field investigation. Field conditions were documented and used to revise the clear and repeatable WMAA Ep Analysis with *field-specific* inputs.

The WMAA Ep Analysis conservatively assumed a highly sensitive relationship between watershed imperviousness and in-channel shear stress. The methodology behind the analysis assumes that accelerated erosion ensues and thus the river system will begin to unravel if the cumulative work performed on any given channel section in the watershed's post-developed condition exceeds the pre-developed condition by more than 5% (Erosion Potential, or Ep > 1.05). This sensitive relationship is likely attributable to the fact that the WMAA Ep methodology was not developed using data from impounded watersheds, and the data that was used did not come from urbanized (>25%) impervious watersheds, but rather from urbanizing (0 to 25% impervious) watersheds. Due to these factors, the erosion potential analysis is implicitly conservative for an impounded system and depends heavily on the watershed imperviousness and the selection of a threshold value at which particle motion occurs at any point along the channel boundary, known as the critical shear stress (τ_c). In the WMAA Ep Analysis, the critical shear stress was conservatively assumed to occur at a flow rate equal to 50% of the 2-year peak flow (Q_2). This "low flow threshold" critical shear stress, which equates to the in-channel shear produced at a flow of $0.5Q_2$, is based upon an assumption of the river channel having "low susceptibility" to accelerated erosion. This very conservative approach assumes a degree of susceptibility to hydromodification within the range of geomorphically significant flows *before* any consideration is given to the river's physical properties, such as soil cohesion, vegetation, or other factors that are to be evaluated in the proper determination of the critical shear stress value (Fischenich, 2001). As a macro-level initial screening of a major river system, the WMAA Ep Analysis includes this implicit factor of safety to an already conservative analysis. The field investigation also sought to investigate this assumption, in addition to testing our initial findings.

On October 21, 2015, the TRWE team investigated the Otay River from just downstream of 27th Street (approximately ¾ mile upstream of Interstate 5) to the confluence with Salt Creek (approximately 2 miles downstream of Savage Dam), with special attention given to three critical cross sections along the reach. These three sections were identified as areas of concern by the WMAA consultant team due to their narrow geometry. We documented the channel boundary conditions at each location. These cross sections (1, 2, and 3) are presented in Figure 9:

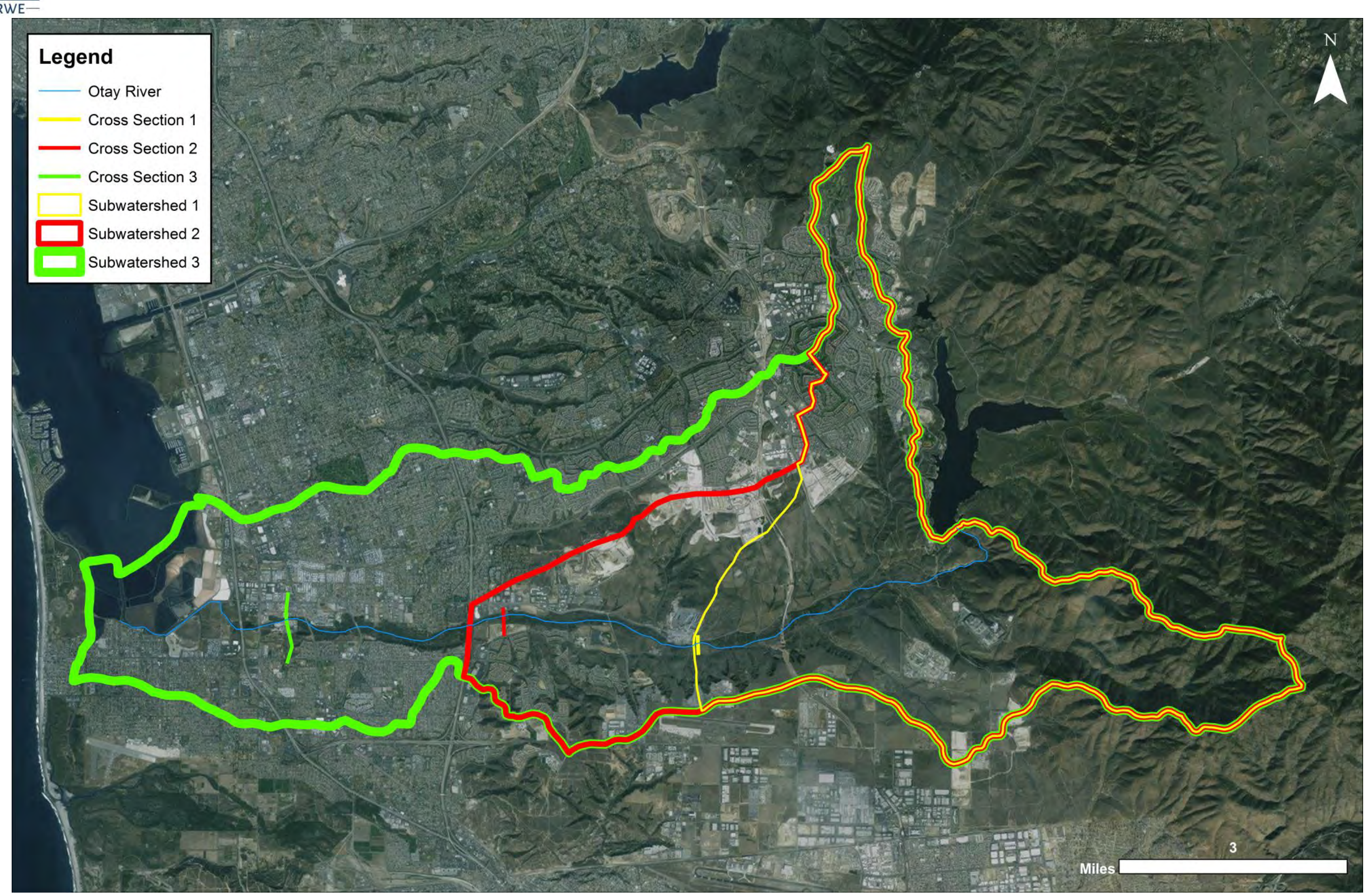

Figure 9: Locations of Cross Sections 1, 2, and 3, Including Upstream Subwatershed Areas

We investigated the boundary conditions at all three cross sections, including additional review at sections in between. We found at all three cross sections, and the areas in between, the river was heavily vegetated with grassland, scrub, meadow, and marsh. Some areas remain scoured to bedrock and still do not support vegetation 100 years after the dam failure, as was the case with Cross Section 1. In all cases, we found no evidence of active scour. Field photos are provided in Figures 10 through 18.

Many of the modern critical shear stress values for uniform, noncohesive channel boundary materials were estimated in 1936 through a series of laboratory flume experiments by A. Shields in his development of what is now known as the Shields criterion. While Shields' estimates are useful for predominantly alluvial or nonvegetated river systems, these theoretical values have little value in assessing the stability of vegetated systems. According to Dr. Craig Fischenich of the U.S. Army Corps Engineer Research and Development Center (ERDC) (2001):

> The presence of vegetation does not render underlying soils immune from erosion, but the critical condition for erosion of a vegetated bank is usually the threshold of failure of the plant stands by snapping, stem scour, or uprooting, rather than for detachment and entrainment of the soils themselves; vegetation failure usually occurs at much higher levels of flow intensity than for soil erosion. (4)

It is well documented that when vegetation establishes itself in a channel, then that channel is capable of handling flow velocities far in excess of that handled by the soil lining alone (1992). A number of recent research efforts have suggested that root systems physically and chemically bind bank soils in place, increasing the critical shear stress (Wynn, 2004). As the research continues, river and stream restoration efforts have produced valuable insight into a wide range of critical shear stress values for different channel materials, including vegetated channels. A prominent study by Dr. Fischenich documents how to assess a channel's stability and also provides a range of critical shear stress values for vegetation-lined channels such as the Otay River (included in Attachment 4). Critical shear stress values of 0.67 pounds per square foot (psf) (shales and hardpan), 0.35 psf (average reeds), and 0.70 psf (short native and bunch grass) are more appropriate assignments for the Otay River based upon the field conditions (Fischenich, 2001); the WMAA Ep Analysis assumed a very conservative critical shear stress value of 0.135 psf not based on the actual boundary conditions. The revised critical shear stress estimates are still fairly conservative, considering that low to average values were selected within the published range.

The MS4 Permit speaks to the significance of a proper critical shear stress assignment in Provision E.3.c.(2)(a)(i) where it states that the channel's low-flow threshold "*must* correspond with the critical channel flow that produces the critical shear stress" (San Diego Regional Water Quality Control Board, 2015). Therefore, we conclude that the revised critical shear stress estimates meet the Permit criteria, as they are appropriate for a wide, vegetated Otay River segment. The revised WMAA Ep Analysis shows that no work occurs at any of the three cross sections for the range of geomorphically significant flows, which is consistent with our observations, the watershed-specific hydrologic modeling and the historical imagery review. The revised WMAA Ep Analysis spreadsheets are provided in Attachment 2.

Figure 10: Cross Section 1 (view south)

Figure 11: Cross Section 1 – Scoured to Bedrock

Figure 12: Cross Section 1 – Immediately Downstream (view south)

Figure 13: Cross Section 2 (view south)

Figure 14: Cross Section 2 (in channel; north bank; view south)

Figure 15: Cross Section 2 (in channel; north bank; view southwest)

Figure 16: Cross Section 3 – Just Upstream (view west)

Figure 17: Cross Section 3 (in channel; view south; north bank)

Figure 18: Cross Section 3 (in channel; view southeast; north bank)

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Attachment 1

SWMM Model Inputs and Outputs

Otay Watershed SWMM Parameters

Table 2: Exempt Subcatchments

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	10.44	1	5.94%	80%	0.012	0.15	0.05	0.10	25%
B	0.00								
C	299.03	24	6.60%	61%	0.012	0.15	0.05	0.10	25%
D	1001.41	80	7.73%	60%	0.012	0.15	0.05	0.10	25%

Table 3: Non Exempt Subcatchments

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	4.08	0.3	6.09%	71%	0.012	0.15	0.05	0.10	25%
B	0.00								
C	143.79	12	6.37%	64%	0.012	0.15	0.05	0.10	25%
D	2851.20	228	6.75%	64%	0.012	0.15	0.05	0.10	25%

Table 4: Developed Subcatchments

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	1024.99	82	19.46%	29%	0.012	0.15	0.05	0.10	25%
B	162.69	13	24.86%	13%	0.012	0.15	0.05	0.10	25%
C	2143.79	172	17.87%	32%	0.012	0.15	0.05	0.10	25%
D	20882.06	1673	16.41%	34%	0.012	0.15	0.05	0.10	25%

Table 5: Impounded Subcatchments

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	2993.07	240	16.47%	9%	0.012	0.15	0.05	0.10	25%
B	3016.93	242	21.43%	8%	0.012	0.15	0.05	0.10	25%
C	8658.65	694	20.59%	10%	0.012	0.15	0.05	0.10	25%
D	48588.71	3892	22.59%	8%	0.012	0.15	0.05	0.10	25%

Flow Duration Curve Data for Otay River Natural versus Exemption Scenarios

Q2 =	1691.48	cfs	Fraction	10	%
Q10 =	2566.55	cfs			
Step =	24.2161	cfs			
Count =	438959	hours			
	50.08	years			

Interval	Natural Scenario			Exemption Scenario			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
1	169.148	5566	1.27E+00	5835	1.33E+00	105%	Pass
2	193.364	4863	1.11E+00	5019	1.14E+00	103%	Pass
3	217.580	4209	9.59E-01	4374	9.96E-01	104%	Pass
4	241.796	3691	8.41E-01	3806	8.67E-01	103%	Pass
5	266.012	3216	7.33E-01	3302	7.52E-01	103%	Pass
6	290.228	2865	6.53E-01	2873	6.55E-01	100%	Pass
7	314.444	2575	5.87E-01	2555	5.82E-01	99%	Pass
8	338.661	2318	5.28E-01	2268	5.17E-01	98%	Pass
9	362.877	2115	4.82E-01	2017	4.59E-01	95%	Pass
10	387.093	1895	4.32E-01	1804	4.11E-01	95%	Pass
11	411.309	1736	3.95E-01	1621	3.69E-01	93%	Pass
12	435.525	1570	3.58E-01	1448	3.30E-01	92%	Pass
13	459.741	1449	3.30E-01	1334	3.04E-01	92%	Pass
14	483.957	1336	3.04E-01	1225	2.79E-01	92%	Pass
15	508.174	1250	2.85E-01	1127	2.57E-01	90%	Pass
16	532.390	1151	2.62E-01	1033	2.35E-01	90%	Pass
17	556.606	1058	2.41E-01	943	2.15E-01	89%	Pass
18	580.822	969	2.21E-01	866	1.97E-01	89%	Pass
19	605.038	890	2.03E-01	799	1.82E-01	90%	Pass
20	629.254	823	1.87E-01	738	1.68E-01	90%	Pass
21	653.471	779	1.77E-01	675	1.54E-01	87%	Pass
22	677.687	732	1.67E-01	628	1.43E-01	86%	Pass
23	701.903	685	1.56E-01	591	1.35E-01	86%	Pass
24	726.119	630	1.44E-01	554	1.26E-01	88%	Pass
25	750.335	592	1.35E-01	526	1.20E-01	89%	Pass
26	774.551	549	1.25E-01	493	1.12E-01	90%	Pass
27	798.767	520	1.18E-01	457	1.04E-01	88%	Pass
28	822.984	488	1.11E-01	427	9.73E-02	88%	Pass
29	847.200	458	1.04E-01	395	9.00E-02	86%	Pass
30	871.416	425	9.68E-02	377	8.59E-02	89%	Pass
31	895.632	405	9.23E-02	350	7.97E-02	86%	Pass
32	919.848	371	8.45E-02	319	7.27E-02	86%	Pass
33	944.064	353	8.04E-02	302	6.88E-02	86%	Pass
34	968.280	333	7.59E-02	283	6.45E-02	85%	Pass

Flow Duration Curve Data for Otay River Natural versus Exemption Scenarios

Q2 =	1691.48	cfs	Fraction	10	%
Q10 =	2566.55	cfs			
Step =	24.2161	cfs			
Count =	438959	hours			
	50.08	years			

Interval	Natural Scenario			Exemption Scenario			Pass or
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	Fail?
35	992.497	314	7.15E-02	257	5.85E-02	82%	Pass
36	1016.713	293	6.67E-02	237	5.40E-02	81%	Pass
37	1040.929	278	6.33E-02	219	4.99E-02	79%	Pass
38	1065.145	266	6.06E-02	205	4.67E-02	77%	Pass
39	1089.361	253	5.76E-02	200	4.56E-02	79%	Pass
40	1113.577	232	5.29E-02	189	4.31E-02	81%	Pass
41	1137.793	222	5.06E-02	181	4.12E-02	82%	Pass
42	1162.010	206	4.69E-02	174	3.96E-02	84%	Pass
43	1186.226	194	4.42E-02	158	3.60E-02	81%	Pass
44	1210.442	184	4.19E-02	147	3.35E-02	80%	Pass
45	1234.658	180	4.10E-02	138	3.14E-02	77%	Pass
46	1258.874	172	3.92E-02	126	2.87E-02	73%	Pass
47	1283.090	163	3.71E-02	118	2.69E-02	72%	Pass
48	1307.306	157	3.58E-02	111	2.53E-02	71%	Pass
49	1331.523	146	3.33E-02	105	2.39E-02	72%	Pass
50	1355.739	139	3.17E-02	101	2.30E-02	73%	Pass
51	1379.955	132	3.01E-02	97	2.21E-02	73%	Pass
52	1404.171	125	2.85E-02	91	2.07E-02	73%	Pass
53	1428.387	114	2.60E-02	81	1.85E-02	71%	Pass
54	1452.603	105	2.39E-02	76	1.73E-02	72%	Pass
55	1476.819	99	2.26E-02	71	1.62E-02	72%	Pass
56	1501.036	92	2.10E-02	65	1.48E-02	71%	Pass
57	1525.252	91	2.07E-02	63	1.44E-02	69%	Pass
58	1549.468	84	1.91E-02	62	1.41E-02	74%	Pass
59	1573.684	80	1.82E-02	58	1.32E-02	73%	Pass
60	1597.900	77	1.75E-02	52	1.18E-02	68%	Pass
61	1622.116	74	1.69E-02	50	1.14E-02	68%	Pass
62	1646.333	73	1.66E-02	46	1.05E-02	63%	Pass
63	1670.549	70	1.59E-02	43	9.80E-03	61%	Pass
64	1694.765	65	1.48E-02	37	8.43E-03	57%	Pass
65	1718.981	60	1.37E-02	35	7.97E-03	58%	Pass
66	1743.197	55	1.25E-02	34	7.75E-03	62%	Pass
67	1767.413	54	1.23E-02	31	7.06E-03	57%	Pass

Flow Duration Curve Data for Otay River Natural versus Exemption Scenarios

Q2 =	1691.48	cfs	Fraction	10	%
Q10 =	2566.55	cfs			
Step =	24.2161	cfs			
Count =	438959	hours			
	50.08	years			

Interval	Natural Scenario			Exemption Scenario			Pass or Fail?
	Q (cfs)	Hours > Q	% time	Hours>Q	% time	Post/Pre	
68	1791.629	51	1.16E-02	29	6.61E-03	57%	Pass
69	1815.846	46	1.05E-02	27	6.15E-03	59%	Pass
70	1840.062	45	1.03E-02	26	5.92E-03	58%	Pass
71	1864.278	42	9.57E-03	23	5.24E-03	55%	Pass
72	1888.494	38	8.66E-03	21	4.78E-03	55%	Pass
73	1912.710	35	7.97E-03	19	4.33E-03	54%	Pass
74	1936.926	31	7.06E-03	17	3.87E-03	55%	Pass
75	1961.142	31	7.06E-03	16	3.64E-03	52%	Pass
76	1985.359	29	6.61E-03	15	3.42E-03	52%	Pass
77	2009.575	27	6.15E-03	14	3.19E-03	52%	Pass
78	2033.791	23	5.24E-03	14	3.19E-03	61%	Pass
79	2058.007	22	5.01E-03	14	3.19E-03	64%	Pass
80	2082.223	20	4.56E-03	14	3.19E-03	70%	Pass
81	2106.439	19	4.33E-03	14	3.19E-03	74%	Pass
82	2130.655	18	4.10E-03	13	2.96E-03	72%	Pass
83	2154.872	18	4.10E-03	13	2.96E-03	72%	Pass
84	2179.088	17	3.87E-03	11	2.51E-03	65%	Pass
85	2203.304	15	3.42E-03	11	2.51E-03	73%	Pass
86	2227.520	15	3.42E-03	11	2.51E-03	73%	Pass
87	2251.736	14	3.19E-03	11	2.51E-03	79%	Pass
88	2275.952	13	2.96E-03	11	2.51E-03	85%	Pass
89	2300.168	12	2.73E-03	10	2.28E-03	83%	Pass
90	2324.385	11	2.51E-03	10	2.28E-03	91%	Pass
91	2348.601	11	2.51E-03	10	2.28E-03	91%	Pass
92	2372.817	11	2.51E-03	8	1.82E-03	73%	Pass
93	2397.033	11	2.51E-03	7	1.59E-03	64%	Pass
94	2421.249	11	2.51E-03	7	1.59E-03	64%	Pass
95	2445.465	11	2.51E-03	6	1.37E-03	55%	Pass
96	2469.681	10	2.28E-03	6	1.37E-03	60%	Pass
97	2493.898	10	2.28E-03	6	1.37E-03	60%	Pass
98	2518.114	9	2.05E-03	6	1.37E-03	67%	Pass
99	2542.330	9	2.05E-03	6	1.37E-03	67%	Pass
100	2566.546	9	2.05E-03	6	1.37E-03	67%	Pass

Otay River Exemption Analysis - Exemption Scenario

```
[TITLE]
Otay River Exemption Analysis - Exemption Scenario

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           02/01/1965
START_TIME           00:00:00
REPORT_START_DATE    02/01/1965
REPORT_START_TIME    00:00:00
END_DATE             02/28/2015
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .14    .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
Bonita+SWRes     INTENSITY 1:00   1.0    TIMESERIES OTAY

[SUBCATCHMENTS]
;;                                                 Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
EX-A             Bonita+SWRes     EXEMPT           10.44    80       1        5.94     0
EX-C             Bonita+SWRes     EXEMPT           299.03   61       24       6.6      0
EX-D             Bonita+SWRes     EXEMPT           1001.41  60       80       7.73     0
DEV-A            Bonita+SWRes     DEVELOPED        1024.99  29       82       19.46    0
DEV-B            Bonita+SWRes     DEVELOPED        162.69   13       13       24.86    0
DEV-C            Bonita+SWRes     DEVELOPED        2143.79  32       172      17.87    0
DEV-D            Bonita+SWRes     DEVELOPED        20882.06 34       1673     16.41    0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
EX-A             .012       .15        .05        .1         25         OUTLET
EX-C             .012       .15        .05        .1         25         OUTLET
EX-D             .012       .15        .05        .1         25         OUTLET
DEV-A            .012       .15        .05        .1         25         OUTLET
DEV-B            .012       .15        .05        .1         25         OUTLET
DEV-C            .012       .15        .05        .1         25         OUTLET
DEV-D            .012       .15        .05        .1         25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
EX-A             1.5        .225       .33
EX-C             6          .075       .31
```

```
EX-D             9          .01875     .3
DEV-A            1.5        .225       .33
DEV-B            3          .15        .32
DEV-C            6          .075       .31
DEV-D            9          .01875     .3

[JUNCTIONS]
;;               Invert     Max.       Init.      Surcharge  Ponded
;;Name           Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
EXEMPT           0          0          0          0          0
NOT_EXEMPT       0          0          0          0          0
DEVELOPED        0          0          0          0          0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
RIVER_OUTFALL    0          FREE                        NO

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.      Max.
;;Name           Node             Node             Length     N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
PE               EXEMPT           RIVER_OUTFALL    400        0.01       0          0          0          0
NE               NOT_EXEMPT       RIVER_OUTFALL    400        0.01       0          0          0          0
NOTDEV           DEVELOPED        RIVER_OUTFALL    400        0.01       0          0          0          0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
PE               DUMMY        0                0          0          0          1
NE               DUMMY        0                0          0          0          1
NOTDEV           DUMMY        0                0          0          0          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------

[INFLOWS]
;;                                                 Param    Units    Scale    Baseline Baseline
;;Node           Parameter        Time Series      Type     Factor   Factor   Value    Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
NOT_EXEMPT       FLOW             NotExempt        FLOW     1.0      .57

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
OTAY             FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\Precip\Otay.txt"

NotExempt        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\NotExempt.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EXEMPT           3627.451           4537.815
NOT_EXEMPT       5042.017           5084.034
DEVELOPED        6750.700           4523.810
```

Otay River Exemption Analysis - Exemption Scenario

```
RIVER_OUTFALL    5056.022           3613.445

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EX-A             2871.148           5672.269
EX-C             3291.317           5434.174
EX-D             3697.479           5126.050
DEV-A            6526.611           6036.415
DEV-B            6848.739           5798.319
DEV-C            7156.863           5532.213
DEV-D            7422.969           5322.129

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Bonita+SWRes     5126.050           7016.807
```

Otay River Exemption Analysis - Exemption Scenario

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

Otay River Exemption Analysis - Exemption Scenario

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ FEB-01-1965 00:00:00
Ending Date .............. FEB-28-2015 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 01:00:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 60.00 sec


WARNING 04: minimum elevation drop used for Conduit PE

WARNING 04: minimum elevation drop used for Conduit NE

WARNING 04: minimum elevation drop used for Conduit NOTDEV

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......   1072329.228       504.143
Evaporation Loss .........    155292.347        73.009
Infiltration Loss ........    659843.766       310.218
Surface Runoff ...........    261955.114       123.155
Final Surface Storage ....         5.545         0.003
Continuity Error (%) .....        -0.445


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......    261955.108     85361.985
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........     28077.362      9149.428
External Outflow .........    290032.470     94511.413
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


********************************
Highest Flow Instability Indexes
********************************
All links are stable.
```

Otay River Exemption Analysis - Exemption Scenario

```
*************************
Routing Time Step Summary
*************************
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00


***************************
Subcatchment Runoff Summary
***************************

--------------------------------------------------------------------------------------------------------
                            Total      Total      Total      Total      Total        Total     Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff       Runoff   Runoff   Coeff
Subcatchment                   in         in         in         in         in     10^6 gal      CFS
--------------------------------------------------------------------------------------------------------
EX-A                       504.14       0.00     165.69     100.74     238.17        67.52     2.60   0.472
EX-C                       504.14       0.00     124.76     194.87     185.38      1505.24    64.61   0.368
EX-D                       504.14       0.00     128.74     188.46     188.48      5125.13   234.25   0.374
DEV-A                      504.14       0.00      46.70     357.70     100.55      2798.49   265.16   0.199
DEV-B                      504.14       0.00      19.16     437.76      48.38       213.74    35.50   0.096
DEV-C                      504.14       0.00      55.63     339.81     110.17      6413.17   549.69   0.219
DEV-D                      504.14       0.00      73.04     311.45     122.10     69232.37  5326.65   0.242


******************
Node Depth Summary
******************

---------------------------------------------------------------------
                               Average  Maximum  Maximum  Time of Max
                                 Depth    Depth      HGL   Occurrence
Node                 Type         Feet     Feet     Feet  days hr:min
---------------------------------------------------------------------
EXEMPT               JUNCTION     0.00     0.00     0.00     0  00:00
NOT_EXEMPT           JUNCTION     0.00     0.00     0.00     0  00:00
DEVELOPED            JUNCTION     0.00     0.00     0.00     0  00:00
RIVER_OUTFALL        OUTFALL      0.00     0.00     0.00     0  00:00


*******************
Node Inflow Summary
*******************

-------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total
                                Lateral    Total  Time of Max      Inflow      Inflow
                                 Inflow   Inflow   Occurrence      Volume      Volume
Node                 Type           CFS      CFS  days hr:min    10^6 gal    10^6 gal
-------------------------------------------------------------------------------------
EXEMPT               JUNCTION    301.47   301.47  6768  19:00    6697.879    6697.879
NOT_EXEMPT           JUNCTION    384.40   384.40  6768  19:00    9148.748    9148.748
DEVELOPED            JUNCTION   6177.00  6177.00  6768  18:00   78657.767   78657.767
RIVER_OUTFALL        OUTFALL       0.00  6741.68  6768  18:00       0.000   94504.394


**********************
Node Surcharge Summary
**********************

Surcharging occurs when water rises above the top of the highest conduit.
---------------------------------------------------------------------
                                           Max. Height   Min. Depth
                                 Hours     Above Crown    Below Rim
Node                 Type      Surcharged         Feet         Feet
---------------------------------------------------------------------
```

Otay River Exemption Analysis - Exemption Scenario

EXEMPT	JUNCTION	438959.02	0.000	0.000
NOT_EXEMPT	JUNCTION	438959.02	0.000	0.000
DEVELOPED	JUNCTION	438959.02	0.000	0.000

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
RIVER_OUTFALL	12.76	62.64	6741.68	94504.394
System	12.76	62.64	6741.68	94504.394

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
PE	DUMMY	301.47	6768 19:00			
NE	DUMMY	384.40	6768 19:00			
NOTDEV	DUMMY	6177.00	6768 18:00			

****
Conduit Surcharge Summary
****

Conduit	--------- Hours Full -------- Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
PE	0.01	0.01	0.01	438959.02	0.01
NE	0.01	0.01	0.01	438959.02	0.01
NOTDEV	0.01	0.01	0.01	438959.02	0.01

Analysis begun on: Fri Dec 18 16:42:35 2015
Analysis ended on: Fri Dec 18 16:43:30 2015
Total elapsed time: 00:00:55

Otay River Exemption Analysis - Natural Scenario

```
[TITLE]
Otay River Exemption Analysis - Natural Scenario

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           02/01/1965
START_TIME           00:00:00
REPORT_START_DATE    02/01/1965
REPORT_START_TIME    00:00:00
END_DATE             02/28/2015
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .14    .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
Bonita+SWRes     INTENSITY 1:00   1.0    TIMESERIES OTAY

[JUNCTIONS]
;;               Invert     Max.       Init.      Surcharge  Ponded
;;Name           Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
EXEMPT           0          0          0          0          0
NOT_EXEMPT       0          0          0          0          0
DEVELOPED        0          0          0          0          0
DAM              0          0          0          0          0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
RIVER_OUTFALL    0          FREE                        NO

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.      Max.
;;Name           Node             Node             Length     N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
PE               EXEMPT           RIVER_OUTFALL    400        0.01       0          0          0          0
NE               NOT_EXEMPT       RIVER_OUTFALL    400        0.01       0          0          0          0
NOTDEV           DEVELOPED        RIVER_OUTFALL    400        0.01       0          0          0          0
4                DAM              RIVER_OUTFALL    400        0.01       0          0          0          0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
PE               DUMMY        0                0          0          0          1
```

```
NE               DUMMY        0                0          0          0          1
NOTDEV           DUMMY        0                0          0          0          1
4                DUMMY        0                0          0          0          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------

[INFLOWS]
;;                                                 Param    Units    Scale    Baseline Baseline
;;Node           Parameter        Time Series      Type     Factor   Factor   Value    Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
EXEMPT           FLOW             Exempt           FLOW     1.0      0.57
NOT_EXEMPT       FLOW             NotExempt        FLOW     1.0      0.57
DEVELOPED        FLOW             Developed        FLOW     1.0      0.57
DAM              FLOW             Impounded        FLOW     1.0      0.57

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
OTAY             FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\Precip\Otay.txt"

Exempt           FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\Exempt.txt"

NotExempt        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\NotExempt.txt"

Developed        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\Developed.txt"

Impounded        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME SERIES\Impounded.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EXEMPT           3492.063           6507.937
NOT_EXEMPT       4790.765           7012.987
DEVELOPED        5945.166           6883.117
DAM              6652.237           6392.496
RIVER_OUTFALL    5098.039           5392.157

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Bonita+SWRes     5382.395           8903.319
```

Otay River Exemption Analysis - Natural Scenario

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

Otay River Exemption Analysis - Natural Scenario (via HMP applied to built-out watershed, including impounded drainage

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ FEB-01-1965 00:00:00
Ending Date .............. FEB-28-2015 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Routing Time Step ........ 60.00 sec


WARNING 04: minimum elevation drop used for Conduit PE

WARNING 04: minimum elevation drop used for Conduit NE

WARNING 04: minimum elevation drop used for Conduit NOTDEV

WARNING 04: minimum elevation drop used for Conduit 4

**************************        Volume         Volume
Flow Routing Continuity        acre-feet       10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .......         0.000          0.000
Wet Weather Inflow .......         0.000          0.000
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........    284576.467      92733.493
External Outflow .........    284576.467      92733.493
Internal Outflow .........         0.000          0.000
Storage Losses ...........         0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......         0.000          0.000
Continuity Error (%) .....         0.000


********************************
Highest Flow Instability Indexes
********************************
All links are stable.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
```

Otay River Exemption Analysis - Natural Scenario

```
******************
Node Depth Summary
******************

---------------------------------------------------------------------
                                 Average  Maximum  Maximum  Time of Max
                                   Depth    Depth      HGL   Occurrence
Node                 Type           Feet     Feet     Feet  days hr:min
---------------------------------------------------------------------
EXEMPT               JUNCTION       0.00     0.00     0.00     0  00:00
NOT_EXEMPT           JUNCTION       0.00     0.00     0.00     0  00:00
DEVELOPED            JUNCTION       0.00     0.00     0.00     0  00:00
DAM                  JUNCTION       0.00     0.00     0.00     0  00:00
RIVER_OUTFALL        OUTFALL        0.00     0.00     0.00     0  00:00


*******************
Node Inflow Summary
*******************

-------------------------------------------------------------------------------------
                                  Maximum  Maximum                  Lateral       Total
                                  Lateral    Total  Time of Max      Inflow      Inflow
                                   Inflow   Inflow   Occurrence      Volume      Volume
Node                 Type             CFS      CFS  days hr:min    10^6 gal    10^6 gal
-------------------------------------------------------------------------------------
EXEMPT               JUNCTION      171.84   171.84  6768  19:00    3817.791    3817.791
NOT_EXEMPT           JUNCTION      384.40   384.40  6768  19:00    9148.748    9148.748
DEVELOPED            JUNCTION     3520.89  3520.89  6768  18:00   44834.927   44834.927
DAM                  JUNCTION     6285.41  6285.41  6768  18:00   34925.140   34925.140
RIVER_OUTFALL        OUTFALL         0.00 10263.22  6768  18:00       0.000   92726.606


**********************
Node Surcharge Summary
**********************

Surcharging occurs when water rises above the top of the highest conduit.
---------------------------------------------------------------------
                                              Max. Height   Min. Depth
                                   Hours      Above Crown    Below Rim
Node                 Type       Surcharged           Feet         Feet
---------------------------------------------------------------------
EXEMPT               JUNCTION    438959.02          0.000        0.000
NOT_EXEMPT           JUNCTION    438959.02          0.000        0.000
DEVELOPED            JUNCTION    438959.02          0.000        0.000
DAM                  JUNCTION    438959.02          0.000        0.000


*********************
Node Flooding Summary
*********************

No nodes were flooded.


***********************
Outfall Loading Summary
***********************

-----------------------------------------------------------
                      Flow       Avg.       Max.       Total
                      Freq.      Flow       Flow      Volume
Outfall Node          Pcnt.       CFS        CFS    10^6 gal
-----------------------------------------------------------
RIVER_OUTFALL         12.75      61.51   10263.22   92726.606
-----------------------------------------------------------
System                12.75      61.51   10263.22   92726.606


********************
```

Otay River Exemption Analysis - Natural Scenario

Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
PE	DUMMY	171.84	6768 19:00			
NE	DUMMY	384.40	6768 19:00			
NOTDEV	DUMMY	3520.89	6768 18:00			
4	DUMMY	6285.41	6768 18:00			

****
Conduit Surcharge Summary
****

Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
PE	0.01	0.01	0.01	438959.02	0.01
NE	0.01	0.01	0.01	438959.02	0.01
NOTDEV	0.01	0.01	0.01	438959.02	0.01
4	0.01	0.01	0.01	438959.02	0.01

Analysis begun on: Fri Dec 18 16:53:03 2015
Analysis ended on: Fri Dec 18 16:54:25 2015
Total elapsed time: 00:01:22

Attachment 2

Revised WMAA Ep Analysis

Erosion Potential Analysis for Otay River - Cross Section 1

*Erosion Potential (Ep)	#DIV/0!

Channel Slope	0.0053	ft/ft
Critical Shear	0.670	lb/sq. ft
γ	62.4	lb/ft^3

			Existing Condition	Future Condition
Tributary Area	*A*	sq mi	19	19
Mean Annual Precip	*MAP*	in/yr	12.0	12.0
Length of Daily Flow Record	*Yr*	yr	30	30
Imperviousness	*Impav*	mi^2/mi^2	0.17598	0.21312
Maximum Flow of Record	*Qmax*	cfs	529.9	529.9
Minimum Flow of Record	*Qmin*	cfs	0.01	0.01
10-year peak flow	*Q10*	cfs	1605.8	1605.8
Coefficient of DDF	*day1*	days & cfs	1147.68	1916.11
Exponent of DDF	*day2*	days & cfs	-0.78	-0.83
Number of Bins	N_B	--	25	25
Bin Size	H_{B-log}	--	0.453	0.453

Bin Number	Lower Bound of Bin Number	Upper Bound of Bin Number	Flow	Hydraulic Radius	Flow Velocity	Shear Stress	Work	Duration	Cumulative Work	Duration	Cumulative Work
B	$B_{lwr-log\ (cfs)}$	$B_{upr-log\ (cfs)}$	*Q (cfs)*	*R (ft)*	*v (ft/s)*	τ (psf)	*W*		*W*duration*		*W*duration*
1	0.006	0.010	0.01	0.01	0.13	0.003	0.000	49104	0.00	101283	0.00
2	0.010	0.016	0.01	0.01	0.13	0.003	0.000	34458	0.00	69670	0.00
3	0.016	0.025	0.02	0.01	0.16	0.003	0.000	24180	0.00	47924	0.00
4	0.025	0.039	0.03	0.02	0.18	0.007	0.000	16968	0.00	32966	0.00
5	0.039	0.061	0.05	0.02	0.20	0.007	0.000	11907	0.00	22676	0.00
6	0.061	0.096	0.08	0.02	0.23	0.007	0.000	8355	0.00	15598	0.00
7	0.096	0.152	0.12	0.03	0.25	0.010	0.000	5863	0.00	10730	0.00
8	0.152	0.239	0.20	0.03	0.29	0.010	0.000	4114	0.00	7381	0.00
9	0.239	0.376	0.31	0.04	0.32	0.013	0.000	2887	0.00	5077	0.00
10	0.376	0.591	0.48	0.05	0.36	0.017	0.000	2026	0.00	3492	0.00
11	0.591	0.930	0.76	0.06	0.40	0.020	0.000	1422	0.00	2402	0.00
12	0.930	1.463	1.20	0.07	0.47	0.023	0.000	998	0.00	1652	0.00
13	1.463	2.302	1.88	0.09	0.55	0.030	0.000	700	0.00	1137	0.00
14	2.302	3.622	2.96	0.12	0.65	0.040	0.000	491	0.00	782	0.00
15	3.622	5.698	4.66	0.15	0.76	0.050	0.000	345	0.00	538	0.00
16	5.698	8.966	7.33	0.19	0.89	0.063	0.000	242	0.00	370	0.00
17	8.966	14.107	11.54	0.24	1.04	0.079	0.000	170	0.00	254	0.00
18	14.107	22.196	18.15	0.30	1.21	0.099	0.000	119	0.00	175	0.00
19	22.196	34.924	28.56	0.37	1.39	0.122	0.000	84	0.00	120	0.00
20	34.924	54.949	44.94	0.45	1.60	0.149	0.000	59	0.00	83	0.00
21	54.949	86.457	70.70	0.55	1.82	0.182	0.000	41	0.00	57	0.00
22	86.457	136.031	111.24	0.70	2.12	0.232	0.000	29	0.00	39	0.00
23	136.031	214.032	175.03	0.87	2.47	0.288	0.000	20	0.00	27	0.00
24	214.032	336.758	275.39	1.08	2.85	0.357	0.000	14	0.00	19	0.00
25	336.758	529.856	433.31	1.33	3.27	0.440	0.000	10	0.00	13	0.00
									0.00		0.00

***(No work occurs in existing of future condition for the range of geomorphically significant flows)**

Ep **#DIV/0!**

Erosion Potential Analysis for Otay River - Cross Section 2

*Erosion Potential (Ep)	**#DIV/0!**

Channel Slope	0.0033	ft/ft
Critical Shear	0.350	lb/sq. ft
γ	62.4	lb/ft^3

			Existing Condition	Future Condition
Tributary Area	*A*	sq mi	28	28
Mean Annual Precip	*MAP*	in/yr	12.0	12.0
Length of Daily Flow Record	*Yr*	yr	30	30
Imperviousness	*Impav*	mi^2/mi^2	0.20473	0.24473
Maximum Flow of Record	*Qmax*	cfs	744.3	744.3
Minimum Flow of Record	*Qmin*	cfs	0.01	0.01
10-year peak flow	*Q10*	cfs	2170.4	2170.4
Coefficient of DDF	*day1*	days & cfs	2157.91	3747.65
Exponent of DDF	*day2*	days & cfs	-0.80	-0.85
Number of Bins	N_B	--	25	25
Bin Size	H_{B-log}	--	0.467	0.467

Bin Number	Lower Bound of Bin Number	Upper Bound of Bin Number	Flow	Hydraulic Radius	Flow Velocity	Shear Stress	Work	Duration	Cumulative Work	Duration	Cumulative Work
B	$B_{lwr-log\ (cfs)}$	$B_{upr-log\ (cfs)}$	*Q (cfs)*	*R (ft)*	*v (ft/s)*	τ (psf)	*W*		*W*duration*		*W*duration*
1	0.006	0.010	0.01	0.01	0.11	0.002	0.000	100346	0.00	218891	0.00
2	0.010	0.016	0.01	0.01	0.11	0.002	0.000	69108	0.00	147449	0.00
3	0.016	0.025	0.02	0.02	0.13	0.004	0.000	47595	0.00	99324	0.00
4	0.025	0.041	0.03	0.02	0.15	0.004	0.000	32779	0.00	66906	0.00
5	0.041	0.065	0.05	0.02	0.17	0.004	0.000	22575	0.00	45069	0.00
6	0.065	0.104	0.08	0.03	0.19	0.006	0.000	15547	0.00	30359	0.00
7	0.104	0.165	0.13	0.03	0.21	0.006	0.000	10707	0.00	20450	0.00
8	0.165	0.264	0.21	0.04	0.24	0.008	0.000	7374	0.00	13776	0.00
9	0.264	0.421	0.34	0.04	0.27	0.008	0.000	5078	0.00	9280	0.00
10	0.421	0.671	0.55	0.05	0.30	0.010	0.000	3498	0.00	6251	0.00
11	0.671	1.071	0.87	0.07	0.35	0.014	0.000	2409	0.00	4211	0.00
12	1.071	1.710	1.39	0.09	0.42	0.019	0.000	1659	0.00	2836	0.00
13	1.710	2.728	2.22	0.11	0.49	0.023	0.000	1142	0.00	1911	0.00
14	2.728	4.354	3.54	0.14	0.58	0.029	0.000	787	0.00	1287	0.00
15	4.354	6.948	5.65	0.18	0.68	0.037	0.000	542	0.00	867	0.00
16	6.948	11.087	9.02	0.23	0.80	0.047	0.000	373	0.00	584	0.00
17	11.087	17.694	14.39	0.29	0.93	0.060	0.000	257	0.00	393	0.00
18	17.694	28.236	22.97	0.35	1.07	0.072	0.000	177	0.00	265	0.00
19	28.236	45.061	36.65	0.44	1.23	0.091	0.000	122	0.00	179	0.00
20	45.061	71.909	58.49	0.41	1.19	0.084	0.000	84	0.00	120	0.00
21	71.909	114.756	93.33	0.48	1.31	0.099	0.000	58	0.00	81	0.00
22	114.756	183.132	148.94	0.51	1.36	0.105	0.000	40	0.00	55	0.00
23	183.132	292.248	237.69	0.64	1.58	0.132	0.000	27	0.00	37	0.00
24	292.248	466.381	379.31	0.80	1.83	0.165	0.000	19	0.00	25	0.00
25	466.381	744.268	605.32	1.00	2.14	0.206	0.000	13	0.00	17	0.00
									0.00		0.00

***(No work occurs in existing of future condition for the range of geomorphically significant flows)**

Ep **#DIV/0!**

Erosion Potential Analysis for Otay River - Cross Section 3

*Erosion Potential (Ep)	**#DIV/0!**

Channel Slope	0.0026	ft/ft
Critical Shear	0.700	lb/sq. ft
γ	62.4	lb/ft^3

			Existing Condition	Future Condition
Tributary Area	*A*	sq mi	46	46
Mean Annual Precip	*MAP*	in/yr	12.0	12.0
Length of Daily Flow Record	*Yr*	yr	30	30
Imperviousness	*Impav*	mi^2/mi^2	0.3188	0.3441
Maximum Flow of Record	*Qmax*	cfs	1236.9	1236.9
Minimum Flow of Record	*Qmin*	cfs	0.01	0.01
10-year peak flow	*Q10*	cfs	3405.1	3405.1
Coefficient of DDF	*day1*	days & cfs	14796.19	20982.62
Exponent of DDF	*day2*	days & cfs	-0.91	-0.94
Number of Bins	N_B	--	25	25
Bin Size	$H_{B\text{-}log}$	--	0.489	0.489

Bin Number	Lower Bound of Bin Number	Upper Bound of Bin Number	Flow	Hydraulic Radius	Flow Velocity	Shear Stress	Work	Duration	Cumulative Work	Duration	Cumulative Work
B	$B_{lwr\text{-}log\ (cfs)}$	$B_{upr\text{-}log\ (cfs)}$	*Q (cfs)*	*R (ft)*	*v (ft/s)*	τ (psf)	*W*		*W*duration*		*W*duration*
1	0.006	0.010	0.01	0.03	0.18	0.005	0.000	1169806	0.00	1916824	0.00
2	0.010	0.016	0.01	0.03	0.18	0.005	0.000	751154	0.00	1212931	0.00
3	0.016	0.027	0.02	0.04	0.22	0.006	0.000	482330	0.00	767520	0.00
4	0.027	0.043	0.03	0.05	0.24	0.008	0.000	309713	0.00	485672	0.00
5	0.043	0.071	0.06	0.06	0.29	0.010	0.000	198872	0.00	307324	0.00
6	0.071	0.115	0.09	0.07	0.32	0.011	0.000	127699	0.00	194469	0.00
7	0.115	0.188	0.15	0.08	0.36	0.013	0.000	81998	0.00	123056	0.00
8	0.188	0.306	0.25	0.10	0.41	0.016	0.000	52653	0.00	77868	0.00
9	0.306	0.498	0.40	0.12	0.46	0.019	0.000	33809	0.00	49273	0.00
10	0.498	0.812	0.66	0.14	0.52	0.023	0.000	21709	0.00	31179	0.00
11	0.812	1.324	1.07	0.17	0.59	0.028	0.000	13940	0.00	19730	0.00
12	1.324	2.158	1.74	0.21	0.67	0.034	0.000	8951	0.00	12485	0.00
13	2.158	3.517	2.84	0.25	0.75	0.041	0.000	5748	0.00	7900	0.00
14	3.517	5.733	4.62	0.30	0.85	0.049	0.000	3691	0.00	4999	0.00
15	5.733	9.344	7.54	0.36	0.96	0.058	0.000	2370	0.00	3163	0.00
16	9.344	15.230	12.29	0.43	1.08	0.070	0.000	1522	0.00	2002	0.00
17	15.230	24.825	20.03	0.52	1.22	0.084	0.000	977	0.00	1267	0.00
18	24.825	40.465	32.64	0.62	1.38	0.101	0.000	627	0.00	801	0.00
19	40.465	65.956	53.21	0.75	1.56	0.122	0.000	403	0.00	507	0.00
20	65.956	107.507	86.73	0.94	1.82	0.153	0.000	259	0.00	321	0.00
21	107.507	175.233	141.37	1.18	2.11	0.191	0.000	166	0.00	203	0.00
22	175.233	285.626	230.43	1.46	2.44	0.237	0.000	107	0.00	129	0.00
23	285.626	465.563	375.59	1.80	2.81	0.292	0.000	68	0.00	81	0.00
24	465.563	758.856	612.21	2.15	3.16	0.349	0.000	44	0.00	51	0.00
25	758.856	1236.916	997.89	2.57	3.56	0.417	0.000	28	0.00	33	0.00
									0.00		0.00

***(No work occurs in existing of future condition for the range of geomorphically significant flows)**

Ep **#DIV/0!**

Attachment 3

Hydrologic Review and Analysis of San Diego County Hydromodification Exemption for Five River Reaches

Smith et al. (2015)

Hydrologic Review and Analysis of San Diego County Hydromodification Exemption for Five River Reaches

Prepared by:

TORY R. WALKER ENGINEERING, INC.

122 Civic Center Drive, Suite 206

Vista, CA 92084

(760) 414-9212

Authors:

Alex J. Smith, MS, EIT

Alicia M. Kinoshita, Ph.D.
Assistant Professor, San Diego State University
Department of Civil, Construction, and Environmental Engineering

Sonya R. Lopez, Ph.D.
Assistant Professor, California State University, Los Angeles
Department of Civil Engineering

Tory R. Walker, PE, CFM, LEED GA

Date:
July 22, 2015

Executive Summary

The purpose of this study is to use a strict hydrologic assessment to either justify or invalidate the renewal of the current hydromodification exemption for projects draining directly to five river reaches (Otay River, San Diego River, San Dieguito River, San Luis Rey River, and Sweetwater River). These reaches have been exempted by the San Diego County Hydromodification Management Plan (HMP) (San Diego County, 2011), based on the wide-spread perception that existing large upstream reservoirs reduce river discharge and erosion potential to a larger extent than potential increases attributed to downstream land developments. In 2013, the San Diego Regional Water Quality Control Board (SDRWQCB) issued a new Permit that now requires justification of exemptions with further hydrologic analysis.

Accordingly, this study evaluates the hydrology of these five watersheds to determine if the continuance of the exemptions may be justified. A rigorous two-step approach is used to describe the effects of either renewing or revoking the 2011 HMP Exemptions through: (1) Statistical Peak Flow Analysis and (2) US Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) Peak Flow Analysis. The Statistical Peak Flow Analysis uses a combination of observed streamflow measurements and USGS Linear Regression Equations to estimate the 2-year, 5-year, and 10-year peak flows at the mouth of each exempt river reach and describe the influence of the upstream impoundments for “dam-in-place” and theoretical “no dam” conditions. The Statistical Peak Flow Analysis characterizes flow reductions as a result of upstream impoundments and serves as a preface for more detailed peak flow simulations. EPA SWMM is used to determine the relative numerical influence of storm water runoff from project development on peak flows and durations, using continuous rainfall-runoff simulation to estimate the 2-year, 5-year, and 10-year peak flows at the mouth of each exempt river reach. Hydromodification flow controls are simulated for all non-directly discharging developable lands and are conditionally simulated for directly discharging developable lands in order to assess the impact of the hydromodification exemptions on the watershed-wide peak flows. The simulated hydromodification controls are modeled both with and without the presence of the dams to assess the influence of impoundment versus land development.

Both analyses resolve that the upstream impoundment is a very significant factor in peak flow alteration for each watershed. The Statistical Peak Flow Analysis results suggest a 29 to 65% peak flow reduction for each watershed due to upstream impoundment. The SWMM Peak Flow Analysis results suggest that peak flows for each watershed, if exemptions are granted, will remain 22 to 79% less than peak flows corresponding to an undammed watershed condition. These pre- to post-dam ratios are consistent with flow impoundment behavior found in other semi-arid, Mediterranean systems. The SWMM results further suggest that the areas directly discharging to exempt river reaches are less than significant, as evidenced by the near-0% peak flow increase granted by the proposed HMP exemption. Therefore, it is recommended that the exemptions be reinstated along all five river reaches for projects directly discharging to the rivers, due to confirmation of significant impoundment effects and the negligible peak flow increase attributable to those directly discharging developable lands.

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ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practice
DEM	Digital Elevation Model
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
GIS	Geographic Information System
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
JURMP	Jurisdictional Urban Runoff Management Plan
MS4	Municipal Separate Storm Sewer System
NED	National Elevation Dataset
OTAY	Otay River
PDP	Priority Development Project
PRISM	Parameter-elevation Regressions on Independent Slopes Model Monthly Climate Data for the Continental United States
SDCFCD	San Diego County Flood Control District
SDGTO	San Dieguito River
SDR	San Diego River
SLR	San Luis Rey River
SW	Sweetwater River
SWMM	Storm Water Management Model
TAC	Technical Advisory Committee
USGS	United States Geological Survey
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan
WY	Water Year (October 1st to September 30th)

1. BACKGROUND & CONTEXT FOR STUDY

A watershed's natural hydrologic state may become severely altered due to land use changes. Hydrologic alterations may include fluctuations to natural stream discharge rates, durations and sediment transport behavior. A stream's physical response to changes in watershed runoff and sediment yield is collectively referred to as hydromodification. The confidence that most hydromodification is highly attributable to changes in land surface—namely urbanization and other development—has recently led to more focused efforts in an attempt to understand and manage these processes.

Hydromodification is occurring in many Southern California creeks and waterways and has become a key element of most stormwater programs in California (Southern California Coastal Water Research Project, 2010). In San Diego, Orange, and Riverside counties, recent storm water regulations have imposed discharge flow and duration control requirements on certain new development and redevelopment projects. As evidenced in 2007 by the San Diego Regional Water Quality Control Board Order No. R9-2007-0001 (the "2007 Municipal Separate Storm Sewer System (MS4) Permit"), the Municipal Copermittees were required to implement a Hydromodification Management Plan (HMP) "...to manage increases in runoff discharge rates and durations from all Priority Development Projects, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force" (San Diego Regional Water Quality Control Board, 2007). Consequently, in 2007 the Copermittees began to prepare the San Diego County HMP (Brown and Caldwell, 2011). The San Diego County HMP effort continued over the span of two years, consisted of a 14 member Technical Advisory Committee (TAC), and received input from a gamut of private and public stakeholders. The total HMP development effort exceeded one million dollars. The Final 2011 HMP was adopted by the San Diego Regional Water Quality Control Board (San Diego Water Board) on July 14, 2010 through Resolution No. R9-2010-0066 (San Diego Regional Water Quality Control Board, 2010).

The 2011 HMP provides San Diego Copermittees with guidance on hydromodification methods, technical approach, requirements, standards, best management practice (BMP) selection and implementation, monitoring, and exemptions. One such HMP applicability requirement provided exemption rationale for Priority Development Projects (PDPs) directly discharging to five large river reaches in San Diego County (developable lands that directly discharge to the exempt river reaches are herein referred to as Project Lands). The Project Lands within each watershed equate to a considerably small fraction of the total watershed area (less than 5%, as summarized in Table 1). The exempt river reaches are summarized in Table 2 and are shown in Figure 1.

Table 1: Watershed Land Use Distribution (Downstream of Dam)

Reach	Total (ac)	[1]Developable (ac)	[2]Project Lands (ac)	% Developable	%Project Lands
Otay	29,571	4,310	1,412	15%	5%
San Diego	111,014	13,667	1,196	12%	1%
San Dieguito	28,710	4,653	1,055	16%	4%
San Luis Rey	118,846	77,180	4,151	65%	3%
Sweetwater	25,135	1,332	255	5%	1%

[1]Acreages were determined using "Developable Land" GIS data from the SanGIS Regional Data Warehouse.
[2]Acreages were determined through desktop analysis using available MS4 GIS data provided by Copermittees.

Table 2: Summary of Exempt River Reaches as Defined by the 2011 HMP

River	Downstream Limit	Upstream Limit
Otay River	Outfall to San Diego Bay	Lower Otay Reservoir Dam
San Diego River	Outfall to Pacific Ocean	Confluence with San Vicente Creek
San Dieguito River	Outfall to Pacific Ocean	Lake Hodges Dam
San Luis Rey River	Outfall to Pacific Ocean	Upstream river limit of Basin Plan subwatershed 903.1 upstream of Bonsall and near Interstate 15
Sweetwater River	Outfall to San Diego Bay	Sweetwater Reservoir Dam

For all proposed exempt river reaches supported by the 2011 HMP, each has:

- a drainage area in excess of 100 square miles;
- a 100-year flow in excess of 20,000 cubic feet per second;
- significant upstream reservoir flow regulation;
- predominantly wide floodplains and/or stabilized channel areas, and;
- low gradients (less than 1 %)

These factors concurred with field observations and were backed by years of historical perspective and practice from the TAC members (Bowling, Grey, Parra, Walker, & Weeden, 2013). There was a conditional requirement for the river reach exemption: a properly-sized energy dissipation feature must be existing or installed at the respective outfall location. Using the exemption rationale provided within the 2011 HMP, Copermittees were permitted to exempt PDPs from the hydromodification management BMP performance requirements prescribed by the 2007 MS4 Permit (herein referred to as the 2011 HMP Exemptions) so long as said PDPs were listed in the Development Planning section of the Copermittees' Jurisdictional Urban Runoff Management Program Annual Report (JURMP).

The current and succeeding municipal storm water permit, the 2013 MS4 Permit, was adopted on May 8, 2013. Similar to the preceding 2007 MS4 Permit, the 2013 MS4 Permit presents a list of criteria that must all be satisfied in order to grant hydromodification management BMP performance requirement exemptions. However, the 2013 MS4 Permit revised the hydromodification management BMP performance requirement exemption language from the 2007 MS4 Permit as follows:

- The project would discharge into channels that are significantly hardened (e.g., with rip-rap, sackcrete, etc.) downstream to their outfall in bays or the ocean;
- The project would discharge to a channel where the watershed areas below the project's discharge points are highly impervious (e.g. >70%).

The 2013 MS4 Permit conditionally excludes the five exempt river reaches justified by the 2011 HMP—exemptions that were based on prior studies of these rivers, the consensus of the TAC, an extensive public review process, and were approved by the San Diego Regional Board. However, the adopted language within the 2013 MS4 Permit does provide an opportunity to grant hydromodification management BMP performance requirement exemptions. A PDP may be exempt from hydromodification management BMP performance requirements when the project discharges storm water runoff to an area identified by the Copermittees as appropriate for an exemption by the optional Watershed Management Area Analysis (WMAA) incorporated into the Water Quality Improvement Plan (WQIP) pursuant to Provision B.3.b.(4).

This language was included to allow further evaluation of these previously exempt channels, rivers, or highly impervious watershed areas for continued exemption under a WQIP. Thus, a complete new analysis is required under the Watershed Management Area Analysis (Bowling, Grey, Parra, Walker, & Weeden, 2013). The Copermittees have since elected to perform the optional Watershed Management Area Analysis, represented by the County of San Diego (Geosyntec Consultants & Rick Engineering, 2015). The April 2015 San Diego County Regional WMAA uses a geomorphic assessment to evaluate the relationship between Erosion Potential (Ep) and Sediment Supply Potential (Sp). Based upon the instream erosion assessment, the Draft Regional WMAA recommends hydromodification management BMP performance requirement exemptions for PDPs directly discharging to the following river reaches:

Table 3: Summary of Exempt River Reaches as Proposed by the Regional WMAA

River	Downstream Limit	Upstream Limit
Otay River	Outfall to San Diego Bay	Interstate 805*
San Diego River	Outfall to Pacific Ocean	Confluence with San Vicente Creek
San Dieguito River	Upstream edge of the railroad crossing*	Lake Hodges Dam
San Luis Rey River	Outfall to Pacific Ocean	Upstream river limit of Basin Plan subwatershed 903.1 upstream of Bonsall and near Interstate 15
Sweetwater River	Outfall to San Diego Bay	Sweetwater Reservoir Dam

*limit changed from 2011 HMP recommendation

The Copermittees will now be able to grant hydromodification management BMP performance requirement exemptions offered by the 2013 MS4 Permit so long as the exemptions are approved via the WMAA and are incorporated into the WQIP—both of which are subject to the vetted public review and San Diego Water Board approval process.

1.1 Impoundment Characteristics

It is well understood that a river is in dynamic equilibrium with its geomorphic components: quantity of sediment, particle size, water discharge, and slope (Lane, 1955). This relationship, known as the Lane relation, is commonly expressed as:

$$Q_s d_s \propto Q_w S_o$$

Where Q_s is the quantity of sediment, d_s is the sediment particle diameter, Q_w is the water discharge, and S_o is the stream bed slope. This relationship is used to describe the qualitative balance between stream power and the discharge of bed material sediment and not intended to be used as an equation (Bowling, Grey, Parra, Walker, & Weeden, 2013).

Generally, long-term channel forms are naturally defined by frequent bankfull floods, approximately 1 to 2-year events in many cases (Wolman & Miller, 1960; Andrews, 1980). However, anthropogenic disturbances in natural systems invalidate assumptions of stationarity (Milly, et al., 2008). An alteration to one or more of the river equilibrium components will usually result in a feedback response to re-establish river equilibrium. A considerable amount of time may be required to achieve a new equilibrium condition; therefore, the effects of hydromodification may not be immediately observable (Trimble, 1997). In the context of all five exempt river reaches, the common denominators are sediment and flow sequestration due to upstream impoundments. The exact rate of sediment and flow sequestration accomplished by the upstream reservoirs is not well known at the desired temporal resolution. Sedimentation processes in a reservoir are quite complex because of the wide variation in many of the influencing factors (United States Bureau of Reclamation, 1987). Nonetheless, a significant reduction in sediment quantity and water discharge is reasonably assumed due to the steep and elevated nature of the impounded watershed drainage areas.

The exempt river reach impoundment summary is summarized as follows:

Table 4: Exempt River Reach Impoundment Summary

River	Major Impoundment[1]	Constructed	Owner	Miles from Mouth	Capacity (acre-ft)	Impounded Area (mi^2)	Percent Impounded[2]
Otay River	Lower Otay Reservoir	1919[a]	City of San Diego	13.1	49,849	100	70%
San Diego River	El Capitan Reservoir	1935	City of San Diego	28.0	112,807	185	61%
	San Vicente Reservoir	1943	City of San Diego	24.6	242,000[b]	75[b]	
San Dieguito River	Hodges Reservoir	1918	City of San Diego	11.0	30,251	245	89%
	Sutherland Reservoir	1954	City of San Diego	22.0	29,508	55	
San Luis Rey River	Lake Henshaw	1923	Vista Irrigation District	53.6	53,160	205	39%
Sweetwater River[3]	Sweetwater Reservoir	1888	Sweetwater Authority	8.2	28,079	85	82%
	Loveland Reservoir	1945	Sweetwater Authority	28.4	25,387	95	

[1] This study defines a Major Impoundment as a reservoir having storage capacity in excess of 25,000 acre feet and able to spill to the river reach
[2] percentage of total area impounded above downstream-most dam
[3] linear reservoir sequence
[a] originally constructed in 1897; reconstructed in 1919 after 1916 dam breach
[b] project recently completed to double reservoir capacity; overflows through tributary to main reach

1.2 Study Objectives

The objective of this study is to perform a rigorous hydrologic analysis to either justify or invalidate the renewal of the 2011 HMP Exemptions for PDPs on Project Lands using highly relevant and available tools, methods, and data. Due to the strict hydrologic focus of this study, sediment transport is not evaluated. This study used a two-step approach to describe the effects of either renewing or revoking the 2011 HMP Exemptions through: (1) Statistical Peak Flow Analysis, and (2) US Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) Peak Flow Analysis. The analyses are summarized below.

1.2.1 Statistical Peak Flow Analysis

The Statistical Peak Flow Analysis seeks to provide a frame of reference for the SWMM Peak Flow Analysis and to describe the general influence of the upstream impoundments on peak flows by using measured flow gage discharge, peak flow estimation, and reservoir overflow data, where possible, to estimate the 2-year, 5-year, and 10-year peak flows at the mouth of the exempt river reach during:

- the ”dam-in-place” condition, which includes the existence of the upstream reservoir(s);
- the hypothetical “no dam” condition, which seeks to remove the significant impoundment effects induced by the upstream reservoir(s)

1.2.2 SWMM Peak Flow Analysis

As hydromodification is a complex phenomenon established in a large scale range, two possible outcomes can occur: (1) the combined effect of the impoundment and potential development may be more similar to the hypothetical and natural peak flow than simply including hydromodification control for an area already modified by a dam, or (2) the combined effect of the impoundment and potential development could improve the situation in a portion of the range of analysis, but be detrimental in another portion of the range of analysis, in which case an exemption to hydromodification is not recommended. The Statistical Peak Flow Analysis serves as a preface to the more detailed SWMM Peak Flow Analysis and seeks to provide a general agreement between impoundment and peak flow behavior on a watershed-by-watershed basis.

The SWMM Peak Flow Analysis seeks to reinforce the Statistical Peak Flow Analysis. The SWMM Analysis will determine the relative change in peak flows from PDPs on Project Lands using EPA SWMM continuous simulation modeling to estimate the 2-year, 5-year, and 10-year peak flows at the mouth of the exempt river reach during:

- the dam-in-place HMP exemption scenario, which accounts for river impoundment and subjects only non-directly discharging developable lands to hydromodification management BMP performance requirements;
- the dam-in-place full HMP scenario, which accounts for river impoundment and subjects all directly and non-directly discharging developable lands to hydromodification management BMP performance requirements;
- the hypothetical “no dam” HMP exemption scenario, which removes the effect of river impoundment and subjects only non-directly discharging developable lands to hydromodification management BMP performance requirements;

- the hypothetical "no dam" full HMP scenario, which removes the effect of river impoundment and subjects all directly and non-directly discharging developable lands to hydromodification management BMP performance requirements.

If the SWMM Peak Flow Analysis demonstrates that the flows and durations of those flows contributed by the exempt Project Lands are insignificant, then the exemptions are justifiable. Contrarily, if the SWMM Peak Flow Analysis demonstrates that the flows and durations of those flows contributed by the exempt Project Lands are significant, then the exemptions are not justifiable and should be revoked.

2. METHODOLOGIES

2.1 Statistical Peak Flow Analysis

The United States Geological Survey (USGS) records and maintains stream station data for locations along each of the exempt river reaches. The period, quality, and availability of data vary significantly depending upon the river. Instantaneous stream flow measurements are desired in order to most accurately assess the true peak flows occurring within the river channel. Often, reliable flow data recorded prior to impounded flow conditions are not available. Therefore, the best available local USGS instantaneous stream stations were selected to represent earlier conditions.

Typical peak flow estimates (2-, 5-, and 10-year) are derived from annual maximum series data. Accurate peak flow assessment requires knowledge of the river's behavior throughout the water year and over a sufficient period of record, with consideration to the prevailing climate. Southern California's semi-arid Mediterranean climate is characterized by a unique seasonal precipitation, with wet winters and warm, dry summers that can produce multiple low-frequency events within the same year, or none at all. Due to this phenomenon, peak flow analyses developed upon single peak annual events will inevitably omit flows that have a significant influence on Mediterranean river morphology. The ultimate result of using the annual maximum series to determine peak flows for high-frequency events (the 2 and 5-year peaks) in a Mediterranean climate is a gross underestimation of the more probable peak flow frequency. This underestimation is likely more pronounced for the higher frequency events (i.e., the 2 and 5-year peak flows (Brown and Caldwell, 2011)). Therefore, a partial-duration series analysis is used to estimate the 2 and 5-year peak flows in this Statistical Peak Flow Analysis. A partial duration series contains "N" values from "N" years of data. For the 10-year peak flow, the annual maximum series will be used, unless the instantaneous data is found to be erroneous, in which case the partial duration will be used.

The USGS began to record instantaneous (15 minute) flow data in water year (WY) 1988 to present. The present-day instantaneous flow data are used to quantify the peak flow events for each reach by partial duration and annual series analyses. A set of peak flow regression equations are applied to the same drainage area recorded by the USGS stream station to develop a ratio of the measured post-dam peak flow to the peak flow estimation equation value; this ratio is named the flood peak ratio (FPR) in this study.

With the flood peak ratio (FPR) established, the 2-, 5-, and 10-year pre-dam peak flow events are estimated by multiplying the FPR by the regression peak flow estimate derived for the entire watershed-wide area. The process is repeated for each watershed to produce impoundment-free 2-, 5-, and 10-year peak flow estimates. For validation, the impoundment-free peak flows are compared with the measured peak flows for those watersheds with USGS stream stations located at or near the river mouth. For additional reference, the impoundment-free 10-year peak flow is compared to the 10-year peak flow estimates published by the 2012 Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) to roughly quantify the relative impact of the upstream impoundments.

USGS regional flood-frequency equations, originally introduced by Waananen and Crippen (1977), are used to estimate flood frequencies in six regions in California (Table 5). These equations relate flood magnitudes of selected frequency to drainage area, precipitation, and altitude (Waananen & Crippen, 1977). These equations (herein referred to as the 1977 USGS Equations) were regressed using available annual peak flow data from 778 USGS stream stations throughout California, 148 of which are located within the South Coast Region concerned with San Diego County. The 1977 USGS Equations are not applicable to sites where the usable storage within the basin exceeds 103 acre feet per square mile, to sites just downstream from large reservoirs, or to streams in urban areas affected substantially by urban development. The relations are primarily used to determine peak discharge values for flow under natural conditions (Waananen & Crippen, 1977). It is noted by a 2004 USGS study of Northern California watersheds that the 1977 USGS Regression equations produce the greatest errors at lower recurrence intervals (2-, 5-, and 10-year) peak flows, which is likely attributable to the lack of more than two decades of peak-flow data at the time of the study (Mann, Rizzardo, & Satkowski, 2004). It is expected that the underestimation would be even more pronounced for southern California's Mediterranean semi-arid climate for the reasons previously discussed.

The 1977 USGS Regression Equations were revised by Gotvald, Barth, Veilleux, & Parrett (2012). These equations (herein referred to as the 2012 USGS Equations) incorporated 30 years of additional annual peak flow data, among other improvements (Gotvald, Barth, Veilleux, & Parrett, 2012). Similarly, the 2012 USGS Regression Equations are specific to one of six hydrologic regions in California. San Diego County is located in the South Coast hydrologic region (Region 5), which was used for the 2-, 5-, and 10-year flood peak analysis. A comparison between the 1977 and 2012 USGS Equations are summarized in Table 5 as follows:

Table 5. 1977 and 2012 USGS Regression Equations for Region 5

Peak Flow	1977 USGS Equation	2012 USGS Equation
2-year	$0.14(DRNAREA)^{0.72}(PRECIP)^{1.62}$	$3.60(DRNAREA)^{0.672}(PRECIP)^{0.753}$
5-year	$0.40(DRNAREA)^{0.77}(PRECIP)^{1.69}$	$7.43(DRNAREA)^{0.739}(PRECIP)^{0.872}$
10-year	$0.63(DRNAREA)^{0.79}(PRECIP)^{1.75}$	$6.56(DRNAREA)^{0.783}(PRECIP)^{1.07}$

DRNAREA, drainage area, in square miles; *PRECIP*, mean annual precipitation, in inches

Drainage area values are estimated with USGS Digital Elevation Map (DEM) analysis using Esri ArcMap. Mean annual precipitation values were estimated using the Parameter-elevation Regressions on Independent Slopes Model Monthly Climate Data for the Continental United States (PRISM) areal statistics for water years 1988-2013 (October 1, 1987 to September 30, 2013) (Daly, 1994, 1997, 2001). PRISM provides an estimation of mean annual precipitation and is noted to have some bias at the monthly scale; however, this product is continuously updated to incorporate point data, a digital elevation model, and expert knowledge of complex climatic extremes, including rain shadows, coastal effects, and temperature inversions. Conterminous U.S. precipitation products can be downloaded from the PRISM Climate Group (http://www.prism.oregonstate.edu/); this study extracted and averaged monthly 4 km pixels for each watershed domain.

The USGS instantaneous stream station data are analyzed to identify individual peak flow events. Individual peak flow events are distinguished by satisfying the following criteria (United States Geological Survey, 1982):

1. Events must be separated by at least five days plus the natural logarithm of the square miles of the drainage area, and;
2. Intermediate flows must drop below 75 percent of the lower of the two separate maximum flows.

For any given time period where a recorded reservoir spill occurred and would have likely influenced the corresponding stream station flow measurement, the potential impacted data is omitted from the instantaneous stream flow record and analysis.

Two of the five river reaches (namely, the San Diego and San Luis Rey rivers) have instantaneous stream gage flow data near the mouth to the Pacific Ocean, where the Statistical Peak Flow Analysis provides an empirical relationship between the urbanized watershed-specific drainage area and partial duration peak flow events downstream of the impoundments. For the three remaining river reaches (namely, the Otay, San Dieguito, and Sweetwater rivers), the USGS stream stations are located upstream of the major impoundments, where the Statistical Peak Flow Analysis provides an empirical relationship between the sparsely developed, watershed-specific drainage area and partial duration peak flow events upstream of the impoundments. For both cases then, the watershed-wide drainage areas are not entirely represented, due to the impoundment in all cases, and due to the absence of a stream station near the mouth in three cases. Hence, these empirical relationships are used in combination with the 2012 USGS regional flood-frequency equations for rural ungaged streams in California to develop a relationship between the empirical and regression estimates on a watershed-wide scale; thus, a methodology is developed for estimating the peak flows at or near the river mouth. This simplified relationship is therefore used to scale the estimated regional flood-frequencies to the watershed-wide extent for each river by developing flood peak ratios (FPRs), defined as:

$$FPR = \frac{Q_{PDS}}{Q_{USGS}} \tag{1}$$

Where:

Q_{PDS} is the partial duration series T-year peak flow, as determined from the stream station instantaneous data record;
Q_{USGS} is the T-year peak flow, as determined by application of the T-year 2012 USGS regression equation to the equivalent stream station drainage area

Assuming a linear watershed-wide relationship between the stream station drainage area peak flows and 2012 USGS Regression peak flows:

$$\frac{Q_{PDS}}{Q_{USGS}} = \frac{Q_{ND}}{Q_{WS}} \tag{2}$$

Where:

Q_{ND} is the T-year estimated “no dam” statistical series peak at the river mouth
Q_{WS} is the 2012 USGS T-year annual peak applied to the entire watershed area

Therefore, the estimated “no dam” peak flow at the river mouth is:

$$Q_{ND} = FPR \times Q_{WS} \tag{3}$$

Figure 1 and Table 6 summarize the information pertinent to this methodology.

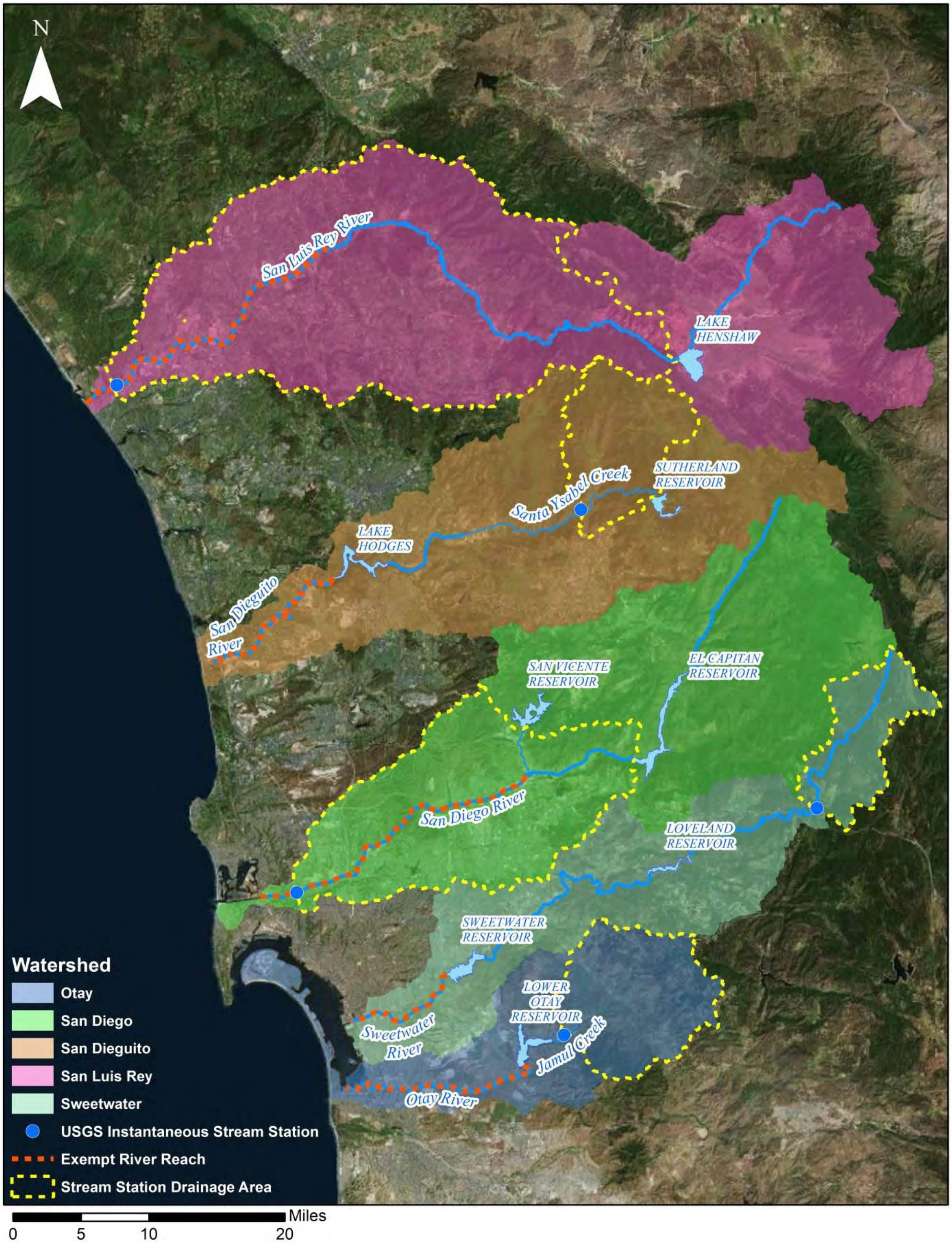

Figure 1. USGS Instantaneous Stream Stations

Table 6: USGS Instantaneous Stream Station Data Summary

River	Stream Station	Date Range (WY)	Month(s) Missing from Flow Record	Spill(s) During Flow Record
Otay River (OTAY)	USGS 11014000 JAMUL C NR JAMUL CA	1988-2014	Dec 1990 Mar 2002	Jan-Mar 1993* Feb-Apr 1994* Feb-Mar 2005* Sep 2005*
San Diego River (SDR)	USGS 11023000 SAN DIEGO R A FASHION VALLEY AT SAN DIEGO CA	1988-2014	-	Feb-Apr 1993 Mar-May 1995
San Dieguito River (SDGTO)	USGS 11025500 SANTA YSABEL C NR RAMONA CA	1988-2014	Dec 1992 Apr 1993 Jul 1994	Feb-Apr 1993 Mar-May 1995
San Luis Rey River (SLR)	USGS 11042000 SAN LUIS REY R A OCEANSIDE CA	1988-2014	Jul-Dec 1992 Jan-Jul 1993 Aug-Dec 1997 Jan-Mar 1998 Oct-Dec 2001 Jan-Dec 2002 Jan-Sep 2003	Feb-Apr 1993
Sweetwater River (SWTR)	USGS 11015000 SWEETWATER R NR DESCANSO CA	1988-2014	-	Jan 1993* Apr 1995* May 1998*

*spills have no influence on USGS stream station

2.2 SWMM Peak Flow Analysis

The SWMM Peak Flow Analysis is used to assess the contribution of storm water runoff discharging from Project Lands to the exempt river reaches. Using available USGS and SanGIS land use data, SWMM models the rainfall-runoff relationship for each watershed under a set of different scenarios. The watersheds were modeled under the planned land use (PLU) condition in order to analyze the developed hydrology. Each watershed is modeled to evaluate the direct runoff from Project Lands, both with and without hydromodification management BMP performance requirements in place, and also without the effect of upstream impoundment.

As stated earlier, only PDPs on land directly discharging to the exempt river reaches (Project Lands) could qualify for the 2011 HMP Exemption. Using the "LANDUSE_PLANNED" SanGIS shapefile, developable lands were classified as such if they were geographically contained within the present-day "Developable_Land" SanGIS shapefile. These developable lands were then sub-classified as either directly-discharging (Project Lands) or non-directly discharging (non-exempt developable). Drainage behavior was assessed based upon available storm drain infrastructure databases and best professional judgment. In all likelihood, not all areas classified as Project Lands by this study would be named as such due to site-specific post development hydrology, jurisdictional requirements, and other related factors. When the effect of the dam was to be considered, the total watershed area upstream of the lower-most impoundment was introduced into the model. Areas upstream of the dam were conservatively assumed to be in a fully built-out condition and subject to hydromodification flow control. Since hydromodification management BMPs, when properly designed, effectively maintain the pre-development hydrology, this conservative assumption effectively models the impounded area as having a "natural" overland flow behavior. For all lumped land classification groups, the area was further divided into four sub-areas based upon hydrologic soil group (HSG) as A, B, C, or D.

To simulate the effects of hydromodification management BMPs, we averaged the percent flow reduction achieved by 25 separate hydromodification design projects performed by TRWE for our clients throughout San Diego County. The 25 projects all met the hydromodification management BMP volume and time-based performance requirements, as prescribed in the 2013 MS4 Permit. The average percent flow reduction for the 2-year to the 10-year peak flow was 43%. In nearly all cases, a hydromodification design project will not perfectly match the pre-development flow duration curve. It would not be practical to produce such a finely-tuned design. In order to safely meet hydromodification BMP performance requirements, the final design will typically produce less runoff than the pre-development hydrologic condition. Therefore, a 43% flow reduction is a conservative expectation for the unmitigated to mitigated post-development scenario. Furthermore, given that the 43% flow reduction estimate was developed from projects that met the hydromodification flow duration requirement, the 43%

flow reduction, when applied, can be assumed to satisfy the post-development flow duration component as well.

In order to simulate the effect of hydromodification on a given land use group, the 43% flow reduction was applied via the inflow scale factor for the respective junction node in SWMM. A conceptual SWMM model schematic is provided in Figure 2.

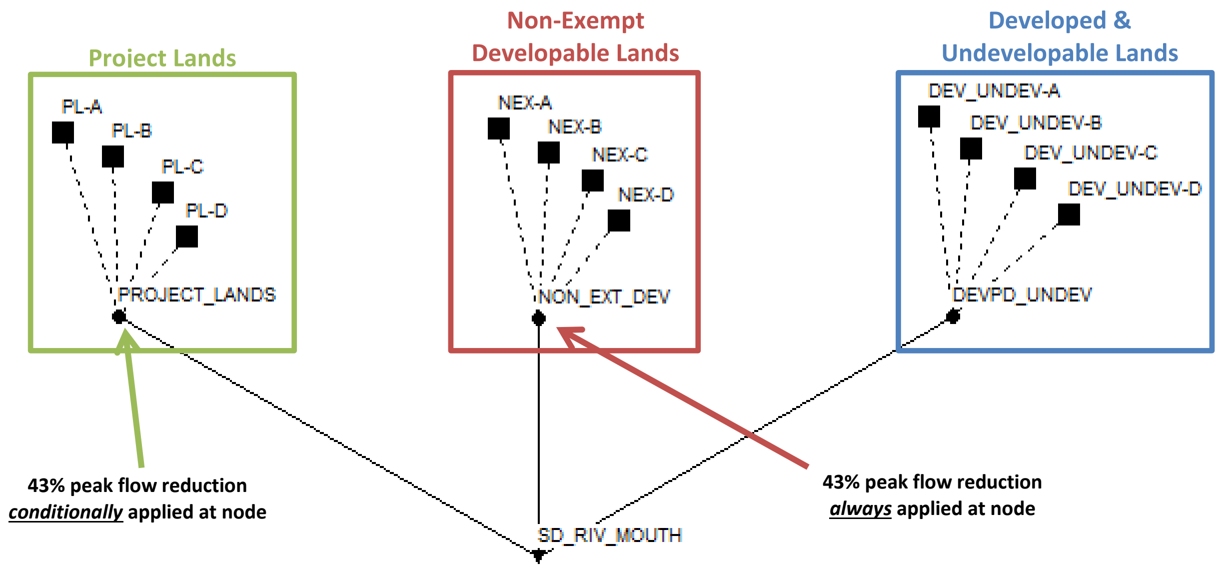

Figure 2: SWMM Model Conceptual Schematic for the San Diego River "Dam-In-Place" Scenario

The rainfall time series provided by the County of San Diego as a work product of the 2011 Final HMP have been analyzed for their accuracy in other studies. It was found that the disaggregation process artificially increases the frequency of the high intensity values (Parra-Rosales, Walker, & Ponce, 2012). Of the 19 rainfall stations produced by the Final 2011 HMP, Parra et al. found Lindbergh and Oceanside to be the most acceptable stations due to the completeness of the original data and quality of data from external stations used to fill data gaps. Therefore, this study used the Oceanside rainfall data for the San Luis Rey Watershed and the Lindbergh rainfall data for the San Diego Watershed. For all other watersheds, an alternate rainfall data source was used, as described below.

Available rainfall data was obtained through coordination with Rand Allan of the San Diego County Flood Control District (SDCFCD). Rainfall stations were selected based on their time format (hourly or finer) and proximity to the study watersheds. Collocated historical hourly and ALERT event-based rainfall stations were combined to make a continuous 50 year record. Natural variability in hourly and daily data exists between stations. Thus, annual values provide a reliable means to estimate precipitation patterns between nearby gages and gages with similar elevation and climatological attributes. To develop continuous precipitation records, a linear regression between SDCFCD stations was used to estimate missing precipitation values and validated on a separate subset of data, where available data exists for both gages. The correlation value (R^2) indicates the ability of the independent variable to predict the dependent variable and ranges from 0 to 1. Only correlations greater than 0.7 were used to guide interpolation of precipitation data. Table 7 summarizes the developed regression equations, the correlation coefficient, and values estimated at each station:

Table 7: Rainfall Station Regression Equations Used for Data Gaps

Independent Station (x)	Dependent Station (y)	Regression Equation[a-h]	Correlation
Kearny Mesa	La Mesa	[1]$y = 0.9813x$	$R^2 = 0.8815$
Poway	Kearny Mesa	[2]$y = 0.9371x$	$R^2 = 0.7993$
Encinitas	San Marcos	[3]$y = 1.0574x$	$R^2 = 0.7260$
Bonita	Sweetwater	[4]$y = 1.0942x$	$R^2 = 0.8734$
Kearny Mesa	Sweetwater	[5]$y = 0.9007x$	$R^2 = 0.7520$
Encinitas	Escondido	[6]$y = 1.3275x$	$R^2 = 0.7720$

a. Kearny Mesa data was used to estimate missing values in **La Mesa**[1] for the period of record for 8/10/1969-3/1/2015. A total of 9447 values (hourly time step) were filled. Note that La Mesa ALERT tipping bucket record begins 9/15/1982, which may account for the number of values filled.

b. Available data from Kearny Mesa was used to estimate missing values in **Poway**[2] for 1/23/1964-2/28/2015. A total of 3278 values (hourly time step) were filled. Note that Poway ALERT tipping bucket record begins 7/19/1982, which may account for the number of values filled. Now, a complete record is available for Poway from 11/1/1962-2/28/2015.

c. Poway data was used to estimate missing values in **Kearny Mesa**[2] for the period of record for 1/22/1964-2/28/2015. A total of 36 values (hourly time step) were filled.

d. Available data from Encinitas was used to estimate missing values in **San Marcos**[3] for 7/1/1963-2/28/2015. A total of 17 values (hourly time step) were filled during this time period. Note that San Marcos ALERT tipping bucket record begins 5/28/1981-3/3/2006 during which, there was 217135 missing values (hourly time step). These values were filled with data from Encinitas. Now, a complete record is available for San Marcos from 11/16/1962-2/28/2015.

e. Kearny Mesa data was used to estimate missing values in **Sweetwater**[5] for the period of record for 2/1/1965-10/30/1992. A total of 765 values (hourly time step) were filled.

f. Available data from Escondido was used to estimate missing values in **Encinitas**[6] for 11/19/1964-2/28/2015. A total of 1862 values (hourly time step) were filled. Now, a complete record is available for Encinitas from 7/1/1963-2/28/2015.

g. Encinitas data was used to estimate missing values in **Escondido**[6] for the period of record for 11/19/1964-2/28/2015. A total of 7761 values (hourly time step) were filled. Note that Encinitas ALERT tipping bucket record begins 7/1/1984, which may account for the number of values filled.

Rainfall data assignment and sources for each watershed are shown in Table 8

Table 8: Select Rainfall Stations for SWMM Peak Flow Analysis

Watershed	Rainfall Station	Record	Elevation (ft)	Source
Otay[1]	Bonita	1975-2015	139	SDCFCD
	Sweetwater[2]	1965-1992	310	SDCFCD
San Diego	Lindbergh[3]	1948-2005	15	Project Clean Water
San Dieguito[1]	Encinitas	1963-2015	250	SDCFCD
	Escondido	1964-2015	660	SDCFCD
	San Marcos	1962-2015	580	SDCFCD
San Luis Rey	Oceanside[3]	1951-2008	30	Project Clean Water
Sweetwater[1]	Bonita	1975-2015	139	SDCFCD
	Sweetwater	1965-1992	310	SDCFCD

[1]Rainfall station rainfall intensity was averaged between rainfall stations and applied uniformly to the entire modeled watershed
[2]No collocated ALERT station
[3]Data downloaded directly from Project Clean Water (http://www.projectcleanwater.org)

The spatial distribution of TRWE sample HMP projects and SDCFCD rainfall stations are illustrated in Figure 3.

2.2.1 Parameters

Physical watershed parameters were estimated using available land use geographic information system (GIS) data from SanGIS. Planned land use classifications were used for all SWMM peak flow analyses, including areas upstream of the dams, which were conservatively assumed to reflect the pre-development hydrology through application of hydromodification flow reduction to the outlet node. Percent imperviousness was determined by using area-weighted averages based upon those values presented in a 2010 County of San Diego imperviousness study. Percent slope was determined by using area-weighted averages based upon relationships between SanGIS land use and the latest USGS National Elevation Dataset (NED) 1/3 arc-second DEM for greater Southern California. The width parameter served as a general calibration parameter for the model using the best available USGS instantaneous stream flow data. Using the relationship between watershed area and river length, a factor was applied to this ratio to match the 5-year peak flow value. The San Diego River station was used to develop this factored relationship due to the completeness of the dataset, the least number of upstream dam overflow events, and location near the river mouth. The remaining SWMM parameters were taken from the San Diego Model BMP Design Manual. General watershed parameters are outlined in Table 9. Specific watershed parameters are provided in Appendix A.

Table 9: SWMM Parameters Used in SWMM Peak Flow Analysis

SWMM Parameter	Description[1]	Value				Source
Area (ac)	Area of the subcatchment.	Watershed-specific				GIS analysis
Width (ft)	Characteristic width of the overland flow path for sheet flow runoff.	Calibrated by factoring the ratio of entire river length to full watershed area to match the PDS-derived San Diego River 5-year peak flow, taken as: $W_{HSG} = 0.184 \frac{A_{HSG}}{L_R}$ where: W_{HSG} is the width of the given HSG subcatchment; A_{HSG} is the area of the given HSG subcatchment; L_R is the length of the entire river reach				TRWE
% Slope	Average percent slope of the subcatchment.	Area-weighted average of percent slope by land use				USGS NED 1/3 arc-second DEM
% Imperv	Percent of the land area which is impervious.	Area-weighted average of percent imperviousness by land use				County of San Diego, 2010
N-Imperv	Manning's n for overland flow over the impervious portion of the subcatchment.	0.012				SD Model BMP Design Manual
N-Perv	Manning's n for overland flow over the pervious portion of the subcatchment.	0.15				SD Model BMP Design Manual
D store-Imperv (in)	Depth of depression storage on the impervious portion of the subcatchment.	0.05				SD Model BMP Design Manual
D store-Perv (in)	Depth of depression storage on the pervious portion of the subcatchment.	0.10				SD Model BMP Design Manual
% Zero-Imperv	Percent of the impervious are with no depression storage.	25%				SD Model BMP Design Manual
Subarea Routing	Choice of internal routing of runoff between pervious and impervious areas	OUTLET				SD Model BMP Design Manual
Percent Routed	Percent of runoff routed between subareas.	100%				SD Model BMP Design Manual
Infiltration	Infiltration parameters for the subcatchment.	GREEN_AMPT				SD Model BMP Design Manual
		HSG A	HSG B	HSG C	HSG D	
	GREEN_AMPT: Suction Head (in)	1.5	3.0	6.0	9.0	SD Model BMP Design Manual
	GREEN_AMPT: Initial Deficit (in/hr)	0.33	0.32	0.31	0.30	SD Model BMP Design Manual
	GREEN_AMPT: Developed Conductivity (in/hr)	0.225	0.15	0.075	0.01875	SD Model BMP Design Manual

[1]Defined by the SWMM User Manual
D/S = downstream; U/S/ = upstream

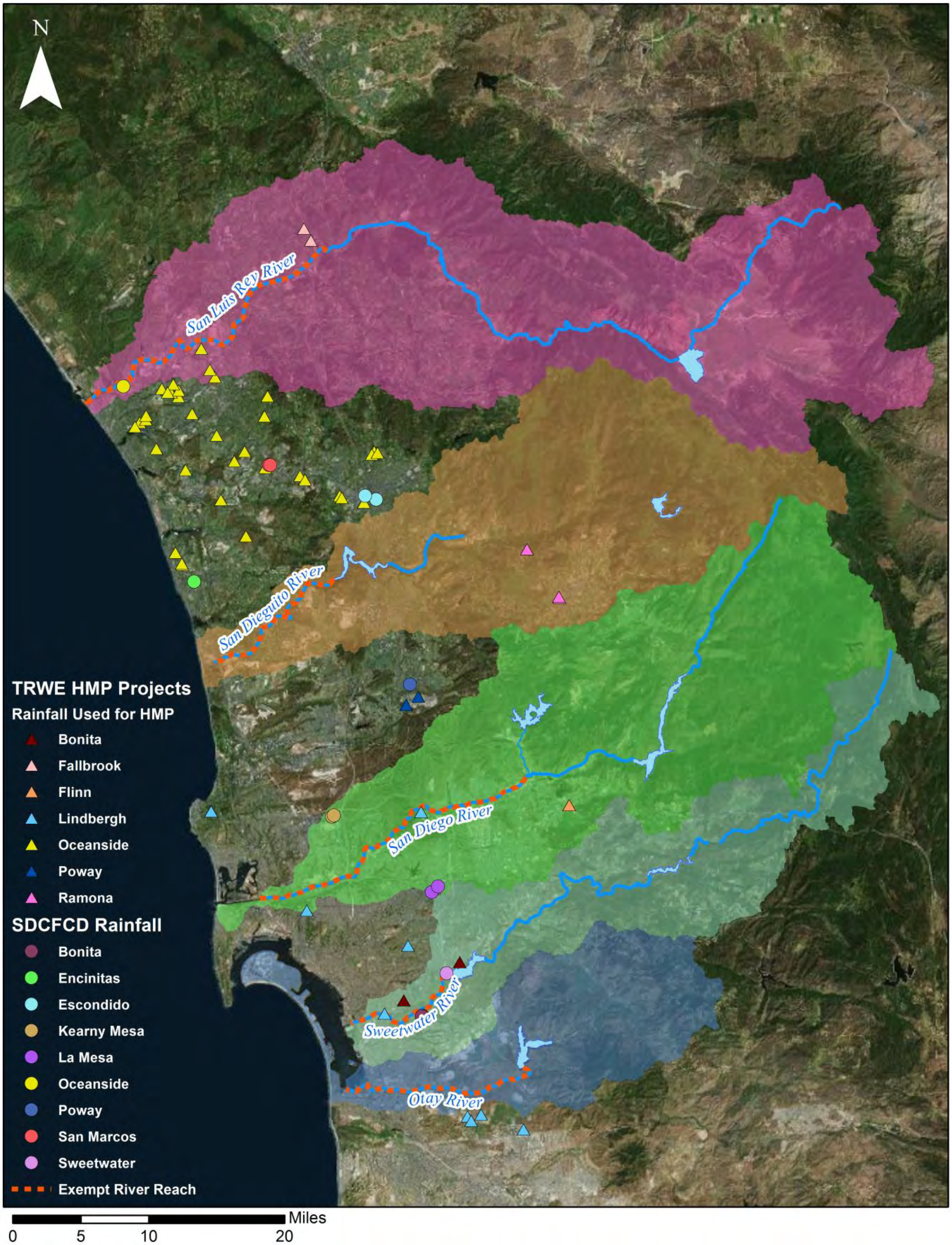

Figure 3. TRWE HMP Project and SDCFCD Rainfall Station Distribution

3. RESULTS

3.1 Statistical Peak Flow Results

Results provided herein are not intended to be used for design purposes, or serve as an exact measurement. The results are solely intended to provide a relative change in peak flow and demonstrate the impact of the upstream impoundment on the peak flow events in each river. The Statistical Peak Flow Analysis results are summarized in Table 10. For those rivers with stream stations located at or near the mouth, the statistical peak flow is compared with the "no dam" peak flows (Table 10, column "Peak[1]"). For those rivers without stream stations located at or near the mouth, the downstream-most available FEMA FIS 10-year peak flows are compared with the "no dam" peak flows. The percent difference or the reduction between the "no dam" and FEMA FIS 10-year peak flows are provided in Table 11. The flow reduction estimates are approximate in nature and are only shown to illustrate significant effects of impoundment on the peak flow events. In developing peak flows for the FIS, FEMA uses an annual series analysis, so it is expected that the percent reductions may be overestimated when used for comparison with a partial duration series analysis.

Table 10: Statistical Peak Flow Results Summary for "No Dam" Peak Flows

River	T-year	Peak[1] (cfs)	A^* (mi^2)	P^* (in)	Q_{USGS}[b] (cfs)	FPR	A^{**} (mi^2)	P^{**} (in)	Q_{WS}[c] (cfs)	Q_{ND}[d] (cfs)
	2	850			481	1.8			717	**1,267**
OTAY	5	2,265	70	15.0	1,822	1.2	144	13.4	2,811	**3,494**
	10	3,890[a]			3,315	1.2			5,163	**6,059**
	2	2,693			759	3.6			1,778	**6,307**
SDR	5	4,187	168	12.6	2,985	1.4	429	16.9	7,711	**10,813**
	10	7,980			5,454	1.5			15,558	**22,763**
	2	930			533	1.7			1,488	**2,594**
SDGTO	5	2,042	58	20.5	2,069	1.0	336	16.6	6,337	**6,255**
	10	4,434			3,971	1.1			12,605	**14,076**
	2	1,040			1,516	0.7			2,147	**1,473**
SLR	5	5,293	350	16.4	6,462	0.8	557	17.2	9,496	**7,777**
	10	11,461			12,847	0.9			19,450	**17,351**
	2	669			527	1.3			1,116	**1,417**
SWTR	5	2,544	46	24.9	2,059	1.2	222	16.4	4,616	**5,702**
	10	3,296			4,065	0.8			8,995	**7,293**

[1] partial duration series (PDS) value selected for 2-year and 5-year peak; annual maximum series selected for 10-year (unless otherwise specified)
[a] partial duration series value used due to unreasonably low 10-year peak flow; data "affected to unknown degree by Regulation or Diversion"
[b] equivalent drainage area peak flow; 2012 USGS Regression Equation calculation using drainage area parameters from A* (stream station drainage area) and P* (stream station drainage area mean annual precipitation)
[c] watershed-wide peak flow; 2012 USGS Regression Equation calculation using watershed parameters from A** (watershed-wide drainage area) and P** (watershed-wide mean annual precipitation)
[d] "no dam" watershed-wide peak flow estimate

Table 11: Comparison of "No Dam" Peak Flows with Available "Dam-in-Place" Peak Flows

River	T-year	Q_{ND} (cfs)	Peak[1] (cfs)	Reduction	FIS Peak[2] (cfs)	FIS Reduction
OTAY	2	**1,267**	-	-	-	-
	5	**3,494**	-		-	-
	10	**6,059**	-		1,200	80%
SDR	2	**6,307**	2,693	57%	-	-
	5	**10,813**	4,187	61%	-	-
	10	**22,763**	7,980	65%	3,100	86%
SDGTO	2	**2,594**	-	-	-	-
	5	**6,255**	-		-	-
	10	**14,076**	-		5,900	58%
SLR	2	**1,473**	1,040	29%	-	-
	5	**7,777**	5,293	32%	-	-
	10	**17,351**	11,461	34%	6,600	62%
SWTR	2	**1,417**	-	-	-	-
	5	**5,702**	-		-	-
	10	**7,293**	-		1,200	84%

[1]partial duration series value selected for 2-year and 5-year peak; annual maximum series selected for 10-year
[2] (Federal Emergency Management Agency, 2012)

The Statistical Peak Flow Analysis provides reasonable estimation of river impoundment peak flow reduction. For comparison, a 2005 study focused on the hydrological effects of dams on the Sacramento and San Joaquin Rivers in Northern California found that the 2-year peak flow declined anywhere between 35 to 95% of pre-dam values, while the 10-year peak flow was reduced from 2 to 78% (Kondolf & Batalla, 2005). For further comparison, a 2005 study of the hydrological effects of dams in semi-arid portions of north-eastern Spain (also a Mediterranean climate) found that 22 of 23 rivers showed reductions in 2 and 10-year peak flow by 31 and 33%, respectively, with effects more pronounced in the low-rainfall southern Mediterranean tributaries (Batalla, Gomez, & Kondolf, 2003). Therefore, the results (~29-65% reduction) provided in this study are consistent with flow impoundment behavior found in other semi-arid, Mediterranean systems and supports the assumption of significant flow sequestration in the five river reaches.

3.2 SWMM Peak Flow Results

Results from the SWMM Peak Flow Analysis are provided in Table 12 through Table 16 for the "dam-in-place" condition and Table 17 through Table 21 for the "no dam" condition. The results are estimates of peak flows and relative change for the exempt reaches using a simplified continuous modeling approach. These results are not intended to be used for design purposes.

The 2-, 5-, and 10-year flow rates are conservative estimates due to a number of underlying assumptions. First, the assumption of uniform rainfall over a large watershed may produce higher flows than what would actually be realized in each river. However, baseflow was not considered in peak flow determination. Also, the simple rainfall-runoff model is kinematic in nature, not accounting for complex overland flow behaviors such as runoff diffusion. Finally, the overland flow model does not consider channel routing and subsequent longitudinal spreading of the wave base for more mildly-sloped areas within the watershed, which ultimately produces a lower peak flow due to the attenuation and translation of the outflow hydrograph over space and time. Given these assumptions, it is important to note that the main objectives of this study do not require obtaining precise peak flow values. Instead, this study is focused on the relative change of discharges from Project Lands with and without hydromodification management BMP performance requirements.

Table 12: Otay River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	1,481	1,378	1,409	4.9%	**2.0%**	31
5-year	1,950	1,803	1,847	5.3%	**2.3%**	44
10-year	2,378	2,226	2,272	4.5%	**2.0%**	47

Table 13: San Diego River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	3,380	3,225	3,243	4.1%	**0.5%**	18
5-year	4,184	3,993	4,013	4.1%	**0.5%**	20
10-year	4,787	4,564	4,584	4.2%	**0.4%**	21

Table 14: San Dieguito River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	1,265	1,170	1,182	6.6%	**0.9%**	11
5-year	1,754	1,625	1,642	6.4%	**1.0%**	17
10-year	1,950	1,811	1,833	6.0%	**1.1%**	22

Table 15: San Luis Rey River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	6,441	5,731	5,781	10.3%	**0.8%**	50
5-year	8,652	7,630	7,697	11.0%	**0.8%**	67
10-year	10,135	9,031	9,111	10.1%	**0.8%**	80

Table 16: Sweetwater River SWMM Peak Flows: "Dam-in-Place" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	751	739	741	1.3%	**0.4%**	3
5-year	1,092	1,073	1,077	1.4%	**0.4%**	4
10-year	1,273	1,251	1,256	1.3%	**0.4%**	5

Table 17: Otay River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	2,274	2,212	2,234	1.8%	**1.0%**	22
5-year	2,876	2,732	2,772	3.6%	**1.4%**	40
10-year	3,658	3,487	3,539	3.2%	**1.4%**	52

Table 18: San Diego River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	5,270	5,123	5,137	2.5%	**0.3%**	13
5-year	6,579	6,386	6,407	2.6%	**0.3%**	21
10-year	7,572	7,356	7,380	2.5%	**0.3%**	24

Table 19: San Dieguito River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	5,601	5,518	5,531	1.3%	**0.2%**	13
5-year	7,570	7,439	7,457	1.5%	**0.2%**	17
10-year	9,044	8,918	8,940	1.2%	**0.3%**	23

Table 20: San Luis Rey River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	8,199	7,488	7,538	8.1%	**0.6%**	50
5-year	11,159	10,151	10,218	8.4%	**0.6%**	67
10-year	12,856	11,746	11,824	8.0%	**0.6%**	78

Table 21: Sweetwater River SWMM Peak Flows: "No Dam" Condition

Peak	No HMP BMPs (cfs)	Full HMP (cfs)	HMP Exemption (cfs)	Peak Reduction w/ HMP Exemption	Peak Flow Increase Due to Exemption	Exemption Peak Flow Increase (cfs)
2-year	2,050	2,039	2,041	0.4%	**0.1%**	2
5-year	2,735	2,718	2,722	0.5%	**0.1%**	4
10-year	3,283	3,265	3,269	0.4%	**0.1%**	4

The SWMM Peak Flow Analysis found that if the HMP exemptions were granted (as opposed to "Full HMP"—no exemptions granted), it would increase the 2-, 5-, and 10-year peak flow events by no more than 1.1% in all rivers except Otay, where at most, a 2.3% increase is predicted. It should be noted, in the case of Otay that, though minor, this additional flow has the potential to aid the many river restoration efforts identified in the 2006 Otay River Watershed Management Plan (Aspen Environmental Group, 2006). With the HMP exemptions in place, the SWMM Peak Flow Analysis applied hydromodification flow reduction to all non-directly discharging developable land to produce peak flow reductions ranging between 1.3 to 11% (as opposed to "No HMP"—no hydromodification flow control). This percent reduction is the peak flow "benefit" achieved through application of peak flow control. When modeled without the influence of the dam, the effects of Project Lands are further diminished—the primary reason for the original exemption. It is worth noting that both the modeled dam-in-place and no-dam peak flows produce reasonable matches with those peak flows presented in the Statistical Peak Flow Analysis.

The most notable comparisons are between the "dam-in-place" peak flows with the HMP exemption ("Dam-in-Place" HMP Exemption) versus the "no dam" peak flows with no HMP exemptions ("No Dam" Full HMP) presented in Table 22 through Table 26. These comparisons were made in order to simulate the impact of the proposed exemptions on peak flows versus the impact of the river impoundment on peak flows. These SWMM Peak Flow comparisons suggest that if, in their current impounded state, only Project Lands were exempt from hydromodification management BMP performance requirements, the resulting peak flows would be far less than the unimpounded, pre-development peak flows. The "No Dam" Full HMP scenario was considered to be the best representation of a pre-development watershed (in the absence of pre-Columbian watershed parameters) because the very nature of hydromodification management is to simulate the pre-development hydrologic condition. In other words, if the entire developed portion of a watershed is subject to hydromodification flow and duration control, then it is assumed to simulate the pre-development hydrologic condition.

Due to the conservative modeling approach, in actuality the "Dam-in-Place" HMP Exemption peak flows would likely be even less than those modeled herein due to strict interpretations on what constitutes a directly discharging developable land. An even greater difference between the HMP exemption peak flows and the pre-development peak flows would result. Therefore, the SWMM Peak Flow Analysis confirms that the major river impoundments are the primary source of peak flow reduction and clearly demonstrates that peak flows discharging from exempted Project Lands would remain considerably less than the natural, pre-development peak flows.

Table 22: Otay River SWMM Scenario Comparison

Peak	"Dam-in-Place" HMP Exemption (cfs)	"No Dam" Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	1,409	2,212	804	**36%**
5-year	1,847	2,732	885	**32%**
10-year	2,272	3,487	1,215	**35%**

Table 23: San Diego River SWMM Scenario Comparison

Peak	"Dam-in-Place" HMP Exemption (cfs)	"No Dam" Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	3,243	5,123	1,880	**37%**
5-year	4,013	6,386	2,373	**37%**
10-year	4,584	7,356	2,772	**38%**

Table 24: San Dieguito River SWMM Scenario Comparison

Peak	"Dam-in-Place" HMP Exemption (cfs)	"No Dam" Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	1,182	5,518	4,336	**79%**
5-year	1,642	7,439	5,797	**78%**
10-year	1,833	8,918	7,085	**79%**

Table 25: San Luis Rey River SWMM Scenario Comparison

Peak	"Dam-in-Place" HMP Exemption (cfs)	"No Dam" Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	5,781	7,488	1,707	**23%**
5-year	7,697	10,151	2,454	**24%**
10-year	9,111	11,746	2,635	**22%**

Table 26: Sweetwater River SWMM Scenario Comparison

Peak	"Dam-in-Place" HMP Exemption (cfs)	"No Dam" Full HMP (cfs)	Difference (cfs)	% Less Than
2-year	741	2,039	1,298	**64%**
5-year	1,077	2,718	1,641	**60%**
10-year	1,256	3,265	2,009	**62%**

4. CONCLUSIONS

All five exempt river reaches are subjected to significant upstream impoundment and are rigorously analyzed with two hydrologic methods. The Statistical Peak Flow Analysis found that the major impoundments reduce peak flows anywhere from 29% to 65% of the unimpounded condition. Similarly, the SWMM Peak Flow Analysis found that the major impoundments reduce peak flows approximately 22% to 79%, depending on the reach and peak flow event. The original assumption of significant flow sequestration in the exempt river reaches made by the 2011 HMP is validated by both the Statistical Peak Flow Analysis and the SWMM Peak Flow Analysis in this study.

The benefit of proper hydromodification management BMP implementation is evidenced by comparison between various HMP scenarios. For all watersheds with more than 1,200 acres of Project Lands, HMP flow controls applied to only non-directly discharging developable lands are projected to achieve peak flow reductions of at least 4%. Furthermore, the projected "cost" of allowing the hydromodification exemptions to stand would increase peak flows by an extremely narrow margin in all reaches. It should be noted that the peak flow reduction estimates presented herein are conservative in nature since all non-directly discharging developed lands will be subject to hydromodification management BMPs in the event any re-development within these areas were to occur, further decreasing any peak flow influence from Project Lands. In reality, the percent peak flow reduction is expected to be even greater.

The results from this analysis suggest that the peak flows from areas directly discharging to exempt river reaches (Otay, San Diego, San Dieguito, San Luis Rey, and Sweetwater River) pose no threat to the erosion potential of the exempt river reaches. If these reaches undergo significant changes (i.e. removal of impoundments), it is recommended that a new hydrologic assessment should be made to determine the resulting implications and continual eligibility for exemption. However, under the current conditions defined in this study, it is clearly demonstrated that the existence of upstream impoundment is the principle factor in peak flow alteration—not developed Project Lands. Changes in peak flows from Project Lands are found to be less than significant. Therefore, it is recommended that the 2011 HMP Exemptions be reinstated for all developable lands directly discharging to the exempt river reaches, so long as the project provides properly designed energy dissipation controls at the outfalls. It is also recommended that hydromodification BMPs be required for non-Project Lands, as these areas account for the majority of the developable land within each watershed and will likely produce the greatest influence on peak flows on these rivers in their current impounded state.

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APPENDIX A

Otay Watershed SWMM Parameters

Table A-1: Otay River Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	10.44	1	5.94%	80%	0.012	0.15	0.05	0.10	25%
B	0.00								
C	299.03	24	6.60%	61%	0.012	0.15	0.05	0.10	25%
D	1001.41	80	7.73%	60%	0.012	0.15	0.05	0.10	25%

Table A-2: Otay River Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	4.08	0.3	6.09%	71%	0.012	0.15	0.05	0.10	25%
B	0.00								
C	143.79	12	6.37%	64%	0.012	0.15	0.05	0.10	25%
D	2851.20	228	6.75%	64%	0.012	0.15	0.05	0.10	25%

Table A-3: Otay River Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	1024.99	82	19.46%	29%	0.012	0.15	0.05	0.10	25%
B	162.69	13	24.86%	13%	0.012	0.15	0.05	0.10	25%
C	2143.79	172	17.87%	32%	0.012	0.15	0.05	0.10	25%
D	20882.06	1673	16.41%	34%	0.012	0.15	0.05	0.10	25%

Table A-4: Otay River Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	2993.07	240	16.47%	9%	0.012	0.15	0.05	0.10	25%
B	3016.93	242	21.43%	8%	0.012	0.15	0.05	0.10	25%
C	8658.65	694	20.59%	10%	0.012	0.15	0.05	0.10	25%
D	48588.71	3892	22.59%	8%	0.012	0.15	0.05	0.10	25%

San Diego Watershed SWMM Parameters

Table A-5: San Diego River Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	340.90	11	7.2%	68%	0.012	0.15	0.05	0.10	25%
B	111.56	4	8.7%	53%	0.012	0.15	0.05	0.10	25%
C	166.56	5	7.4%	63%	0.012	0.15	0.05	0.10	25%
D	675.39	21	8.1%	59%	0.012	0.15	0.05	0.10	25%

Table A-6: San Diego River Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	892.75	28	13.9%	25%	0.012	0.15	0.05	0.10	25%
B	1180.34	37	12.7%	21%	0.012	0.15	0.05	0.10	25%
C	1095.09	34	12.4%	23%	0.012	0.15	0.05	0.10	25%
D	9021.30	284	12.9%	22%	0.012	0.15	0.05	0.10	25%

Table A-7: San Diego River Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	9226.19	291	13.2%	35%	0.012	0.15	0.05	0.10	25%
B	6856.56	216	13.3%	38%	0.012	0.15	0.05	0.10	25%
C	9565.50	301	12.8%	39%	0.012	0.15	0.05	0.10	25%
D	67079.47	2113	17.0%	33%	0.012	0.15	0.05	0.10	25%

Table A-8: San Diego River Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	23826.07	751	16.7%	14%	0.012	0.15	0.05	0.10	25%
B	7266.39	229	16.9%	16%	0.012	0.15	0.05	0.10	25%
C	42292.04	1332	19.5%	13%	0.012	0.15	0.05	0.10	25%
D	94561.45	2979	19.8%	15%	0.012	0.15	0.05	0.10	25%

San Dieguito Watershed SWMM Parameters

Table A-9: San Dieguito River Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	304.92	30	16.35%	10%	0.012	0.15	0.05	0.10	25%
B	74.03	7	16.40%	10%	0.012	0.15	0.05	0.10	25%
C	5.41	1	16.50%	10%	0.012	0.15	0.05	0.10	25%
D	533.66	52	16.07%	11%	0.012	0.15	0.05	0.10	25%

Table A-10: San Dieguito River Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	32.72	3	11.90%	22%	0.012	0.15	0.05	0.10	25%
B	4.85	0.5	3.27%	42%	0.012	0.15	0.05	0.10	25%
C	257.06	25	9.39%	31%	0.012	0.15	0.05	0.10	25%
D	3247.43	315	9.16%	30%	0.012	0.15	0.05	0.10	25%

Table A-11: San Dieguito River Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	1640.99	159	14.67%	19%	0.012	0.15	0.05	0.10	25%
B	538.60	52	12.43%	21%	0.012	0.15	0.05	0.10	25%
C	1200.70	116	17.09%	25%	0.012	0.15	0.05	0.10	25%
D	16223.04	1571	17.49%	24%	0.012	0.15	0.05	0.10	25%

Table A-12: San Dieguito River Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	22792.85	2208	16.00%	16%	0.012	0.15	0.05	0.10	25%
B	12916.07	1251	14.50%	16%	0.012	0.15	0.05	0.10	25%
C	70226.09	6802	17.95%	15%	0.012	0.15	0.05	0.10	25%
D	86888.08	8416	26.80%	13%	0.012	0.15	0.05	0.10	25%

San Luis Rey Watershed SWMM Parameters

Table A-13: San Luis Rey River Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	882.77	19	13.01%	24%	0.012	0.15	0.05	0.10	25%
B	630.17	14	13.37%	24%	0.012	0.15	0.05	0.10	25%
C	801.92	17	14.55%	20%	0.012	0.15	0.05	0.10	25%
D	1831.81	40	13.74%	20%	0.012	0.15	0.05	0.10	25%

Table A-14: San Luis Rey River Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	11583.70	251	15.84%	12%	0.012	0.15	0.05	0.10	25%
B	3901.74	84	15.08%	14%	0.012	0.15	0.05	0.10	25%
C	22677.02	491	15.75%	13%	0.012	0.15	0.05	0.10	25%
D	34871.15	755	16.03%	12%	0.012	0.15	0.05	0.10	25%

Table A-15: San Luis Rey River Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	26968.00	584	15.40%	26%	0.012	0.15	0.05	0.10	25%
B	8036.86	174	15.21%	28%	0.012	0.15	0.05	0.10	25%
C	45902.52	993	15.58%	24%	0.012	0.15	0.05	0.10	25%
D	66408.60	1437	14.87%	29%	0.012	0.15	0.05	0.10	25%

Table A-16: San Luis Rey River Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	45012.92	974	19.29%	15%	0.012	0.15	0.05	0.10	25%
B	440.52	10	18.73%	12%	0.012	0.15	0.05	0.10	25%
C	20690.04	448	24.13%	8%	0.012	0.15	0.05	0.10	25%
D	65878.92	1426	20.82%	15%	0.012	0.15	0.05	0.10	25%

Sweetwater Watershed SWMM Parameters

Table A-17: Sweetwater Project Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	10.91	0.33	3.6%	48%	0.012	0.15	0.05	0.10	25%
B	0.25	0.01	3.3%	42%	0.012	0.15	0.05	0.10	25%
C	133.69	4	5.8%	45%	0.012	0.15	0.05	0.10	25%
D	109.99	3	5.2%	47%	0.012	0.15	0.05	0.10	25%

Table A-18: Sweetwater Non-Exempt Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	4.60	0.1	3.6%	45%	0.012	0.15	0.05	0.10	25%
B	58.00	2	3.9%	40%	0.012	0.15	0.05	0.10	25%
C	141.55	4	5.6%	37%	0.012	0.15	0.05	0.10	25%
D	735.80	22	4.5%	42%	0.012	0.15	0.05	0.10	25%

Table A-19: Sweetwater Developed & Non-Developable Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	850.76	26	13.6%	29%	0.012	0.15	0.05	0.10	25%
B	748.45	23	10.1%	44%	0.012	0.15	0.05	0.10	25%
C	4827.23	147	13.0%	40%	0.012	0.15	0.05	0.10	25%
D	16715.79	511	12.1%	42%	0.012	0.15	0.05	0.10	25%

Table A-20: Sweetwater Dammed Lands.

HSG	Area (ac)	Width (ft)	Slope	% Imperv	N-IMP	N-Perv	D store-Imperv (in)	D store-Perv (in)	%Zero-Imperv
A	10871.62	332	15.7%	16%	0.012	0.15	0.05	0.10	25%
B	9974.55	305	16.6%	16%	0.012	0.15	0.05	0.10	25%
C	24732.95	756	18.7%	14%	0.012	0.15	0.05	0.10	25%
D	70655.14	2160	21.5%	11%	0.012	0.15	0.05	0.10	25%

Attachment 4

Stability Thresholds for Stream Restoration Materials

Fischenich (2001)

Stability Thresholds for Stream Restoration Materials

by Craig Fischenich[1]

May 2001

Complexity	***Value as a Planning Tool***	***Cost***
Low Moderate High	Low Moderate High	Low Moderate High

OVERVIEW

Stream restoration projects usually involve some modification to the channel or the banks. Designers of stabilization or restoration projects must ensure that the materials placed within the channel or on the banks will be stable for the full range of conditions expected during the design life of the project. Unfortunately, techniques to characterize stability thresholds are limited. Theoretical approaches do not exist and empirical data mainly consist of velocity limits, which are of limited value.

Empirical data for shear stress or stream power are generally lacking, but the existing body of information is summarized in this technical note. Whereas shear thresholds for soils found in channel beds and banks are quite low (generally < 0.25 lb/sf), those for vegetated soils (0.5 – 4 lb/sf), erosion control materials and bioengineering techniques (0.5 – 8 lb/sf), and hard armoring (< 13 lb/sf) offer options to provide stability.

STABILITY CRITERIA

The stability of a stream refers to how it accommodates itself to the inflowing water and sediment load. In general, stable streams may adjust their boundaries but do not exhibit trends in changes to their geometric character. One form of instability occurs when a stream is unable to transport its sediment load (i.e., sediments deposited within the channel), leading to the condition referred to as aggradation.

When the ability of the stream to transport sediment exceeds the availability of sediments within the incoming flow, and stability thresholds for the material forming the boundary of the channel are exceeded, erosion occurs. This technical note deals with the latter case of instability and distinguishes the presence or absence of erosion (threshold condition) from the magnitude of erosion (volume).

Erosion occurs when the hydraulic forces in the flow exceed the resisting forces of the channel boundary. The amount of erosion is a function of the relative magnitude of these forces and the time over which they are applied. The interaction of flow with the boundary of open channels is only imperfectly understood. Adequate analytical expressions describing this interaction have not yet been developed for conditions associated with natural channels. Thus, means of characterizing erosion potential must rely heavily upon empiricism.

Traditional approaches for characterizing erosion potential can be placed in one of two categories: maximum permissible velocity, and tractive force (or critical shear stress). The former approach is advantageous in that velocity is a parameter that can be measured within the flow. Shear stress cannot be directly measured – it must be computed from other flow parameters. Shear stress is a better measure of the fluid force on the channel boundary than is velocity. Moreover, conventional guidelines, including ASTM standards, rely upon the shear stress as a

[1] USAE Research and Development Center, Environmental Laboratory, 3909 Halls Ferry Rd., Vicksburg MS 39180

means of assessing the stability of erosion control materials. Both approaches are presented in this paper.

Incipient Motion (Threshold Condition)

As flow over the bed and banks of a stream increases, a condition referred to as the threshold state is reached when the forces tending to move materials on the channel boundary are in balance with those resisting motion. The forces acting on a noncohesive soil particle lying on the bed of a flowing stream include hydrodynamic lift, hydrodynamic drag, submerged weight ($F_w – F_b$), and a resisting force F_r. as seen in Figure 1. The drag is in the direction of the flow and the lift and weight are normal to the flow. The resisting force depends on the geometry of the particles. At the threshold of movement, the resultant of the forces in each direction is zero. Two approaches for defining the threshold state are discussed herein, initial movement being specified in terms of either a critical velocity (v_{cr}) or a critical shear stress (τ_{cr}).

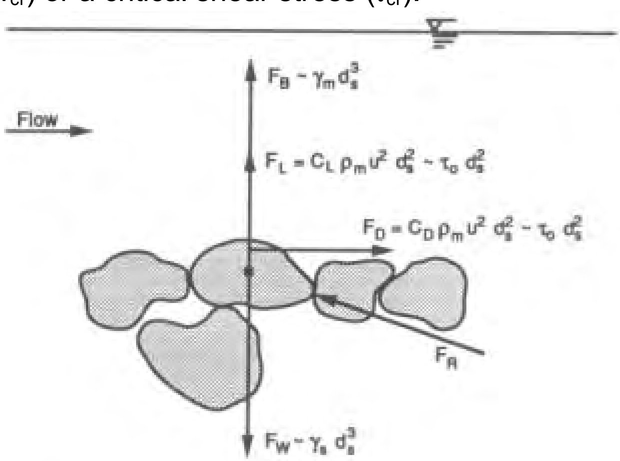

Figure 1. Forces acting on the boundary of a channel (adapted from Julien (1995)).

Critical Velocity

Figure 1 shows that both the lift and the drag force are directly related to the velocity squared. Thus, small changes in the velocity could result in large changes in these forces. The permissible velocity is defined as the maximum velocity of the channel that will not cause erosion of the channel boundary. It is often called the critical velocity because it refers to the condition for the initiation of motion. Early works in canal design and in evaluating the stability of waterways relied upon this method. Considerable empirical data exist relating maximum velocities to various soil and vegetation conditions.

However, this simple method for design does not consider the channel shape or flow depth. At the same mean velocity, channels of different shapes or depths may have quite different forces acting on the boundaries. Critical velocity is depth-dependent, and a correction factor for depth must be applied in this application. Despite these limitations, maximum permissible velocity can be a useful tool in evaluating the stability of various waterways. It is most frequently applied as a cursory analysis when screening alternatives.

Critical Shear Stress

The forces shown in Figure 1 can also be expressed in terms of the shear stress. Shear stress is the force per unit area in the flow direction. Its distribution in steady, uniform, two-dimensional flow in the channel can be reasonably described. An estimate of the average boundary shear stress (τ_o) exerted by the fluid on the bed is:

$$\tau_o = \gamma D S_f \tag{1}$$

where γ is the specific weight of water, D is the flow depth (~ hydraulic radius), and S_f is the friction slope. Derived from consideration of the conservation of linear momentum, this quantity is a spatial average and may not provide a good estimate of bed shear at a point.

Critical shear stress (τ_{cr}) can be defined by equating the applied forces to the resisting forces. Shields (1936) determined the threshold condition by measuring sediment transport for values of shear at least twice the critical value and then extrapolating to the point vanishing sediment transport. His laboratory experiments have since served as a basis for defining critical shear stress. For soil grains of diameter d and angle of repose ϕ on a flat bed, the following relations can approximate the critical shear for various sizes of sediment:

$$\tau_{cr} = 0.5(\gamma_s - \gamma_w) d \, Tan \phi \quad \text{For clays} \tag{2}$$

$$\tau_{cr} = 0.25 d_*^{-0.6} (\gamma_s - \gamma_w) d \, Tan \phi \quad \text{For silts and sands} \tag{3}$$

$\tau_{cr} = 0.06(\gamma_s - \gamma_w)d\ Tan\phi$ For gravels and cobbles (4)

Where

$$d_* = d\left[\frac{(G-1)g}{\nu^2}\right]^{1/3} \quad (5)$$

γ_s = the unit weight of the sediment
γ_w = the unit weight of the water/sediment mixture
G = the specific gravity of the sediment
G = gravitational acceleration
ν = the kinematic viscosity of the water/sediment mixture

The angle of repose φ for noncohesive sediments is presented in Table 1 (Julien 1995), as are values for critical shear stress. The critical condition can be defined in terms of shear velocity rather than shear stress (note that shear velocity and channel velocity are different). Table 1 also provides limiting shear velocity as a function of sediment size. The V_{*c} term is the critical shear velocity and is equal to

$$V_{*c} = \sqrt{gR_hS_f} \quad (6)$$

Table 1. Limiting Shear Stress and Velocity for Uniform Noncohesive Sediments

Class name	d_s (in)	φ (deg)	τ_{*c}	τ_{cr} (lb/sf)	V_{*c} (ft/s)
Boulder					
Very large	>80	42	0.054	37.4	4.36
Large	>40	42	0.054	18.7	3.08
Medium	>20	42	0.054	9.3	2.20
Small	>10	42	0.054	4.7	1.54
Cobble					
Large	>5	42	0.054	2.3	1.08
Small	>2.5	41	0.052	1.1	0.75
Gravel					
Very coarse	>1.3	40	0.050	0.54	0.52
Coarse	>0.6	38	0.047	0.25	0.36
Medium	>0.3	36	0.044	0.12	0.24
Fine	>0.16	35	0.042	0.06	0.17
Very fine	>0.08	33	0.039	0.03	0.12
Sands					
Very coarse	>0.04	32	0.029	0.01	0.070
Coarse	>0.02	31	0.033	0.006	0.055
Medium	>0.01	30	0.048	0.004	0.045
Fine	>0.005	30	0.072	0.003	0.040
Very fine	>0.003	30	0.109	0.002	0.035
Silts					
Coarse	>0.002	30	0.165	0.001	0.030
Medium	>0.001	30	0.25	0.001	0.025

Table 1 provides limits best applied when evaluating idealized conditions, or the stability of sediments in the bed. Mixtures of sediments tend to behave differently from uniform sediments. Within a mixture, coarse sediments are generally entrained at lower shear stress values than presented in Table 1. Conversely, larger shear stresses than those presented in the table are required to entrain finer sediments within a mixture.

Cohesive soils, vegetation, and other armor materials can be similarly evaluated to determine empirical shear stress thresholds. Cohesive soils are usually eroded by the detachment and entrainment of soil aggregates. Motivating forces are the same as those for noncohesive banks; however, the resisting forces are primarily the result of cohesive bonds between particles. The bonding strength, and hence the soil erosion resistance, depends on the physio-chemical properties of the soil and the chemistry of the fluids. Field and laboratory experiments show that intact, undisturbed cohesive soils are much less susceptible to flow erosion than are non-cohesive soils.

Vegetation, which has a profound effect on the stability of both cohesive and noncohesive soils, serves as an effective buffer between the water and the underlying soil. It increases the effective roughness height of the boundary, increasing flow resistance and displacing the velocity upwards away from the soil, which has the effect of reducing the forces of drag and lift acting on the soil surface. As the boundary shear stress is proportional to the square of the near-bank velocity, a reduction in this velocity produces a much greater reduction in the forces responsible for erosion.

Vegetation armors the soil surface, but the roots and rhizomes of plants also bind the soil and introduce extra cohesion over and above any intrinsic cohesion that the bank material may have. The presence of vegetation does not render underlying soils immune from erosion, but the critical condition for erosion of a vegetated bank is usually the threshold of failure of the plant stands by snapping, stem scour, or uprooting, rather than for detachment and entrainment of the soils themselves. Vegetation failure usually occurs at much higher levels of flow intensity than for soil erosion.

Both rigid and flexible armor systems can be used in waterways to protect the channel bed from erosion and to stabilize side slopes. A wide array of differing armor materials are available to accomplish this. Many manufactured products have been evaluated to determine their failure threshold. Products are frequently selected using design graphs that present the flow depth on one axis and the slope of the channel on the other axis. Thus, the design is based on the depth/slope product (i.e., the shear stress). In other cases, the thresholds are expressed explicitly in terms of shear stress. Notable among the latter group are the field performance testing results of erosion control products conducted by the TXDOT/TTI Hydraulics and Erosion Control Laboratory (TXDOT 1999).

Table 2 presents limiting values for shear stress and velocity for a number of different channel lining materials. Included are soils, various types of vegetation, and number of different commonly applied stabilization techniques. Information presented in the table was derived from a number of different sources. Ranges of values presented in the table reflect various measures presented within the literature. In the case of manufactured products, the designer should consult the manufacturer's guidelines to determine thresholds for a specific product.

Uncertainty and Variability

The values presented in Table 2 generally relate to average values of shear stress or velocity. Velocity and shear stress are neither uniform nor steady in natural channels. Short-term pulses in the flow can give rise to instantaneous velocities or stresses of two to three times the average; thus, erosion may occur at stresses much lower than predicted. Because limits presented in Table 2 were developed empirically, they implicitly include some off this variability. However, natural channels typically exhibit much more variability than the flumes from which these data were developed.

Sediment load can also profoundly influence the ability of flow to erode underlying soils. Sediments in suspension have the effect of damping turbulence within the flow. Turbulence is an important factor in entraining materials from the channel boundaries. Thus, velocity and shear stress thresholds are 1.5 to 3 times that presented in the table for flows carrying high sediment loads.

In addition to variability of flow conditions, variation in the channel lining characteristics can influence erosion predictions. Natural bed material is neither spherical nor of uniform size. Larger particles may shield smaller ones from direct impact so that the latter fail to move until higher stresses are attained. For a given grain size, the true threshold criterion may vary by nearly an order of magnitude depending on the bed gradation. Variation in the installation of erosion control measures can reduce the threshold necessary to cause erosion.

Table 2. Permissible Shear and Velocity for Selected Lining Materials[1]

Boundary Category	Boundary Type	Permissible Shear Stress (lb/sq ft)	Permissible Velocity (ft/sec)	Citation(s)
Soils	Fine colloidal sand	0.02 - 0.03	1.5	A
	Sandy loam (noncolloidal)	0.03 - 0.04	1.75	A
	Alluvial silt (noncolloidal)	0.045 - 0.05	2	A
	Silty loam (noncolloidal)	0.045 - 0.05	1.75 – 2.25	A
	Firm loam	0.075	2.5	A
	Fine gravels	0.075	2.5	A
	Stiff clay	0.26	3 – 4.5	A, F
	Alluvial silt (colloidal)	0.26	3.75	A
	Graded loam to cobbles	0.38	3.75	A
	Graded silts to cobbles	0.43	4	A
	Shales and hardpan	0.67	6	A
Gravel/Cobble	1-in.	0.33	2.5 – 5	A
	2-in.	0.67	3 – 6	A
	6-in.	2.0	4 – 7.5	A
	12-in.	4.0	5.5 – 12	A
Vegetation	Class A turf	3.7	6 – 8	E, N
	Class B turf	2.1	4 - 7	E, N
	Class C turf	1.0	3.5	E, N
	Long native grasses	1.2 – 1.7	4 – 6	G, H, L, N
	Short native and bunch grass	0.7 - 0.95	3 – 4	G, H, L, N
	Reed plantings	0.1-0.6	N/A	E, N
	Hardwood tree plantings	0.41-2.5	N/A	E, N
Temporary Degradable RECPs	Jute net	0.45	1 – 2.5	E, H, M
	Straw with net	1.5 – 1.65	1 – 3	E, H, M
	Coconut fiber with net	2.25	3 – 4	E, M
	Fiberglass roving	2.00	2.5 – 7	E, H, M
Non-Degradable RECPs	Unvegetated	3.00	5 – 7	E, G, M
	Partially established	4.0-6.0	7.5 – 15	E, G, M
	Fully vegetated	8.00	8 – 21	F, L, M
Riprap	6 – in. d_{50}	2.5	5 – 10	H
	9 – in. d_{50}	3.8	7 – 11	H
	12 – in. d_{50}	5.1	10 – 13	H
	18 – in. d_{50}	7.6	12 – 16	H
	24 – in. d_{50}	10.1	14 – 18	E
Soil Bioengineering	Wattles	0.2 – 1.0	3	C, I, J, N
	Reed fascine	0.6-1.25	5	E
	Coir roll	3 - 5	8	E, M, N
	Vegetated coir mat	4 - 8	9.5	E, M, N
	Live brush mattress (initial)	0.4 – 4.1	4	B, E, I
	Live brush mattress (grown)	3.90-8.2	12	B, C, E, I, N
	Brush layering (initial/grown)	0.4 – 6.25	12	E, I, N
	Live fascine	1.25-3.10	6 – 8	C, E, I, J
	Live willow stakes	2.10-3.10	3 – 10	E, N, O
Hard Surfacing	Gabions	10	14 – 19	D
	Concrete	12.5	>18	H

[1] Ranges of values generally reflect multiple sources of data or different testing conditions.

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al and instantaneous values for
ters. Guidance for making these
s presented in the section titled
below.

MAGNITUDE

g discussion dealt with the bsence of erosion, but did not xtent to which erosion might ven flow. If the thresholds Table 2 are exceeded, erosion ected to occur. In reality, even resholds are not exceeded, some ew select locations may occur. which this minor erosion could nificant concern depends in large he duration of the flow, and upon he stream to transport those ents.

n

stated, limits regarding erosion shed by manufacturers for cts are typically developed from short flow durations. They do not ential for severe erosion damage t from moderate flow events over . Studies have shown that w reduces erosion resistance of f erosion control products, as res 2 - 4. A factor of safety plied when flow duration exceeds urs.

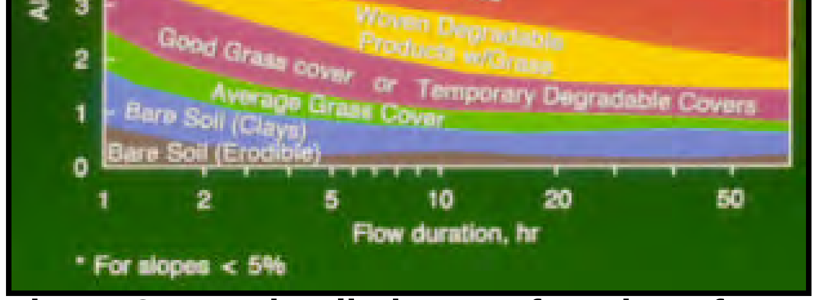

Figure 2. Erosion limits as a function of flow duration (from Fischenich and Allen (2000)).

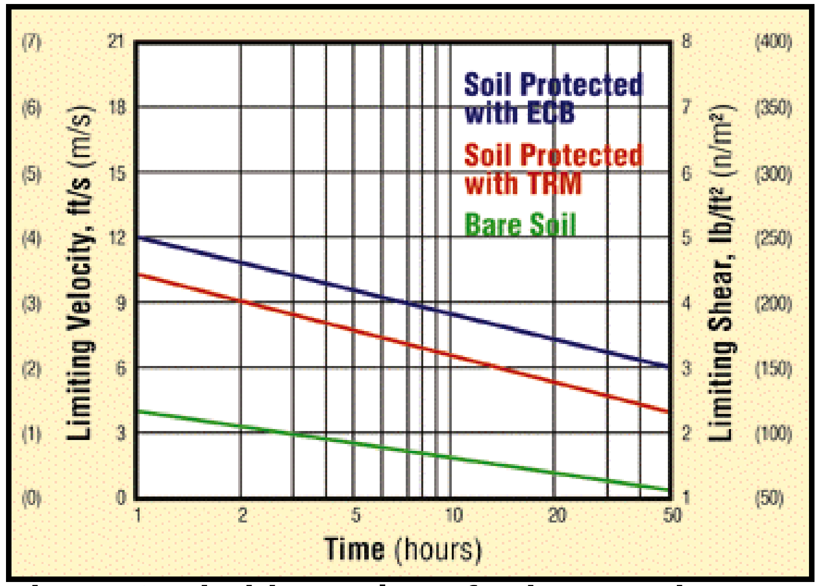

Figure 3. Limiting values for bare and TRM protected soils (from Sprague (1999))

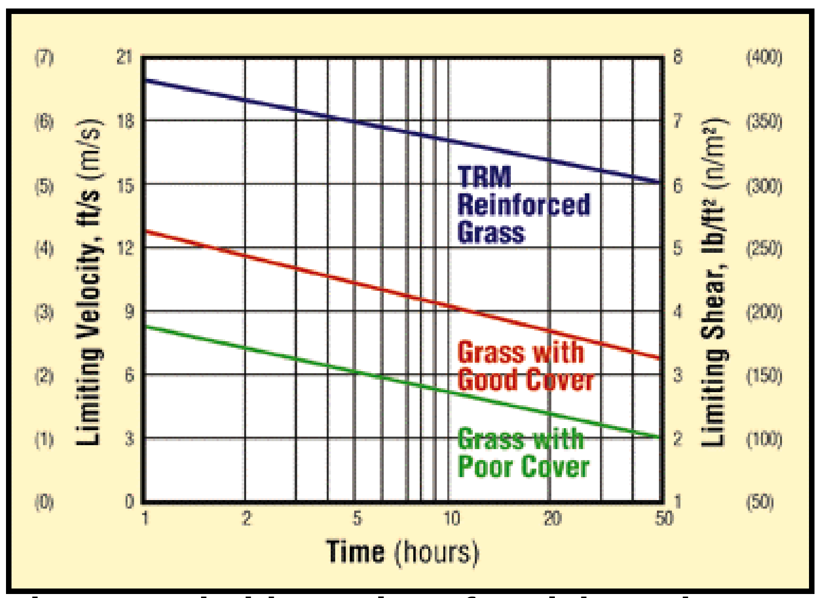

Figure 4. Limiting values for plain and TRM reinforced grass (from Sprague (1999))

Correlations between flow volume and amount of erosion tend to be poor. Multi-peaked flows may be more effective than single flows of comparable or greater magnitude because of the increased incidence of wetting. Flows with long durations often have a more significant effect on erosion than short-lived flows of higher magnitude. Sediment transport analysis can be used to gauge the magnitude of erosion potential in the channel design, but predictive capability is limited.

Sediment Transport

A number of flow measures can be used to assess the ability of a stream to transport sediment. The unit stream power (P_m) is one common approach, and is related to the earlier discussion in that stream power includes both velocity and shear stress as components. Sediment transport (Q_s) increases when the unit stream power (P_m) increases. Unit stream power in turn is controlled by both tractive stress and flow velocity:

$$P_m = v \cdot \tau = v \cdot \gamma_w \cdot D \cdot S_f \quad (7)$$

The total power (P_t) is the product of the unit power times the channel width (W):

$$P_t = P_m \cdot W = v \cdot W \cdot D \cdot \gamma_w \cdot S_f = v \cdot A \cdot \gamma_w \cdot S_f = Q_w \cdot \gamma_w \cdot S_f \quad (8)$$

Stream power assessments can be useful in evaluating sediment discharge within a stream channel and the deposition or erosion of sediments from the streambed. However, their utility for evaluating the stability of measures applied to prevent erosion is limited because of the lack of empirical data relating stream power to stability. The analysis of general streambank erosion is not a simple extension of the noncohesive bed case with an added downslope gravity component. Complication is added by other influencing variables, such as vegetation, whose root system can reinforce bank material and increase erosion resistance. Factors influencing bank erosion are summarized in Table 3.

Table 3. Factors Influencing Erosion

actor	*elevant characteristics*
low properties	lagnitude, frequency and variability of stream discharge; Magnitude and distribution of elocity and shear stress; Degree of turbulence
ediment composition	ediment size, gradation, cohesion and stratification
limate	ainfall amount, intensity and duration; Frequency and duration of freezing
ubsurface conditions	eepage forces; Piping; Soil moisture levels
hannel geometry	Vidth and depth of channel; Height and angle of bank; Bend curvature
iology	egetation type, density and root character; Burrows
nthropogenic factors	Irbanization, flood control, boating, irrigation

APPLICATION

The stability of a waterway or the suitability of various channel linings can be determined by first calculating both the mean velocity and tractive stress (by the previous equations). These values can then be compared with allowable velocity and tractive stress for a particular ground cover or lining system under consideration (e.g., existing vegetation cover, an erosion control blanket, or bioengineering treatment). Allowable tractive stresses for various types of soil, linings, ground covers, and stabilization measures including soil bioengineering treatments, are listed in Table 2. Additionally, manufacturers' product literature can provide allowable tractive stresses or velocities for various types of erosion control products.

An iterative procedure may be required when evaluating channel stability because various linings will affect the resistance coefficient, which in turn may change the estimated flow conditions. A general procedure for the application of information presented in this paper is outlined in the following paragraphs.

Step 1-Estimate Mean Hydraulic Conditions.
Flow of water in a channel is governed by the discharge, hydraulic gradient, channel geometry, and roughness coefficient. This functional relationship is most frequently evaluated using normal depth or backwater computations that take into account principles of conservation of linear momentum. The latter is preferable because it accounts for variations in momentum slope, which is directly related to shear stress. Several models are available to aid the hydraulic engineer in assessing hydraulic conditions. Notable examples include HEC-2, HEC-RAS, and WSP2. Channel cross sections, slopes, and Manning's coefficients should be determined based upon surveyed data and observed or predicted channel boundary conditions. Output from the model should be used to compute main channel velocity and shear stress at each cross section.

Step 2- Estimate Local/Instantaneous Flow Conditions.
The computed values for velocity and shear stress may be adjusted to account for local variability and instantaneous values higher than mean. A number of procedures exist for this purpose. Most commonly applied are empirical methods based upon channel form and irregularity. Several references at the end of this paper present procedures to make these adjustments. Chang (1988) is a good example. For straight channels, the local maximum shear stress can be assumed from the following simple equation:

$$t_{max} = 1.5t \tag{9}$$

for sinuous channels, the maximum shear stress should be determined as a function of the planform characteristics using Equation 10:

$$t_{max} = 2.65\, t \left(\frac{R_c}{W}\right)^{-0.5} \tag{10}$$

where R_c is the radius of curvature and W is the top width of the channel. Equations 9 and 10 adjust for the spatial distribution of shear stress; however, temporal maximums in turbulent flows can be 10 – 20 percent higher, so an adjustment to account for instantaneous maximums should be added as well. A factor of 1.15 is usually applied.

Step 3- Determine Existing Stability.
Existing stability should be assessed by comparing estimates of local and instantaneous shear and velocity to values presented in Table 2. Both the underlying soil and the soil/vegetation condition should be assessed. If the existing conditions are deemed stable and are in consonance with other project objectives, then no further action is required. Otherwise, proceed to step 4.

Step 4- Select Channel Lining Material.
If existing conditions are unstable, or if a different material is needed along the channel perimeter to meet project objectives, a lining material or stabilization measure should be selected from Table 2, using the threshold values as a guideline in the selection. Only material with a threshold exceeding the predicted value should be selected. The other project objectives can also be used at this point to help select from among the available alternatives. Fischenich and Allen (2000) characterize attributes of various protection measures to help in the selection.

Step 5- Recompute Flow Values.
Resistance values in the hydraulic computations should be adjusted to reflect the selected channel lining, and hydraulic condition should be recalculated for the channel. At this point, reach- or section-averaged hydraulic conditions should be adjusted to account for local and instantaneous extremes.
Table 4 presents velocity limits for various channel boundaries conditions. This table is useful in screening alternatives, or as an alternative to the shear stress analysis presented in the preceding sections.

Table 4. Stability of Channel Linings for Given Velocity Ranges

Lining	0 – 2 fps	2 – 4 fps	4 – 6 fps	6 – 8 fps	> 8 fps
Sandy Soils	Use Caution	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate
Firm Loam	Use Caution	Use Caution	Not Appropriate	Not Appropriate	Not Appropriate
Mixed Gravel and Cobbles	Appropriate	Use Caution	Use Caution	Not Appropriate	Not Appropriate
Average Turf	Appropriate	Use Caution	Use Caution	Not Appropriate	Not Appropriate
Degradable RECPs	Appropriate	Use Caution	Use Caution	Use Caution	Not Appropriate
Stabilizing Bioengineering	Appropriate	Use Caution	Use Caution	Use Caution	Not Appropriate
Good Turf	Appropriate	Appropriate	Use Caution	Use Caution	Use Caution
Permanent RECPs	Appropriate	Appropriate	Appropriate	Appropriate	Use Caution
Armoring Bioengineering	Appropriate	Appropriate	Appropriate	Appropriate	Use Caution
CCMs & Gabions	Appropriate	Appropriate	Appropriate	Appropriate	Use Caution
Riprap	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
Concrete	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate

Key:

(green)	**Appropriate**
(yellow)	**Use Caution**
(red)	**Not Appropriate**

Step 6– Confirm Lining Stability.
The stability of the proposed lining should be assessed by comparing the threshold values in Table 2 to the newly computed hydraulic conditions. These values can be adjusted to account for flow duration using Figures 2-4 as a guide. If computed values exceed thresholds, step 4 should be repeated. If the threshold is not exceeded, a factor of safety for the project should be determined from the following equations:

$$FS = \frac{t_{\max}}{t_{est}} \quad or \quad FS = \frac{V_{\max}}{V_{est}} \qquad (11)$$

In general, factors of safety in excess of 1.2 or 1.3 should be acceptable. The preceding five steps should be conducted for every cross section used in the analysis for the project. In the event that computed hydraulic values exceed thresholds for any desirable lining or stabilization technique, measures must be undertaken to reduce the energy within the flow. Such measures might include the installation of low-head drop structures or other energy-dissipating devices along the channel. Alternatively, measures implemented within the watershed to reduce total discharge could be employed.

APPLICABILITY AND LIMITATIONS

Techniques described in this technical note are generally applicable to stream restoration projects that include revegetation of the riparian zone or bioengineering treatments.

ACKNOWLEDGEMENTS

Research presented in this technical note was developed under the U.S. Army Corps of Engineers Ecosystem Management and Restoration Research Program. Technical reviews were provided by Messrs. E.A. (Tony) Dardeau, Jr., (Ret.), and Jerry L. Miller, both of the Environmental Laboratory.

POINTS OF CONTACT

For additional information, contact the author, Dr. Craig Fischenich, (601-634-3449, fischec@wes.army.mil), or the manager of the Ecosystem Management and Restoration Research Program, Dr. Russell F. Theriot (601-634-2733, therior@wes.army.mil).

This technical note should be cited as follows:

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USACE TR EL 97-8

Attachment 5

General Comments on Final Water Quality Improvement Plans and Notice of Noncompliance

Walsh (2015)

August 5, 2015 **Via Email Only**

San Diego County Principal Watershed Copermittees

In reply refer to / attn:
PIN :786088:LWalsh

Subject: General Comments on Final Water Quality Improvement Plans and Notice of Noncompliance

San Diego County Principal Watershed Copermittees:

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) received the Water Quality Improvement Plans (Plans) from the San Diego County Copermittees (Copermittees) on or before June 26, 2015, as required pursuant to Provision F.1.b.(1) of Order No. R9-2013-0001, *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region* (Order).

The Plans are the product of more than two years of concentrated Plan development efforts by the Copermittees. These Plans were prepared in phases and the Copermittees received regular input from the San Diego Water Board, industry professionals, non-governmental environmental organizations, and community members as part of feedback from the Water Quality Improvement Consultation Panel groups and the public at large during multiple public workshops. While the San Diego Water Board recognizes this is the first time the Copermittees have prepared such Plans and acknowledges their efforts to comply with the requirements of the Order, some of the Plans did a better job of meeting the requirements of the Order than others.

The San Diego Water Board is confident that once the Plans are in compliance with the requirements of the Order and accepted by the San Diego Water Board, the Copermittees' jurisdictional runoff management programs (JRMPs) will have the greatest potential to achieve significant reductions in pollutant loads in MS4 discharges and improvements in receiving water quality to the level supportive of beneficial uses within the shortest possible time.

In addition to reviewing the Plans for compliance with the requirements of the Order, the San Diego Water Board reviewed the acceptability of the Plans. The Order allows the Copermittees to develop Plans that prioritize the water quality conditions to address sooner rather than later, and to set numeric goals and schedules to address the highest priorities. However, not all proposed priorities, goals, and schedules will be determined acceptable, especially if the San Diego Water Board determines that a Plan will not achieve water quality improvements within a reasonable period of time. While the elements of a Plan may meet the requirements of the Order, those elements must also meet the intent of the Order which is instrumental to achieving the goals of the San Diego Water Board's Practical Vision.

The San Diego Water Board has not yet completed a detailed review of each Plan. At this time, the San Diego Water Board is providing general comments for all the Plans because there are several issues of concern already identified that make the Plans unacceptable, as well as noncompliant with the requirements of the Order. When the detailed reviews are completed the San Diego Water Board staff will schedule a time to meet with the Copermittees for each Watershed Management Area, as soon as practicable and anticipated to be before the end of August 2015, to discuss specific issues that need to be addressed in each Plan. At the meetings, the San Diego Water Board may have Plan-specific comments in addition to the issues identified below.

Until then, the issues identified below must be adequately addressed for the Plans to be considered acceptable by the San Diego Water Board, and to be in compliance with the requirements of Order. Not all of the following comments and areas of noncompliance are applicable to every Plan or to every Copermittee, so the San Diego County Copermittees should review the Plans to determine where the following issues are applicable to their watershed and their jurisdiction.

PRIORITY WATER QUALITY CONDITIONS

1. *Identification of Priority Water Quality Conditions*

Requirements: Provisions B.2.a through B.2.c of the Order require the Copermittees to identify the priority water quality conditions that will be evaluated to determine which of those conditions will be the highest priorities to be addressed by the Plan. Provisions B.2.a through B.2.c require the Copermittees to consider several sources of data and information to identify priority water quality conditions within the Watershed Management Area, and whether there is a potential that MS4 discharges may be causing or contributing to those conditions.

Issues of Concern: Each Plan includes a description of the process to review different sources of data and information, including input from the public, to identify priority water quality conditions. The San Diego Water Board, however, has found the following general issues of concern:

a) In several Plans, the San Diego Water Board did not find a fully inclusive list of all priority water quality conditions (i.e. pollutants, stressors, receiving water conditions) that should have been identified in data and information that were required to be considered pursuant to Provisions B.2.a and B.2.b. Pursuant to

Provision B.2.c.(1), a fully inclusive list was required to be evaluated to identify which of those conditions were the highest threat to receiving water quality, or most adversely affect the quality of receiving waters.

b) In at least one Plan, there was not enough description or information that allowed the San Diego Water Board to determine if all the factors under Provisions B.2.a and B.2.b were adequately considered or not.

c) A few Plans have identified bacteria as a highest priority water quality condition based on the Revised Total Maximum Daily Loads (TMDLs) for Indicator Bacteria, Project I – Twenty Beaches and Creek in the San Diego Region (Beaches and Creeks Bacteria TMDLs), but the segment which the highest priority water quality condition is based on is no longer identified as impaired on the Clean Water Act Section 303(d) List (303(d) List).

Noncompliant Priority Water Quality Conditions: In several Plans, there was a notable absence of one or more pollutants or conditions of concern known to the San Diego Water Board (e.g. trash, hydromodification, benthic alteration, stream or riparian habitat degradation) that were also identified in reports, plans, and data cited and reviewed by the Copermittees (e.g. 2011 Long Term Effectiveness Assessment). In a few Plans, there was also a notable absence of pollutants or conditions of concern identified by the public at workshops or Water Quality Improvement Plan Consultation Panel meetings, and in written comments from stakeholders and the public. The lists developed pursuant to Provision B.2.c.(1) that do not acknowledge and include these notably absent pollutants and conditions of concern are not in compliance with the requirements of Provisions B.2.a-c.

Unacceptable Priority Water Quality Conditions: A few Plans have bacteria as a highest priority water quality condition only because of the Beaches and Creeks Bacteria TMDLs, but there is no longer an impairment identified on the 303(d) List. If there are no strategies proposed to be implemented other than the requirements of Provisions E.2 through E.7 to address bacteria, or there are no load reductions quantified for other pollutants in addition to bacteria, or both, the Plans are not acceptable to the San Diego Water Board.

WATER QUALITY IMPROVEMENT GOALS

2. Final Numeric Goals

Requirements: Provision B.3.a.(1)(a) of the Order requires the Copermittees to include final numeric goals in the Plan to address the highest priority water quality conditions. Each final numeric goal must either demonstrate the discharges from the Copermittees' MS4s will not cause or contribute to exceedances of water quality standards in receiving waters, or the receiving waters are protected from the Copermittees' MS4 discharges, or both (see Provisions B.3.a.(1)(a)(i)-(iii)).

Issues of Concern: Each Plan includes final numeric goals for the highest priority water quality conditions. The San Diego Water Board, however, has found the following general issues of concern:

a) Several Plans include proposed final numeric goals expressed in a manner that is difficult for the San Diego Water Board to determine the final numeric goal is a criterion or indicator capable of demonstrating one or more of the criteria given in Provisions B.3.a.(1)(a)(i)-(iii). In addition, the San Diego Water Board questions how some of these proposed final numeric goals could be measured by the Copermittees.

b) Several proposed final numeric goals appear to be in conflict with the prohibitions and limitations in Provision A of the Order. For example, there are Plans with proposed final numeric goals associated with reducing non-storm water discharges from the MS4s, but the San Diego Water Board cannot determine how achievement of the proposed final numeric goal is in compliance with the requirement to effectively prohibit non-storm water discharges to the MS4 (Provision A.1.b).

c) There are proposed final numeric goals that are difficult for the San Diego Water Board to establish a link between achieving the final numeric goal and addressing the highest priority water quality condition. For example, there are Plans with proposed final numeric goals associated with reducing non-storm water discharges from the MS4s to achieve reductions of pollutants in MS4 discharges (e.g. bacteria) during wet weather and dry weather conditions; however, the MS4 discharge reduction metric (e.g. flow) does not quantify the pollutant reduction that will be achieved during wet weather or dry weather conditions.

d) Some proposed final numeric goals did not meet the criteria of Provision B.3.a.(1)(a), but could be acceptable interim numeric goals.

Noncompliant Final Numeric Goals: Final numeric goals that are not numeric, AND measureable, AND capable of demonstrating the Copermittees' MS4s will not cause or contribute to exceedances of receiving water limitations, or the receiving waters are protected from the Copermittees' MS4 discharges, or both, are not in compliance with the requirements of Provision B.3.a.(1)(a).

Unacceptable Final Numeric Goals: The following proposed final numeric goals are not acceptable to the San Diego Water Board:

a) Final numeric goals that are not consistent or do not demonstrate compliance with the prohibitions and limitations of the Provision A.

b) Final numeric goals with a metric that is unclear about how it will be measured, and lacks any description of, or reference to the data that will be collected to measure the metric.

c) Final numeric goals that do not clearly demonstrate achievement of the final numeric goal will result in MS4 discharges that do not cause or contribute to exceedances of water quality standards in receiving waters, or the receiving waters are protected from the Copermittees' MS4 discharges, or both.

d) Final numeric goals that do not have a metric that clearly demonstrates a link to addressing the highest priority water quality conditions.

3. Interim Numeric Goals

Requirements: Provision B.3.a.(1)(b) of the Order requires the Copermittees to include interim numeric goals in the Plan for each final numeric goal. The Copermittees are allowed to propose as many interim numeric goals for each final numeric goal as they determine appropriate (Provision B.3.a.(b)(i)), but must include at least one interim numeric goal that is expressed as a reasonable increment of the final numeric goal. This interim numeric goal is expected to be in the same or a similar metric as the final numeric goal (Provision B.3.a.(b)(ii)). At least one interim numeric goal is required to be established during each 5 year period between the acceptance of the Plan and the achievement of the final numeric goal (Provision B.3.a.(b)(iii)).

Issues of Concern: In at least one Plan, the San Diego Water Board has found proposed final numeric goals that do not have interim numeric goals that are expressed in the same or similar metric as the final numeric goals.

Noncompliant Interim Numeric Goals: Final numeric goals that do not have at least one interim numeric goal expressed as a reasonable increment in the same or similar metric as the final numeric goal are not in compliance with Provision B.3.a.(1)(b)(ii).

WATER QUALITY IMPROVEMENT STRATEGIES

4. Identification of Potential Water Quality Improvement Strategies

Requirements: Provision B.2.e of the Order requires the Copermittees to identify potential strategies that can result in improvements to water quality. Provision F.1.a.(2)(f) requires the Copermittees consider revisions to potential water quality improvement strategies they propose in the Plan based on public comments.

Issues of Concern: Most Plans include lists of water quality improvement strategies that may be implemented by the Copermittees. The San Diego Water Board, however, has found the following general issues of concern:

a) In at least one Plan, the San Diego Water Board was not able to locate the list of potential water quality improvement strategies developed during the public participation process in the Plan.

b) In at least one Plan, the San Diego Water Board could not find all the potential water quality improvement strategies suggested or recommended in public comments.

Noncompliant Potential Water Quality Improvement Strategies: Plans that do not identify all potential strategies that were considered for implementation to improve water quality are not in compliance with the requirements of Provision B.2.e. Plans that did not consider all the potential water quality improvement strategies submitted in public comments are also not in compliance with the requirements of Provision B.2.e.

5. *Optional Jurisdictional Strategies*

Requirements: Provision B.3.b.(1)(b) of the Order requires each Copermittee to identify the optional jurisdictional strategies that will be implemented within its jurisdiction, as necessary, to achieve final numeric goals. Each Copermittee is required to identify water quality improvement strategies that are in addition to the best management practice (BMP) implementation, inspection, enforcement, and education activities that are already required by Provisions E.2 through E.7 (Provision B.3.b.(1)(b)(i)). Optional jurisdictional strategies to encourage or implement retrofit projects and channel and habitat rehabilitation projects are also required to be provided (Provisions B.3.b.(1)(b)(ii) and (iii)). For each optional jurisdictional strategy that a Copermittee includes in the Plan, descriptions of the funds and/or resources needed, and the circumstances needed to trigger implementation of the strategy are also required (Provisions B.3.b.(1)(b)(iv) and (v), respectively).

Issues of Concern: All the Plans lacked enough information for the San Diego Water Board to make a determination that all the requirements of Provision B.3.b.(1)(b) have been met. The San Diego Water Board has found the following general issues of concern:

a) Several Copermittees did not include any proposed optional jurisdictional strategies to be implemented within their jurisdictions, as necessary, to effectively prohibit non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the maximum extent practicable (MEP), protect beneficial uses of receiving waters from MS4 discharges, or achieve proposed interim and final numeric goals.

b) Most Copermittees did not include an incentive or program to encourage or implement projects to retrofit areas of existing development within its jurisdiction.

Pursuant to Provision E.5.e.(1)(a), every Copermittee is required to identify areas of existing development within its jurisdiction as candidates for retrofitting. Therefore, every Copermittee should have some incentive or program to encourage implementation of retrofit projects in the areas of existing development identified in its JRMP document pursuant to Provision E.5.e.(1)(a), unless there is an acceptable rationale in the Plan describing why it is infeasible to encourage or implement such retrofit projects.

c) Most Copermittees did not include an incentive or program to encourage or implement projects that will rehabilitate the conditions of channels or habitats within its jurisdiction. Pursuant to Provision E.5.e.(2)(a), every Copermittee is required to identify streams, channels, and/or habitats in areas of existing development within its jurisdiction as candidates for rehabilitation. Therefore, every Copermittee should have some incentive or program to encourage implementation of projects to rehabilitate the conditions of channels or habitats within its jurisdiction identified in JRMP document pursuant to Provision E.5.e.(2)(a), unless there is an acceptable rationale in the Plan describing why it is infeasible to encourage or implement such rehabilitation projects.

d) Of the Copermittees that did include proposed optional jurisdictional strategies, adequate information about the funds and/or resources needed to implement the strategy (e.g. plans to be developed, studies to be conducted, data to be collected, personnel needed, equipment needed, administrative structures required, contracts needed, land to be acquired, etc.) was not provided.

e) Of the Copermittees that did include proposed optional jurisdictional strategies, adequate information about the circumstances necessary to trigger implementation of the strategy (e.g. funding availability, obtain approval from city councils, findings from assessments or studies, etc.) was not provided.

f) Many proposed optional jurisdictional strategies did not appear to be a BMP, an incentive, or a program that could be implemented to effectively prohibit non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the MEP, protect beneficial uses of receiving waters from MS4 discharges, or achieve proposed interim and final numeric goals. Implementation of an optional jurisdictional strategy is expected to result in an improvement of water quality.

Noncompliant Optional Jurisdictional Strategies: The San Diego Water Board found that the proposed optional jurisdictional strategies in the Plans do not comply with the requirements of Provision B.3.b.(1)(b) as follows:

a) A Copermittee that did not propose any optional jurisdictional strategies to be implemented within its jurisdiction, as necessary, to effectively prohibit non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the MEP, protect beneficial uses of receiving waters from MS4 discharges, or achieve proposed interim and final numeric goals, in addition to the BMP implementation, inspection, enforcement, and education activities that are already required by Provisions E.2 through E.7 is not in compliance with the requirements of Provision B.3.b.(1)(b)(i).

b) Unless acceptable data or rationale are provided in the Plan, a Copermittee that did not propose any incentives or programs to encourage or implement projects to retrofit areas of existing development within its jurisdiction as optional jurisdictional strategies is not in compliance with the requirements of Provision B.3.b.(1)(b)(ii). A Copermittee that has not identified areas of existing development within its jurisdiction as candidates for retrofitting in its JRMP document also is not in compliance with Provision E.5.e.(1)(a), unless acceptable data or rationale is provided.

c) Unless acceptable data or rationale are provided in the Plan, a Copermittee that did not propose any incentives or programs to encourage or implement projects to rehabilitate channels or habitats within its jurisdiction as optional jurisdictional strategies is not in compliance with the requirements of Provision B.3.b.(1)(b)(iii). A Copermittee that has not identified projects to rehabilitate the conditions of channels or habitats within its jurisdiction in its JRMP document also is not in compliance with Provision E.5.e.(2)(a), unless acceptable data or rationale are provided.

d) A Copermittee that does not have any optional jurisdictional strategies in the Plan or has proposed an optional jurisdictional strategy without an adequate description of the funds and/or resources needed to implement the strategy is not in compliance with the requirements of Provision B.3.b.(1)(b)(iv).

e) A Copermittee that does not have any optional jurisdictional strategies in the Plan or has proposed an optional jurisdictional strategy without an adequate description of the circumstances needed to trigger implementation of the strategy is not in compliance with the requirements of Provision B.3.b.(1)(b)(v).

Unacceptable Optional Jurisdictional Strategies: The following proposed optional jurisdictional strategies are not acceptable to the San Diego Water Board:

a) Many proposed optional jurisdictional strategies are described using terms such as “consider”, “evaluate”, “investigate”, or “develop” a BMP, incentive, or program. These terms indicate to the San Diego Water Board that the Copermittee is only preparing for the implementation of a BMP, incentive, or program. Provision B.3.b.(1)(b) requires each Copermittee identify that optional jurisdictional strategies that ***will be*** implemented. Preparation for a strategy does not meet the requirement of a strategy that will be implemented.

b) Many proposed optional jurisdictional strategies describe development of a plan, conducting a special study or an assessment, or collecting data. Plans, special studies, assessments, and data collection are necessary steps to implement a strategy, but are not in and of themselves a strategy that will result in the effective prohibition of non-storm water discharges to the MS4, reduction of pollutants in storm water discharges from the MS4 to the MEP, protection of beneficial uses of receiving waters from MS4 discharges, or achievement of proposed interim and final numeric goals.

c) Several proposed optional jurisdictional strategies appear to be BMP implementation, inspection, enforcement, and education activities that are already being implemented or required to be implemented by the Copermittee pursuant to Provisions E.2 through E.7. Optional jurisdictional strategies are required in addition to the requirements of Provisions E.2 through E.7.

6. <u>Watershed Management Area Strategies</u>

Requirements: Provision B.3.b.(2) of the Order requires the Copermittees to identify Watershed Management Area strategies that will be implemented, as necessary, to achieve final numeric goals. The Copermittees are required to identify regional or multi-jurisdictional scale water quality improvement strategies (Provision B.3.b.(2)(a)). Watershed Management Area strategies to encourage or implement retrofit projects and channel and habitat rehabilitation projects are also required to be provided in the Plan (Provisions B.3.b.(2)(b) and (c)). For each Watershed Management Area strategy that the Copermittees includes in the Plan, descriptions of the funds and/or resources needed, and the circumstances needed to trigger implementation of the strategy are also required (Provisions B.3.b.(2)(d) and (e), respectively).

Issues of Concern: All the Plans lacked enough information about Watershed Management Area strategies to meet the requirements of Provision B.3.b.(2).

Noncompliant Watershed Management Area Strategies: The San Diego Water Board found that the Watershed Management Area strategies in the Plans do not comply with the requirements of Provision B.3.b.(2) as follows:

a) A Plan that did not propose any Watershed Management Area strategies to be implemented on a regional or multi-jurisdictional scale, as necessary, to effectively prohibit non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the MEP, protect beneficial uses of receiving waters from MS4 discharges, or achieve proposed interim and final numeric goals is not in compliance with the requirements of Provision B.3.b.(2)(a).

b) Unless acceptable data or rationale are provided in the Plan, a Plan that did not propose any incentives or programs to encourage or implement projects to retrofit areas of existing development as a Watershed Management Area strategy is not in compliance with the requirements of Provision B.3.b.(2)(b).

c) Unless acceptable data or rationale are provided in the Plan, a Plan that did not propose any incentives or programs to encourage or implement projects to rehabilitate channels, streams, or habitats as a Watershed Management Area strategy is not in compliance with the requirements of Provision B.3.b.(2)(c).

d) A Plan without Watershed Management Area strategies or a Plan that has a proposed Watershed Management Area strategy without information about the funds and/or resources needed to implement a Watershed Management Area strategy is not in compliance with the requirements of Provision B.3.b.(2)(d).

e) A Plan without Watershed Management Area strategies or a Plan that has a proposed Watershed Management Area strategy without a description of the circumstances needed to trigger implementation of Watershed Management Area strategy is not in compliance with the requirements of Provision B.3.b.(2)(e).

WATER QUALITY IMPROVEMENT SCHEDULES

7. *Schedules for Achieving Numeric Goals*

Requirement: Provision B.3.a.(2) of the Order requires the Copermittees to develop and incorporate schedules for achieving interim and final numeric goals. Provision B.3.a.(2) requires the schedules to incorporate TMDL compliance dates, incorporate ASBS compliance schedules, and be designed to achieve the interim and final numeric goals in the shortest time practicable taking into account the time required to implement water quality improvement strategies.

Issues of Concern: Each Plan includes schedules to achieve interim and final numeric goals. The San Diego Water Board, however, has found the following general issues of concern:

a) For Plans where the Beaches and Creeks Bacteria TMDLs are applicable and bacteria is the only highest priority water quality condition identified, and only final numeric goals are established for bacteria, the Plan is a Bacteria Load Reduction Plan (BLRP) not a Comprehensive Load Reduction Plan (CLRP). According to the Beaches and Creeks Bacteria TMDLs, the wet weather and dry weather dates for compliance with the final wasteload allocations (WLAs) must be no later than 10 years after the effective date of the TMDLs, which is April 4, 2021. For the Copermittees to have until April 4, 2031 (i.e. 20 years after the effective date of the TMDLs) to achieve the Beaches and Creeks Bacteria TMDLs WLAs, the Plan needs to be a CLRP and incorporate load reduction programs with quantified load reductions for other pollutants of concern in addition to bacteria.

b) Several Plans propose more than 20 years from the date the Plan was submitted to achieve final numeric goals if there are no applicable TMDL compliance dates. Schedules proposing to achieve final numeric goals in more than 20 years appear to be relying primarily on BMP implementation, inspection, enforcement, and education activities that are required to be implemented by the Copermittees pursuant to Provisions E.2 through E.7, with few, if any, commitments to implement optional jurisdictional strategies within the first 10 or more years.

Noncompliant Schedules for Achieving Numeric Goals: There are several Plans that have a proposed date to achieve compliance with the Beaches and Creeks Bacteria TMDLs by April 4, 2031. Unless the Plan includes quantified load reductions for pollutants in addition to bacteria, the April 4, 2031 date to achieve the final numeric goals for bacteria is not in compliance with the requirement to incorporate CLRPs into the Plan pursuant to Attachment E, Specific Provision 6.b.(2)(c)(i).

Unacceptable Schedules for Achieving Numeric Goals: The following proposed schedules to achieve numeric goals are not acceptable to the San Diego Water Board:

a) Schedules of 10 years or more to address only one highest priority water quality condition are not acceptable, unless there is information provided that allows the San Diego Water Board to make a determination that the schedules are clearly based on the time reasonably required to implement proposed optional jurisdictional strategies.

b) Schedules of 10 years or more to achieve final numeric goals without optional jurisdictional strategies proposed to be implemented within the next 5 years are not acceptable.

c) Schedules of 5 years or more to achieve final numeric goals for only addressing one highest priority water quality condition by eliminating unauthorized non-storm water discharges to and from the MS4 without optional jurisdictional strategies proposed to be implemented within the next 5 years are not acceptable.

8. ***Schedules for Implementing Strategies***

Requirements: Provision B.3.b.(3) of the Order requires the Copermittees to develop reasonable schedules for implementing the jurisdictional, optional jurisdictional, and Watershed Management Area strategies to achieve interim and final numeric goals. Provision B.3.b.(3) requires the schedules for implementing strategies to describe: 1) when jurisdictional strategies required pursuant to Provisions E.2 through E.7 will be implemented (Provision B.3.b.(3)(a)(i) and (ii)), 2) the shortest practicable time to secure funds and procure resources to initiate implementation of each optional jurisdictional strategy (Provision B.3.b.(3)(a)(iii)), and the shortest practicable time to secure funds and procure resources to initiate implementation of each Watershed Management Area strategy (Provision B.3.b.(3)(b)(i)). The schedules are also required to provide information about whether a strategy is expected to be a continuously implemented strategy (Provisions B.3.b.(3)(a)(iv) and B.3.b.(3)(b)(ii)) or strategy to be completed within a schedule (Provisions B.3.b.(3)(a)(v) and B.3.b.(3)(b)(iii)).

Issues of Concern: Each Plan includes schedules to implement strategies. The San Diego Water Board, however, has found the following general issues of concern:

a) In most Plans there were several proposed strategies that did not have any schedules associated with them, other than “to be determined.”

b) Most Plans lacked enough information about the shortest practicable time to secure funds and procure resources of initiate implementation of optional jurisdictional strategies and Watershed Management Area strategies.

c) For several strategies that appeared to be limited timeframe or structural projects, they lacked the information about the anticipated time to complete the project based on a realistic assessment of the shortest practicable time required.

Noncompliant Schedules for Implementing Strategies: The San Diego Water Board found that the schedules in the Plans for implementing strategies do not comply with the requirements of Provision B.3.b.(3) as follows:

a) Strategies that do not have a schedule are not in compliance with the requirements of Provision B.3.b.(3).

b) A Copermittee that does not have any optional jurisdictional strategies or has proposed an optional jurisdictional strategy without a description of the shortest practicable time to secure funds and procure resources to initiate implementation of the optional jurisdictional strategy is not in compliance with the requirements of Provision B.3.b.(3)(a)(iii).

c) A Plan without Watershed Management Area strategies or has a proposed Watershed Management Area strategy without a description of the shortest practicable time to secure funds and procure resources to initiate implementation of the optional jurisdictional strategy is not in compliance with the requirements of Provision B.3.b.(3)(b)(i).

d) Strategies that are expected to be completed within a limited timeframe without information about the anticipated time to complete the project based on a realistic assessment of the shortest practicable time required are not in compliance with the requirements of Provision B.3.b.(3)(a)(v) or B.3.b.(3)(b)(iii).

OTHER ISSUES

9. *__Hydromodification Management Exemptions__*

Requirements: Provision E.3.c.(2)(d) of the Order describes situations where the Copermittees have the discretion to exempt Priority Development Projects from the hydromodification management BMP performance requirements. Exemptions may be granted to projects that discharge to 1) existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean, or 2) conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. The Copermittees may also propose additional exemptions via the optional Watershed Management Area Analysis.

Issues of Concern: Most Plans proposed additional exemptions via the optional Watershed Management Area Analysis. The San Diego Water Board, however, has found issues of concern with proposed exemptions in Plans for two different Watershed Management Areas:

a) As part of the Watershed Management Area Analysis, the City of Carlsbad included a report entitled "*Hydromodification Exemption Analysis for Select Carlsbad Watersheds*" (Report). Based on the Report, the Copermittees in the Carlsbad Watershed Management Area proposed to add drainage areas upstream of the Buena Vista, Agua Hedionda, and Batiquitos Lagoons as exempt from hydromodification management BMP requirements. Instead of evaluating the drainage areas leading to the lagoons using an erosion potential (or equivalent) analysis, the Report studies the lagoons using the criteria for exemptions outlined in the Hydromodification Management Plan for the San Diego Region (HMP) that was approved by the San Diego Water Board in July, 2010. However, the HMP is predicated on requirements of the previous MS4 permit. When the Order was adopted in 2013, the only exemptions retained were those cited in Provision E.3.c.(2)(d), meaning exemptions are essentially limited to concrete-lined or underground drainage channels. Any additional exemptions, including "non-erodible drainage networks" as described in the Report, must be evaluated from an erosion potential (or equivalent) point of view and included in the optional Watershed Management Area Analysis.

   The Report describes rationale for exempting areas draining to Agua Hedionda and Batiquitos Lagoon, and different rationale for exemptions for areas draining to Buena Vista Lagoon. The discussions regarding the areas draining to Agua Hedionda and Batiquitos Lagoons indicate that these areas may meet the Order's requirement of being concrete lined all the way from the point of discharge to an enclosed embayment (lagoon). However, whether or not drainage conveyances from these areas act like "concrete lined channels" is unclear because the discussion is centered on criteria applicable to the HMP and not the Order.

For Buena Vista Lagoon, the Report states that: "*As long as a project discharges into a non-erodible drainage network that is continuous to a lagoon outlet, it is potentially eligible for a hydromodification exemption*." The Report continues to explain that in drainage areas upstream of Buena Vista Lagoon, "… *the intervening ground is densely vegetated and or naturally armored. The City Engineer found no evidence of erosion at or near the water's edge of the lagoon. Consequently, this area is identified as exempt*…."

In order for the San Diego Water Board to accept a conclusion that a conveyance system can be exempt from hydromodification management BMP requirements, the Report must include an analysis demonstrating that the natural area under review would not experience erosion for the range of storms considered to be geomorphically significant. Although these areas are presented as "naturally armored," because they are not concrete-lined, the systems must be evaluated from an erosion potential (or equivalent) point of view to determine if an exemption is appropriate.

b) In the San Diego River Water Quality Improvement Plan, the Watershed Management Area Analysis includes a proposed methodology for demonstrating that hydromodification management BMPs are not needed upstream of Forrester Creek, a channel stabilized with materials other than concrete. The proposed methodology includes a process for classifying additional channels as "stabilized," and thus allowing exemptions for areas upstream of these channels. The San Diego Water Board is supportive of allowing exemptions for such stabilized channels, provided that the exemptions are supported and the proposed process is clear and repeatable.

The Watershed Management Area Analysis includes a discussion of erosion potential in Forrester Creek under several different flow rates, all of which suggest that Forrester Creek would not experience erosion caused by land development occurring in the upstream watershed, even in a fully built-out condition. The discussion includes analyses using various methods to verify the assertion that the channel is stable in the range of flows considered to be geomorphically significant. Because the discussion includes several lines of evidence, the San Diego Water Board agrees that Forrester Creek can be considered stable and therefore the proposed exemption is appropriate.

The Watershed Management Area Analysis appears to rationalize a more succinct and less rigorous analysis for including exemptions for future proposed channel segments. Absent a similar, thorough, and multiple lines of evidence approach analysis as was included for Forrester Creek, the San Diego Water Board disagrees and cannot support the less rigorous analysis. The San Diego Water Board supports the concept of introducing additional stabilized channel reaches that are exempt from hydromodification management BMP requirements, but only if an erosion potential analysis using continuous simulation modeling demonstrates that the channel segment would not erode in the range of flows determined to be geomorphically significant. Additionally, the analysis would need to include flows expected from a fully-built out watershed condition, and would have to consider erosion potential at the channel's most susceptible location(s). Finally, the criteria and process to qualify for an exemption should be clear so that future proposals for exemptions for additional channel segments include all the required elements.

Unacceptable Hydromodification Management Exemptions: The following proposed exemptions are not acceptable to the San Diego Water Board:

a) Without an appropriate and acceptable analysis of the potential of erosion for the range of storms considered to be geomorphically significant, the additional exemptions proposed for Agua Hedionda Lagoon, Batiquitos Lagoon, and Buena Vista Lagoon are not acceptable.

b) Without an erosion potential analysis using continuous simulation modeling that shows a channel will not erode in the range of geomorphically significant flows for the fully built out condition of the drainage area at the most sensitive channel segment(s) included in the Watershed Management Area Analysis, future proposals for exemptions from the hydromodification management BMP requirements will not be acceptable.

10. <u>Loma Alta Slough Resolution Implementation Requirements</u>

Requirements: Provision A.1.b of the Order requires the Copermittees to effectively prohibit non-storm water discharges into the MS4. Provision B.3.a requires the Copermittees to develop interim and final numeric goals and schedules to achieve those goals for the highest priority water quality conditions. Resolution No. R9-2014-0020, a *Resolution of Commitment to an Alternative Process for Achieving Water Quality Objectives for Biostimulatory Substances in Loma Alta Slough* (Resolution), was adopted by the San Diego Water Board on June 26, 2014. The Resolution includes numeric targets, a compliance schedule, and monitoring which are expected to be implemented through the Carlsbad Watershed Management Area Water Quality Improvement Plan (Carlsbad WMA Plan).

Issues of Concern: A number of items in the Carlsbad WMA Plan are not consistent with the Resolution. The San Diego Water Board chose to adopt the Resolution as a practical, measureable, and timely approach for directing actions to remedy the Slough through a productive collaboration with the community to address an important water quality challenge. The Copermittees must implement the elements of the Resolution, or the San Diego Water Board will reinitiate the process of considering adoption of the Phosphorus TMDL for Loma Alta Slough. The San Diego Water Board has found the following issues of concern:

a) The Resolution includes numeric targets for both surface water macroalgal biomass and surface water macroalgal cover, which represent attainment of the biostimulatory water quality objective for Loma Alta Slough. These numeric targets were developed through a multi-year stakeholder process, and were based on special studies specific to the Slough and water quality modeling. The numeric targets are to be achieved by 2023.

According to the source and linkage analysis for which the numeric targets are based, the primary sources of the impairment in Loma Alta Slough are dry-weather discharges from irrigation runoff and other illicit dry weather discharges conveyed by the MS4 to Loma Alta Slough. Nutrient loading, specifically phosphorus, into the Slough from dry weather flows results in excessive algal growth. Further, modeling results cited in the staff report (which served as the technical basis for the Resolution) suggests that reductions of dry weather flows in excess of 96 percent are needed to achieve the targeted reductions in phosphorus loading. As such, the Resolution relies on the Order, specifically the prohibitions of dry weather non-storm water discharges, and development and implementation of a Plan that includes the Loma Alta Creek watershed, to achieve the necessary reductions in phosphorus loading and restore the beneficial uses.

In contrast to the approach for which the Resolution is based, the Carlsbad WMA Plan proposes interim numeric goals that fall short of achieving the prohibitions on dry weather discharges. The Carlsbad WMA Plan describes the interim goals as:

- 50 percent reduction in anthropogenic persistent dry weather flows at the three outfalls addressed through 2018, and
- 25 percent reduction in additional (other outfalls in watershed) anthropogenic persistent flows identified during dry weather monitoring program implemented in 2015 and in subsequent years.

The interim goals as expressed in the Carlsbad WMA Plan are not consistent with the Resolution because there is no mention in the Resolution that the City of Oceanside would only first reduce flows by 50 percent, followed by an additional 25 percent in subsequent years, and no explicit attempt to comply with the requirement to effectively eliminate non-storm water discharges into the MS4. Additionally, Finding 20 of the Resolution states that the City of Oceanside, in a comment letter dated May 5, 2014 committed to:

- Using the numeric targets, developed through the stakeholder process as numeric goals in the Water Quality Improvement Plan for the Loma Alta Creek watershed, and
- Develop and implement a Water Quality Improvement Plan to effectively prohibit the City's non-storm water discharges into the MS4 system.

The San Diego Water Board expects the City of Oceanside to honor its commitment as stated in the letter dated May 5, 2014, and therefore expected the interim and final numeric goals in the Carlsbad WMA Plan to incorporate the prohibition of dry weather non-storm water discharges into the MS4 for reducing phosphorus loading to Loma Alta Slough. Further, there must also be interim numeric goals expressed as an increment toward achieving the final numeric goals.

b) The Carlsbad WMA Plan does not include the required Loma Alta Slough Monitoring Plan. Table 2 of Resolution No. R9-2014-0022 describes the City of Oceanside's *Tentative Proposed Schedule to Address the Eutrophication Impairment in Loma Alta Slough*. According to this Table, in 2015, "*the City was to submit a Water Quality Improvement Plan, including the Loma Alta Slough Monitoring Plan, to the San Diego Water Board.*"

   Section 3.1.4 of the Carlsbad WMA Plan describes a special study whose objectives are "*to develop a water quality monitoring program for the Loma Alta Slough (Slough Monitoring Plan) that will allow the City of Oceanside to track progress toward reducing nutrient discharges into the Slough and eliminate the eutrophication impairment*." The monitoring is to occur every summer from 2016 to 2022.

   In a letter dated May 5, 2014, the City of Oceanside indicated that it would incorporate the slough monitoring requirements proposed in Tentative Investigative Order No. R9-2014-0022 into the Carlsbad WMA Plan[1]. The San Diego Water Board's expectation was that the Slough Monitoring Plan would be fully developed and included in the Carlsbad WMA Plan, as stated in the City's letter and described in Table 2 of the Resolution. The City of Oceanside has not submitted any correspondence to the San Diego Water Board suggesting a need to amend the schedule described in Table 2 since Resolution No. R9-2014-0020 was adopted on June 26, 2014.

Noncompliant Loma Alta Slough Resolution Implementation Requirements: The San Diego Water Board found that the Carlsbad WMA Plan does not comply with the requirements of Provisions A.1.b and B.3.a.(1) as follows:

a) The interim numeric goals as expressed are not consistent with the Resolution and not in compliance with the requirements of Provisions A.1.b and B.3.a.(1)(b).

b) Each final numeric goal that does not have an interim numeric goal expressed as a reasonable increment in the same or similar metric as the final numeric goal is not in compliance with Provision B.3.a.(1)(b)(ii).

Unacceptable Loma Alta Slough Resolution Implementation Requirements: The City of Oceanside committed to incorporating slough monitoring requirements proposed in Tentative Investigative Order No. R9-2014-0022 into the Carlsbad WMA Plan. Without the slough monitoring requirements proposed in Tentative Investigative Order No. R9-2014-0022 in the monitoring and assessment program for the Carlsbad Watershed Management Area, the Carlsbad WMA Plan is not acceptable to the San Diego Water Board.

[1] Tentative Investigative Order No. R9-2014-0022 was replaced by Resolution No. R9-2014-0020.

11. Items of Additional Concern

Pursuant to Provision F.1.b.(2), the Copermittees are required to consider revisions to the Plans based on written comments received by the close of the public comment period. Pursuant to Provision F.1.b.(3), the Copermittees are required to submit any revisions to the Plans no later than 60 days after the close of the comment period, or by September 29, 2015.

Pursuant to Provisions E and F.2.a.(2) of the Order each Copermittee was required to update its JRMP document to incorporate the requirements of Provision E concurrently with the submittal of the Plans. Pursuant to Provisions E.3.d and F.2.b.(1) of the Order each Copermittee was also required to update its BMP Design Manual to incorporate the requirements of Provisions E.3.a-d. Each Copermittee's JRMP document updated with the requirements of Provision E became effective with the submittal of the Plans. In addition, each Copermittee must begin implementing its updated BMP Design Manual within 180 days of submittal of the Plans, unless directed otherwise by the San Diego Water Board.

Until the Plans are accepted by the San Diego Water Board, any exemptions to the hydromodification management BMP requirements of Provisions E.3.c.(2)(a)-(c), proposed in the Plans pursuant to Provision B.3.b.(4)(c), are not authorized to be applied to any Priority Development Projects within a Copermittee's jurisdiction. Likewise, a Copermittee is not authorized to implement an Alternative Compliance Program (pursuant to Provision E.3.c.(3)) for any Priority Development Project within its jurisdiction until the optional Watershed Management Area Analysis developed pursuant to Provision B.3.b.(4) has been accepted as part of the Plans.

12. Potential Future Enforcement Options

The areas of noncompliance identified herein began on the due date to submit the Plans (June 26, 2015) and may be subject to additional future enforcement by the San Diego Water Board or State Water Resources Control Board, including a potential civil liability assessment of up to $10,000 per day of violation (Water Code section 13385) until the violations are corrected and/or pursue any of the following enforcement actions:

Other Potential Enforcement Options	**Applicable Water Code Sections**
Technical or Investigative Order	Sections 13267 or 13383
Cleanup and Abatement Order	Section 13304
Cease and Desist Order	Sections 13301-13303
Time Schedule Order	Sections 13300, 13308

In addition, the San Diego Water Board may consider revising or rescinding applicable waste discharge requirements, if any, referring the matter to other resource agencies, or referring the matter to the State Attorney General for injunctive relief, as applicable.

The San Diego Water Board is available to assist the Copermittees with refining the Plans to become acceptable, and to be in compliance with the requirements of the Order. In the subject line of any response, please include the information located in the heading of this letter: "in reply refer to." Please contact Wayne Chiu at (619) 521-3354 or Wayne.Chiu@waterboards.ca.gov., or Christina Arias at (619) 521-3351 or Christina.Arias@waterboards.ca.gov with any questions or concerns.

Respectfully,

Laurie Walsh, P.E.
Senior Water Resource Control Engineer
Storm Water Management Unit

Tech Staff Info & Use	
Order No.	R9-2013-0001
Party (CIWQS) ID	536787
NPDES No.	CAS0109266
Reg. Measure ID	387335
PIN ID	786088

Appendix B

June 6, 2016 Clarification Email from TRWE

From:	Tory Walker <tory@trwengineering.com>
Sent:	Monday, June 06, 2016 11:17 AM
To:	Mosolgo, Eric
Cc:	McPherson, Sheri; Boushra Salem; Charles Mohrlock (Charles.Mohrlock@sdcounty.ca.gov); Alex Smith
Subject:	RE: Otay River Report - Clarifications
Attachments:	271-02_Sp_TechMemo_052415 FINAL.PDF

Eric,

It occurred to me that we did not send the attached Sp technical memorandum without the watermark removed.

Tory Walker, PE, CFM, LEED GA

TORY R. WALKER ENGINEERING
Reliable Solutions in Water Resources
122 Civic Center Dr. #206, Vista, CA 92084
P: 760-414-9212 W: TRWEngineering.com

From: Tory Walker
Sent: Monday, June 6, 2016 9:39 AM
To: 'Mosolgo, Eric' <EMosolgo@sandiego.gov>
Cc: McPherson, Sheri <Sheri.McPherson@sdcounty.ca.gov>; bsalem@chulavistaca.gov; Charles Mohrlock (Charles.Mohrlock@sdcounty.ca.gov) <Charles.Mohrlock@sdcounty.ca.gov>; Alex Smith <alex@trwengineering.com>
Subject: RE: Otay River Report - Clarifications

Good Morning Eric,

We have provided clarifications to your questions below (in red):

1. Please direct us to the portion of the report in which the Ep and Sp analysis results are summarized. There was some uncertainty regarding the conclusions of the Ep and Sp analysis. We would like to see a summary of the final Ep thresholds at various locations along the river reach seeking an exemption. The Ep analysis is summarized in the Attachment 2 spreadsheets—exactly the same way the Copermittees presented the original WMAA Ep results in WMAA Attachment B.1.1. The spreadsheets summarize the Ep value (0), as well as critical shear stress values, estimated flow rates, durations, watershed acreage, imperviousness, and annual average rainfall depth. Sp results are summarized in the memo we sent to you on 5/25, which demonstrates the exemptions meet the 0.9 Sp threshold approved by the Copermittees
2. With regard to the Ep and Sp analysis, outline what methodology was the same of the WMAA analysis and what methodology changed. Please outline any changes to the WMAA methodology. Our report uses the exact same methodology for Ep as was used in the WMAA. The only difference between the WMAA Ep analysis and our "Revised" Ep analysis was the critical shear stress value at each cross section. We assigned critical shear stress values that are more descriptive of the in-stream condition, determined as a result of the field investigation

(critical shear stress values referenced from Fischenich publication, Table 2, which we provide in Attachment 4; our field investigation summary and photos are in the report, pages 17-23). Our Sp memo also used the exact same methodology as the WMAA. The only difference was a change to the "post" soil loss estimate, reduced from 24,364 tons/year to 22,288 tons/year (calculated using original source WMAA GIS data), due to an increase in "exempt" acreage.

3. Please summarize assumptions used to estimate critical shear stress and other key parameters in the Ep analysis. A clear summary of the values used for various vegetation and soils conditions would be appreciated. Estimates are provided on page 19 of the report where we state: "Critical shear stress values of 0.67 pounds per square foot (psf) (shales and hardpan), 0.35 psf (average reeds), and 0.70 psf (short native and bunch grass) are more appropriate assignments for the Otay River based upon the field conditions (Fischenich, 2001)." The Fischenich report is provided in Attachment 4, complete with technical details.
4. Is the Sp parameter defined as part of the updated analysis? It was not clear upon initial review. Since the Sp parameter was a key part of the WMAA analysis, exclusion of the parameter would seem to complicate the methodology if a replication of the WMAA methodology was desired to prove a major river reach exemption. See Sp memo dated 5/24/16. Due to the explicit MS4 Permit language, as reinforced by the SD Water Board's General Comments on Final WQIPs and Notice of Noncompliance dated 8/5/15 (provided in Attachment 5), we focused on the potential for erosion (Ep). We now (in a supplemental GIS analysis) analyzed the sediment supply potential (Sp) and demonstrated the exemptions meet the 0.9 threshold approved by the Copermittees.
5. The constant runoff reduction factor (43%) referenced in the report would be consistent with the old 2007 Permit conditions. Since the 2013 Permit now allows 10% increases of flows and durations across the flow threshold range, it does not appear that the 43% factor would be applicable to the new Permit. That said, please briefly describe what effect, if any, this would have on the updated analysis and conclusions. Design practices prove that this is not a concern. Our 43% reduction is the average % reduction for the Q_2, Q_5, and Q_{10} flow rates, when comparing the post-developed-**mitigated** (hydromod control) flow rate to the post-developed-**unmitigated** flow rate for **actual** hydromodification management projects throughout the County. What we (and other experts) observe during hydromodification management facility design is that the low-flow (X% Q_2) and high-flow (Q_{10}) flow rates are often at or near 110%, controlling the entire design. Since the high and low flow values are already at or near 110% the flow rates/durations between these two points along the curve will sag well below the pre-developed FDC. Since, from a practical design standpoint, the normal behavior of the FDC does not usually allow for the post-developed FDC to mirror the pre-developed FDC closely (due to the unique hydraulics of outflow passing through the outlet structure, causing a "sag" appearance between low and high flow thresholds), it is very unlikely that the 110% threshold along the entire curve would change the engineer's approach to design.

   Furthermore, we tested the % flow reduction in SWMM, and found that even with a mere 20% reduction, the FDC still passes the existing pre-to-post developed (mitigated) criteria. Therefore, the 43% peak flow reduction remains a valid—and conservative—estimate.

Please let us know if you have any questions on the above.

Regards,

Tory Walker, PE, CFM, LEED GA

TORY R. WALKER ENGINEERING
Reliable Solutions in Water Resources
122 Civic Center Dr. #206, Vista, CA 92084
P: 760-414-9212 W: TRWEngineering.com

From: Mosolgo, Eric [mailto:EMosolgo@sandiego.gov]
Sent: Thursday, June 2, 2016 5:08 PM
To: Tory Walker <tory@trwengineering.com>
Cc: McPherson, Sheri <Sheri.McPherson@sdcounty.ca.gov>; bsalem@chulavistaca.gov; Charles Mohrlock (Charles.Mohrlock@sdcounty.ca.gov) <Charles.Mohrlock@sdcounty.ca.gov>
Subject: Otay River Report - Clarifications

Tory – thanks for speaking with us last week regarding the Otay River report.

We request the following clarifications:

1. Please direct us to the portion of the report in which the Ep and Sp analysis results are summarized. There was some uncertainty regarding the conclusions of the Ep and Sp analysis. We would like to see a summary of the final Ep thresholds at various locations along the river reach seeking an exemption.
2. With regard to the Ep and Sp analysis, outline what methodology was the same of the WMAA analysis and what methodology changed. Please outline any changes to the WMAA methodology.
3. Please summarize assumptions used to estimate critical shear stress and other key parameters in the Ep analysis. A clear summary of the values used for various vegetation and soils conditions would be appreciated.
4. Is the Sp parameter defined as part of the updated analysis? It was not clear upon initial review. Since the Sp parameter was a key part of the WMAA analysis, exclusion of the parameter would seem to complicate the methodology if a replication of the WMAA methodology was desired to prove a major river reach exemption.
5. The constant runoff reduction factor (43%) referenced in the report would be consistent with the old 2007 Permit conditions. Since the 2013 Permit now allows 10% increases of flows and durations across the flow threshold range, it does not appear that the 43% factor would be applicable to the new Permit. That said, please briefly describe what effect, if any, this would have on the updated analysis and conclusions.

Thank you for providing this information.

Eric Mosolgo, PE
Senior Civil Engineer
City of San Diego
Transportation and Storm Water Department
Storm Water Division

T (858) 541-4337
C (858) 336-6644
sandiego.gov

Appendix C

May 25, 2016 Supplemental Letter from TRWE
Sediment Supply Potential Analysis

TORY R. WALKER ENGINEERING
RELIABLE SOLUTIONS IN WATER RESOURCES

May 25, 2016

Boushra Salem
Storm Water Management Section
City of Chula Vista
1800 Maxwell Road
Chula Vista, CA 91911

SUBJECT: OTAY RIVER SEDIMENT SUPPLY POTENTIAL ANALYSIS

Dear Boushra:

In reply to the comments made by the sub-committee of the San Diego Bay WQIP Copermittee group, Tory R. Walker Engineering (TRWE) has completed the Sediment Supply Potential (Sp) analysis to support the proposed hydromodification management exemption for projects directly discharging to the Otay River from west of Interstate 805 (I-805) to San Diego Bay. TRWE found that the proposed exemptions result in an Sp value that meets the criteria recommended by the Southern California Coastal Watershed Research Project[1] (SCCWRP). The final soil loss estimates were executed in GIS and are presented in the following table:

Exempt River Reach	Soil Loss (tons/yr.)			Sp (Post/Pre) [Criteria>0.90]
	Pre	Exempt Parcels	Post [Pre – Exempt Parcels]	
Otay River	24,402	2,114	22,288	0.91

The Sp analysis demonstrates that the proposed reduction in bed sediment supply is not expected to have significant effects on stream stability. Therefore, together with the findings from our December 2015 Erosion Potential (Ep) study, the reinstatement of hydromodification exemptions for the Otay River has been justified by the quantitative Ep and Sp criteria adopted by both the Copermittees and the San Diego Regional Water Quality Control Board.

We appreciate your time in reviewing our findings. Please contact us with any questions you may have.

Sincerely,

Tory R Walker

Tory R. Walker, PE, CFM, LEED GA
Principal

[1]SCCWRP, 2010. Hydromodification Screening Tools: GIS-based Catchment analyses of Potential Changes in Runoff and Sediment Discharge. Technical Report 605.

Appendix D

SWMM Results

```
[TITLE]
Otay River Exemption Analysis - Exemption Scenario


[OPTIONS]
;;Options            Value
;;------------------ ------------
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           02/01/1965
START_TIME           00:00:00
REPORT_START_DATE    02/01/1965
REPORT_START_TIME    00:00:00
END_DATE             02/28/2015
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         60
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
MAX_TRIALS           0
HEAD_TOLERANCE       0
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5

[EVAPORATION]
;;Type          Parameters
;;------------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .14    .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
Bonita+SWRes     INTENSITY 1:00   1.0    TIMESERIES OTAY

[SUBCATCHMENTS]
;;                                                Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
DEV-A            Bonita+SWRes     DEVELOPED        1024.99  29       82       19.46    0
DEV-B            Bonita+SWRes     DEVELOPED        162.69   13       13       24.86    0
DEV-C            Bonita+SWRes     DEVELOPED        2143.79  32       172      17.87    0
DEV-D            Bonita+SWRes     DEVELOPED        20882.06 34       1673     16.41    0
EX-A             Bonita+SWRes     EXEMPT           10.44    80       1        5.94     0
EX-C             Bonita+SWRes     EXEMPT           299.03   61       24       6.6      0
EX-D             Bonita+SWRes     EXEMPT           1001.41  60       80       7.73     0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DEV-A            .012       .15        .05        .1         25         OUTLET
DEV-B            .012       .15        .05        .1         25         OUTLET
DEV-C            .012       .15        .05        .1         25         OUTLET
DEV-D            .012       .15        .05        .1         25         OUTLET
EX-A             .012       .15        .05        .1         25         OUTLET
```

```
EX-C             .012       .15        .05        .1         25         OUTLET
EX-D             .012       .15        .05        .1         25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
DEV-A            1.5        .225       .33
DEV-B            3          .15        .32
DEV-C            6          .075       .31
DEV-D            9          .01875     .3
EX-A             1.5        .225       .33
EX-C             6          .075       .31
EX-D             9          .01875     .3

[JUNCTIONS]
;;               Invert     Max.       Init.      Surcharge  Ponded
;;Name           Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
DEVELOPED        0          0          0          0          0
EXEMPT           0          0          0          0          0
NOT_EXEMPT       0          0          0          0          0

[OUTFALLS]
;;               Invert     Outfall      Stage/Table      Tide
;;Name           Elev.      Type         Time Series      Gate
;;-------------- ---------- ------------ ---------------- ----
RIVER_OUTFALL    0          FREE                         NO

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.
;;Name           Node             Node             Length     N          Offset     Offset     Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ----------
NE               NOT_EXEMPT       RIVER_OUTFALL    400        0.01       0          0          0
NOTDEV           DEVELOPED        RIVER_OUTFALL    400        0.01       0          0          0
PE               EXEMPT           RIVER_OUTFALL    400        0.01       0          0          0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
NE               DUMMY        0                0          0          0          1
NOTDEV           DUMMY        0                0          0          0          1
PE               DUMMY        0                0          0          0          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate  SeepageRate
;;-------------- ---------- ---------- ---------- ---------- ----------

[INFLOWS]
;;                                                 Param    Units    Scale    Baseline Baseline
;;Node           Parameter        Time Series      Type     Factor   Factor   Value    Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
NOT_EXEMPT       FLOW             NotExempt        FLOW     1.0      .57

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
NotExempt        FILE "K:\AMEC US OFFICES\SanDiego\Otay\Download\SWMM\SWMM\Inflow Time Series\NotExempt.t

OTAY             FILE "K:\AMEC US OFFICES\SanDiego\Otay\Download\SWMM\SWMM\Otay.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
```

```
DIMENSIONS       3465.126086      3539.91555       6913.024914      5157.56345
UNITS            None

[COORDINATES]
;;Node           X-Coord          Y-Coord
;;-------------- ---------------- ----------------
DEVELOPED        6750.7           4523.81
EXEMPT           3627.451         4537.815
NOT_EXEMPT       5042.017         5084.034
RIVER_OUTFALL    5056.022         3613.445

[VERTICES]
;;Link           X-Coord          Y-Coord
;;-------------- ---------------- ----------------

[POLYGONS]
;;Subcatchment   X-Coord          Y-Coord
;;-------------- ---------------- ----------------
DEV-A            6750.7           4523.81
DEV-A            6745.098         4529.412
DEV-A            6745.098         4540.617
DEV-A            6756.302         4540.617
DEV-A            6756.302         4529.412
DEV-A            6750.7           4523.81
DEV-B            6750.7           4523.81
DEV-B            6745.098         4529.412
DEV-B            6745.098         4540.617
DEV-B            6756.302         4540.617
DEV-B            6756.302         4529.412
DEV-B            6750.7           4523.81
DEV-C            6750.7           4523.81
DEV-C            6745.098         4529.412
DEV-C            6745.098         4540.617
DEV-C            6756.302         4540.617
DEV-C            6756.302         4529.412
DEV-C            6750.7           4523.81
DEV-D            6750.7           4523.81
DEV-D            6745.098         4529.412
DEV-D            6745.098         4540.617
DEV-D            6756.302         4540.617
DEV-D            6756.302         4529.412
DEV-D            6750.7           4523.81
EX-A             3627.451         4537.815
EX-A             3621.849         4543.417
EX-A             3621.849         4554.622
EX-A             3633.053         4554.622
EX-A             3633.053         4543.417
EX-A             3627.451         4537.815
EX-C             3627.451         4537.815
EX-C             3621.849         4543.417
EX-C             3621.849         4554.622
EX-C             3633.053         4554.622
EX-C             3633.053         4543.417
EX-C             3627.451         4537.815
EX-D             3627.451         4537.815
EX-D             3621.849         4543.417
EX-D             3621.849         4554.622
EX-D             3633.053         4554.622
EX-D             3633.053         4543.417
EX-D             3627.451         4537.815

[SYMBOLS]
;;Gage           X-Coord          Y-Coord
;;-------------- ---------------- ----------------
Bonita+SWRes     5126.05          7016.807
```

```
[TITLE]
;;Project Title/Notes
Otay River Exemption Analysis - Exemption Scenario

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           02/01/1965
START_TIME           00:00:00
REPORT_START_DATE    02/01/1965
REPORT_START_TIME    00:00:00
END_DATE             02/28/2015
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         0:01:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           0
HEAD_TOLERANCE       0
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          .041   .076   .118   .192   .237   .318   .308   .286   .217   .14    .067   .041
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Bonita+SWRes     INTENSITY 1:00     1.0      TIMESERIES OTAY

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
EX-A             Bonita+SWRes     EXEMPT           10.44    80       1        5.94     0
EX-C             Bonita+SWRes     EXEMPT           299.03   61       24       6.6      0
EX-D             Bonita+SWRes     EXEMPT           1001.41  60       80       7.73     0
DEV-A            Bonita+SWRes     DEVELOPED        1024.99  29       82       19.46    0
DEV-B            Bonita+SWRes     DEVELOPED        162.69   13       13       24.86    0
DEV-C            Bonita+SWRes     DEVELOPED        2143.79  32       172      17.87    0
DEV-D            Bonita+SWRes     DEVELOPED        20882.06 34       1673     16.41    0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
EX-A             .012       .15        .05        .1         25         OUTLET
EX-C             .012       .15        .05        .1         25         OUTLET
EX-D             .012       .15        .05        .1         25         OUTLET
DEV-A            .012       .15        .05        .1         25         OUTLET
DEV-B            .012       .15        .05        .1         25         OUTLET
DEV-C            .012       .15        .05        .1         25         OUTLET
DEV-D            .012       .15        .05        .1         25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
EX-A             1.5        .225       .33
EX-C             6          .075       .31
EX-D             9          .01875     .3
DEV-A            1.5        .225       .33
DEV-B            3          .15        .32
DEV-C            6          .075       .31
DEV-D            9          .01875     .3

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
EXEMPT           0          0          0          0          0
NOT_EXEMPT       0          0          0          0          0
```

```
DEVELOPED        0          0          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
RIVER_OUTFALL    0          FREE                        NO

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow
MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ----------
----------
PE               EXEMPT           RIVER_OUTFALL    400        0.01       0          0          0          0

NE               NOT_EXEMPT       RIVER_OUTFALL    400        0.01       0          0          0          0

NOTDEV           DEVELOPED        RIVER_OUTFALL    400        0.01       0          0          0          0


[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
PE               DUMMY        0                0          0          0          1
NE               DUMMY        0                0          0          0          1
NOTDEV           DUMMY        0                0          0          0          1

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
NOT_EXEMPT       FLOW             NotExempt        FLOW     1.0      .57

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
OTAY             FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\Precip\Otay.txt"
;
NotExempt        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\SWMM\OT\New\FINAL\TIME
SERIES\NotExempt.txt"

[REPORT]
;;Reporting Options
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EXEMPT           3627.451           4537.815
NOT_EXEMPT       5042.017           5084.034
DEVELOPED        6750.700           4523.810
RIVER_OUTFALL    5056.022           3613.445

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EX-A             2871.148           5672.269
EX-C             3291.317           5434.174
EX-D             3697.479           5126.050
DEV-A            6526.611           6036.415
DEV-B            6848.739           5798.319
DEV-C            7156.863           5532.213
DEV-D            7422.969           5322.129

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Bonita+SWRes     5126.050           7016.807
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.007)
--------------------------------------------------------------

Otay River Exemption Analysis - Exemption Scenario
WARNING 04: minimum elevation drop used for Conduit NE
WARNING 04: minimum elevation drop used for Conduit NOTDEV
WARNING 04: minimum elevation drop used for Conduit PE

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ FEB-01-1965 00:00:00
Ending Date .............. FEB-28-2015 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 01:00:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 60.00 sec


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......   1072329.228       504.143
Evaporation Loss .........    156272.392        73.470
Infiltration Loss ........    658333.211       309.508
Surface Runoff ...........    262571.882       123.445
Final Surface Storage ....         5.545         0.003
Continuity Error (%) .....        -0.453


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......    262571.876     85562.969
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........     28077.362      9149.428
External Outflow .........    290649.238     94712.397
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


********************************
Highest Flow Instability Indexes
********************************
All links are stable.
```

****
Routing Time Step Summary
****

Minimum Time Step : 60.00 sec
Average Time Step : 60.00 sec
Maximum Time Step : 60.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 1.00
Percent Not Converging : 0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runof Coef
DEV-A	504.14	0.00	46.70	357.70	100.55	2798.49	265.16	0.19
DEV-B	504.14	0.00	19.16	437.76	48.39	213.75	35.50	0.09
DEV-C	504.14	0.00	55.68	339.78	110.17	6413.25	549.69	0.21
DEV-D	504.14	0.00	73.59	310.61	122.44	69427.53	5327.00	0.24
EX-A	504.14	0.00	165.69	100.74	238.17	67.52	2.60	0.47
EX-C	504.14	0.00	124.79	194.86	185.38	1505.24	64.61	0.36
EX-D	504.14	0.00	129.08	187.96	188.69	5130.84	234.27	0.37

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
DEVELOPED	JUNCTION	0.00	0.00	0.00	0 00:00
EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00
NOT_EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00
RIVER_OUTFALL	OUTFALL	0.00	0.00	0.00	0 00:00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
DEVELOPED	JUNCTION	6177.35	6177.35	6768 18:00	7.89e+004	7.89e+004	0.000
EXEMPT	JUNCTION	301.48	301.48	6768 19:00	6.7e+003	6.7e+003	0.000
NOT_EXEMPT	JUNCTION	384.40	384.40	6768 19:00	9.15e+003	9.15e+003	0.000
RIVER_OUTFALL	OUTFALL	0.00	6742.04	6768 18:00	0	9.47e+004	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Hours	Max. Height Above Crown	Min. Depth Below Rim

Node	Type	Surcharged	Feet	Feet
DEVELOPED	JUNCTION	438959.02	0.000	0.000
EXEMPT	JUNCTION	438959.02	0.000	0.000
NOT_EXEMPT	JUNCTION	438959.02	0.000	0.000

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
RIVER_OUTFALL	12.76	62.77	6742.04	94705.363
System	12.76	62.77	6742.04	94705.363

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
NE	DUMMY	384.40	6768 19:00			
NOTDEV	DUMMY	6177.35	6768 18:00			
PE	DUMMY	301.48	6768 19:00			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Thu Jun 23 13:07:25 2016
Analysis ended on: Thu Jun 23 13:08:21 2016
Total elapsed time: 00:00:56

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.010)
--------------------------------------------------------------

Otay River Exemption Analysis - Exemption Scenario
WARNING 04: minimum elevation drop used for Conduit PE
WARNING 04: minimum elevation drop used for Conduit NE
WARNING 04: minimum elevation drop used for Conduit NOTDEV

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ FEB-01-1965 00:00:00
Ending Date .............. FEB-28-2015 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 01:00:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 60.00 sec


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......   1072329.228       504.143
Evaporation Loss .........    156270.046        73.469
Infiltration Loss ........    658333.211       309.508
Surface Runoff ...........    262571.880       123.445
Final Storage ............         7.896         0.004
Continuity Error (%) .....        -0.453


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......    262571.876     85562.969
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........     28077.362      9149.428
External Outflow .........    290649.238     94712.396
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


********************************
Highest Flow Instability Indexes
********************************
All links are stable.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
Percent Not Converging      :     0.00


***************************
Subcatchment Runoff Summary
***************************

--------------------------------------------------------------------------------------------------------
                            Total      Total      Total      Total      Total        Total     Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff       Runoff   Runoff   Coeff
```

Subcatchment	in	in	in	in	in	10^6 gal	CFS	
EX-A	504.14	0.00	165.68	100.74	238.17	67.52	2.60	0.472
EX-C	504.14	0.00	124.78	194.86	185.38	1505.24	64.61	0.368
EX-D	504.14	0.00	129.07	187.96	188.69	5130.84	234.27	0.374
DEV-A	504.14	0.00	46.70	357.70	100.55	2798.49	265.16	0.199
DEV-B	504.14	0.00	19.16	437.76	48.39	213.75	35.50	0.096
DEV-C	504.14	0.00	55.68	339.78	110.17	6413.25	549.69	0.219
DEV-D	504.14	0.00	73.58	310.61	122.44	69427.53	5327.00	0.243

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
NOT_EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
DEVELOPED	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
RIVER_OUTFALL	OUTFALL	0.00	0.00	0.00	0 00:00	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
EXEMPT	JUNCTION	301.48	301.48	6768 19:01	6.7e+003	6.7e+003	0.000
NOT_EXEMPT	JUNCTION	384.40	384.40	6768 19:01	9.15e+003	9.15e+003	0.000
DEVELOPED	JUNCTION	6177.35	6177.35	6768 18:01	7.89e+004	7.89e+004	0.000
RIVER_OUTFALL	OUTFALL	0.00	6742.04	6768 18:01	0	9.47e+004	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
EXEMPT	JUNCTION	438959.00	0.000	0.000
NOT_EXEMPT	JUNCTION	438959.00	0.000	0.000
DEVELOPED	JUNCTION	438959.00	0.000	0.000

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
RIVER_OUTFALL	12.76	62.77	6742.04	94705.363
System	12.76	62.77	6742.04	94705.363

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
PE	DUMMY	301.48	6768 19:01			
NE	DUMMY	384.40	6768 19:01			
NOTDEV	DUMMY	6177.35	6768 18:01			

```
*************************
Conduit Surcharge Summary
*************************

No conduits were surcharged.


Analysis begun on:  Thu Apr 14 11:13:52 2016
Analysis ended on:  Thu Apr 14 11:15:04 2016
Total elapsed time: 00:01:12
```

```
[TITLE]
Otay River Exemption Analysis - Natural Scenario (via HMP applied to built-out watershed, including impou

[OPTIONS]
;;Options            Value
;;------------------ ------------
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           02/01/1965
START_TIME           00:00:00
REPORT_START_DATE    02/01/1965
REPORT_START_TIME    00:00:00
END_DATE             02/28/2015
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         60
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
MAX_TRIALS           0
HEAD_TOLERANCE       0
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5

[EVAPORATION]
;;Type          Parameters
;;------------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .14    .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
Bonita+SWRes     INTENSITY 1:00   1.0    TIMESERIES OTAY

[JUNCTIONS]
;;               Invert     Max.       Init.      Surcharge  Ponded
;;Name           Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
DAM              0          0          0          0          0
DEVELOPED        0          0          0          0          0
EXEMPT           0          0          0          0          0
NOT_EXEMPT       0          0          0          0          0

[OUTFALLS]
;;               Invert     Outfall      Stage/Table      Tide
;;Name           Elev.      Type         Time Series      Gate
;;-------------- ---------- ------------ ---------------- ----
RIVER_OUTFALL    0          FREE                         NO

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.
;;Name           Node             Node             Length     N          Offset     Offset     Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ----------
4                DAM              RIVER_OUTFALL    400        0.01       0          0          0
```

```
NE                NOT_EXEMPT        RIVER_OUTFALL     400        0.01       0          0          0
NOTDEV            DEVELOPED         RIVER_OUTFALL     400        0.01       0          0          0
PE                EXEMPT            RIVER_OUTFALL     400        0.01       0          0          0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
4                DUMMY        0                0          0          0          1
NE               DUMMY        0                0          0          0          1
NOTDEV           DUMMY        0                0          0          0          1
PE               DUMMY        0                0          0          0          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate  SeepageRate
;;-------------- ---------- ---------- ---------- ---------- ----------

[INFLOWS]
;;                                                 Param    Units    Scale    Baseline Baseline
;;Node           Parameter        Time Series      Type     Factor   Factor   Value    Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
DAM              FLOW             Impounded        FLOW     1.0      0.57
DEVELOPED        FLOW             Developed        FLOW     1.0      0.57
EXEMPT           FLOW             Exempt           FLOW     1.0      0.57
NOT_EXEMPT       FLOW             NotExempt        FLOW     1.0      0.57

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Developed        FILE "K:\AMEC US OFFICES\SanDiego\Otay\Download\SWMM\SWMM\Inflow Time Series\Developed.t

Exempt           FILE "K:\AMEC US OFFICES\SanDiego\Otay\Download\SWMM\SWMM\Inflow Time Series\Exempt.txt'

Impounded        FILE "K:\AMEC US OFFICES\SanDiego\Otay\Download\SWMM\SWMM\Inflow Time Series\Impounded.t

NotExempt        FILE "K:\AMEC US OFFICES\SanDiego\Otay\Download\SWMM\SWMM\Inflow Time Series\NotExempt.t

OTAY             FILE "K:\AMEC US OFFICES\SanDiego\Otay\Download\SWMM\SWMM\Otay.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS       3334.0543        5311.1155        6810.2457        7094.0285
UNITS            None

[COORDINATES]
;;Node           X-Coord          Y-Coord
;;-------------- ---------------- ----------------
DAM              6652.237         6392.496
DEVELOPED        5945.166         6883.117
EXEMPT           3492.063         6507.937
NOT_EXEMPT       4790.765         7012.987
RIVER_OUTFALL    5098.039         5392.157

[VERTICES]
;;Link           X-Coord          Y-Coord
;;-------------- ---------------- ----------------

[SYMBOLS]
;;Gage           X-Coord          Y-Coord
;;-------------- ---------------- ----------------
Bonita+SWRes     5382.395         8903.319
```

```
[TITLE]
;;Project Title/Notes
Otay River Exemption Analysis - Natural Scenario (via HMP applied to built-out watershed, including impounded
drainage area)

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           02/01/1965
START_TIME           00:00:00
REPORT_START_DATE    02/01/1965
REPORT_START_TIME    00:00:00
END_DATE             02/28/2015
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             01:00:00
DRY_STEP             01:00:00
ROUTING_STEP         0:01:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           0
HEAD_TOLERANCE       0
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          .041   .076   .118   .192   .237   .318   .308   .286   .217   .14    .067   .041
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
Bonita+SWRes     INTENSITY 1:00     1.0      TIMESERIES OTAY

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
EXEMPT           0          0          0          0          0
NOT_EXEMPT       0          0          0          0          0
DEVELOPED        0          0          0          0          0
DAM              0          0          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
RIVER_OUTFALL    0          FREE                        NO

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow
MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ----------
----------
PE               EXEMPT           RIVER_OUTFALL    400        0.01       0          0          0          0

NE               NOT_EXEMPT       RIVER_OUTFALL    400        0.01       0          0          0          0

NOTDEV           DEVELOPED        RIVER_OUTFALL    400        0.01       0          0          0          0

4                DAM              RIVER_OUTFALL    400        0.01       0          0          0          0


[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
PE               DUMMY        0                0          0          0          1
NE               DUMMY        0                0          0          0          1
NOTDEV           DUMMY        0                0          0          0          1
4                DUMMY        0                0          0          0          1

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline Pattern
```

```
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
EXEMPT           FLOW             Exempt           FLOW     1.0      0.57
NOT_EXEMPT       FLOW             NotExempt        FLOW     1.0      0.57
DEVELOPED        FLOW             Developed        FLOW     1.0      0.57
DAM              FLOW             Impounded        FLOW     1.0      0.57

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
OTAY             FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\Ep\AMEC\SWMM\Otay.txt"
;
Exempt           FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\Ep\AMEC\SWMM\Inflow Time
Series\Exempt.txt"
;
NotExempt        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\Ep\AMEC\SWMM\Inflow Time
Series\NotExempt.txt"
;
Developed        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\Ep\AMEC\SWMM\Inflow Time
Series\Developed.txt"
;
Impounded        FILE "Z:\Projects\271 BIA\02 (River Exemptions)\Analysis\Ep\AMEC\SWMM\Inflow Time
Series\Impounded.txt"

[REPORT]
;;Reporting Options
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EXEMPT           3492.063           6507.937
NOT_EXEMPT       4790.765           7012.987
DEVELOPED        5945.166           6883.117
DAM              6652.237           6392.496
RIVER_OUTFALL    5098.039           5392.157

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Bonita+SWRes     5382.395           8903.319
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.007)
--------------------------------------------------------------

Otay River Exemption Analysis - Natural Scenario (via HMP applied to built-out watershed, including imp
WARNING 04: minimum elevation drop used for Conduit 4
WARNING 04: minimum elevation drop used for Conduit NE
WARNING 04: minimum elevation drop used for Conduit NOTDEV
WARNING 04: minimum elevation drop used for Conduit PE

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ FEB-01-1965 00:00:00
Ending Date .............. FEB-28-2015 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Routing Time Step ........ 60.00 sec


**************************        Volume         Volume
Flow Routing Continuity         acre-feet      10^6 gal
**************************      ---------      ---------
Dry Weather Inflow .......          0.000          0.000
Wet Weather Inflow .......          0.000          0.000
Groundwater Inflow .......          0.000          0.000
RDII Inflow ..............          0.000          0.000
External Inflow ..........     284576.467      92733.493
External Outflow .........     284576.467      92733.493
Internal Outflow .........          0.000          0.000
Evaporation Loss .........          0.000          0.000
Exfiltration Loss ........          0.000          0.000
Initial Stored Volume ....          0.000          0.000
Final Stored Volume ......          0.000          0.000
Continuity Error (%) .....          0.000


*********************************
Highest Flow Instability Indexes
*********************************
All links are stable.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     60.00 sec
Average Time Step           :     60.00 sec
Maximum Time Step           :     60.00 sec
Percent in Steady State     :      0.00
Average Iterations per Step :      1.00
Percent Not Converging      :      0.00
```

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
DAM	JUNCTION	0.00	0.00	0.00	0 00:00
DEVELOPED	JUNCTION	0.00	0.00	0.00	0 00:00
EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00
NOT_EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00
RIVER_OUTFALL	OUTFALL	0.00	0.00	0.00	0 00:00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
DAM	JUNCTION	6285.41	6285.41	6768 18:00	3.49e+004	3.49e+004	0.000
DEVELOPED	JUNCTION	3520.89	3520.89	6768 18:00	4.48e+004	4.48e+004	0.000
EXEMPT	JUNCTION	171.84	171.84	6768 19:00	3.82e+003	3.82e+003	0.000
NOT_EXEMPT	JUNCTION	384.40	384.40	6768 19:00	9.15e+003	9.15e+003	0.000
RIVER_OUTFALL	OUTFALL	0.00	10263.22	6768 18:00	0	9.27e+004	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
DAM	JUNCTION	438959.02	0.000	0.000
DEVELOPED	JUNCTION	438959.02	0.000	0.000
EXEMPT	JUNCTION	438959.02	0.000	0.000
NOT_EXEMPT	JUNCTION	438959.02	0.000	0.000

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
RIVER_OUTFALL	12.75	61.51	10263.22	92726.606
System	12.75	61.51	10263.22	92726.606

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
4	DUMMY	6285.41	6768 18:00			
NE	DUMMY	384.40	6768 19:00			
NOTDEV	DUMMY	3520.89	6768 18:00			
PE	DUMMY	171.84	6768 19:00			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Thu Jun 23 11:27:58 2016
Analysis ended on: Thu Jun 23 11:29:03 2016
Total elapsed time: 00:01:05

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.010)

Otay River Exemption Analysis - Natural Scenario (via HMP applied to built-out watershed, including impounded drainage area)
WARNING 04: minimum elevation drop used for Conduit PE
WARNING 04: minimum elevation drop used for Conduit NE
WARNING 04: minimum elevation drop used for Conduit NOTDEV
WARNING 04: minimum elevation drop used for Conduit 4

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****

```
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ FEB-01-1965 00:00:00
Ending Date .............. FEB-28-2015 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Routing Time Step ........ 60.00 sec
```

************************** Flow Routing Continuity **************************	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	284576.467	92733.493
External Outflow	284576.467	92733.493
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

```
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
Percent Not Converging      :     0.00
```

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
NOT_EXEMPT	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
DEVELOPED	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
DAM	JUNCTION	0.00	0.00	0.00	0 00:00	0.00
RIVER_OUTFALL	OUTFALL	0.00	0.00	0.00	0 00:00	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
EXEMPT	JUNCTION	171.84	171.84	6768 19:01	3.82e+003	3.82e+003	0.000
NOT_EXEMPT	JUNCTION	384.40	384.40	6768 19:01	9.15e+003	9.15e+003	0.000
DEVELOPED	JUNCTION	3520.89	3520.89	6768 18:01	4.48e+004	4.48e+004	0.000
DAM	JUNCTION	6285.41	6285.41	6768 18:01	3.49e+004	3.49e+004	0.000
RIVER_OUTFALL	OUTFALL	0.00	10263.22	6768 18:01	0	9.27e+004	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
EXEMPT	JUNCTION	438959.00	0.000	0.000
NOT_EXEMPT	JUNCTION	438959.00	0.000	0.000
DEVELOPED	JUNCTION	438959.00	0.000	0.000
DAM	JUNCTION	438959.00	0.000	0.000

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
RIVER_OUTFALL	12.75	61.51	10263.22	92726.606
System	12.75	61.51	10263.22	92726.606

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
PE	DUMMY	171.84	6768 19:01			
NE	DUMMY	384.40	6768 19:01			
NOTDEV	DUMMY	3520.89	6768 18:01			
4	DUMMY	6285.41	6768 18:01			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Thu Apr 14 12:00:45 2016
Analysis ended on: Thu Apr 14 12:02:23 2016
Total elapsed time: 00:01:38

SAN DIEGO
WATERSHED MANAGEMENT
WATER QUALITY IMPROVEMENT
2015-2016 ANNUAL R

Prepared for the following San Diego River WMA Participating Agencies:

City of El Cajon
City of La Mesa
City of San Diego
City of Santee
County of San Diego
Caltrans

Order No.R9-2013-0001
Amended Order No. R9-2015-00011118 and R9-2015-0100

January 2017

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ABBREVIATIONS AND ACRONYMS

%	percent
µg	microgram
µg/L	micrograms per liter
µS/cm	microSiemens per centimeter
ac	acres
AEP	Association of Environmental Professionals
AFDM	ash-free dry mass
AMAL	average monthly action level
Basin Plan	Water Quality Control Plan for the San Diego Region
Bight	Southern California Bight Regional Monitoring Program
BMI	benthic macroinvertebrate
BMP DM	BMP Design Manual
Caltrans	California Department of Transportation
CCC	criterion continuous concentration
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
cf	cubic feet
CFR	Code of Federal Regulations
cfs	cubic feet per second
CFU/100 mL	colony-forming units per 100 milliliters
CMC	criterion maximum concentration
Copermittees	Municipal Copermittees
CRAM	California Rapid Assessment Method
CSBP	California Stream Bioassessment Procedure
CSCI	California Stream Condition Index
CTR	California Toxics Rule
DROPS	Drought Response Outreach Program for Schools
EMC	event mean concentration
ft	feet

FY	fiscal year
gpm	gallons per minute
HA	hydrologic area
HMP	Hydromodification Management Plan
HOA	home owners' association
HPWQC	highest priority water quality condition(s)
HSA	hydrologic subarea
HU	hydrologic unit
IBI	Index of Biotic Integrity
IC/ID	illegal connection and illicit discharge
IDDE	Illicit Discharge Detection and Elimination
IM	instantaneous maximum
JRMP	Jurisdictional Runoff Management Program
LID	Low Impact Development
LOE	line of evidence
MAP	Monitoring and Assessment Plan
MBAS	methylene blue active substance
MCL	maximum contaminant level
MDAL	maximum daily action level
mg/L	milligram per liter
mL	milliliter
MPN/100 mL	most probable number per 100 milliliters
MS4	municipal separate storm sewer system (storm drain system)
NAL	non-stormwater action level
ND	not detected
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NS	not sampled
NTU	nephelometric turbidity unit
NWS	National Weather Service
O/E	observed to expected
Permit	Regional MS4 Permit
pMMI	predictive multi-metric index

ppt	parts per thousand
PWQC	priority water quality condition(s)
QA	quality assurance
QMRA	quantitative microbial risk assessment
Regional Board (RWQCB)	San Diego Regional Water Quality Control Board
SAL	stormwater action level
SCCWRP	Southern California Coastal Water Research Project
SDSU	San Diego State University
SLP	Sustainable Landscapes Program
SMC	Stormwater Monitoring Coalition
SQO	sediment quality objective
SSM RWL	single sample maximum receiving water limitations
SUSMP	Standard Urban Stormwater Mitigation Plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TIE	toxicity identification evaluation
TMDL	total maximum daily load
TRE	toxicity reduction evaluation
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WMA	Watershed Management Area
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan
WQO	water quality objective
WRCC	Western Regional Climate Center
WQBEL	water quality based effluent limitation

Executive Summary

ES.1 INTRODUCTION

This first Water Quality Improvement Plan (WQIP) Annual Report for the San Diego River Watershed Management Area (WMA) (Figure ES-1) was developed in compliance with the Regional municipal separate storm sewer system (MS4) Permit (Permit) (San Diego Regional Water Quality Control Board [Regional Board], 2013). This Annual Report represents the work of the Participating Agencies in the WMA, including the Cities of La Mesa, El Cajon, Santee, and San Diego; the County of San Diego; and the California Department of Transportation (Caltrans). These Participating Agencies implement strategies through their WQIP and Jurisdictional Runoff Management Programs (JRMPs) to achieve improvements in the quality of stormwater (wet weather) and non-stormwater (dry weather) discharges from the MS4 (storm drain system) and, in turn, within the receiving waters by focusing on the highest priority water quality condition (HPWQC) and priority water quality condition(s) (PWQC) within the watershed. Caltrans' participation in the development of the WQIP was voluntary as they are regulated under a separate Permit from the California State Water Resources Control Board. Therefore, while they participated in the WQIP development on certain strategies, they do not participate in the Monitoring and Assessment Programs under the WQIP.

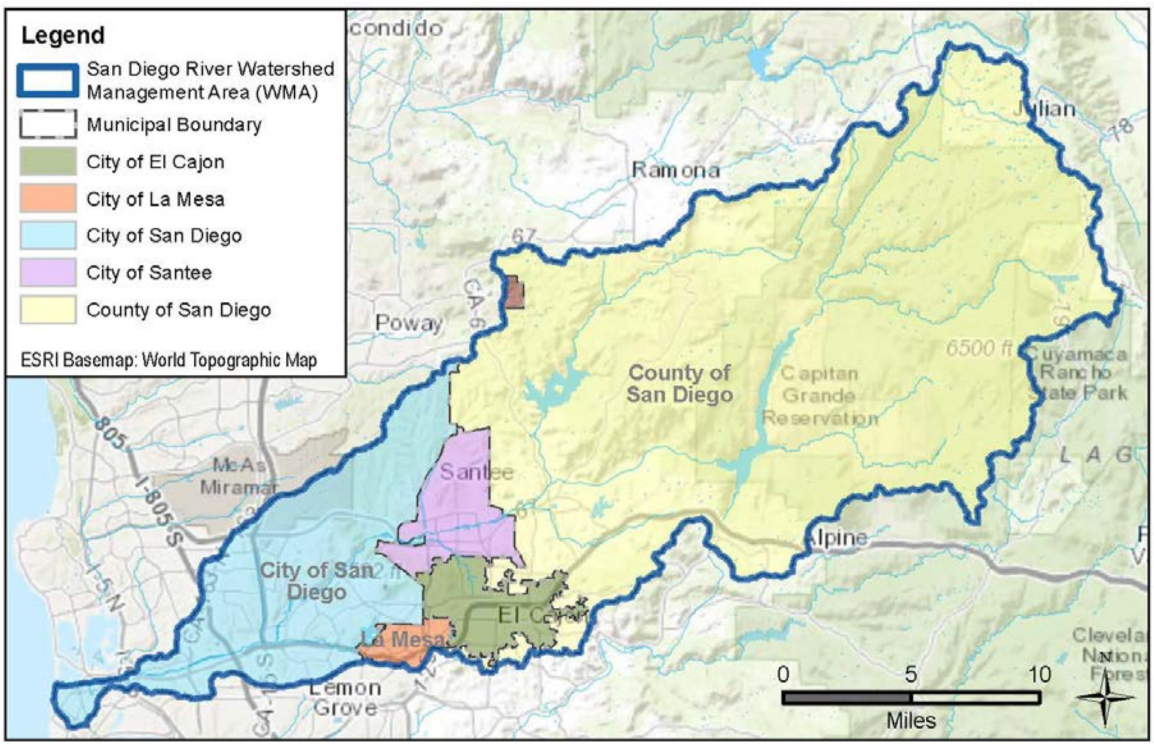


Figure ES-1. The San Diego River Watershed Management Area

The HPWQC and PWQCs for the WMA were identified based on an assessment of receiving water conditions, storm drain outfall discharges and their potential impacts, and the sources of pollutants in the watershed. Using the methodology outlined in the WQIP, bacteria was identified as the HPWQC for the WMA.

HPWQC:
Bacteria (Wet and Dry)

PWQCs:
Eutrophic Conditions, Total Dissolved Solids, Nitrogen, Phosphorus, Index of Biotic Integrity, Total Nitrogen as N (Dry)

ES.2 MONITORING AND ASSESSMENT

The 2015-2016 monitoring year was the first under the Monitoring and Assessment Plan (MAP) of the accepted WQIP that focuses on addressing bacteria. Monitoring results as they relate to bacteria are presented in the following sections, with details provided in the Annual Report. Overall, monitoring results support the selection of bacteria as the HPWQC and provide substantial data to assess progress toward goals.

ES.2.1 Total Maximum Daily Load (TMDL) Monitoring

Bacteria Total Maximum Daily Load (TMDL) sampling was conducted during wet and dry weather at one beach location and four creek locations in accordance with TMDL requirements specified in the Permit. Additional detail is provided in Section 3.1.2.

- Beach location
  - Pacific Ocean Shoreline at Dog Beach **FM-010**
- Creek locations:
  - Forester Creek **SDR-FC1**, **SDR-FC2**
  - Lower San Diego River **SDR-MLS**, **SDR-CDE**

- Interim and final receiving water limitations (RWLs) for indicator bacteria are being achieved at FM-010 except the dry season geometric mean for *Enterococcus*.
- There were also no exceedances of geometric means for fecal coliform at SDR-CDE during the dry and wet seasons and at SDR-FC2 and SDR-MLS during the wet season. Both interim and final RWLs are being met for these analytes at these locations.
- All other results did not meet the interim or final RWLs.

TMDL Monitoring Location SDR-CDE

- Interim numeric targets are not required to be achieved until 2020 for dry weather and 2028 for wet weather; therefore, the exceedances observed during 2015-2016 do not indicate non-compliance at this time.

ES.2.2 Storm Drain Outfall Dry Weather Field Screening

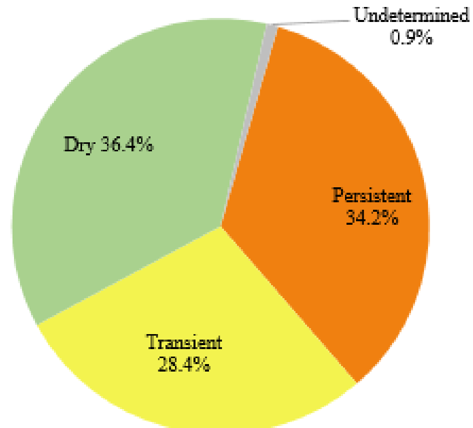
Dry weather field screening is conducted to identify non-stormwater and illicit discharges from the Participating Agencies' major storm drain outfalls, determine which discharges are persistent, and prioritize those discharges that will be investigated and eliminated.

Based on field screening visits and available historical data, the Participating Agencies determined the flow status of each major storm drain outfall as persistent, transient, dry, or undetermined. As defined in the Permit, flow status for a given outfall is "dry" if no flowing or standing water is observed at the outfall over three most recent visits, and "persistent" flow is defined as presence of flowing or standing water upon three most recent visits. Otherwise, the outfall status is classified as "transient." Additional detail is provided in Section 3.2.1.1.

- There was no trash or little trash (less than 50 pieces) during most (95%) of the trash assessments (n = 375) at visited outfalls.
- Outfalls were dry during 49% of routine field screening visits; flowing water was present during 30% of routine visits.
- When flow was observed, the majority (75 of 113) of the flow rates were less than five gallons per minute.

Overall, since the prior monitoring year:

- The number of "dry" outfalls decreased by one.
- Outfalls categorized as "transient" decreased by three.
- Outfalls with "persistent" flow increased by 11.
- The number of "undetermined" outfalls decreased by five.
- No modifications to field screening monitoring locations or frequencies are planned for 2016-2017 in the WMA.



Flow Determinations for Major Storm Drain Outfalls (n=225)

Major storm drain outfalls are prioritized for monitoring by each Participating Agency based on criteria such as persistence of non-stormwater flow, monitoring data results, and the potential threat to receiving water quality. Monitoring was conducted at the highest priority outfalls, which are shown in Figure ES-2. Highest priority storm drain outfall monitoring is described in ES.2.3. These outfalls were also a specific focus for the Illicit Discharge Detection and Elimination (IDDE) investigations by each Participating Agency as described in Section ES.2.5.

ES.2.3 Highest Priority Storm Drain Outfall Dry Weather Monitoring

Analytical monitoring during dry weather was conducted at the highest priority outfalls identified by each Participating Agency. Monitoring locations are shown in Figure ES-2, and results for bacteria in non-stormwater samples at these outfalls are shown in Figure ES-3. Eighty-three % of *Enterococcus* and 71% of fecal coliform results were above non-stormwater action levels (NALs). No re-prioritizations of the highest priority outfalls are planned for 2016-2017 in the WMA. Additional detail is provided in Section 3.2.1.2.

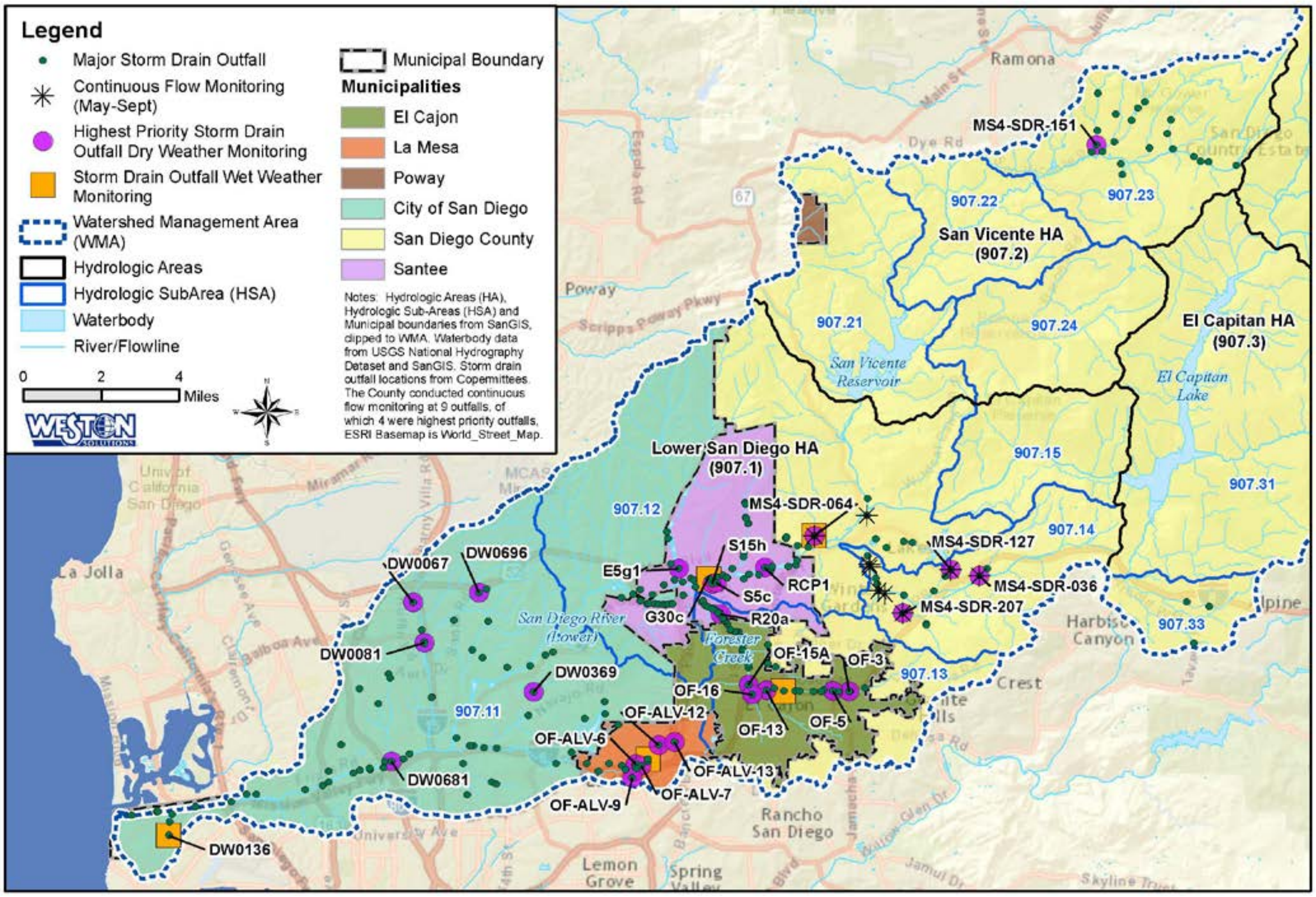
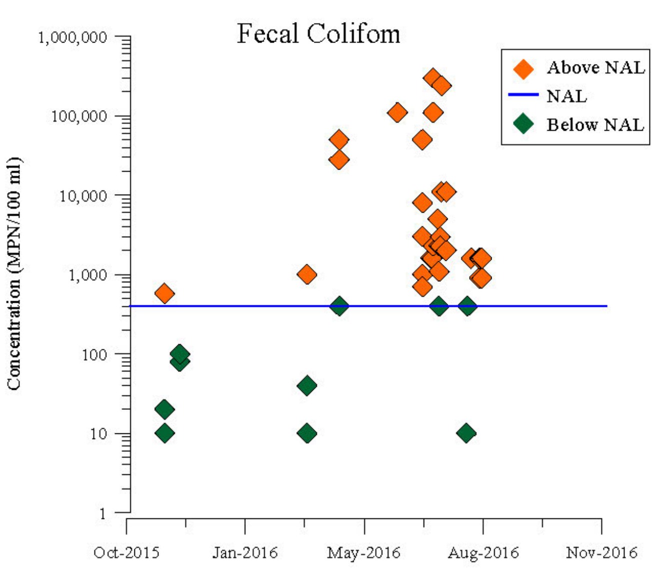


Figure ES-2. 2015-2016 Dry and Wet Weather Storm Drain Outfall Monitoring Locations



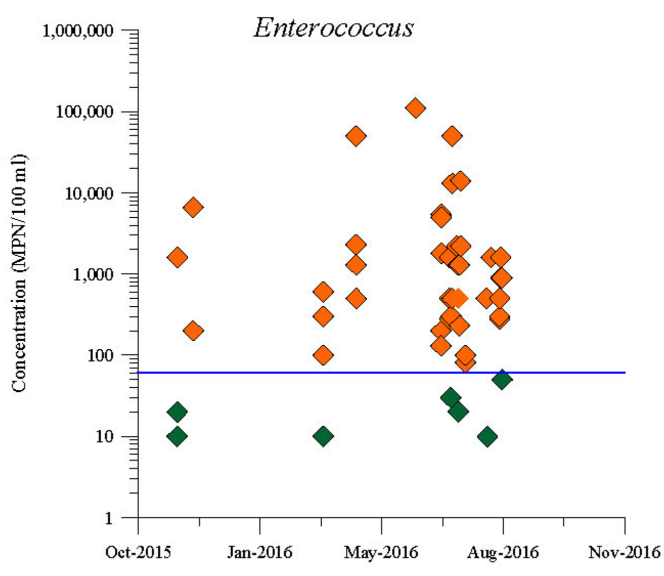


Figure ES-3. Indicator Bacteria Concentrations in Highest Priority Storm Drain Outfall Dry Weather Samples

ES.2.4 Illicit Discharge Detection and Elimination (IDDE) Program

Each Participating Agency's IDDE Program seeks to address and reduce the potential contribution of pollutants from stormwater and non-stormwater discharges through the storm drain system. The highest priority outfalls were a specific focus of IDDE investigations. Additional detail is provided in Section 3.2.1.3.

Flow sources identified through the Participating Agencies' outfall flow investigations included:

- The most common source of non-stormwater flow was irrigation runoff, followed by groundwater.
- Sources were recorded as known or suspected, and identified as controllable or uncontrollable.
- In several cases, the sources of non-stormwater flows investigated were allowable (e.g., groundwater), were reported to enforcement for follow-up actions, or were eliminated.

The City of San Diego and County of San Diego are utilizing flow meters at selected outfalls to assist in source identification.

ES.2.5 Storm Drain Outfall Wet Weather Monitoring

Storm drain outfall wet weather monitoring identifies and quantifies pollutants in stormwater discharges from the storm drain system, guides pollutant source identification efforts, and tracks progress toward achieving wet weather numeric goals set forth in the WQIP. Monitoring locations are shown in Figure ES-2 in Section ES.2.3. Additional detail is provided in Section 3.2.2.

- 100% of *Enterococcus* and fecal coliform concentrations in storm drain outfall wet weather discharges were above the single sample maximum water quality based effluent limitations specified in the Permit for the Bacteria TMDL.

ES.2.6 Special Studies

Special studies conducted in the San Diego River WMA are described in Section 3.3 and included the following:

- Reference Streams and Beaches Studies - provide a scientific basis for updating the "reference" conditions to be considered in evaluating compliance levels in the Bacteria TMDL, and will be useful in the re-evaluation of the Bacteria TMDL.
- Wet Weather Epidemiology Study – demonstrated the applicability of quantitative microbial risk assessment (QMRA) for recreational water risk estimates during wet weather and may facilitate consideration of site-specific water quality criteria.

Wet Weather Epidemiology Study Site – Ocean Beach

ES.3 WATERSHED STRATEGY IMPLEMENTATION AND PROGRESS TOWARD GOALS

The Permit requires the Participating Agencies to select the HPWQC for the WMA and develop strategies and numeric goals to address that HPWQC. Since the acceptance of the WQIP in February 2016, the Participating Agencies have implemented strategies and have begun making progress toward achieving numeric goals for bacteria. Many of the interim goals to be achieved during the current Permit term, which extends to 2018, are expressed in terms of performance measures. Examples of performance measures include the amount of area treated by installation of green infrastructure or percent reduction in dry weather discharge flow rates. Performance measures are helpful as milestones over relatively short timeframes because they are closely linked to reductions in bacteria, and they are subject to less natural variation than water quality monitoring data. Several key strategy types, which address not only bacteria but other PWQC in the watershed, were implemented broadly across the watershed and included the following:

- Preventing wastewater discharges to the storm drain system.
- Trash cleanups.
- Dry and wet weather runoff reduction programs.
- Retrofit and rehabilitation projects.
- Additional monitoring to investigate sources of dry weather flows.

Interim Permit-term goals are applicable to individual jurisdictions, but the collective progress towards achieving these goals also indicates progress on a watershed level. Progress made toward achievement of the interim Permit-term numeric goals is summarized below, with supporting information provided in Table ES-1. Additional detail is provided in Section 4.

Permit Term Numeric Goals for the City of El Cajon:

- Dry Weather Goal: Flow Reduction – **Goal Has Been Achieved**
- Dry Weather Goal: Encampment Removals - **Goal Has Been Achieved**
- Wet Weather Goal: Cleanup Events at Forester Creek – **Goal Has Been Achieved**
- Wet Weather Goal: Pet Waste Management – **On Track to Achieve Goal**

Permit Term Numeric Goals for the County of San Diego:

- Dry Weather Goal: Flow Reduction – **Baseline Estimations are Complete**
- Wet Weather Goal: BMP Implementation – **On Track to Achieve Goals**
- Wet Weather Goal: Distributed BMP Operation and Maintenance – **Goal Has Been Achieved**

Permit Term Numeric Goals for the City of La Mesa:

- Dry and Wet Weather Goal: Alvarado Creek Restoration – **On Track to Achieve Goals**

Permit Term Numeric Goals for the City of Santee:

- Dry and Wet Weather Goal: Bacteria Load Reductions – **On Track to Achieve Goals**

Permit Term Numeric Goals for the City of San Diego:

- Dry and Wet Weather Goal: Green Infrastructure BMPs – **On Track to Achieve Goals**
- Dry Weather Goal: Flow Reduction – **Goal Has Been Achieved**

Table ES-1. Progress Toward Permit Term Numeric Goals in the San Diego River WMA for the 2015-2016 Monitoring Year

City of El Cajon
Dry Weather
• The estimated dry weather flow volume from major outfalls and the percentage of major outfalls with flowing water during dry weather were 58% and 47% lower than the baseline, respectively, during FY 15-16. Both of these numbers represent greater reductions than the Permit-term reduction goal of 10%. • The City performed 18 transient encampment removal events and removed 212.6 cubic yards of trash and debris during FY 15-16. These numbers are greater than the Permit-term goals of five cleanups per year and 25 cubic yards of material removed per year; especially high numbers were achieved in FY 15-16 due to flood prevention cleanups in channels in anticipation of El Niño conditions.
Wet Weather
• The City sponsored two cleanup events at Forester Creek during FY 15-16, in line with the Permit-term goal to complete two per year. Approximately 2,280 lbs. of trash and debris were removed. • The City began planning its expanded pet waste management outreach program during FY 15-16 and is on track to implement it in one focused area or for one homeowners' association by 2018, as required to meet the Permit-term goal.
City of La Mesa
Dry and Wet Weather
• The City started construction of the 900 linear feet of restoration in Alvarado Creek in FY 15-16. The project is scheduled to be completed in FY16-17, which will achieve the City's Permit-term goal.
City of Santee
Dry Weather
• During FY15-16, the City of Santee worked with a local big box business to eliminate a persistent discharge. Regular flow had been observed at an outfall to the San Diego River located close to the Town Center commercial development. Through upstream investigation efforts, the City tracked the flow source to two catch basins and a manhole in the shopping center, which had a total flow rate of about three gallons per minute. Further investigation found that the source of flow to these locations was from swamp coolers in a big box store. The City worked with store management, their corporate office, and legal department to eliminate the flow. Corrections involved the vetting of multiple solutions, with the store deciding on the replacement of the HVAC units, implementing a closed loop plumbing system, and redirecting any excess runoff to the sewer. • The City participated with the sheriff to abate transient encampments, and facilitated the disposal of waste from 22 volunteer based clean up events. The total amount of debris removed from the San Diego River within Santee's jurisdiction was 45.56 cubic yards.
Wet Weather
• The City sent out 1,115 letters to private properties informing them of their responsibility to prevent erosion, and clean out their brow ditches. Public Services staff also prepared for the forecasted El Niño conditions by conducting additional channel maintenance to prevent potential flooding.

Table ES-1. Progress Toward Permit Term Numeric Goals in the San Diego River WMA for the 2015-2016 Monitoring Year

City of San Diego
Dry Weather
• Average dry weather flow was reduced by 46.7% from the calculated baseline average flow, exceeding the Permit-term reduction goal of 10%.
Dry and Wet Weather
• The City implemented green infrastructure projects that treat 43.6 acres of drainage area, which is about 75% of the total of 58.4 acres to be treated by 2018 to meet the FY 18 performance based goal. • In accordance with the requirements of the WQIP, the storm drain discharge baselines to be used for assessing progress toward dry and wet weather jurisdictional numeric goals for bacteria reductions due to be achieved in future permit terms were calculated and are presented in Table A3-9 and Table A3-10 of Appendix 3.
County of San Diego
Dry Weather
• In accordance with the County's commitment in the WQIP, additional dry weather flow data beyond routine major outfall monitoring was collected from storm drain outfalls during the 2015-2016 monitoring year. A baseline was established using that data. In future years, data will be compared to the baseline to assess progress toward the County's flow reduction goal.
Wet Weather
• Planned programmatic (non-structural) BMPs were implemented according to the schedule in the WQIP to reduce bacteria loads. Continued implementation of these non-structural BMPs through FY 17-18 will achieve a Permit-term goal. • BMPs constructed between 2003 and 2009 were operated and maintained to reduce bacteria loads. Continued operation and maintenance of these structural BMPs through FY 17-18 will achieve a Permit-term goal.

ES.4 CONCLUSION

Data collected in the San Diego River WMA during the 2015-2016 monitoring year support the identified priority and highest priority water quality conditions as provided in the WQIP and provide the information necessary to assess progress. Since the acceptance of the WQIP in February 2016, the Participating Agencies have begun implementing their strategies intended to result in achievement of dry and wet weather interim goals for the term of the current Permit, and progress has been demonstrated toward each goal. The strategies implemented by the Participating Agencies and identified in the WQIP focus on reducing bacteria discharges, but also address other pollutants, providing a multi-benefit approach to implementation.

The Participating Agencies will continue to implement these identified strategies, collect additional monitoring and programmatic data, and assess their progress toward goals on an annual basis. New data and information will be utilized as it becomes available to improve the WQIP with updates to priorities, assessments of and adjustments to goals, updates to strategies to achieve the latest goals, and updates to the MAP as necessary through the adaptive management process.

1 Introduction

The San Diego Regional Water Quality Control Board (Regional Board) regulates discharges from municipal separate storm sewer systems (MS4s) (storm drain systems) in the San Diego Region under the Regional MS4 Permit[1] (Permit) (Regional Board, 2013). The Permit covers portions of San Diego County, southern Orange County, and southwestern Riverside County and regulates Phase I municipalities who own and operate storm drain systems, which discharge stormwater (wet weather) runoff and non-stormwater (dry weather) runoff to surface waters throughout the San Diego Region. One of the main goals of the Permit is to focus on water quality improvement outcomes rather than completing specific actions, giving the Participating Agencies more control over how their stormwater programs are implemented.

Within the Permit, the San Diego Region is sub-divided into 10 watershed management areas (WMAs), which cover the major, natural drainages in the region[2]. The Permit requires the development of a Water Quality Improvement Plan (WQIP) for each WMA, which guides the Participating Agencies' Jurisdictional Runoff Management Programs (JRMPs) (their local plans) towards an outcome-based approach and improved water quality. This process is accomplished through an adaptive planning and management method that identifies the highest priority water quality condition(s) (HPWQC) within a watershed and implements strategies through the WQIP and JRMPs to achieve improvements in the quality of discharges from the storm drain system and within the receiving waters.

Participating Agencies within each WMA are required by the Permit to submit an Annual Report to communicate the implementation status and progress of the WQIPs and corresponding JRMPs in meeting the defined numeric goals[3]. This San Diego River WMA Annual Report covers two reporting periods on different schedules. The first is from July 1, 2015 to June 30, 2016 for the JRMPs and WQIP strategy implementation (note that the WQIP was accepted in February 2016), and the second is from October 1, 2015 to September 30, 2016 for monitoring and assessment programs. Progress to achieve goals may be assessed for either reporting period, depending on the goal metric. This Annual Report, the first under the San Diego River WMA's WQIP, addresses the requirements of the Permit. Table 1-1 provides an overview of the Permit requirements that must be addressed by the Annual Report, and where they are discussed within this document. Appendix 1 includes additional detail regarding the specific Permit requirements as well as where they are addressed within the Annual Report[4]. Appendix 2 provides information related to each jurisdiction's JRMP.

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[1] Order No. R9-2013-0001, as amended by Order Nos. R9-2015-001 and R9-2015-0100. http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/docs/2015-1118_AmendedOrder_R9-2013-0001_COMPLETE.pdf

[2] Order No. R9-2013-0001 (as amended), Table B-1 (page 21 of 139)

[3] Order No. R9-2013-0001 (as amended), F.3.b.(3) (page 132-133 of 139)

[4] Order No. R9-2013-0001 (as amended), F.3.b.(3)(f) Each Copermittee must provide any data or documentation utilized in developing the Water Quality Improvement Plan Annual Report upon request by the San Diego Water Board. Any Copermittee monitoring data utilized in developing the Water Quality Improvement Plan Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN). Any Copermittee monitoring and assessment data utilized in developing the Water Quality Improvement Plan Annual Report must be available for access on the Regional Clearinghouse required pursuant to Provision F.4.

Table 1-1. Regional MS4 Permit WQIP Annual Reporting Provisions and Corresponding Annual Report Sections[5]

Permit Provision	WQIP Annual Report Section						WQIP Appendix			
	Section 1 – Introduction	Section 2 – Priority & Goals	Section 3 – Monitoring	Section 4 – Achieving Goals	Section 5 – Adaptive Mgmt.	Section 6 – Conclusions	Appendix 2 – Jurisdictional Specific Info.	Appendix 3 – Goals	Appendix 4 – Monitoring	Appendix 5 – Adaptive Mgmt.
Provision A										
A.4.a.(2)			X		X		X		X	X
Provision B										
B.5.a.					X				X	X
B.5.b.			X	X	X		X	X	X	X
B.5.c.					X					X
Provision D										
D.1.e.(2)(c)			X						X	
D.2.b.(2)(iv)			X						X	
D.4.b.(1)(a)(ii)			X						X	
D.4.b.(1)(b)			X		X				X	X
D.4.b.(1)(c)			X		X				X	X
D.4.b.(2)(a)					X					X
D.4.b.(2)(b)			X		X				X	X
D.4.b.(2)(c)			X		X				X	X
D.4.b.(2)(d)									X	
D.4.c.			X						X	
D.4.d.					X					X
D.4.d.(1)					X					X
D.4.d.(2)					X					X
D.4.d.(3)					X					X
Provision E										
E.1.b.							X			
E.2.d.(4)			X						X	
E.8.c.	X						X			
Provision F										
F.1.b.(6)					X					X
F.2.a.(2)					X					X
F.2.a.(3)					X					X
F.2.b.(1)					X		X			
F.2.b.(2)					X		X			
F.2.c.(1)(c)					X					X
F.3.b.(3)(a-f)	X		X	X	X		X		X	X
Attachment E										
Attachment E			X						X	

[5]Appendix 1 includes additional detail regarding the specific Permit requirements, as well as where they are addressed within the Annual Report.

This San Diego River WMA Annual Report is structured as follows:

1. **Introduction** – Provides an overview of the Regional MS4 Permit, the WQIP, and the Annual Reporting requirements.

   Appendix 1. Crosswalk of Permit Requirements and Annual Report References

   Appendix 2. Jurisdictional Runoff Management Program Annual Report Certifications and Forms, Strategies, and Changes to the Best Management Practices (BMP) Manual (as applicable)

2. **San Diego River WMA Priorities and Numeric Goals** – Introduces the WMA, the priority water quality conditions (PWQC) and HPWQC for the watershed, and the numeric goals and schedules developed to measure progress in addressing the priority conditions.

   Appendix 3. Water Quality Improvement Plan Numeric Goals

3. **Monitoring and Assessment** – Summarizes the monitoring programs and provides an assessment of the data collected.

   Appendix 4. Monitoring Results and Assessments

4. **Implementation and Progress Towards Achieving Numeric Goals** – Provides a detailed assessment of the progress towards achieving the numeric goals, with a focus on those numeric goals occurring during the Permit term. The section also provides an overview of the strategies implemented to achieve the numeric goals, the status of implementation, and plans for the coming year.

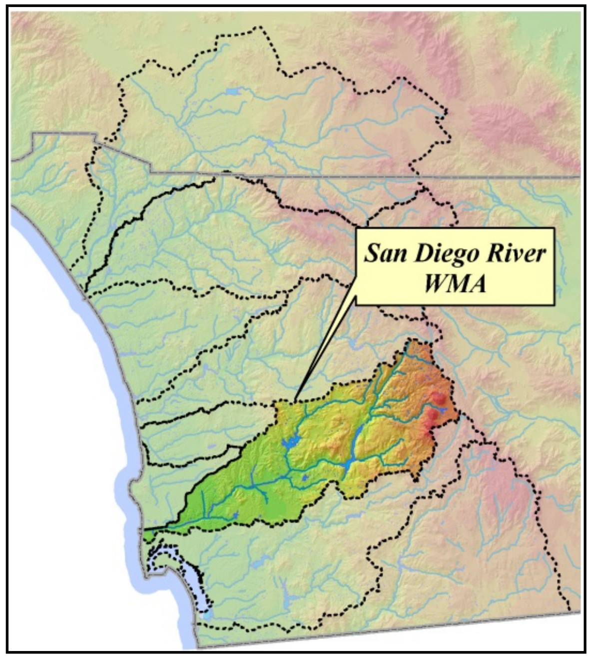
5. **Adaptive Management** – Provides a summary of the elements of the WQIP process that be altered during the course of Permit implementation and any changes that were made as a result of new information realized during the reporting period.

   Appendix 5. Adaptive Management Modifications

6. **Conclusions** – Provides the conclusions that are based on the data collected and assessments conducted during implementation of the WQIP.

7. **References**

2 Overview of San Diego River Watershed



The San Diego River WMA is located in central San Diego County, bordered by the Mission Bay and La Jolla, Peñasquitos, and San Dieguito River WMAs to the north and the San Diego Bay WMA to the south. Major surface water bodies and the municipalities/agencies responsible for stormwater management within the WMA are summarized in Table 2-1. Although the California Department of Transportation (Caltrans) is not a part of the Permit, Caltrans works cooperatively with the Copermittees in accordance with their statewide National Pollutant Discharge Elimination System (NPDES) permit.

The San Diego River WMA (hydrologic unit [HU] 907) encompasses approximately 277,543 acres, or 434 square miles. For the purposes of the San Diego River WMA WQIP, the watershed was separated into upper and lower portions to better focus water quality prioritization JRMP implementation efforts. The upper portion, above the reservoirs, is comprised of the San Vicente (907.2), El Capitan (907.3), and Boulder Creek (907.4) hydrologic areas (HAs), whereas the lower portion, below the reservoirs, is the Lower San Diego (907.1) HA. These HAs are comprised of 14 hydrologic subareas (HSAs).

The San Diego River originates in the Cuyamaca Mountains near Santa Ysabel, over 6,000 feet above sea level along the western border of the Anza Borrego Desert State Park, and extends more than 52 miles across central San Diego County. It ultimately discharges to the Pacific Ocean at Dog Beach in Ocean Beach, a community within the City of San Diego. Additional information is provided in the San Diego River WMA WQIP (Larry Walker Associates et al., 2016). A map of the watershed is shown in Figure 2-1.

Table 2-1. Major Surface Water Bodies and the Municipalities/Agencies Responsible for Stormwater Management within the San Diego River WMA

Hydrologic Unit(s)	Major Surface Water Bodies	Municipalities/Agencies
San Diego River (903.00)	▪ San Diego River ▪ Pacific Ocean	▪ City of El Cajon ▪ City of La Mesa ▪ City of San Diego ▪ City of Santee ▪ County of San Diego ▪ Caltrans[6]

[6]Caltrans is regulated under a separate permit from the State Water Resources Control Board (Order No. 2012-0011 DWQ). However, Caltrans has voluntarily participated in the development of Water Quality Improvement Plans throughout the San Diego Region.

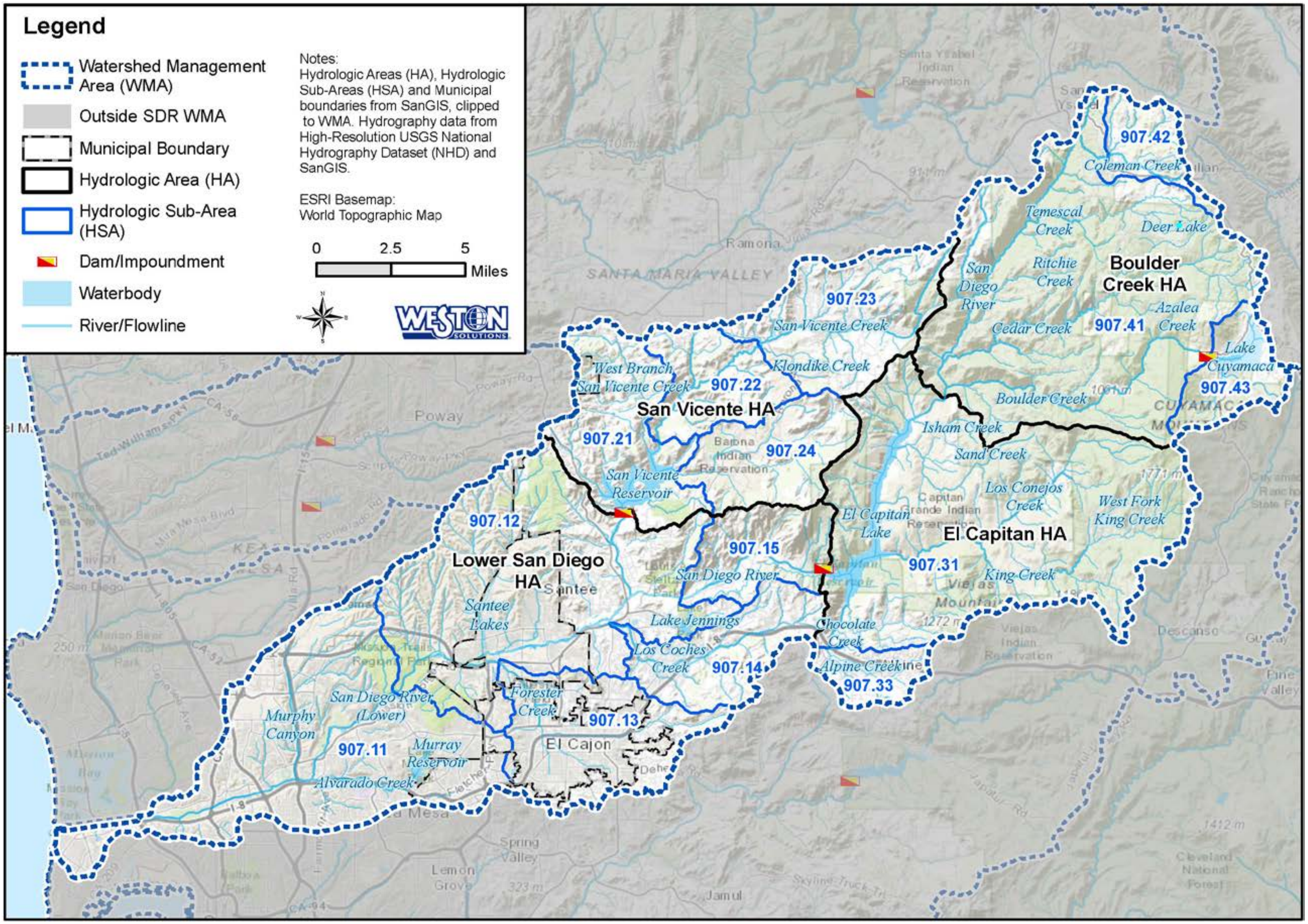


Figure 2-1. San Diego River Watershed Management Area

The total annual rainfall in the San Diego Region during the reporting period (October 2015 through September 2016), as measured at San Diego International Airport-Lindbergh Field, was 8.21 inches. Despite El Niño conditions reported by the National Weather Service (NWS) Climate Prediction Center through the spring of 2016 (National Oceanic and Atmospheric Administration [NOAA], 2016a), this total is below the historical (1939 to 2016) annual mean of 9.85 inches. The majority of the rainfall during the 2015-2016 reporting period fell during November and January, and rainfall was above average for those months (Western Regional Climate Center [WRCC], 2016). Long-term drought conditions persisted in the San Diego region during the 2015-2016 monitoring year, and temperatures were generally above average (NOAA, 2016b).

Annual rainfall at four Alert System Precipitation Gauges (http://sdcfcd.org/whatalert.html) in the San Diego River WMA, all within the Lower San Diego HA, is shown in Figure 2-2. Annual rainfall totals at these stations ranged from 11.87 to 15.63 inches. Precipitation totals at the Alert Stations are provided for the fiscal year (FY) (July 1, 2015 to June 30, 2016) for consistency with the wet weather storm drain outfall assessments presented in Appendix 4. The rainfall total at Lindbergh field for FY 2015-2016 was 10.82 inches (WRCC, 2016).

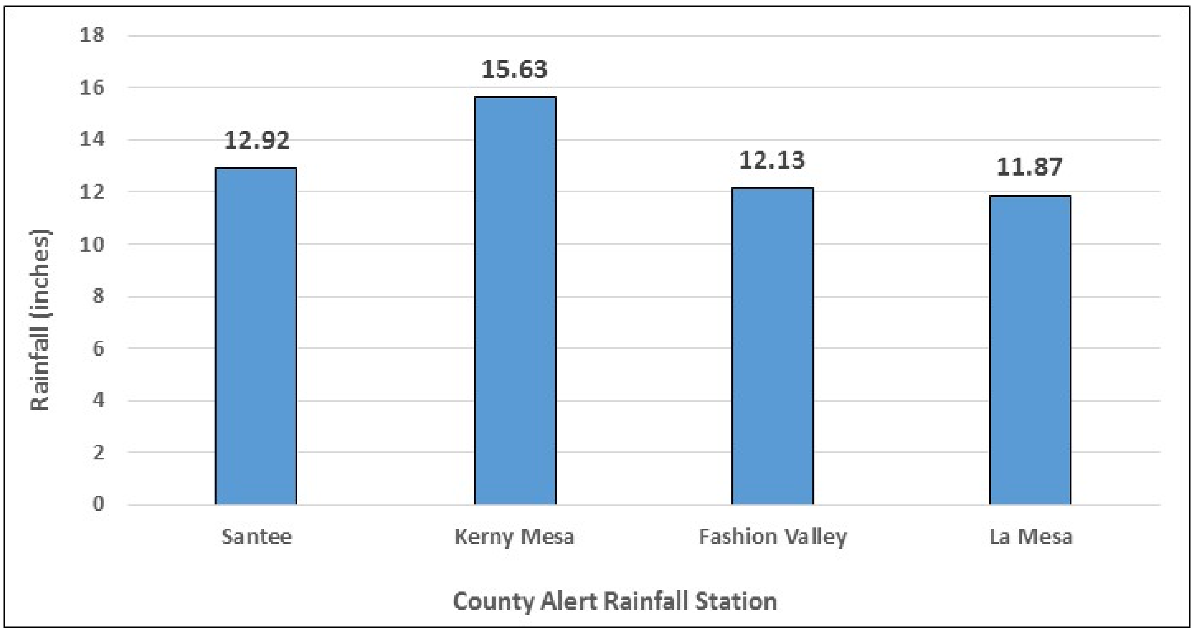


Figure 2-2. Total Precipitation at Four County Alert Weather Stations in the Lower San Diego HA, July 1, 2015 to June 30, 2016

2.1 SAN DIEGO RIVER WATER QUALITY IMPROVEMENT PLAN

The WQIP for the San Diego River WMA identifies strategies that will be implemented through JRMPs to address bacteria in pursuit of measurable numeric goals that will achieve improvements in the quality of storm drain outfall discharges and, in turn, the receiving waters. The WQIP outlines how the Participating Agencies within the watershed are evaluating water quality conditions, prioritizing those water quality conditions, and using these common priorities to guide jurisdictional and watershed scale programs to address the highest priorities.

Figure 2-3 illustrates the general planning, implementation, monitoring, and adaptive management process and the text that follows briefly describes the components of the WQIP.

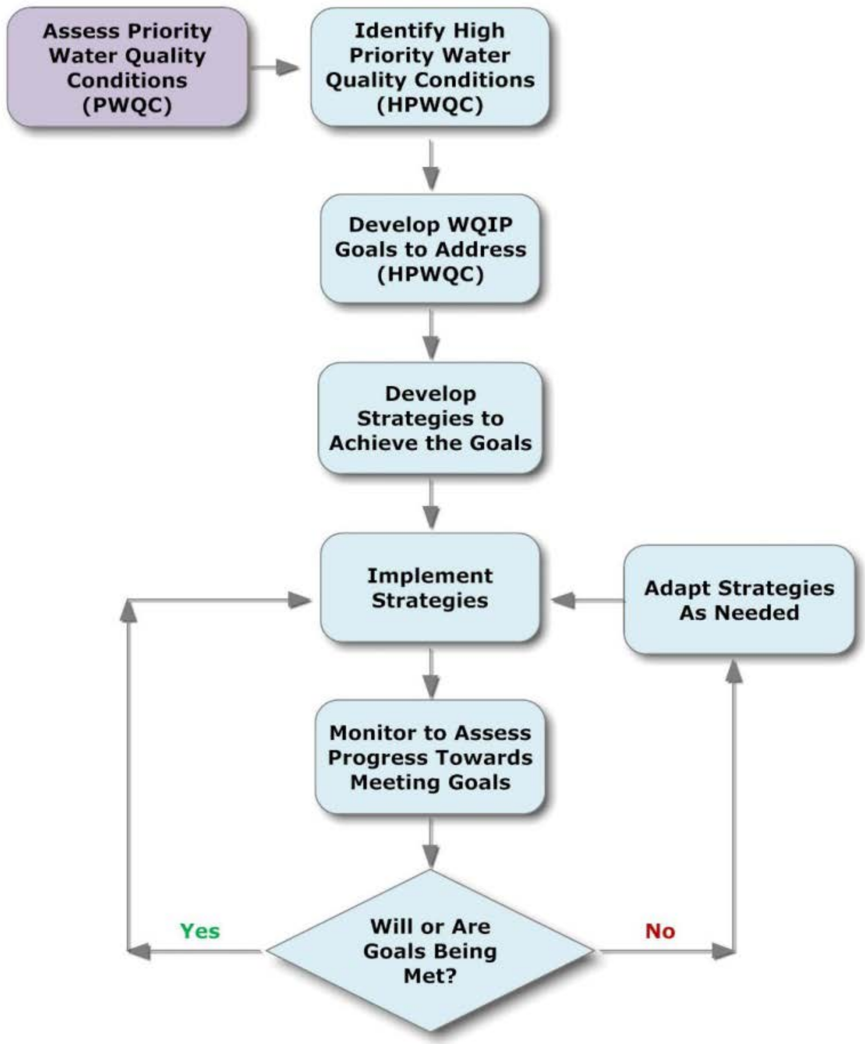


Figure 2-3. Water Quality Improvement Plan Process

The complete WQIP document contains the following components, identified in the 2013 Permit:

- Priority Water Quality Conditions.
- Goals, Strategies, and Schedules.
- Watershed Management Area Analysis (WMAA), which the Permit indicates is optional.

- Monitoring and Assessment Program (MAP), which also documents how the Participating Agencies will comply with the applicable monitoring and assessment portions of the Permit.
- Iterative Approach and Adaptive Management Process.

The complete WQIP was provided to the Regional Board on June 26, 2015. Appropriate revisions were made to address public comments and Regional Board concerns, and a revised WQIP was submitted to the Regional Board for acceptance on September 29, 2015. The Regional Board advised the San Diego River WMA Copermittees on January 7, 2016 that minor deficiencies remained, and provided proposed corrections on January 29, 2016. The Regional Board accepted the revised San Diego River WQIP, with the proposed corrections, on February 12, 2016. WQIP documents can be accessed on the Regional Board website: http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/wqip.shtml.

2.2 PRIORITY AND HIGH PRIORITY WATER QUALITY CONDITIONS

Using the methodology outlined in the WQIP, bacteria was identified as the HPWQC for the San Diego River WMA. The HPWQC and additional priority water quality conditions (PWQCs) for the WMA are summarized in Table 2-2. Each of the water bodies listed in Table 2-2 are located in the Lower San Diego HA except El Capitan Lake and San Vincente Reservoir, which are located in the El Capitan and San Vincente HAs, respectively. Additional information is provided in Section 2 and Appendix 2D of the WQIP.

Table 2-2. San Diego River WMA Priority Water Quality Conditions

Constituent	Wet	Dry	Beneficial Use*	Geographic Area
Highest Priority Water Quality Condition				
Bacteria	X	X	REC-1 (water contact recreation)	Forester Creek, Pacific Ocean Shoreline at San Diego River Outlet, Lower San Diego River
Priority Water Quality Conditions				
Eutrophic Conditions		X	MAR (marine habitat)	Famosa Slough and Channel
Total Dissolved Solids (TDS)		X	IND (industrial service supply)	Forester Creek
			AGR (agricultural supply)	Lower San Diego River
Nitrogen		X	WARM (warm freshwater habitat)	Murray Reservoir, Lower San Diego River
			MUN (municipal and domestic supply)	El Capitan Lake
Phosphorus		X	WARM (warm freshwater habitat)	Lower San Diego River
Index of Biotic Integrity (IBI)		X	WARM (warm freshwater habitat)	Lower San Diego River
Total Nitrogen as N		X	MUN (municipal and domestic supply)	San Vincente Reservoir

* Source: Water Quality Control Plan for the San Diego Region (Basin Plan) (Regional Board, 1994).

Bacteria are important indicators of water quality for recreational users like surfers, swimmers, and beach waders. Indicator bacteria are used as detection surrogates or proxies for pathogens because they are easier and less costly to measure. Allowable bacteria loads for the watershed are defined by the Bacteria Total Maximum Daily Load (TMDL)[7], which requires the Participating Agencies to improve water quality in local waters during both dry weather and wet weather conditions within a 10- and 20-year compliance timeline, respectively (see Section 2.3).

2.3 WATER QUALITY IMPROVEMENT PLAN NUMERIC GOALS

The Participating Agencies identified and developed specific water quality improvement numeric goals and strategies to address bacteria within the WMA. The numeric goals (interim and final) and corresponding schedules support implementation of the WQIP and measure reasonable progress towards addressing bacteria. In addition, the Participating Agencies' monitoring and assessment programs measure progress towards attaining these goals.

The numeric goals for the San Diego River WMA WQIP are designed to demonstrate progress towards compliance with the Bacteria TMDL, which differentiates between wet and dry conditions. Since wet weather bacteria loads are more challenging to control, the wet and dry TMDL targets and load reductions have different schedules. The targets for dry and wet weather are on a 10- and 20-year timeline, respectively. As a result, the goals extend beyond the timeframe of the current Permit. For this reason, the numeric goals within the WQIP are categorized into three distinct time periods:

1. Interim goals within the five-year Permit term. These goals are specific to each Participating Agency's jurisdiction.
2. Interim goals based on the interim Bacteria TMDL compliance pathways.
3. Final goals based on final Bacteria TMDL compliance options.

Attachment E.6 of the Permit outlines interim dry and wet weather TMDL compliance dates of April 4, 2017 and April 4, 2021, respectively. The Permit allows the Participating Agencies to propose alternative schedules. The Participating Agencies proposed moving the interim TMDL compliance dates for dry and wet weather to April 4, 2020 and April 4, 2028, respectively. These dates were proposed to allow adequate time to investigate and mitigate sources of bacteria and to monitor progress and adjust implementation through the adaptive management process. The detailed numeric goals for the San Diego River WMA are presented by jurisdiction in Appendix 3, and the timeline for achievement of these goals is shown in Figure 2-4.

[7]Revised TMDL for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek). Resolution No. R9-2010-0001. Approved February 10, 2010.

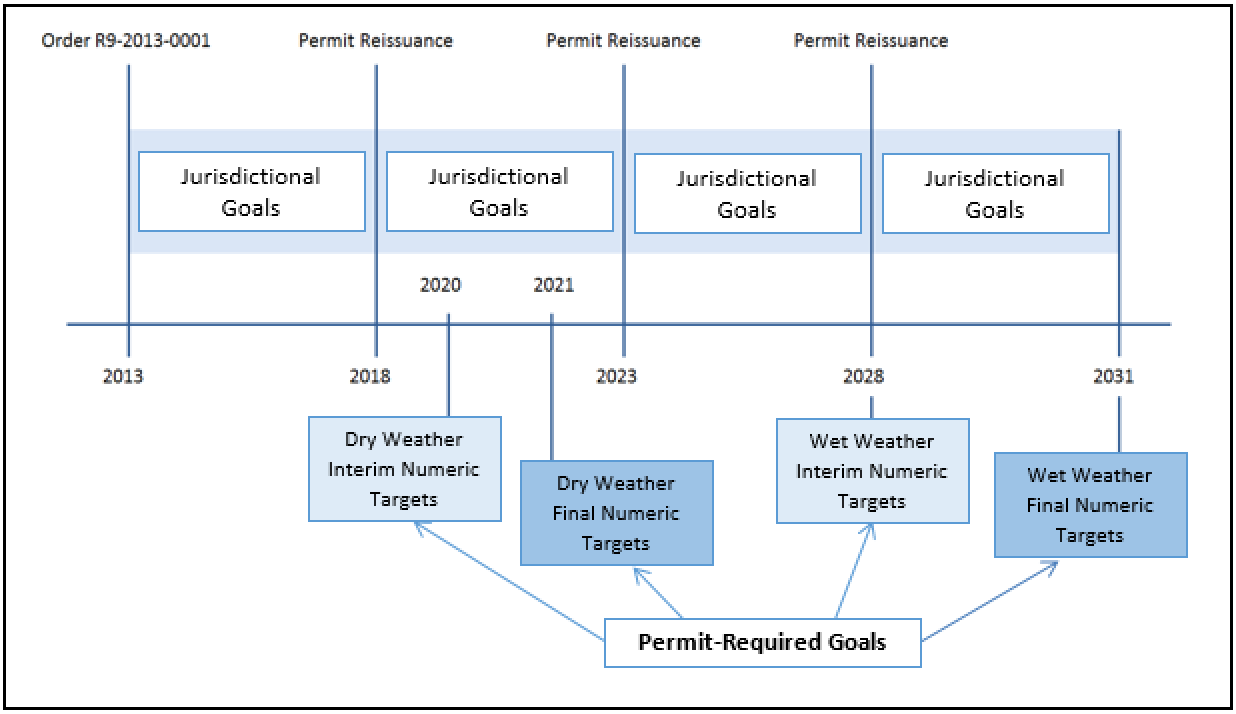


Figure 2-4. Timeline for Achievement of Bacteria TMDL Numeric Targets in the San Diego River WMA

3 Monitoring and Assessment

The Permit requires an outcome-based approach to improve water quality in stormwater and non-stormwater discharges, guided by strategies and goals identified in the WQIP. By conducting multiple types of monitoring activities, the Participating Agencies are collecting data to evaluate progress toward achieving numeric goals, and determine if modifications to stormwater program activities are necessary. Caltrans is not a Participating Agency for the monitoring and assessment program described in this section, as Caltrans is regulated under a separate permit from the State Water Resource Control Board.

This Annual Report assesses the data collected within the San Diego River WMA in combination with the Participating Agencies' management actions to determine what actions are improving the quality of storm water outfall discharges and/or receiving water conditions (Section 4) and where additional actions may be necessary (Section 5).

The Monitoring and Assessment Program includes five major components:

1. Receiving water monitoring that measures the long-term health of the watershed during dry and wet weather conditions;
2. Storm drain outfall discharge monitoring program that investigates illicit non-stormwater flows from outfalls and measures changes in the quality of discharges from the storm drain system during wet weather;
3. Special studies that look further into the sources, pollutants, and/or stressors that contribute to bacteria;
4. Illicit Discharge Detection and Elimination (IDDE) investigations and inspections of potential pollutant sources; and
5. Monitoring to assess progress toward goals and schedules.

This section describes results from the implementation of the MAP for the WMA as they pertain to bacteria. The MAP was developed and implemented to accomplish the following objectives:

1. Measure the progress toward addressing bacteria;
2. Assess the progress toward achieving the numeric goals, strategies, and schedules; and
3. Evaluate each Participating Agency's overall efforts to implement the WQIP.

Because bacteria was identified as the HPWQC for the WMA, monitoring is being conducted to characterize bacteria levels in discharges from storm drain outfalls, to identify potential sources of bacteria, and to assess the effectiveness of strategies designed to address bacteria. Additionally, these programs will generate data to track the PWQCs and the general health and conditions within the watershed.

Monitoring programs where information related to bacteria was collected during the 2015-2016 monitoring year (October 1 – September 30) are shown in Table 3-1. Relevant results from these programs from the 2015-2016 monitoring year are summarized in the sections below, with details provided in Appendix 4. Monitoring program results not directly related to bacteria, such as the Southern California Stormwater Monitoring Coalition (SMC) regional program, are presented in Appendix 4, including results as they relate to other PWQCs.

Table 3-1. Monitoring Programs Relevant to Bacteria for the San Diego River Watershed

Monitoring Program	Supports HPWQC and Summarized Below	
	Yes	No
Receiving Water Monitoring		
Long Term Monitoring at Mass Loading Station[1]		X[2]
Regional (SMC)		X[3]
Sediment Quality		X[3]
TMDL	X	
Storm Drain Outfall Monitoring		
Field Screening	X	
Dry Weather Monitoring	X	
Wet Weather Monitoring	X	
Illicit Discharge Detection and Elimination	X	
Special Studies	X	
Additional Monitoring to Assess Progress toward Goals and/or Strategies		X

[1]HMP monitoring was also conducted regionally. One reference station was located in the San Diego River WMA. The objectives and results of the program are summarized in Appendix 4.

[2]Long-term receiving water monitoring includes bacteria sampling but was conducted during the 2013-2014 monitoring year. Results can be found in the Transitional Monitoring and Assessment Report (WESTON, 2015a).

[3]No bacteria data are collected for these programs.

3.1 RECEIVING WATER MONITORING

The purpose of the receiving water monitoring program is to characterize trends in the chemical, physical, and biological conditions of a receiving water to determine whether beneficial uses are being protected, maintained, or enhanced. An overview of the receiving water monitoring program activities for the San Diego River WMA for the current Permit term is presented in Table 3-2. A summary of the results from each of these programs for the 2015-2016 monitoring year with respect to bacteria is presented below. Additional details and results for programs not related to bacteria in the WMA are presented in Appendix 4.

The receiving water assessments required by the Permit will be addressed in the Regional Monitoring and Assessment Report (RMAR), which will be submitted to the Regional Board in December 2017 with the Report of Waste Discharge (ROWD).

Table 3-2. Elements of Water Quality Improvement Plan Receiving Water Monitoring

Monitoring Programs		Dry	Wet	Monitoring Element	Permit Schedule[a]				
					2013-2014[b]	2014-2015	2015-2016	2016-2017	2017-2018
Long-Term [b]		X	X	Conventionals, bacteria, nutrients, metals, pesticides, toxicity (chronic), TIE/TREs	●	–	–	–	–
		X		Hydromodification (HMP)	●	–	–	–	–
		X		Bioassessment	●	–	–	–	–
Regional	Bight [c]	X		Chemistry, toxicity, benthic infauna	●	●	–	–	●
	SMC	X		Bioassessment	●	●	●	●	●
	2011 HMP Program		X	Channel assessments; flow monitoring; sediment transport monitoring	●	●	●	–	–
Sediment Quality [c]		X		Chemistry, toxicity, benthic infauna	●	–	–	–	–
Bacteria TMDL[d]		X	X	Bacteria	●	●	●	●	●

SMC = Southern California Stormwater Monitoring Coalition; Bight = Southern California Bight Regional Monitoring Program; TIE=Toxicity Identification Evaluation; TRE=Toxicity Reduction Evaluation

a. The Permit was adopted on May 8, 2013, and became effective on June 27, 2013.

b. Completed under the Transitional Monitoring Program.

c. The 2018 Southern California Bight Regional Monitoring will occur during the summer of 2018 or 2019.

d. Includes Forester Creek, Lower San Diego River, and Dog Beach.

3.1.1 Regional Monitoring Participation

Regional monitoring includes studies that provide information to evaluate various aspects of receiving water health on a regional scale. The Participating Agencies participated in the SMC Regional Monitoring Program during the 2015-2016 monitoring year. Because data collected under this program do not include bacteria, results are not included in this section. Detailed results are presented in Appendix 4 and its attachments, including results related to PWQCs.

3.1.2 Total Maximum Daily Load Monitoring

In February 2010, the Regional Board adopted Resolution No. R9-2010-0001, *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)* (Bacteria TMDL) (Regional Board, 2010). This TMDL amendment to the Water Quality Control Plan for the San Diego Region (Basin Plan) (Regional Board, 1994) includes three segments within the San Diego River WMA, Forester Creek, the Lower San Diego River, and the Pacific Ocean Shoreline at San Diego River mouth at Dog Beach. The Participating Agencies within the WMA that are named as responsible in the

TMDL are summarized in Table 3-3. The compliance requirements and monitoring and reporting requirements of the TMDL have been incorporated into Attachment E.6 of the Permit.

Table 3-3. Bacteria TMDL Responsible Agencies in the San Diego River WMA

Waterbody Segment	Responsible Agencies
Forester Creek	▪ City of El Cajon ▪ City of Santee ▪ County of San Diego
Lower San Diego River	▪ City of El Cajon ▪ City of La Mesa ▪ City of Santee ▪ City of San Diego ▪ County of San Diego
Pacific Ocean Shoreline at San Diego River mouth at Dog Beach	

The goal of the Bacteria TMDL is to achieve the necessary pollutant load reductions to restore and protect the designated beneficial use of water contact recreation (REC-1), as it is designated within the Basin Plan. The purpose of the TMDL monitoring program is to assess progress toward achieving compliance with the interim and final TMDL numeric targets. The data collected as part of this program can be used to assess the receiving water compliance pathway toward reaching interim and long-term goals in future years. The data generated are used to address the following questions:

- Are TMDL numeric targets for indicators being met at the compliance monitoring locations?
- Are levels of bacteria decreasing at the compliance monitoring locations?

During the monitoring year (October 1, 2015 through September 30, 2016), sampling was conducted during wet and dry weather at five receiving water monitoring locations: one beach location at the Pacific Ocean Shoreline at Dog Beach (FM-010), and four creek locations, two along Forester Creek in the Santee HSA and two along the Lower San Diego River in the Mission San Diego HSA (Figure 3-1, Table 3-4, Table 3-5). This was the third year of monitoring in accordance with the Bacteria TMDL. Samples were analyzed for the indicator bacteria compliance constituents (fecal coliform and *Enterococcus* for creeks; total coliform, fecal coliform, and *Enterococcus* for beaches) in accordance with the requirements of Attachment E.6 of the Permit.

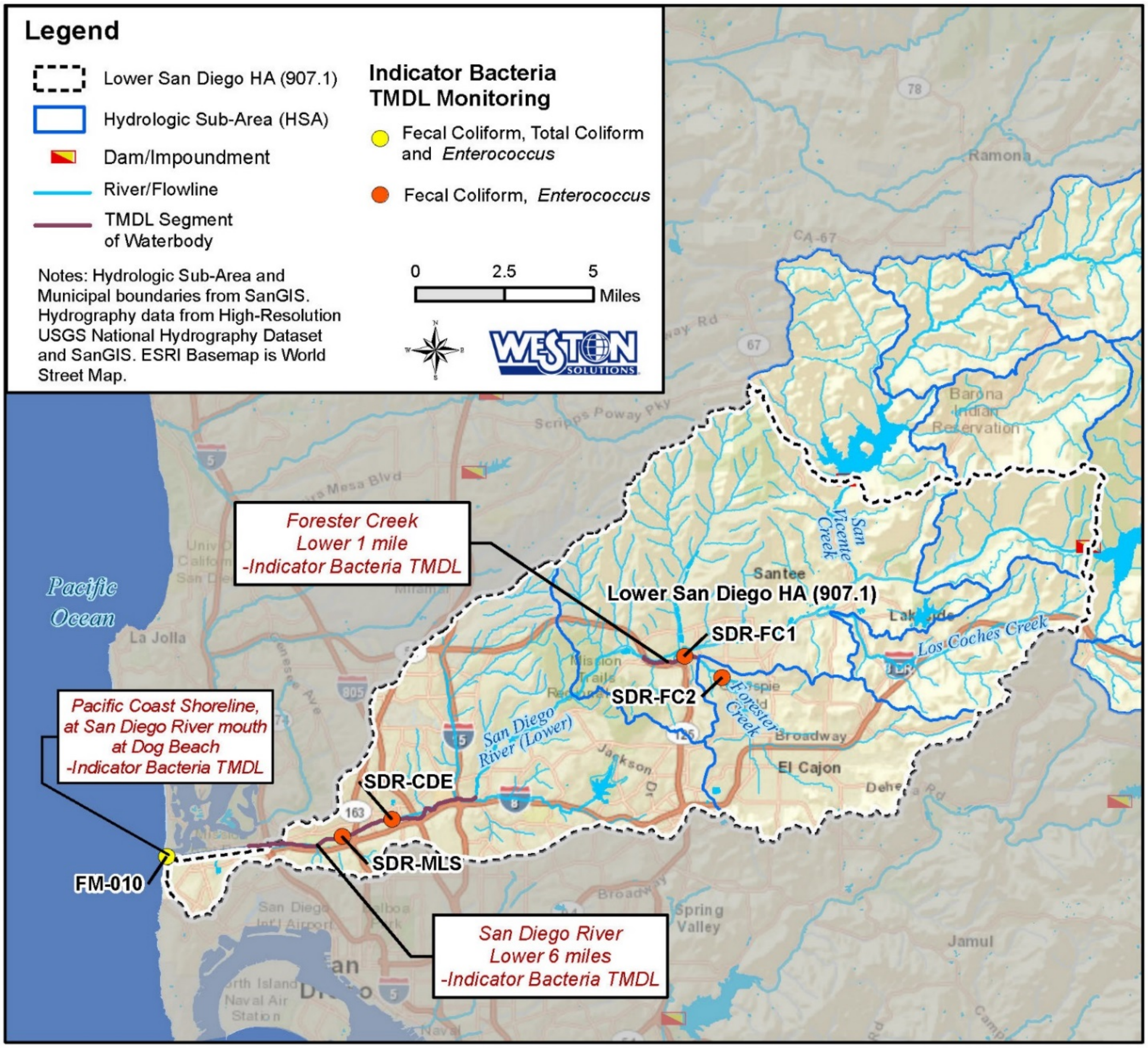


Figure 3-1. Bacteria TMDL Compliance Monitoring Locations in the San Diego River WMA

Table 3-4. 2015-2016 Bacteria TMDL Beach Monitoring Summary for the San Diego River WMA

Season	Date Range	Event Type	Event Frequency	Monitoring Location	Samples Per Site Per Event[a]	Total Number of Samples
2015-2016 Wet Season	10/01/2015-04/30/2015	Wet	Three storm events	FM-010	1	3
	10/01/2015-03/30/2016	Dry	Monthly			6
	04/01/2016-04/30/2016	Dry	Weekly[b]			5
2016 Dry Season	05/01/2016-09/30/2016	Dry	Weekly[b]			25

[a] Quality assurance (QA) or replicate samples not included.
[b] A minimum of 5 samples are collected in a 30-day period.

Table 3-5. 2015-2016 Bacteria TMDL Creek Monitoring Summary for the San Diego River WMA

Season	Date Range	Event Type	Event Frequency	Monitoring Location	Samples Per Site Per Event[a]	Total Number of Samples
2015-2016 Wet Season	10/01/2015-04/30/2015	Wet	Three storm events	SDR-MLS SDR-CDE SDR-FC1 SDR-FC2	1	12
	10/01/2015-03/30/2016	Dry	Monthly			24
	04/01/2016-04/30/2016	Dry	Weekly[b]			20
2016 Dry Season	05/01/2016-09/30/2016	Dry	Weekly[b]			100

[a] Quality assurance (QA) or replicate samples not included.

[b] A minimum of 5 samples are collected in a 30-day period.

Table 3-6 presents the exceedance rates for each indicator bacteria across the five monitored stations within the San Diego River WMA. The exceedances observed during the 2015-2016 monitoring year do not indicate non-compliance with the Permit or the Bacteria TMDL at this time. Progress toward meeting water quality based effluent limitations (WQBELs), in terms of interim and final receiving water limitations, is presented in Table 3-7 for each analyzed constituent at the five monitoring stations. Interim WQBELs are not required to be achieved until 2020 for dry weather and 2028 for wet weather, while final WQBELS must be achieved by 2021 for dry weather and 2031 for wet weather. Based on the sampling data from the 2015-2016 monitoring year, receiving water limitations that have already been achieved are indicated by (●), whereas receiving water limitations that have not yet been achieved are indicated by (X).

In summary, interim and final WQBELs are being met at FM-010 with the exception of the dry season geometric mean for *Enterococcus*. There were also no exceedances of geometric means for fecal coliform at SDR-CDE during the dry and wet seasons, and at SDR-FC2 and SDR-MLS during the wet season. Both interim and final receiving water limitations are being achieved for these analytes at these locations. All other results did not meet the interim or final receiving water limitations, which are not required to be achieved during this Permit term. Additional details are presented in the TMDL report attached to Appendix 4 of this Annual Report.

Table 3-6. 2015–2016 Exceedance Frequency Results: San Diego River WMA

Segment	Monitoring Location	Bacteria TMDL Constituent	2016 Dry Season Geometric Mean (CFU/100 mL)	2015-2016 Wet Season Geometric Mean (CFU/100 mL)	2015-2016 Wet Weather Single-Sample Maximum (CFU/100 mL)
Forester Creek	SDR-FC1	*Enterococcus*	100%	100%	100%
		Fecal Coliform	100%	80%	100%
	SDR-FC2	*Enterococcus*	100%	100%	100%
		Fecal Coliform	52%	0%	100%
San Diego River	SDR-MLS	*Enterococcus*	100%	90%	100%
		Fecal Coliform	33%	0%	93%
	SDR-CDE	*Enterococcus*	52%	90%	100%
		Fecal Coliform	0%	0%	94%
Pacific Ocean Shoreline	FM-010	*Enterococcus*	19%	0%	0%
		Fecal Coliform	0%	0%	0%
		Total Coliform	0%	0%	0%

CFU/100 mL – colony-forming units per 100 milliliters. The Permit identifies WQBELs in most probable number per 100 mL (MPN/100 mL); the laboratory methods provide results in CFU. CFU and MPN units are comparable.

Table 3-7. 2015–2016 General Progress Toward Interim and Final Goals: San Diego River WMA

Monitoring Location	Bacterial TMDL Constituent	2015-2016 Dry Season Geometric Means		2015-2016 Wet Season Geometric Means		2015-2016 Wet Season Single-Sample Maximum	
		Interim	Final	Interim	Final	Interim	Final
SDR-FC1	*Enterococcus*	X	X	X	X	X	X
	Fecal Coliform	X	X	X	X	X	X
SDR-FC2	*Enterococcus*	X	X	X	X	X	X
	Fecal Coliform	X	X	●	●	X	X
SDR-MLS	*Enterococcus*	X	X	X	X	X	X
	Fecal Coliform	X	X	●	●	X	X
SDR-CDE	*Enterococcus*	X	X	X	X	X	X
	Fecal Coliform	●	●	●	●	X	X
FM-010	*Enterococcus*	X	X	●	●	●	●
	Fecal Coliform	●	●	●	●	●	●
	Total Coliform	●	●	●	●	●	●

● = Receiving water limitations are met; X= Receiving water limitations are not met.

3.2 STORM DRAIN OUTFALL MONITORING

The purpose of Storm Drain Outfall Monitoring is to evaluate the potential impacts from storm drain outfall discharges on the beneficial uses of a waterbody during dry and wet weather conditions. In addition, under dry conditions, the program is used to assess the ability of jurisdictional and watershed programs to effectively eliminate non-stormwater discharges to waterbodies. The data generated are used to identify and quantify pollutants in discharges, guide pollutant source identification efforts, and track progress towards achieving numeric goals set forth in the WQIP.

An overview of the conducted and planned storm drain outfall monitoring activities for the San Diego River watershed for the current Permit term is presented in Table 3-8.

Table 3-8. Elements of Storm Drain Outfall Monitoring During the Current Permit Term

Monitoring Programs	Dry	Wet	Monitoring Element	Permit Schedule[a]				
				2013-2014[b]	2014-2015	2015-2016	2016-2017	2017-2018
Field Screening	X		Visual: flow condition, presence and assessment of trash in and around the station, IC/IDs, descriptions	●	●	●	●	●
Storm Drain Outfall	X		Field parameters, conventionals, bacteria, nutrients, metals	-	-	●	●	●
		X	Field parameters, conventionals, bacteria, nutrients, metals	●	●	●	●	●
Illicit Discharge Detection and Elimination	X		Visual surveys, field parameter testing, analytical testing and follow-up investigations, if warranted	–	–	●	●	●

IC/ID – Illegal connection and illicit discharge

a. The Permit was adopted on May 8, 2013 and became effective on June 27, 2013.

b. Completed under the Transitional Monitoring Program.

The major storm drain outfalls currently included in the storm drain outfall discharge monitoring station inventory for the WMA are shown in Figure A4-3 in Appendix 4.

The number of major outfalls monitored under each element of the Storm Drain Outfall Monitoring Program by each Participating Agency in the WMA is provided in Table 3-9. In accordance with the Permit, Participating Agencies with fewer than 125 major storm drain outfalls in their inventory must conduct field screening at 80% of these major outfalls twice per year. The City of San Diego has more than 500 major storm drain outfalls within its jurisdiction and is required to annually screen 500 of these outfalls city-wide (but not within each watershed) in accordance with the Permit.

Table 3-9. Number of Monitored Major Storm Drain Outfalls per Participating Agency in San Diego River WMA

Participating Agency	Field Screening	Dry Weather Monitoring	Wet Weather Monitoring
County of San Diego	51	5	1
City of El Cajon	33	5	1
City of La Mesa	13	5	1
City of Santee	63	5	1
City of San Diego	65	5	1

3.2.1 Storm Drain Outfall Dry Weather Monitoring

Storm drain outfall dry weather monitoring consisted of dry weather field screening, IDDE investigations, and highest priority storm drain outfall analytical monitoring. These programs are summarized in the following subsections and are described in greater detail in Appendix 4.

3.2.1.1 Dry Weather Field Screening and Outfall Prioritization

Field screening is visual monitoring of major storm drain outfalls as outlined in Table D-5 of the Permit. Field screening observation results included the following:

- Field screening trash assessment results indicated that there was no trash or a low presence of trash during most (95%) of the trash assessments (n = 375) at visited outfalls.
- Flow conditions recorded during routine field screening indicated that 59% of the observations made by the County of San Diego, 60% made by the City of El Cajon, 60% by the City of Santee, 25% made by the City of San Diego, and 8% made by the City of La Mesa indicated dry conditions/no flow. Flow was observed during 30% or less of the visits conducted by each Participating Agency.
- When flow was observed during visual observations, the majority of estimated flow rates were low, with 75 of 113 estimations categorized as less than five gallons per minute.

Based on these field screening visits and historical data as needed and available, the Participating Agencies determined the flow status of each major storm drain outfall as persistent, transient, dry, tidal, or undetermined. The numbers of storm drain outfalls in each category are shown by Participating Agency in Table 3-10. These flow determinations are shown with the locations of the storm drain outfalls in Figure A4-6 in Appendix 4. Overall, since the 2014-2015 monitoring year, the number of undetermined outfalls in the WMA has been reduced from 7 to 2, and the number of outfalls identified as persistent increased by 11 (WESTON, 2016) based on an additional year of field screening. No modifications to field screening monitoring locations or frequencies are planned for the 2016-2017 monitoring year in the San Diego River WMA.

Table 3-10. 2015-2016 Dry Weather Storm Drain Outfall Flow Determinations for the San Diego River WMA

Participating Agency	Persistent	Transient	Dry/ No Flow	Undetermined	Grand Total
County of San Diego	8	17	25	1	51
City of El Cajon	8	7	18	0	33
City of La Mesa	10	2	1	0	13
City of San Diego	35	18	11	1	65
City of Santee	16	20	27	0	63
GRAND TOTAL	**77**	**64**	**82**	**2***	**225**

*One City of San Diego outfall has been tidal on all visits except one when dry, and one County outfall is a new site with only one visit.

The list of prioritized outfalls based on field screening results is maintained and updated as program implementation develops and monitoring occurs. The highest priority outfalls for each jurisdiction in the San Diego River WMA during the 2015-2016 monitoring season are summarized in Table 3-11. These outfalls are also presented in Figure 3-2, which shows the dry and wet weather storm drain outfall monitoring locations in the WMA.

Table 3-11. Highest Priority Outfalls in the San Diego River WMA During the 2015-2016 Monitoring Year

Participating Agency	Station
County of San Diego	MS4-SDR-036, MS4-SDR-064, MS4-SDR-127, MS4-SDR-151, MS4-SDR-207
City of El Cajon	OF-3, OF-5, OF-13, OF-15A, OF-16
City of La Mesa	OF-ALV-6, OF-ALV-7, OF-ALV-9, OF-ALV-12, OF-ALV-13
City of Santee	E5g1, RCP1, R20a, S15h, S5c
City of San Diego	DW0067, DW0081, DW0369, DW0681*, DW0696

*Upstream location sampled.

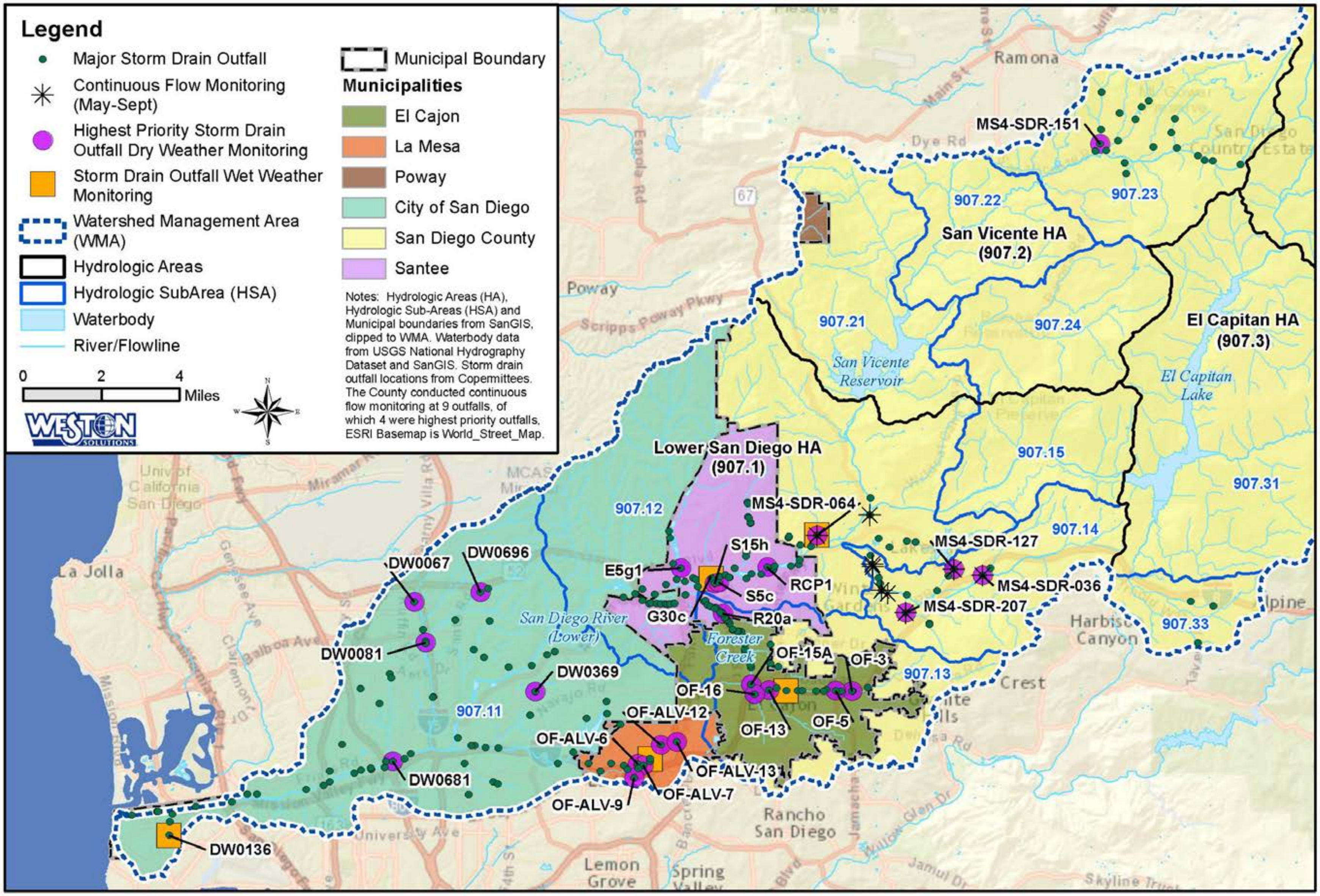


Figure 3-2. 2015-2016 Dry and Wet Weather Storm Drain Outfall Monitoring Locations in the San Diego River WMA

3.2.1.2 Highest Priority Storm Drain Outfall Dry Weather Monitoring

The purpose of the highest priority storm drain outfall dry weather monitoring is to evaluate the potential contribution from storm drain outfall discharges to receiving water quality during dry weather and to assess the ability of programs to effectively eliminate non-stormwater discharges to waterbodies or waterways.

The 2015-2016 monitoring year was the first year of dry weather storm drain outfall analytical sampling under the WQIP MAP, and monitoring was conducted at the highest priority outfalls identified for each Participating Agency in the WMA (Table 3-11). These monitored outfalls are shown in Figure 3-2. Two sampling events were conducted at most outfalls. However, one outfall under the jurisdiction of the County of San Diego and one under the jurisdiction of the City of Santee were sampled only once due to lack of flow. For sampled outfalls, grab samples were collected and analyzed for pH, temperature, conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria and composite samples were collected and analyzed for constituents contributing to the HPWQC, 303(d) List impairments, constituents with non-stormwater action levels (NALs), and those listed in Table D-7 of the Permit. Observational and hydrologic data were also recorded.

Enterococcus concentrations were above the instantaneous maximum (IM) NAL except in both samples from DW0067 and one of two samples collected at OF-5, OF-16, OF-ALV-7, OF-ALV-9, and DW0081. Fecal coliform concentrations were above the IM except in both samples from MS4-SDR-036, OF-ALV-7, DW0067, DW0081, and DW0369 and one of two samples collected at MS4-SDR-207, OF-3, DW0696, and DW0681UP01. Detailed results are presented in Sections 4.2.2 (data) and 4.2.3 (assessments) of Appendix 4. These highest priority outfalls were a specific focus for IDDE investigations during the 2015-2016 monitoring year (Section 3.2.1.3).

No re-prioritizations of the highest priority outfalls are planned for the 2016-2017 monitoring year in the San Diego River WMA. The highest priority outfalls selected for analytical monitoring in 2015-2016 will continue to be monitored until one of the following conditions outlined in the Permit have been met:

- No flowing or standing water observed over the three most recent consecutive visits.
- No exceedances of NALs.
- Identified as a non-stormwater discharge authorized under a separate NPDES permit.

When an outfall fulfills one of these criteria or the threat to water quality has been reduced (as outlined in the Permit), it will be replaced with the next highest priority outfall on the Participating Agency's list for the WMA.

As required by the Permit, annual discharge volumes and non-stormwater pollutant loads were estimated for the persistently flowing outfalls. Dry weather visual observation and field investigation data related to known and/or suspected sources of non-stormwater discharge were used to estimate the percent contribution from each source, including suspected sources. Results are presented in Section 4.2.3 of Appendix 4. The loads derived from highest priority storm drain outfall dry weather monitoring will ultimately be useful in assessing progress to storm drain outfall load reduction goals; the methodology for this assessment is in development.

3.2.1.3 Illicit Discharge Detection and Elimination (IDDE) Program

Based on the results of the dry weather major storm drain outfall monitoring described above, the Participating Agencies conducted investigations to identify sources of flow or NAL exceedances. Where IC/IDs are identified, additional action to address the source(s) is taken. These investigations and source elimination activities related to outfall monitoring are one part of the larger IDDE programs that each Participating Agency has established. The goals of these IDDE programs are as follows:

- Control the contribution of pollutants to and the discharges from the storm drain system within the Participating Agencies' jurisdictions.
- Effectively prohibit non-stormwater discharges to the storm drain system.
- Reduce the discharge of pollutants in stormwater to the maximum extent practicable.

In addition to outfall monitoring and associated source investigations, the IDDE programs also include the following components to prevent, identify, and eliminate IC/IDs:

- Educating the local community about prohibited discharges and how to prevent them. During the 2015-2016 fiscal year, this outreach program included working closely with water utilities to educate communities about outdoor water conservation, including preventing irrigation runoff.
- Operating a public complaint phone hotline and website and investigating the complaints received.
- Inspecting industrial/commercial and municipal facilities, construction sites, and residential areas. In addition to identifying and eliminating IC/IDs where applicable, inspectors also proactively educate responsible parties about how to avoid IC/IDs, such as cleaning outdoor areas by sweeping instead of hosing them off.
- Maintaining the storm drain system and sewer system, which provide opportunities to identify unpermitted connections to the storm drain system, cross connections, and other potential sources of IC/IDs.

Dry weather storm drain outfall source identifications investigations indicated that irrigation runoff was the most commonly identified known or suspected controllable source within the San Diego River WMA. Copermittees identified groundwater infiltration into the storm drain system as the most common uncontrollable source.

In addition to the field screening completed at all outfalls, samples were also taken for analysis at the five highest priority persistently flowing outfalls (Section 3.2.1.1), as described in Section 3.2.1.2. The highest priority outfalls were a focus for IDDE investigations during fiscal year 2015-2016. Figure 3-3 shows the known or suspected flow source types identified at the highest priority outfalls.

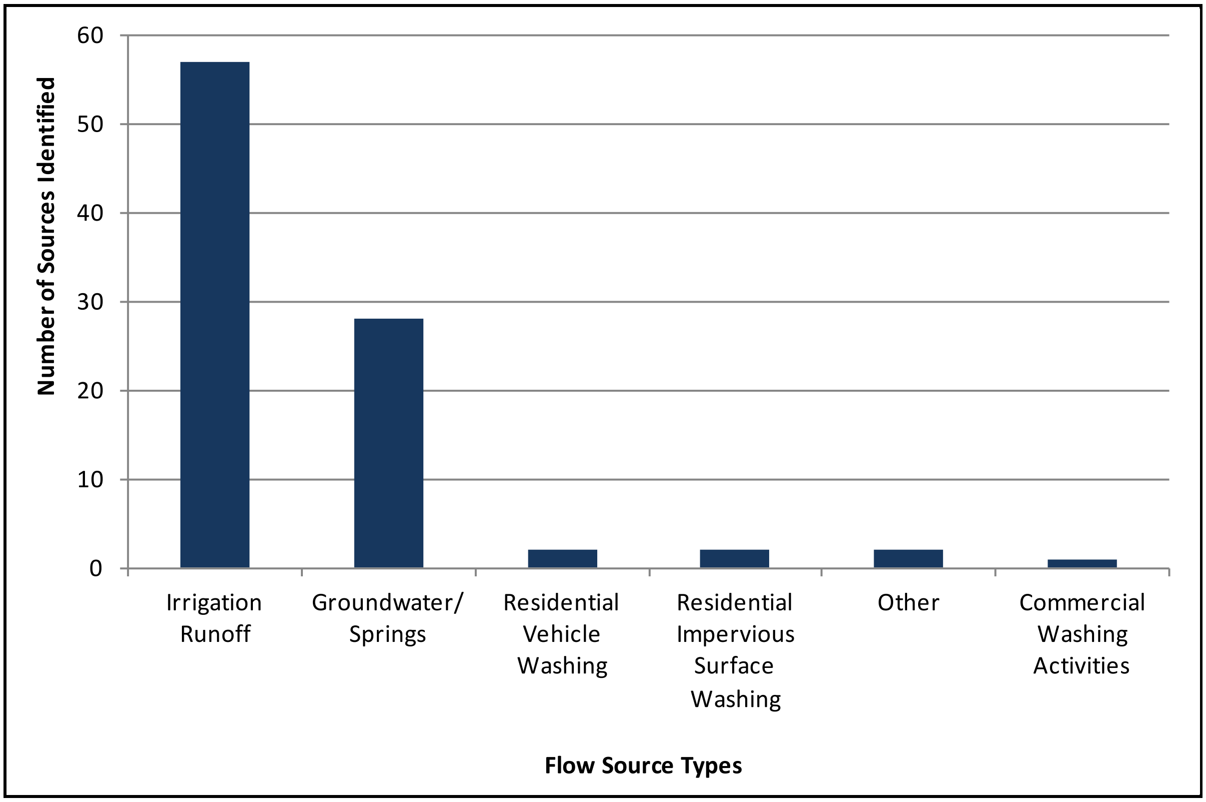


Figure 3-3. Known or Suspected Flow Sources Identified for Highest Priority Storm Drain Outfalls

Additional source investigation activities in the San Diego River WMA include the following:

- The City of San Diego and County of San Diego are utilizing flow meters at selected outfalls in the San Diego River WMA to assist in source identification.
- The Copermittees are investigating potential sources of bacteria from wastewater systems since human sources of bacteria are the highest priority source from a public health perspective.
    - A broken private sewer lateral in the Sports Arena area within the City of San Diego that had been contributing wastewater to the storm drain system was identified and repaired.
    - The City of Santee has been working with Padre Dam Municipal Water District, which is also the owner and operator of the public wastewater conveyance system in Santee, on an investigation of potential exfiltration from the wastewater system to the storm drain system. This investigation focuses in the area around a Bacteria TMDL site in Forester Creek.

The IDDE components listed above are described in more detail in Section 4 and in the jurisdictional strategy tables in Appendix 2. The Copermittees' JRMP Annual Report forms, also included in Appendix 2, list the total numbers of IC/IDs identified and eliminated through all IDDE program activities during the fiscal year. More details about source investigation and elimination specifically related to the storm drain outfall dry weather monitoring component of the IDDE program are described in greater detail in Appendix 4.

3.2.2 Storm Drain Outfall Wet Weather Outfall Monitoring

The purpose of storm drain outfall wet weather monitoring is to identify and quantify pollutants in stormwater discharges from the storm drain system, guide pollutant source identification efforts, and track progress in achieving numeric goals set forth in the WQIP. The Participating Agencies' five monitoring locations were chosen to be representative of the Residential, Commercial, Industrial, and typical Mixed-use land uses within the watershed in accordance with the Permit. Two outfalls were located in the Mission San Diego HSA, two in the Santee HSA, and one in the El Cajon HSA. This is the first year of storm drain outfall wet weather monitoring in accordance with the WQIP MAP. The prior two years of wet weather monitoring were conducted under the transitional monitoring program with a different list of analytical parameters. The storm drain outfall wet weather monitoring stations for the WMA are presented in Table 3-12 with both the station name used in the wet weather monitoring program and the identifier used by the jurisdiction in their storm drain outfall inventory. The monitored outfall locations are shown in Figure 3-2, and the land uses for their drainage areas are shown in Figure A4-8 in Appendix 4. The locations of these outfalls have not been modified since transitional monitoring began during the 2013-2014 monitoring year. Therefore, three years of data have now been collected at all five wet weather storm drain outfall wet weather monitoring locations in the San Diego River WMA.

Table 3-12. Storm Drain Outfall Wet Weather Monitoring Stations in the San Diego River WMA

Storm Drain Outfall Name	Jurisdictional Identifier	Jurisdiction	HSA Name/No.	Latitude	Longitude
MS4-SDR-1	OF-11	City of El Cajon	El Cajon/907.13	32.80256	-116.95808
MS4-SDR-2	OF-ALV-11	City of La Mesa	Mission San Diego/ 907.11	32.77776	-117.01751
MS4-SDR-3	DW0136	City of San Diego	Mission San Diego/ 907.11	32.74773	-117.22927
MS4-SDR-4	G30c	City of Santee	Santee/907.12	32.84501	-116.99122
MS4-SDR-5	MS4-SDR-064	County of San Diego	Santee/907.12	32.86165	-116.94474

Monitoring events were conducted in accordance with the WQIP MAP on December 11, 2015 at MS4-SDR-4; on January 4, 2016 at MS4-SDR-3 and MS4-SDR-5; and on January 31, 2016 at MS4-SDR-1 and MS4-SDR-2. Grab samples were collected and analyzed for pH, temperature, conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria. Composite samples were collected and analyzed for constituents contributing to the HPWQC, 303(d) List impairments, and for constituents with stormwater action levels (SALs). Observational and hydrologic data were also recorded. A summary of analytical results is provided below in relation to bacteria, and detailed results are presented in Appendix 4 Sections 4.2.5 (data) and 4.2.6 (assessments).

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform indicated that the highest concentrations were measured at MS4-SDR-3 in the Mission San Diego HSA (907.11) for *Enterococcus* and at MS4-SDR-5 in the Santee HSA (907.12) for fecal coliform. Concentrations of *Enterococcus* and fecal coliform in wet weather discharges from all five outfalls were above the single sample maximums specified in the Permit for the Bacteria TMDL (WQBELs discharging to freshwater creeks with REC-1 beneficial use). Detailed results for all constituents are provided in Appendix 4. The required assessments are also provided in Appendix 4 and its attachments. The loads derived from storm drain outfall wet weather monitoring will ultimately be useful in assessing progress toward storm drain outfall load reduction goals; the methodology for this assessment is in development. The land-use based assessment required by the Permit was completed for the third year in the San Diego River WMA; a more robust data set was developed for the land-use based assessment of wet weather storm drain outfall discharge, and land-use based event mean concentrations (EMCs) were refined based on three years of monitoring.

3.3 SPECIAL STUDIES SUMMARY

Special studies are conducted to "address pollutant and/or stressor data gaps and/or develop information necessary to more effectively address the pollutants and/or stressors that cause or contribute to highest priority water quality conditions identified in the Water Quality Improvement Plan (Regional Board, 2013)." An overview of the conducted and planned special studies for the watershed for the current Permit term is presented in Table 3-13. Descriptions of the studies and results, where applicable to bacteria, are provided below. An assessment of special study results is presented in Appendix 4.

Table 3-13. Special Studies Occurring Within the San Diego River WMA

Monitoring Programs	Dry	Wet	Monitoring Element	Permit Schedule[a]				
				2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
San Diego Regional Reference Streams and Beaches	X		Field parameters, conventionals, bacteria instantaneous flow	2012-2014	●	–	–	–
			Streams only: nutrients, metals, bioassessment, including physical habitat and chlorophyll a		–	–	–	–
		X	Field parameters, conventionals, bacteria		●	–	–	–
			Streams only: nutrients, metals, toxicity, flow and precipitation (duration of storm)		●	–	–	–
San Diego Wet Weather Epidemiology Study		X	Field parameters, bacteria, human genetic markers, viruses, human health data, flow and precipitation	●	●	●	–	–

a. The Permit was adopted on May 8, 2013 and became effective on June 27, 2013.

3.3.1 San Diego Regional Reference Streams and Beaches Studies

From 2014 to 2016, the Copermittees participated in the San Diego Regional Reference Streams (Tiefenthaler et al., 2015) and Beaches (Tiefenthaler et al., 2016) Studies, which measured levels of indicator bacteria that account for natural sources to establish the background concentrations, or "reference conditions," for streams or beaches minimally disturbed by anthropogenic activities. This reference system approach results in allocation of allowable exceedance days based on the frequencies of exceedance at reference sites with natural sources of bacteria. The results of these studies support the forthcoming re-evaluation of the Bacteria TMDL and numeric target development for future TMDLs. These studies were intended to provide data to support discussions of reasonable, accurate targets for indicator bacteria at Southern California streams and beaches.

3.3.1.1 Reference Streams Study

This study investigated concentrations of indicator bacteria, nutrients, metals, and conventional constituents occurring naturally at reference streams in minimally disturbed watersheds in Southern California during wet and dry weather. Although additional constituents were analyzed, the primary focus of the study was indicator bacteria. The study also sought to categorize exceedance frequencies for indicator bacteria by hydrologic, geomorphologic, biotic, and abiotic factors. Human genetic marker results were used to exclude sites and samples with potential human sources of fecal contamination so that observed exceedance rates were not due to human sources of bacteria. Results are presented in detail in the Technical Report (Tiefenthaler et al., 2015) provided as Attachment 4I to Appendix 4 of this Annual Report.

Findings from the study included the following:

- Indicator bacteria concentrations measured during the study were generally below water quality objectives (WQOs) except for *Enterococcus*, and exceedance frequencies were highest during summer dry weather.
- Wet weather EMC exceedance frequencies were low except for *Enterococcus*. The number of events was not sufficient to determine whether relationships exist between the exceedance frequencies and watershed size and/or geology.
- Temperature was the major factor associated with elevated summer dry weather concentrations of indicator bacteria, although total suspended solids (TSS), nutrients, and organic carbon were also positively correlated. No significant relationships between indicator bacteria concentrations and watershed size or geology were observed during dry weather.
- EMC fluxes (flux was calculated as the ratio of mass loading and watershed area) during wet weather were two to three times greater than during dry weather and were comparable to those described in previous studies.

3.3.1.2 Reference Beaches Study

This study investigated concentrations of indicator bacteria occurring naturally at reference beaches during a period of prolonged drought. Results are presented in detail in the Technical Report (Tiefenthaler et al., 2016) provided as Attachment 4J to Appendix 4 of this Annual Report.

Findings from the study included the following:

- Indicator bacteria concentrations and exceedance frequencies during both winter and summer dry weather were low at both monitored beaches. This is consistent with results from previous studies of beaches with blocked estuary inlets or beaches with flowing creeks and no estuary.
- Indicator bacteria concentrations in the estuary or mixing zone associated with both beaches were one to three orders of magnitude greater than those at the corresponding

beach, and were higher at San Onofre Creek than Deer Creek. Exceedance frequencies were also higher in the estuary associated with San Onofre Creek compared to the mixing zone associated with Deer Creek. This suggests that dry weather exceedance frequencies may have been greater if the estuary had been open to tidal exchange.

- At both study locations, no significant relationships between indicator bacteria and water temperature, salinity, or antecedent dry days were observed, but indicator bacteria concentrations decreased with the number of antecedent dry days at the San Onofre Creek beach and increased with the number of antecedent dry days in the associated estuary. Significant positive correlations were found between total coliform concentrations and water temperature, salinity, and antecedent dry days and between *E. coli* and fecal coliform and salinity in the estuary associated with San Onofre Creek. These correlations indicate that freshwater input from the creek dilutes bacteria concentrations. Regrowth of bacteria may have been a factor at this estuary.
- During the single monitored storm event, indicator bacteria exceedances were common in the San Onofre Beach creek and estuary samples, but exceedances were observed at the beach only on the day of the storm. Since all samples associated with this storm event were positive for human genetic marker, results could not be used to determine natural background exceedance frequencies. However, positive human marker results were rare throughout the study overall, indicating that the study locations may be suitable reference sites.

3.3.2 Wet Weather Epidemiology Study and Quantitative Microbial Risk Assessment

This special study examines the correlation between bacteria levels in stormwater discharges from the San Diego River and the health effects experienced by surfers at Ocean Beach, located near the mouth of the San Diego River. The first phase of the study was performed from January 2014 through March 2015 and included 654 surfers and 10,081 logged surfing sessions. The overall goal of the study was to answer the following four questions:

- Is surfing associated with an increased rate of illness?
- Are illness rates higher when surfing following wet weather compared to dry weather?
- What is the association between water quality and illness following wet weather events?
- What level of water quality corresponds to the same risk of illness as current water quality objectives?

Results indicated that there is an increased risk of illness associated with water contact, and that risk was greater when surfing after a wet weather event compared to during dry weather. The excess risk of illness when entering the ocean in wet weather compared to not entering the ocean was quantified to be 12 surfers per 1,000. An association was established between *Enterococcus* and illness after a wet weather event; however, the risk of illness was found to be lower than that which would be predicted by *Enterococcus* WQOs. An extra 12 illnesses per 1,000 surfers after wet weather ocean exposure was below the most recent water quality guidelines for recreational beaches from the USEPA (2012), which recommends no more than 32 to 36 illnesses per 1,000 swimmers. In addition, a quantitative microbial risk assessment (QMRA) was performed to estimate the risks of gastrointestinal illness from recreational exposure to beaches impacted by storm drain outfall discharges during wet weather. Source tracking work and analysis of pathogen concentrations were conducted, and modeling results were comparable to epidemiological study results. The study demonstrated the applicability of QMRA for recreational water risk estimates during wet weather and may facilitate consideration of site-specific water quality criteria. Additional details are provided in the Technical Report (Schiff et al., 2016) provided as Attachment 4K to Appendix 4 of this Annual Report.

4 Implementation and Progress Towards Achieving Numeric Goals

The Permit requires the Participating Agencies to develop specific water quality improvement numeric goals and strategies to address their HPWQC, which is identified as bacteria for the San Diego River WMA.

Each year, the Participating Agencies assess specific water quality data and programmatic information in order to gauge progress towards achieving the numeric goals. These assessments provide information to determine whether intended outcomes are being realized or whether adaptations of Participating Agencies' programs are necessary. This section discusses the strategies that have been implemented during the reporting period, the progress towards achieving specific Permit term goals for the watershed, and provides an overview of proposed modifications to goals, strategies, and schedules. Data collected per the JRMP and MAP, along with the schedules developed in conjunction with each goal, were used to assess goals. Note that the selected strategies necessarily target bacteria in the watershed, but also address other pollutants as well, providing a multi-benefit approach to implementation.

4.1 STRATEGIES AND SCHEDULES

The strategies being implemented by the Participating Agencies are the mechanisms that enable improvements in water quality to achieve the numeric goals outlined in Section 2 and detailed in Appendix 3. The chosen strategies have been identified and selected based on their likelihood of achieving one or more of several of the following outcomes:

- Effectively prohibiting non-stormwater discharges to the storm drain system (dry weather);
- Reducing pollutants in stormwater discharges from the storm drain system to the maximum extent practicable (wet weather); and/or
- Protecting the beneficial uses of receiving waters from storm drain outfall discharges.

Achievement of these outcomes and the success of the strategies will ultimately be measured against the interim and final numeric goals.

In general, the Participating Agencies are implementing aggressive non-structural BMPs as part of their JRMPs as the initial methods for achieving dry and wet weather load reduction goals. As implementation continues and progress is evaluated, distributed and regional structural BMPs will be implemented as needed to achieve interim and final goals and as funding is available.

4.1.1 Overall Watershed Strategy Implementation Highlights

During FY 2015-2016, the Participating Agencies implemented a broad range of strategies to target bacteria, as well as other constituents such as nutrients and trash. Table 4-1 through Table 4-4 summarize strategies implemented during FY 2015-2016; jurisdictional strategy highlights are described later in this section, and tables presenting all strategies implemented by Participating

Agency are presented in Appendix 2. Several key strategy types were implemented broadly across the watershed and are highlighted below.

- **Preventing wastewater discharges to the storm drain system**. This strategy addresses human sources of bacteria, which are the highest priority from a public health perspective.
  - The City of San Diego organized an interdepartmental team to investigate and eliminate sources of bacteria in areas where microbial source tracking found markers of human bacteria. This team eliminated a wastewater discharge to the storm drain system from a broken restaurant private sewer lateral in the Sports Arena area within the City of San Diego during FY 2015-2016 and will continue additional investigations in the San Diego River Watershed during FY 2016-2017.
  - The City of Santee is working with its local wastewater utility to complete a forensic investigation of potential wastewater contributions to the storm drain system in the vicinity of a Bacteria TMDL monitoring site in Forester Creek.
  - The City of La Mesa conducts smoke testing to check for defects in its wastewater system and is constructing system upgrade projects as a proactive measure to prevent potential discharges from its wastewater system to the storm drain system.
  - The County of San Diego Department of Environmental Health issues enforcement actions for failing septic systems when effluent could reach the storm drain system. Prompt follow up and mitigation is implemented.

- **Trash cleanups**, including volunteer cleanup events and cleanups of trash associated with transient encampments, which remove trash and also address likely sources of bacteria. Over 134,000 pounds of trash were removed through cleanups along local waterways during FY 2015-2016. Cleanups were accomplished in partnership with I Love a Clean San Diego and the San Diego River Park Foundation.

- **Rebate programs**, which help reduce dry and wet weather runoff. Within the City of San Diego and Helix Water District services areas, rebates[8] were issued for more than 111,000 square feet of grass that were converted to lower water use plants and for more than 2,700 rain barrels. The Sustainable Landscapes Program, which will begin active implementation during FY 2016-2017, includes replacing turf with lower water use plants to reduce dry weather runoff and downspout disconnections and soil quality improvement to capture stormwater. The City of Santee and Padre Dam Municipal Water District encouraged participation, and referred customers to the programs and rebates available through the County Water Authority and Southern California Water Smart. The City also created a water conservation and water quality outreach material, which included the posting of rotating messages on the City's digital clock tower in the town's center.

- **Retrofit and rehabilitation projects**, which address most pollutants and also often provide other benefits, such as aesthetic improvement or habitat enhancement.
  - The City of La Mesa has begun construction on a restoration project in Alvarado Creek, a tributary of San Diego River.

[8]Only rebates within the San Diego River WMA were considered for numbers from the City of San Diego. Helix numbers are total for the entire water district, but most of Helix's service area is within the San Diego River WMA.

- o The City of Santee is a finalist for a Proposition 1 grant project through a program administered by the San Diego River Conservancy. The project would install bioretention and trash control BMPs at Mast Park, adjacent to the San Diego River. The BMPs would collectively treat approximately 540 acres.
- o During FY 16, approximately 43.6 acres of drainage area were treated in the City of San Diego by green infrastructure features to meet TMDL water quality standards within the San Diego River, and approximately 14.8 additional acres are expected to be treated by FY 18.
- o During FY 16, the City of San Diego constructed some of the bioretention facilities planned at the Allied Gardens Recreation Area. In accordance with strategy CSD-GI-07, the bioretention is designed to treat a 4.5-acre drainage area.

▪ **Additional monitoring to investigate sources of dry weather flows**, which are a transport mechanism for bacteria and other pollutants. The County of San Diego and the City of San Diego are utilizing continuous flow meters at selected outfalls in the watershed to investigate potential flow patterns. The collected data will be analyzed and used to target source investigation and enforcement activities.

Table 4-1. San Diego River Watershed Strategies, Illicit Discharge Detection and Elimination Program

San Diego River Watershed Illicit Discharge Detection and Elimination Program Strategies	Participating Agency						HPWQC	PWQC			
	City of El Cajon	City of La Mesa	City of San Diego	City of Santee	County of San Diego	Caltrans	Bacteria	Nutrients	Eutrophic Conditions	Total Dissolved Solids	Index of Biotic Integrity
Engage the public, jurisdictional staff, and other agency staff to proactively identify and report illicit discharges.	●	●	●	●	●	●	●	●	●	●	●
Develop and implement approaches to address the impacts of septic systems within the watershed.	●	●			●						
Develop and implement approaches to address the impacts of homeless activities within the watershed.	●	●		●			●	●	●		
Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.	●	●	●	●	●	●	●	●	●		
Implement monitoring programs to provide new information to refine the prioritization of drainage areas.	●	●	●	●	●		●	●	●	●	●
Actively educate public on prohibitions related to illicit discharges and connections.	●	●	●	●	●	●	●	●	●	●	●

Table 4-2. San Diego River Watershed Jurisdictional Strategies, Development Planning Program

San Diego River Watershed Development Planning Program Strategies	Participating Agency						HPWQC	PWQC			
	City of El Cajon	City of La Mesa	City of San Diego	City of Santee	County of San Diego	Caltrans	Bacteria	Nutrients	Eutrophic Conditions	Total Dissolved Solids	Index of Biotic Integrity
Provide updated materials, enhanced outreach, and training to convey land development requirements.	•	•	•	•	•	•	•	•	•	•	•
Develop and implement low-impact design (LID) programs to complement standard Permit requirements.	•		•	•			•	•	•		
Implement a Watershed Management Area Analysis to develop watershed specific requirements for structural BMP implementation and identify a list of candidate projects that could be used as alternative compliance options for Priority Development Projects.	•	•	•	•	•		•	•	•	•	•
Consider development of an alternative compliance program for Priority Development Projects.	•	•	•	•	•		•	•	•	•	•
Implement a post-construction BMP program for development projects to ensure proper construction and maintenance.	•	•	•	•	•	•	•	•	•	•	•
Enforce post-construction requirements related to new and redevelopment.	•	•	•	•	•	•	•	•	•	•	•

Table 4-3. San Diego River Watershed Jurisdictional Strategies, Construction Management Program

San Diego River Watershed Construction Management Program Strategies	Participating Agency						HPWQC	PWQC			
	City of El Cajon	City of La Mesa	City of San Diego	City of Santee	County of San Diego	Caltrans	Bacteria	Nutrients	Eutrophic Conditions	Total Dissolved Solids	Index of Biotic Integrity
Ensure that minimum BMPs are designated and required for construction projects.	•	•	•	•	•	•	•	•	•		
Provide enhanced outreach and coordination to convey construction requirements.	•	•	•	•	•	•	•	•	•		

Table 4-4. San Diego River Watershed Jurisdictional Strategies, Existing Development Management Program

San Diego River Watershed Existing Development Management Program Strategies	Participating Agency						HPWQC	PWQC			
	City of El Cajon	City of La Mesa	City of San Diego	City of Santee	County of San Diego	Caltrans	Bacteria	Nutrients	Eutrophic Conditions	Total Dissolved Solids	Index of Biotic Integrity
Maintain and improve data tracking methods for existing development inventories where necessary.	•	•	•	•	•	•	•	•	•	•	•
Develop and implement approaches to address the impacts of improper water use and irrigation runoff.	•	•	•	•	•		•	•	•	•	
Improve and/or continue existing pet waste programs.	•	•	•	•	•		•	•	•		
Improve trash management strategies within the watershed.	•	•	•	•	•	•	•				
Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.	•	•	•	•	•		•	•	•		
Improve and implement existing outreach programs to target key sources and pollutants.	•	•	•	•	•	•	•	•	•	•	•
Enhance existing stormwater maintenance programs.	•			•		•	•				
Develop and implement targeted programs to address issues in residential areas.	•	•	•	•	•		•	•	•	•	
Improve existing inspection programs to more efficiently target key sources.	•	•	•	•	•	•	•	•	•	•	•
Actively enforce stormwater and urban runoff requirements for existing development.	•	•	•	•	•		•	•	•	•	•
Identify and facilitate retrofit opportunities in areas of existing development.	•	•	•	•	•	•	•	•	•	•	
Perform strategic monitoring to improve understanding of sources and water quality within the watershed.				•	•		•	•	•	•	•
Improve coordination between agencies.	•	•	•	•	•		•	•	•		

4.1.2 City of El Cajon

Since the San Diego River WQIP was accepted in February 2016, the City of El Cajon has implemented a number of new strategies during FY 2015-2016 aiming to reduce dry weather flows, reduce sources of bacteria, and sponsor community trash cleanup events. El Cajon's strategies, such as enhanced inspection protocols, trash cleanups, community outreach, and water conservation public education are discussed below. These strategies seek to reduce sources of priority water quality conditions such as bacteria, trash, nutrients, and non-stormwater flow.

The City of El Cajon works to reduce trash in the watershed, which also can be a source of bacteria, by cleaning transient encampments and supporting cleanup projects by non-profit groups in the Forester Creek area. During FY 2015-2016, the City of El Cajon performed 18 transient encampment removals and cleanups. A total of 212.6 cubic yards of trash and material were removed during these encampment cleanups. The City also partnered with I Love a Clean San Diego on two trash cleanups at Forester Creek during FY 2015-2016. A total of 63 volunteers collected 2,280 pounds of trash (43 cubic yards). In addition to cleanups, during FY 2015-2016, the City of El Cajon installed 20 inlet filters in areas with high trash volumes, for a total of approximately 100 inlet filters installed throughout the City to date.

The City of El Cajon, in partnership with the San Diego River Park Foundation, was awarded a Disadvantaged Community grant to organize community outreach focused in Forester Creek regarding trash, City recreation, and stormwater pollution. The City of El Cajon partnered with the San Diego River Park Foundation to accomplish this grant project, set to be performed in FY 2016-2017 and 2017-2018. This project aims to provide the framework to engage the disadvantaged community of El Cajon in community-based planning to address both trash issues and lack of recreation access.

The project will involve broad outreach and surveys of community members, as well as engage the community in volunteer-based data collection to further define the trash issues and specific strategies for cleanup. A training program will be created to engage community volunteers in on-the-ground source identification assessments. Teams of volunteers will assess quantities and types of trash entering the creek as dumping, stormwater debris, litter, homeless encampment debris, and other categories as needed. Documentation and analysis will take place at seasonal field assessments along the creek, and following major storm flushing events. Sorting and weighing of trash and debris will provide valuable data for planning future trash capture and prevention projects.

Education is a key component for increasing public awareness of stormwater issues and thereby reducing pollution and flow sources. Water conservation articles were included in the bi-annual City of El Cajon newsletter that is distributed to an estimated 35,000 residents. In addition, the City stormwater employees staffed a booth at five outreach events in the City of El Cajon during FY 2015-2016. Informational water conservation pamphlets were updated and distributed at these events. Since the City performed this outreach related to reducing irrigation runoff, the City has received an increase in hotline calls regarding irrigation runoff, which suggests the irrigation outreach was effective.

The City of El Cajon has combined on-site structural treatment BMP checks with industrial and commercial inspections to reduce inspection set-up time, increase efficiency, and increase the number of inspections. The City's stormwater inspector has been with the program for a number of years and has developed an extensive knowledge base of the City and historical stormwater issues. This consistency allows the City to build on past efforts and minimizes duplicate investigation work. The stormwater inspector has also developed a strong working relationship with businesses in the area while performing industrial and commercial inspections, which allows for better communication and cooperation from businesses.

The City of El Cajon also increased drive-by assessments of residential properties in FY 2015-2016. Particular focus was given to residential neighborhoods close to channels or located in areas with historical stormwater issues. Letters were sent to homeowners in these areas if overwatering, erosion, or other stormwater issues were identified. Once residents are aware that irrigation runoff is not an allowed discharge, they should be more likely to reduce watering times and fix irrigation systems.

4.1.3 City of La Mesa

The City of La Mesa put into practice a number of new strategies during FY 2015-2016, including the Alvarado Creek Restoration project, requiring redevelopment BMPs and increasing residential, commercial, and industrial inspections. La Mesa's programmatic and structural strategies aim to prevent, identify, and eliminate pollutants and non-stormwater flow sources.

In order to restore native habitat, slow and infiltrate flow, and reduce bacteria, the City of La Mesa broke ground on the Alvarado Creek Restoration project in October 2015. Invasive plants such as Mexican fan palm, tamarisk, eucalyptus, and *Arundo* have been removed, after which grading began. The project is scheduled to be completed in December 2016. In total, 900 linear feet of the Alvarado Creek will be restored. Concurrently with the creek restoration work, the City is also replacing a major wastewater line that runs along the creek (Figure 4-1).

Starting next year, the City of La Mesa will replace part of the Alvarado Trunk Sewer, a section of 70-year old sewer pipes near Interstate-8 and the 70th Street Trolley Station. The City does not have any direct indication that there are any leaks from the sewer line that might impact the storm drain system or Alvarado Channel. However, because the pipe is old, replacing the existing pipe is a proactive measure to prevent wastewater leaks from aging infrastructure from reaching the storm drain system or receiving water bodies.

Figure 4-1. Alvarado Creek Restoration

Structural BMPs have also been installed in the City of La Mesa to help reduce stormwater pollutant discharges. An apartment complex near Coleman College with 200 to 300 apartment units installed Silva Cells, impervious pavement, and Filterra units on-site to retain and filter stormwater runoff. In addition, the City partnered with I Love a Clean San Diego to install cigarette ash cans in downtown areas where higher levels of cigarette butt litter had previously been observed, generally around bars and restaurants. The cigarette butt containers are popular with local businesses and their patrons, and there has been a noticeable decrease in cigarette butts along the street and sidewalks.

Industrial and commercial stormwater inspection procedures were updated based on the new City of La Mesa JRMP. The City switched to a property-based inspection approach, which allowed the City to increase the inspection frequency to two to three times per year. As part of the switch to property-based inspections, the City also changed its inspection fee structure. Previously, businesses paid a higher amount, but only in the years they were inspected. The fact that the fee was not consistent each year and was relatively high, in addition to the perception of unfairness when neighboring businesses were not inspected and charged in the same year, created some opposition from the business community. Switching to a property-based inspection approach, in which every business is inspected every year, has allowed for a shift to a lower fee that is the same every year, which has been better received by the business community and has led to a more productive working relationship between businesses and the City's inspector.

The City of La Mesa inspected its entire inventory of residential management areas during FY 2015-2016. The assessment process included driving throughout the residential management areas and noting instances of illicit discharges, trash, erosion, and similar issues. If issues such as overwatering or erosion were seen associated with a residence, the resident was sent a letter to make them aware of the issue and to suggest solutions.

4.1.4 City of San Diego

During FY 15-16, City of San Diego implemented strategies as described in the WQIP. Highlights of strategies implemented by City of San Diego to address bacteria are shown in Figure 4-2. A complete list of strategies planned for implementation within the WMA and the progress made on each strategy during the reporting period are provided in Appendix 2.

Allied Gardens Recreation Area Bioretention

In FY 16 the City constructed some of the bioretention facilities planned at the Allied Gardens Recreation Area. In accordance with strategy CSD-GI-07, the bioretention is designed to treat a 4.5-acre drainage area.

Structural Controls

In FY 16, 43.6 acres of drainage area were treated by green infrastructure features to meet TMDL water quality standards within the San Diego River, and approximately 14.8 additional acres are expected to be treated by FY 18.

Surfer Epidemiological Study

The City participated in preparation of Surfer Epidemiological Study, which tracked illness in surfers at City beaches and identified potential sources of bacteria within the watershed. Information on human health risk and levels of bacteria in the watershed identified in the study may assist in refining the Bacteria TMDL during the re-opener process.

Trash Removal

The City completed trash removal along 5,750 feet of the San Diego River as part of a larger habitat restoration and trash removal project. In accordance with strategy CSD-STRUCT-02, the restoration project will cover 57 acres and is expected to be completed in FY 22.

Figure 4-2. Highlights of City of San Diego Strategies

Additional strategies being implemented are listed in Table 4-5.

Table 4-5. Summary of Strategies for the San Diego River WMA - City of San Diego

Strategy	Multiple Benefits[1]						
	Bacteria[2]	Nutrients	Metals	Trash	Sediment	Flow[3]	Habitat/Wildlife
Storm Drain Structure Cleaning: 5,485 storm drain structure inspections were conducted, resulting in the cleaning of 1,189 structures and removal of 130 tons of debris in the WMA.	•		•	•	•		
New in FY 16: Enhanced Catch Basin Cleaning Optimization: Enhanced catch basin cleaning is a strategy to address pollutant removal by inspecting catch basins more than the JRMP-required minimum of once per year in the Tijuana River, San Diego Bay, and Los Peñasquitos WMAs to meet specific TMDL pollutant removal requirements. In an effort to further optimize its drain cleaning program, the City analyzed eight years of catch basin cleaning data and assigned priorities to individual basins based on historical debris removal. This enhancement will allow the City to target high priority drains to maximize pollutant removal while maintaining cost efficiencies.	•		•	•	•		
Street Sweeping: Approximately 18,182 curb miles of roads, streets, highways, medians, parking lots, and operations yards were swept in the WMA.	•	•	•	•	•		
New in FY 16: Median Sweeping: 4,315 median miles were swept citywide.	•	•	•	•	•		
New in FY 16: Targeted Aggressive Street Sweeping Pilot: The City completed a pilot study that quantified the effectiveness of posting limited-hour "no parking" signs on typically nonposted routes. The study found that posting routes resulted in an approximate 50% increase in pollutant removal because the sweeper had more access to curbs and gutters. Based on this finding, the City will consider posting additional routes if supported by the community.	•	•	•	•	•		
New in FY 16: MS4 Maintenance: In addition to routine maintenance of the MS4, the City repaired or replaced 12 pump stations and modernized another 14 pump stations, closed-circuit television (CCTV) surveyed 28,000 linear feet of pipe in 62 locations citywide, and began the development of the Waterways Maintenance Plan and Channel Maintenance Prioritization Plan. To help minimize the risk of flooding in a flood-prone drainage area, the City also installed a 2,400-volt automatic transfer switch and generator to a 130,000-gallon-per-minute pump station, allowing for sustained function in the event of a power outage.	•		•	•	•		
Illicit Discharge Dectection and Elmination (IDDE) Program: 683 cases were investigated, including 368 discharges reported by the public, 553 illicit discharges or illicit connections were eliminated, and 553 enforcement actions and 349 escalated enforcement actions were issued in the WMA. **New in FY 16: Launch of the Get It Done App**: This app allows illicit discharges to be reported quickly and accurately via any smartphone. Lastly, the Tiger Team (a proactive escalated monitoring and	•	•	•	•	•	•	•

Table 4-5. Summary of Strategies for the San Diego River WMA - City of San Diego

Strategy	Multiple Benefits[1]						
	Bacteria[2]	Nutrients	Metals	Trash	Sediment	Flow[3]	Habitat/Wildlife
enforcement team that involves multiple City departments and divisions) was developed to identify, locate, and eliminate sources of human specific bacteria in the MS4. Over several months during the reporting year, one problem area within the City was investigated extensively and a source of human-specific bacteria in the MS4 was identified and abated.							
Commercial and Industrial Business Inspections: 2,672 inspections were completed, 198 follow-up inspections were completed, 431 violations were identified, 527 enforcement actions were issued, and 172 escalated enforcement actions were issued in the WMA. In addition, the City conducted property-based inspections that focus on common areas/activities shared among multiple businesses or tenants that generate pollution. A previously conducted pilot study on inspection practices found property-based inspections to be more effective at identifying and resolving water quality issues (e.g., improper trash disposal practices and irrigation runoff, etc.) associated with commercial and industrial businesses.	●	●	●	●	●	●	●
Trash Cleanups: Five cleanup events were sponsored through I Love a Clean San Diego that collected a total of 23,887 pounds of trash and debris in the WMA. An additional 102,215 pounds of trash and debris were removed via a partnership with the San Diego River Park Foundation (see Appendix 2 for a list of specific projects).				●			
Rebates to Reduce Irrigation Runoff: Rebates were issued to convert 68,236 square feet of turf in the WMA and rebates for rain barrels were issued to capture 772,740 gallons of rainwater citywide.	●	●	●	●	●	●	●
New in FY 16: Offsite Alternative Compliance Program: The City implemented Phase I of the Alternative Compliance Program to give development projects that would require onsite structural BMPs the ability to propose offsite alternative compliance projects. The development of Phase II was also initiated and will include the establishment of an in-lieu fee structure and credit system.	●	●	●	●	●	●	●
New in FY 16: Bacteria Regrowth Study: The City completed a study to characterize the magnitude and extent of potential *Enterococcus* loading because pf regrowth within the City's storm drain system. This study quantifies the amount of bacteria in receiving water samples that are harmless to humans and would potentially be used to refine bacteria water quality standards of the Bacteria TMDL as a part of the Reopener process.	●						

1. X – Addresses the water quality conditions.
2. Highest priority water quality condition is highlighted in orange.
3. Flow is defined as storm water and non-storm water discharges to receiving waters, including freshwater inputs.

4.1.5 County of San Diego

The County of San Diego put into practice a number of improvements to existing strategies since the San Diego River WQIP was accepted in February 2016, including a focus on increasing efforts to find and address IC/IDs, since reducing dry weather flows is an important part of the County's approach to reducing bacteria during dry weather conditions.

As part of the effort to find and discontinue IC/IDs, the County of San Diego implemented off hours patrolling to identify discharges. Most off-hours patrols were conducted between 8 am and 8 pm during the weekends, but twice County staff patrolled between 5 am and 9 am to identify sources that occurred during the early morning hours. Staff focused their efforts on residential sources, such as irrigation runoff, and patrolled all residential management areas (RMAs) at least once. Each RMA consists of the residential area under the County's jurisdiction in each HSA in the watershed. In addition to the off-hours program, a new residential inspection program was implemented to identify illicit discharges in residential areas.

As part of the program to reduce residential over irrigation and pollutants, the County conducted a pilot study that tested different messages and door hanger styles (Figure 4-3) to see which were most effective at achieving behavior change. Then the County selected the most effective design to target each type of commonly observed activity (e.g., irrigation runoff, erosion). Additionally, the County developed educational materials for home owners' association (HOA) outreach in FY 2015-2016 and plans to implement an educational pilot project in FY 2016-2017. The pilot project will target certain HOAs in drainage areas with priority outfalls. A preliminary list of HOAs has already been compiled.

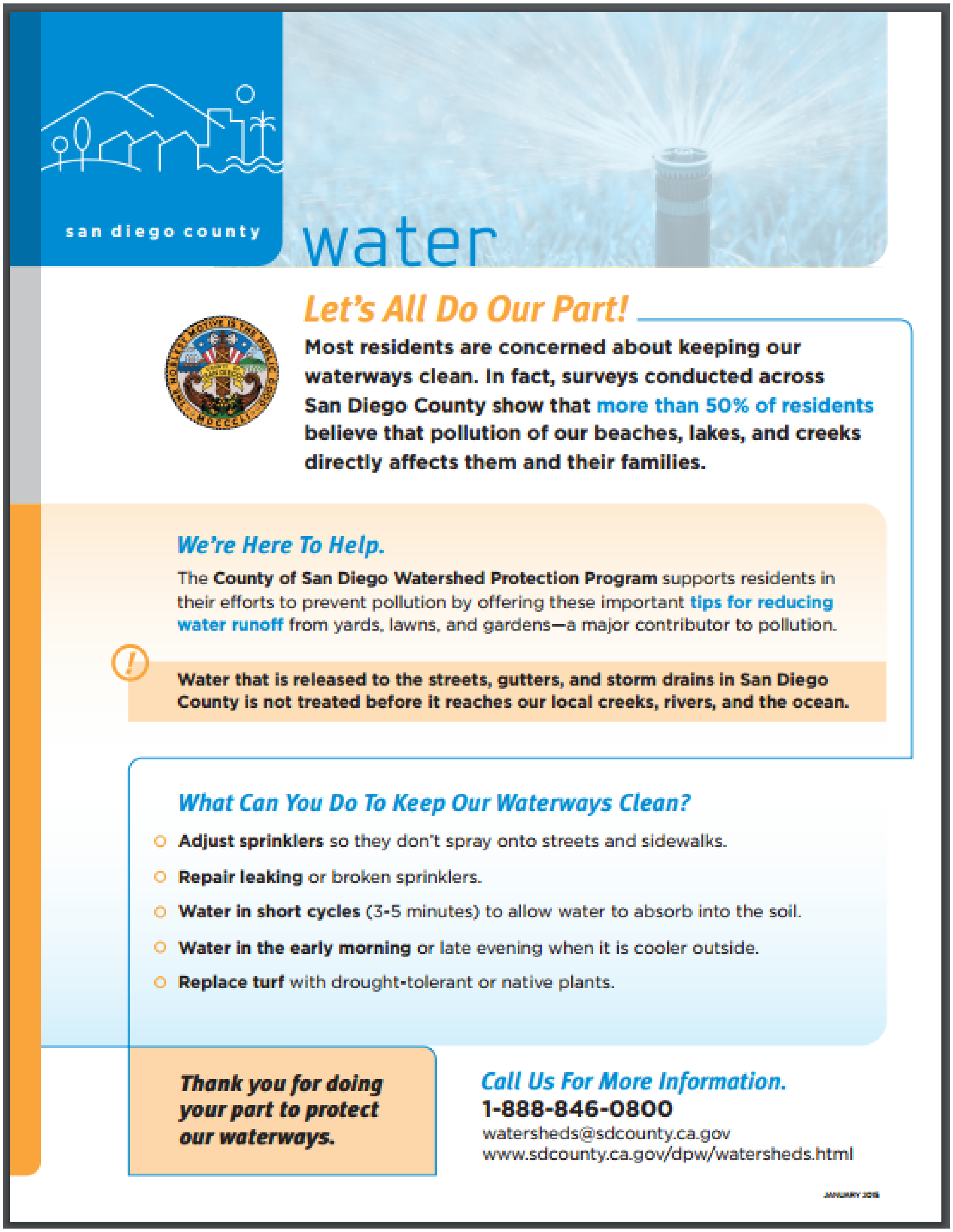


Figure 4-3. Residential Educational Outreach Door Hanger

In another effort to track and identify IC/IDs, the County has installed flow meters at nine outfalls in the San Diego River WMA. The flow data from the outfalls will be analyzed to identify trends or patterns that can help target source identification efforts in the upstream areas. If specific trends or patterns indicating potential IC/IDs are observed, patrolling or targeted investigations will be scheduled during the times when those flows typically occur based on data from the meters.

The County monitors more storm drain outfalls, more frequently than is required by the WQIP. During the 2015-2016 monitoring year, all County major storm drain outfalls were inspected for dry weather flows three or more times, while the Permit requires a minimum of only two visits per year at 80% of the outfalls. Overall, the County completed about 50% more field screening monitoring visits to its major outfalls than required by the Permit. During the 2015-2016 monitoring year, the County also visited 111 smaller storm drain outfalls (outfalls with diameter less than 36 inches) that it has inventoried as part of its Microbial Source Tracking Study (published as Appendix L of the *Transitional Monitoring and Assessment Program Report 2012-2014*, and provided in this report Attachment 4C to Appendix 4). These were inspected for non-stormwater flows approximately once every two months over the monitoring year. The data were collected to better inform the program about the County's progress toward achieving its dry weather storm drain outfall flow reduction goals.

To reduce trash and bacterial sources associated with transient activity, the County of San Diego collaborates with a multi-departmental group, including the Sherriff's Department, to remove and clean up homeless encampments. The County has also partnered with I Love a Clean San Diego on cleanup events, and has partnered with other nonprofit groups upstream of the El Capitan reservoir to remove invasive plants.

As a regional leader in water conservation, the County implements several programs and strategies, both independently and in partnership with other agencies, to help conserve local water supplies. During FY 2015-2016, these efforts included the County conducting two rain barrel distribution events in partnership with other agencies which provided 55-gallon water collection drums to qualifying local citizens. The County has also worked in partnership with local water agencies, including the San Diego County Water Authority under its WaterSmart campaign, to provide assistance within its jurisdiction on the distribution of water conservation educational materials. This effort has included the promotion of available water conservation rebates and incentives including water efficiency audits and other tools to help save water.

Through the County's collaboration with a diverse group of partners, the Sustainable Landscapes Program (SLP)[9] was developed to integrate multiple sustainability concepts and resource benefits for residential-scale urban landscapes (Figure 4-4). The program aims to reduce the amount of potable water applied to the landscape, capture and use rainwater as a resource, and reduce pollutant infiltration into local waterways. The comprehensive approach includes the following:

1. the development of landscape guidelines,
2. residential and professional landscape training courses,
3. technical landscaping assistance including planting and irrigation plans,
4. marketing and outreach,
5. financial incentives for turf conversions, and
6. landscape materials provisions, including mulch and compost/compost tea.

During FY 2015-2016, the SLP partners offered free education and training opportunities to over 1,000 homeowners and professionals throughout San Diego County. All training opportunities align with the San Diego Sustainable Landscape Guidelines, which details best practices and

[9] Information on the San Diego Sustainable Landscape Program can be found at http://sustainablelandscapessd.org/

recommendations for a watershed approach to landscaping. Financial incentives for turf conversions and discounts on landscape material are scheduled to commence in late 2016.

Figure 4-4. Sustainable Landscape Planted with Low Water Plants (San Diego Sustainable Landscape Guidelines)

While bacterial pollution is a priority in the San Diego River Watershed, the County has also taken efforts to address other water quality conditions, such as sediment, nutrients, and habitat quality. In response to a complaint in the Winter Gardens area of Lakeside alleging sediment discharge occurring during a heavy El Niño winter storm, the County contracted with a consultant to conduct a community-based social marketing study of the residents in the area and their behaviors related to erosion and sediment control. The study concluded that although most residents did not perceive soil erosion as a serious problem in the area, many had already planted ground cover on their properties and would be interested in additional resources like the SLP. The County held a number of Sustainable Landscapes workshops throughout the year, including one in the Lakeside area in June 2016. Additionally, the County implemented new rock energy dissipaters at the outfalls of Winter Gardens Elementary School to reduce the velocity of storm water that flows onto the road in an effort to reduce sediment transport. The County also inspected the sewer manholes in the area and determined that they were intact and in good structural condition, and did not pose a threat of sewage infiltration into the storm drain system.

In addition, the County has taken a multi-faceted approach to reduce water consumption and limit dry weather flows through collaboration among departments. In response to drought conditions in the region, the County recently implemented a Water Shortage and Drought Response Plan to reduce water use at its facilities. For example, a collaborative effort between the Departments of Parks and Recreation and General Services resulted in installation of synthetic turf at several parks, including Lakeside Baseball Park and Collier Park Soccer Arena in Ramona (Figure 4-5). Since 2009, Parks and Recreation's installation of high-efficiency irrigation heads and smart irrigation controllers was completed in 20 parks county-wide, which has enabled the County to save over 180 millions of gallons of irrigation water. Other measures taken include, but are not limited to, elimination of regularly scheduled exterior window washing at County facilities and identification of parks and facilities with the potential for recycled water connections.

Figure 4-5. Lakeside Baseball Park (Left) and Collier Park Soccer Arena (Right)

The County is committed to improving training and guidance materials for construction contractors, businesses, and internal staff. The 2007 Low Impact Development (LID) Handbook[10] was updated to better align with the County's Standard Urban Stormwater Mitigation Plan (SUSMP) and Hydromodification Management Plan (HMP), and to reflect the most current data on LID approaches and their efficacy. For its distinguished efforts, the County was named the recipient of the 2015 Outstanding Innovation in Green Planning and Design Award by the San Diego Chapter of the California Association of Environmental Professionals (AEP), a non-profit organization established in 1974 and dedicated to enforcing and supporting the California Environmental Quality Act (CEQA). Additionally, the County received a similar award in October 2016 for work done during the fiscal year on development of its Guidance on Green Infrastructure[11], a document outlining tools to uniformly design, install, and maintain LID features in the public right-of-way (Figure 4-6). The County also increased the number of stormwater inspectors with relevant certifications (QSP/QSD/CSSWI) during FY 2015-2016.

[10] http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

[11] http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/DevelopmentandConstruction/BMP_Design_Manual.html

Figure 4-6. Green Infrastructure in the County of San Diego

4.1.6 City of Santee

The City of Santee put into practice a number of new strategies during FY 2015-2016. These strategies seek to reduce bacteria, as well as other pollutants of concern, such as trash and nutrients. To establish a foundation for implementing these new strategies, the City and environmental engineering students from San Diego State University (SDSU) studied the water quality of both stormwater and non-stormwater runoff flowing into the San Diego River at six locations within the City in a partnership called the SAGE Project.

The six sites were chosen based on the the location of a hotspot and the feasibility of placing a structural BMP at the location. This process included a review of existing land use, environment, soil, hydrology, and infrastructure. Samples were analyzed for 10 constituents, including indicator bacteria and nutrients, and results were compared to WQOs outlined in the WQIP. Results indicated that indicator bacteria concentrations were above WQOs at all locations during dry and wet conditions. Phosphate concentrations were above WQOs at all but one location, whereas nitrate concentrations were generally below the WQO. In addition, students re-evaluated the last five years' monitoring data and plotted it onto a GIS heat map (Figure 4-7). This map identified the City's hot spots for both bacteria and nutrients. Combined, this data served to identify pollutant hot spots, and to identify the locations that would serve as valuable candidate sites where alternative or off-site compliance projects could be implemented.

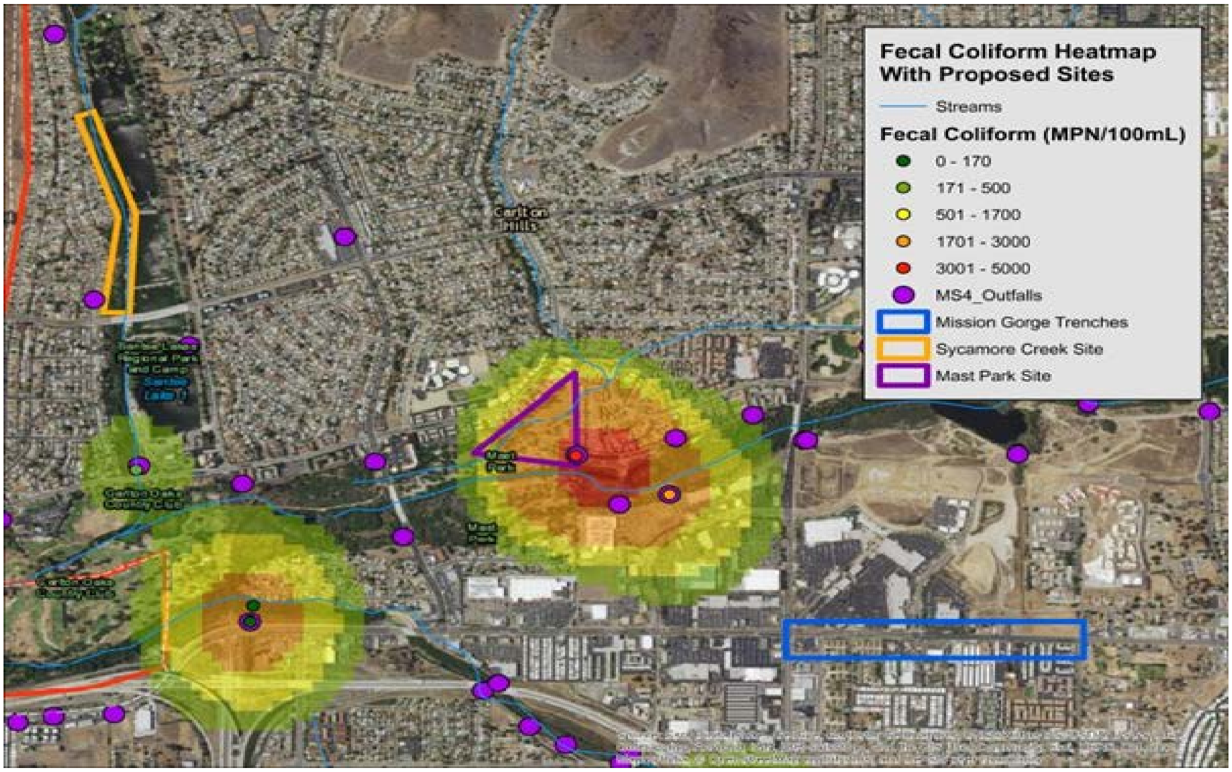


Figure 4-7. GIS Heat Map of SAGE Project Monitoring Data

Based on the review of monitoring data, pollutant hot spots, and upstream investigations, school campuses have been identified as a likely source of nutrients. The City is working with the school districts to establish good housekeeping practices such as landscape maintenance, especially for sports fields. As apart of this effort, the City supported the Santee School Districts successful application to the Drought Response Outreach Program for Schools (DROPS) grant program for a million dollar grant to implement storm water BMPs on school campuses.

The findings from the special studies conducted in partnership with SDSU have served as the foundation for prioritizing and establishing all Storm Water Program efforts. One outcome of theses studies is the implementation of a complete property inspection program. This means that while the City conducts routine inspections of inventoried facilities, the entire property, such as a shopping center/retail strip mall, will also be inspected. This enables the City to look at the big picture concerns at the property and encourages property managers, owners, tenants, and neighbors to work together. For each inspection of a business (tenant), the property manager/owner is notified, a corrective action response is prepared, and all tenants are notified of any concerns identified and best management practice requirements.

Another strategy that has been successfully implemented involves the leveraging of partnerships and resources to achieve water quality improvements. The City of Santee has strengthened relations and formed new partnerships with many community groups and organizations, including the Chamber of Commerce, the YMCA, the Santee School District, various volunteer organizations, and the Padre Dam Municipal Water and Sewer District (Padre Dam). Of note, the City has worked closely with Padre Dam to streamline communication and reporting, leverage resources, and has forged a working relationship on the review of land development projects and water conservation and wastewater issues. Both agencies worked to streamline their plan of action to identify, discontinue, and clean illicit discharges. In addition, Padre Dam is conducting a forensic investigation of the sewer lines that are co-located with a bacterial hotspot near Forester Creek. Planning and coordination started in FY 2015-2016, and the evaluation will be completed FY 2016-2017.

Trash has been identified as a concern in the City of Santee and is a potential contributing source of bacteria to the storm drain conveyance system. This fiscal year, the City mandated that certain new developments and redevelopments install specialized dumpster enclosures as well as drainage insert or trash screen BMPs in private storm drain inlets (Figure 4-8). Trash enclosures are required to be contained on four sides as well as by a roof, with screens between the top of the enclosure walls and the roof to prevent trash from escaping. These requirements apply to all Priority Development Projects as well as certain redevelopment/tenant improvement projects. The City also requires all construction projects, including tenant improvement projects that only have indoor work, to complete construction BMP plans. This requirement helps ensure proper materials and waste management and disposal for such projects.

The City of Santee also worked to reduce trash through many community partnerships. Santee partners with the San Diego River Park Foundation, SDSU volunteers, and religious organizations, among others, to identify high trash areas and organize regular volunteer trash cleanups. Santee Public Works, in partnership with the Sheriff's Department, conducts river sweeps to identify transient encampments. The encampments are given a 72-hour eviction notice. After 72 hours, the City crews remove trash and old belongings.

A couple of notable acheivements were realized this reporting year. The City of Santee was selected as a finalist for a Proposition 1 grant administered by the San Diego River Conservancy to implement stormwater BMPs at Mast Park. The $1.2 million project would include a bioretention area and trash capture BMPs. The total area treated by all proposed BMPs is approximately 540 acres. In addition, significant progress was made toward the goal of eliminating dry weather runoff. As part of a dry weather monitoring investigation, a three gpm flow was tracked from a persistently flowing outfall to a big box store. The City worked with the business to reduce and redirect their swamp cooler discharge from the storm drain into the sewer and eliminate the flow.

CITY OF SANTEE

NEW AND REDEVELOPMENT PROJECTS MINIMUM STORM WATER REQUIREMENTS

New and Redevelopment Projects

All projects must submit a Project Applicability checklist and implement Low Impact Design (LID) to the maximum extent practicable. At minimum, submittals must also address the following:

Trash Management

1. Each property must provide sufficient trash cans (hooded type) throughout the property. All trash and recycling dumpsters must be stored within a fully contained trash enclosure with solid roofing to prevent rain run-on and runoff as well as wind or animal dispersal to the maximum extent practicable. Required signage includes: "No Dumping", and "Keep Lids Closed."

a. *Statewide regulations have been approved by both the U.S. Environmental Protection Agency (EPA) and the California Office of Administrative Law (OAL) to address trash in the environment and waterways. For more information, visit www.waterboards.ca.gov/water_issues/ under Programs, Trash Control.*

b. As of April 1, 2016 all commercial and industrial businesses that generate at least 8 cubic yards (equivalent to two full 4-yard dumpsters) of organic waste are required to separate organic waste from trash and recycling. Organic waste should be kept in a separate leak proof and covered bin within the trash enclosure. Therefore, the trash enclosure must be sized accordingly. For more information regarding this requirement, reference California Assembly Bill No. 1826, Chapter 727.

Outdoor Storage

Hazardous materials may not be stored outdoors. If outdoor storage (non-hazardous) is permitted per zoning code (i.e. Industrial), then the following is required:

1. Submit an inventory and description of all materials to be stored outside to the City.
2. Describe how the outdoor storage area will be covered and contained with permanent controls.
3. All structures must be permitted by the City, and prevent all rain water run-on and run-off.

Landscaping

1. Utilize San Diego native and drought tolerant plantings to maximum extent and install low water-use irrigation systems.
2. Irrigation systems must be installed to prevent overspray and/or runoff.

CITY OF SANTEE

NEW AND REDEVELOPMENT PROJECTS MINIMUM STORMWATER REQUIREMENTS

New and Redevelopment Projects

Storm Drain Inlets

All development projects must comply with full trash capture requirements.

1. All inlets must be fitted with grates, trash baskets, or equivalent proprietary device.
2. The device must be designed to capture debris 5mm or greater, and prevent flooding potential. All inlets must be labeled with concrete stamp, or equivalent, stating "No Dumping—Drains to River."

Residential Developments (with HOA, or more than 10 units)

1. Dog waste stations must be provided throughout the property.
2. Dog waste stations shall include signage to pick up and properly dispose of pet waste.
3. Stations must provide pet waste bags and a covered trash receptacle.

Property Maintenance and Housekeeping

1. All parking lots and private roads must be cleaned as needed, and at least once per year.
   a. Cleaning shall be sufficient to remove oil, grease, food stains, and debris—all wash water must be captured and contained for disposal to a sanitary sewer.
2. Trash containers shall remain covered at all times, and be emptied when full; dumpsters shall not be allowed to overtop.
3. Routine property inspections should be performed to remove stray debris, clean up residual materials, sweep up sediment, and maintain irrigation systems.

For more information regarding storm water regulations, visit www.santeeh2o.org.

Figure 4-8. New and Redevelopment Projects Minimum Stormwater Requirements

4.1.7 Caltrans

Although Caltrans is not a part of the Permit, Caltrans works cooperatively with the Copermittees in accordance with their statewide NPDES permit. Strategies Caltrans has implemented are presented in tabular format in Appendix 2.

4.1.8 Optional Watershed and Jurisdictional Strategies

In addition to the strategies presented above, the Participating Agencies developed optional jurisdictional and watershed strategies. Implementation of the optional strategies contingent on circumstances supported by the need for the additional effort as determined through the adaptive management process, the cost/benefit as compared to other options and strategies, and the availability of funding. Optional watershed strategies for the San Diego River WMA during FY 2015-2016 are presented in Table 4-6. Jurisdictional optional strategy implementation is described in the Participating Agencies' strategy tables, which are provided in Appendix 2.

Detailed jurisdictional strategies, including optional strategies and whether they have been triggered, are included in Appendix 2. Within the detailed strategies tables, information is presented to indicate whether the strategy was implemented during this reporting period, whether it will continue to be implemented during the next reporting period, or whether the strategy will be modified or eliminated for the coming year(s).

Table 4-6. San Diego River Optional Watershed Strategies Implemented during FY 2015-2016.

San Diego River WMA Optional Watershed Strategies	Implementation Timeframe	Collaborating Entities	HPWQC	PWQC			
			Bacteria	Nutrients	Eutrophic Conditions	Total Dissolved Solids	Index of Biotic Integrity
Implement Sustainable Landscapes Program to encourage landscape retrofits.*	FY 2016-17; Continuous until grant funding and incentives are depleted	Water districts, Copermittees, non-profit organizations	●	●	●	●	●
Implement an invasive species (i.e., *Arundo*) removal program in upstream areas, rivers, or tributaries.	FY 2016-18; Continuous until grant funding depleted	Copermittees, non-profit organizations	●	●	●	●	●
Implement wastewater management program to prevent sewer overflows.	FY 2016-2018; Continuous until grant funding depleted.	Copermittees, wastewater agencies	●	●	●	●	●

Note:

* Guideline development and residential/professional training courses were completed in FY 2015-2016; additional program components will begin in FY 2016-2017. See Section 4.5.1 for additional details.

4.2 GOALS FOR THE SAN DIEGO RIVER WATERSHED

As discussed in Section 2, interim and final numeric goals were established for the watershed as a means of measuring reasonable progress towards addressing bacteria and are focused to achieve compliance with the Bacteria TMDL. These goals are outlined in Chapter 3 of the WQIP and in Appendix 3 of this Annual Report, and include six compliance pathways. Each compliance pathway provides an independent option to demonstrate progress and ultimately compliance with the TMDL. Any one of the compliance pathways may be used for assessment purposes; all pathways do not have to be assessed. Each year, the Participating Agencies assess specific water quality data and programmatic information in order to gauge progress towards achieving the numeric goals. These assessments provide information to determine whether intended outcomes are being realized or if adaptations of Participating Agencies' programs are necessary.

This section focuses on the progress that the Participating Agencies have made towards their interim goals established for the Permit term ending in 2018. Progress towards these numeric goals is measured using the water quality and programmatic data collected during the 2015-2016 monitoring year. Progress is summarized in Table 4-7 (for dry weather) and Table 4-8 (for wet weather) and in the following subsections.

4.2.1 Interim Numeric Goals, Permit Term

The San Diego River WQIP was accepted in February 2016, and none of the goals outlined in the WQIP are due to be achieved by the end of FY 2015-2016. The Participating Agencies are demonstrating progress towards goals in the San Diego River WMA through the WQIP implementation option (Pathway 6), which involves executing the jurisdictional strategies outlined in the WQIP to achieve interim and, eventually, final goals. Progress toward the interim numeric goals for the current Permit term is presented in Table 4-7 (dry weather goals) and Table 4-8 (wet weather goals). The completion of baseline estimates are included in the progress assessment for those Participating Agencies that committed to providing baseline information in the 2015-2016 WQIP Annual Report which had not already given in the WQIP.

4.2.1.1 The City of El Cajon

The City of El Cajon is focusing its efforts during the current Permit term primarily on addressing dry weather urban runoff. Based on cumulative assessment reports and monitoring studies focusing on the San Diego Watershed (San Diego River) and Forester Creek, known sources of bacteria include anthropogenic (human and pet contributions), high density areas and industry (multi-family housing, high use areas such as retail centers, and eateries), irrigation runoff (over irrigation, pavement washing), and natural (wildlife) contributors. Based on the urban runoff monitoring program results, historical data show that bacteria and nutrients exceedances occur at major outfalls within the jurisdiction of El Cajon.

Interim dry weather numeric goals for this Permit term and progress towards those goals are presented in Table 4-7. Progress is also shown in Figure 4-9. During dry weather, the City of El Cajon met its goal of achieving a 10% reduction in flow volume or the in the number of flowing outfalls compared to the baseline calculated from 2013-2014 monitoring year data, and will continue to implement their programs to reduce dry weather flows. A second dry weather goal for the Permit term is to increase the number of cubic yards of debris collected from drainage channels to reduce the gross pollutants that may contribute to bacteria loads. Progress was measured by comparing the number of annual transient encampment removal events and associated cubic yards removed to the yearly average of five removal events removing 25 cubic yards of trash and debris. The City of El Cajon exceeded this average during the 2015-2016 monitoring year and will continue cleanups in future fiscal years.

During wet weather, interim goals included sponsoring and coordinating with jurisdictions for bi-annual creek cleanup events in one focused management area and expanding pet waste management outreach to one focused management area or to large properties owners. Progress is described in Table 4-8 and shown in Figure 4-9. The City of El Cajon achieved the first goal by removing a greater amount of solid waste than the per-event average of five cubic yards. For the second goal, the City of El Cajon began planning its pet waste management outreach program and is on track to implement the program within the Permit term.

Permit Term Goal	Baseline Estimation Completed	On Track to Achieve Goal	Permit-Term Goal Achieved
Dry Weather Goal #1: Flow Reduction	✓		✓
Dry Weather Goal #2: Encampment Removals			✓
Wet Weather Goal #1: Cleanup Events at Forester Creek			✓
Wet Weather Goal #2: Pet Waste Management		✓	

Figure 4-9. The City of El Cajon's Progress Towards Permit Term Numeric Goals

4.2.1.2 The City of La Mesa

The City of La Mesa is focusing its current Permit term efforts on performing a creek restoration project encompassing a 900 foot segment of Alvarado Creek. Progress is described in Table 4-7 (dry weather) and Table 4-8 (wet weather) and shown in Figure 4-10. The metric used to demonstrate compliance will be linear feet of structural projects, and the City of La Mesa is on track to achieve its goal during the Permit term.

Permit Term Goal	On Track to Achieve Goal	Permit-Term Goal Achieved
Dry and Wet Weather Goal: Alvarado Creek Restoration	✓	

Figure 4-10. The City of La Mesa's Progress Towards Permit Term Numeric Goals

4.2.1.3 The City of Santee

Interim numeric goals for the Permit term are presented in Table 4-7 (dry weather) and Table 4-8 (wet weather) and progress is shown in Figure 4-11. The Permit term goals are to reduce indicator bacteria loads from storm drain outfalls during dry and wet weather. With only a few months of official program implementation since the WQIP was accepted in February 2016, assessment of pollutant load reductions would be premature at this time. However, The City has a robust program in place to achieve bacteria reductions and has made programmatic progress. A comparison of dry weather major storm drain outfall flow data indicates that progress has been made with regard to eliminating non-stormwater flow. The number of major outfalls at which flowing water was observed during at least one visit decreased by 14% from the 2014-2015 monitoring year to the 2015-2016 monitoring year. In addition, the average observed flow rate at major outfalls decreased by more than half over the same time period. This is largely due to the City eliminating illicit discharges observed during 2014-2015, including an illicit discharge from a development project with an estimated flow rate of 18 gallons per minute (gpm) and a swamp cooler at a commercial facility with a flow rate of approximately three gpm.

The City has also partnered with SDSU to perform additional monitoring to further investigate bacteria and nutrient levels in its jurisdiction and has used that data to help prioritize outfalls for additional investigation. The City is also working with Padre Dam Municipal Water District, the local sewer agency, on a study to assess whether wastewater infrastructure may be contributing bacteria to Forester Creek around identified areas with higher bacteria levels or where human markers have been noted. Based on program implementation to date, the City of Santee has made significant accomplishments and is making progress toward meeting its interim goals, which are due by 2018.

Permit Term Goal	On Track to Achieve Goal	Permit-Term Goal Achieved
Dry Weather Goal: Bacteria Load Reductions	✓	
Wet Weather Goal: Bacteria Load Reductions	✓	

Figure 4-11. The City of Santee's Progress Towards Permit Term Numeric Goals

4.2.1.4 The City of San Diego

The City of San Diego's jurisdictional interim goal for wet and dry weather is to develop and implement a policy requiring the inclusion of green infrastructure features on all suitable City projects, including non-SUSMP projects. This policy will be coordinated with ongoing efforts to update City design manuals and LID standards for public LID BMPs. To guide implementation of the new policy, a green infrastructure program will be initiated in parallel. The program will begin with research and recommendations for ideal methods for green infrastructure project siting and prioritization within the City, but will ultimately result in the construction of additional green infrastructure projects.

FY 18 Performance Based goals for the Permit term and progress toward achieving those goals are presented in Table 4-7 (dry weather) and Table 4-8 (wet weather). Progress is also shown in Figure 4-12 for the wet and dry weather FY 18 Performance Based goal to have 58.4 acres of drainage area treated through construction of four green infrastructure BMPs and in Figure 4-13 for the dry weather FY 18 Performance Based goal to reduce prohibited non-stormwater flow from the City of San Diego's persistently flowing outfalls in the watershed by 10% compared to baseline flows. For the green infrastructure BMP goal, the City has begun the process for developing a green infrastructure policy and implemented projects that treat 43.6 acres of drainage area (75% of the total FY 18 Performance Based goal). Projects that make up the 43.6 acres include the Cabrillo Rain Garden (6 acres) and Park Ridge Structural BMP (37.6 acres). The FY 18 Performance Based goal is expected to be achieved by implementing additional projects that treat 14.8 acres of drainage area, for a total of 58.4 acres (Allied Gardens Bioretention - 4.5 acres, Famosa Slough Bioretention - 10.3 acres) treated by 2018. For the flow reduction goal, average dry weather flow in FY 2015-2016 was 62.8 gallons per minute, representing a 46.7% reduction from the baseline average flow. Therefore, this goal has been achieved.

In accordance with the requirements of the WQIP, the storm drain discharge baselines to be used for assessing progress toward dry and wet weather jurisdictional numeric goals for bacteria reductions due to be achieved in future permit terms were calculated and are presented in Table A3-9 and Table A3-10 of Appendix 3.

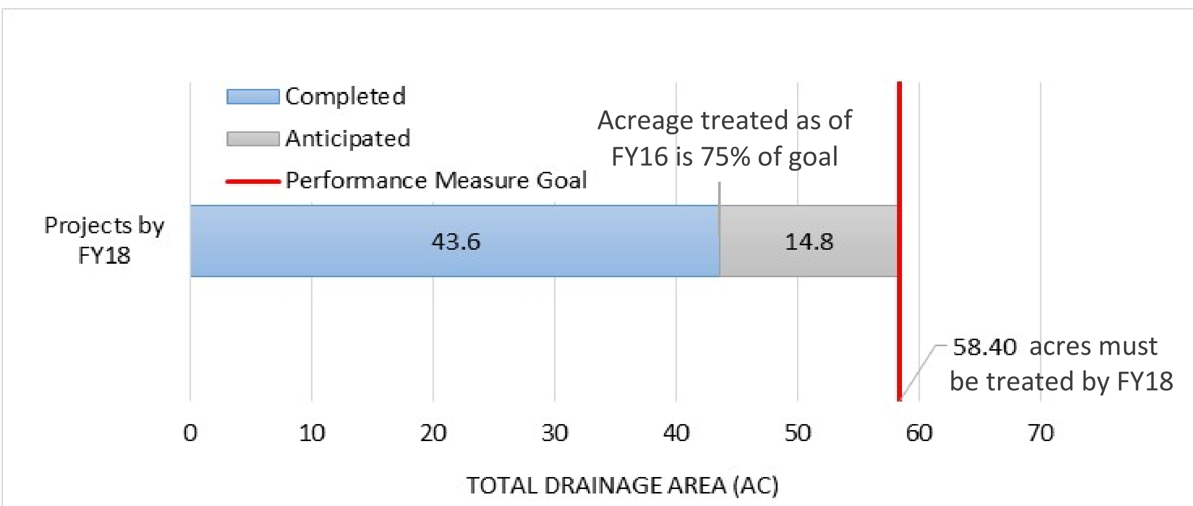


Figure 4-12. The City of San Diego's Progress FY 18 Performance Based Goals – Green Infrastructure BMPs (Wet and Dry Weather)

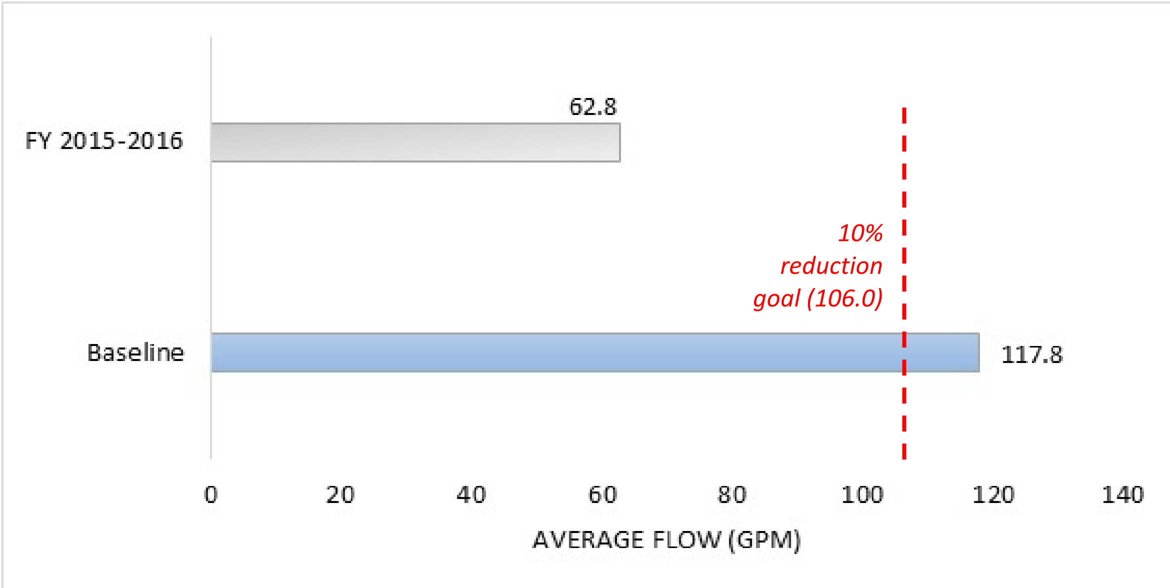


Figure 4-13. The City of San Diego's Progress Towards FY 18 Performance Based Goals – Flow Reduction (Dry Weather)

4.2.1.5 The County of San Diego

The County of San Diego has established dry weather numeric goals for bacteria in the watershed, focusing its efforts on eliminating anthropogenic dry weather discharges from storm drain outfalls to receiving waters through implementation of jurisdictional strategies. The County of San Diego determined the first Permit term will be utilized for planning and feasibility analyses. As such, the County shifted to a more active field program to better locate and abate dry weather flow, and trained staff members to identify and report IC/IDs more effectively. In addition, the County is focusing on reducing flow at persistently flowing storm drain outfalls. The County also has a goal of participating in additional public private partnerships including a small-scale residential incentive program.

Interim numeric goals for the Permit term and progress toward achieving those goals are presented in Table 4-7 (dry weather) and Table 4-8 (wet weather). Progress is also shown in Figure 4-14. The Permit term goal during dry weather is a 20% reduction in aggregate flow volume or in the number of persistently flowing storm drain outfalls. To demonstrate progress toward the goal of reducing and eventually eliminating non-stormwater discharges from the County stormwater conveyance system (see WQIP Table 3-12; Compliance Pathway 6a), dry weather monitoring of outfalls was conducted during 2015-2016 to develop a baseline. To this end, required storm drain outfall monitoring was augmented with additional continuous flow monitoring in a number of outfalls during the dry season to provide a baseline flow metric that accounts for seasonal and daily variations in non-stormwater flows. This detailed flow information will assist in source identification and abatement activities. Furthermore, the County is leveraging these current efforts to meet the Permit requirements to "effectively eliminate" non-stormwater flows in the stormwater conveyance system by 2021. Doing so will allow the County to achieve the Bacteria TMDL goal of stopping "direct or indirect discharges from the Responsible Copermittee's storm drain systems to the receiving waters" in accordance with the Permit.

During the 2014-2015 and 2015-2016 monitoring years, the County of San Diego conducted dry weather field screening monitoring at all of its 51 major storm drain outfalls in the WMA to document the presence of standing or flowing water. These data were used to determine which outfalls have persistent dry weather flows and should be prioritized for their potential impact on the quality of receiving waters per the Permit. During 2015-2016, five of the eight persistently flowing outfalls were identified as highest priority storm drain outfalls and were targeted for additional bi-annual field and analytical monitoring and focused source reduction activities. The County also installed continuous flow monitoring equipment in nine outfalls with persistent or transient flows that included four of the five highest priority outfalls. These nine outfalls were selected based on presence of persistent and transient flows as well as the feasibility of monitoring with consideration for equipment installation, safety, and access. The resulting data are used to measure dry season baseline flows and to screen for cyclical trends in these flows. This information will assist the County in reducing or eliminating non-stormwater flows.

The 2015-2016 monitoring results show that eight (16%) of the 51 major storm drain outfalls had persistent non-stormwater flows. The mean flow rate as measured at the nine outfalls with continuous flow monitoring equipment equaled 1.80 gpm. These preliminary flows represent a baseline against which the County will measure progress toward achieving the goal of reducing and effectively eliminating anthropogenic dry weather flows from the stormwater conveyance system to the receiving waters.

During wet weather, the interim goal for the current Permit term is to implement non-structural BMPs to achieve source reduction of bacteria loads from the storm drain outfalls or to reduce by 1% the baseline bacteria loads from distributed structural BMPs constructed between 2003 and 2009, which are outlined and mapped in Appendix E to WQIP Chapter 3. Since these BMPs were implemented to mitigate anticipated development, they are considered to contribute to the pollutant load reductions achieved under the WQIP. Progress is described in Table 4-8 and shown in Figure 4-14. The County implemented all planned programmatic BMPs and is on track to achieve the first wet weather goal. The County has achieved the second wet weather goal through continued operation and maintenance of the distributed BMPs.

Permit Term Goal	Baseline Estimations Completed	On Track to Achieve Goal	Permit-Term Goal Achieved
Dry Weather Goal: Flow Reduction	✓		
Wet Weather Goal #1: BMP Implementation		✓	
Wet Weather Goal #2: Distributed BMP Operation and Maintenance			✓

Figure 4-14. The County of San Diego's Progress Towards Permit Term Numeric Goals

Table 4-7. Permit Term Dry Weather Numeric Goals

Goal	Metric	Schedule	Baseline Data	Data Collected/Results	Progress
City of El Cajon					
Reduce the volume of dry weather flows or the number of storm drains with dry weather flows by 10%.	% reduction of dry weather flow volume from major outfalls or number of major outfalls with dry weather flows	Achieve during Permit Term (expires June 27, 2018).	The baseline was calculated based on data from monitoring year 2013-2014, the first year that flow data were collected at the major outfalls in the City. The estimated flow volume from major outfalls was 47.4 million gallons, and 45% of major outfalls had flowing water during at least one visit.[a]	Dry weather flow measurements were collected as part of the City's major MS4 outfall monitoring program. The estimated flow volume in monitoring year 15-16 was 20.1 million gallons, and 24% of major outfalls had flowing water during at least one visit.	Reductions of more than 10% in both the estimated flow volume and the percentage of outfalls with flowing water during 15-16, compared to the baseline, were observed. Relatively small amounts of rainfall and statewide mandatory water conservation programs, in addition to the City's strategies, likely contributed to these reductions. While water agencies' mandatory conservation programs are no longer in effect, the City will continue to implement its programs to reduce dry weather flows.
Increase annual transient encampment removal events to a minimum of eight (8) annual events to increase to 40 cubic yards of trash and debris.	The number of annual transient encampment removal events throughout the City's drainage channels.	Achieve during Permit Term (expires June 27, 2018).	Yearly average of five (5) removal events during R9-2007-0001 Permit cycle to help remove 25 cubic yards of trash and debris.	The City performed 18 transient encampment removal events during FY15-16 and removed 212.6 cubic yards of trash and debris. An especially large number of cleanups were completed in FY 15-16 to prepare for El Niño conditions and reduce flood risk.	The City exceeded the average annual goals for the number of cleanups and the volume of trash and debris removed. The total volume of material removed also exceeds the entire Permit term goal of 120 cubic yards (40 cubic yards/year x 3 fiscal years). The City will continue cleanups of transient encampments in future fiscal years.
City of La Mesa					
Perform 900 linear feet of Alvarado Creek Restoration	Linear feet of structural projects	Achieve during Permit Term (expires June 27, 2018).	Existing channel conditions.	The City has started construction of the 900 linear feet of restoration in Alvarado Creek in FY 15-16. Work will be completed before 2018.	The City is on track to achieve the goal for the Permit term due in 2018.
City of Santee					
Loads are reduced by 18.5% for total coliform; 17.4% for fecal coliform; 23.5% for *Enterococcus* from MS4 outfalls	Load reductions in MS4 discharges	Achieve during Permit Term (expires June 27, 2018).	1,727 x 10^{12} MPN during Water Year 2003 (based on modeling). This baseline may require updating as this baseline is not specific to MS4 discharges from the City of Santee only.	The City has developed more strict development requirements and more aggressive requirements for retrofits, performed IDDE investigations, partnered with SDSU to investigate bacteria levels at creek sites in the City's jurisdiction, and is working with Padre Dan Municipal Water District to assess whether wastewater infrastructure is contributing to bacteria levels and whether human marker is present.	The number of major outfalls at which non-stormwater flow was observed during at least one visit decreased by 14% from the 2014-2015 monitoring year to the 2015-2016 monitoring year. The average observed flow rate at major outfalls decreased by more than half over the same time period.
City of San Diego					
Treat 58.4 acres of drainage area through construction of 4 green infrastructure BMPs.	Acres of drainage area treated	Achieve during Permit Term (expires June 27, 2018).	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL.	The City has begun the process for developing a green infrastructure policy.	The City implemented green infrastructure projects that treat 43.6 acres (Cabrillo Rain Garden- 6 acres, Park Ridge Structural BMP -37.6 acres) of drainage area and is expected to achieve the performance measure by implementing additional projects that treat 14.8 acres (Allied Gardens Bioretention-4.5 acre, Famosa Slough Bioretention-10.3 acres) of drainage area for a total of 58.4 acres treated by 2018.
Reduce prohibited dry weather flow from baseline measured at persistently flowing outfalls in the WMA by 10%.	Interim compliance is implementation of strategies and schedule based on analysis results.	Achieve during Permit Term (expires June 27, 2018).	Average Dry Weather Flow[c]: 117.8 gallons per minute.	Average dry weather flow in FY 16 was 62.8 gallons per minute.	Average dry weather flow was reduced by 46.7% from the baseline average flow.

Table 4-7. Permit Term Dry Weather Numeric Goals

Goal	Metric	Schedule	Baseline Data	Data Collected/Results	Progress
County of San Diego					
Reduce by 20% the aggregate flow volume or the number of persistently flowing outfalls.	% reduction of flow volume or number of outfalls with persistent flows	Achieve during Permit Term (expires June 27, 2018).	Data collected as part of the 2015-2016 Dry Weather MS4 Outfall Monitoring and from 9 outfalls with continuous flow monitoring equipment were used to establish the baseline. Eight (16%) of 51 major MS4 outfalls had persistent non-stormwater flows. Using data from all inventoried outfalls (including those less than 36"), 27 of 164 (also 16%) had persistent non-stormwater flows. The mean flow rate at the 9 outfalls with continuous flow monitoring equipment equaled 1.80 gallons per minute (gpm).	In accordance with the County's commitment in the WQIP, dry weather flow data from major MS4 outfalls were collected during the 15-16 monitoring year to establish a baseline.	Data from the 15-16 monitoring year were used to set a baseline. Future years' data will be compared to that baseline.

[a] The City-wide major outfall estimated dry weather flow volume is the sum of the individual outfall flow volumes. The flow volume for each major outfall was estimated by multiplying the average flow rate at each outfall by 330 dry days per year. While the number of dry days each year may change, for the purposes of assessing progress toward this goal, the same number of dry days is used to estimate the flow volume each year for consistency.

[b] Geosyntec Consultants, Technical Memorandum, San Diego River Watershed Water Quality Improvement Plan City of La Mesa – Jurisdictional Load Reduction Summary, October 10, 2014.

[c] Baseline dry weather flow value calculated using FY 16 outfall data from persistently flowing City of San Diego outfalls in the San Diego River WMA and the average reduction in dry weather flow observed in the Los Peñasquitos, San Dieguito River, Chollas Creek, and Mission Bay WMAs. Calculations are described in Appendix 3.

Table 4-8. Permit Term Wet Weather Numeric Goals

Goal	Metric	Schedule	Baseline Data	Data Collected/Results	Progress
City of El Cajon					
Sponsor, coordinate with jurisdictions creek cleanup events in 1 focused management area, bi-annually; segregate and quantify waste materials.	Number of cleanup events	Achieve during Permit Term (expires June 27, 2018).	The number of cleanup events has varied from year to year. The average amount of material removed has been about 5 cubic yards of solid waste (i.e. trash and debris) per cleanup event.	The City sponsored two removal events at Forester Creek during FY15-16 and removed between 7.6 and 9.12 cubic yards (2,280 lbs.) of trash and debris.[a]	Biannual cleanup events were completed in FY 15-16, and the amounts of material removed exceeded the historical averages for cleanup events in the City. Clean The City will continue cleanup events in the next two fiscal years to achieve the WQIP goal.
Expand pet waste management outreach to 1 focused management area; or to large properties' owners (i.e. apartments, commercial facilities).	Number of focused management areas or large properties' owners to which outreach was completed	Achieve during Permit Term (expires June 27, 2018).	Pet waste program not expanded to any new areas.	The City began planning its pet waste management outreach program during FY 15-16.	The City is on track to implement an expanded pet waste management outreach program by 2018.
City of La Mesa					
Perform 900 linear feet of Alvarado Creek Restoration resulting in a 6.3% reduction in bacteria loading from municipal land use [a]	Linear feet of stream restoration	Achieve during Permit Term (expires June 27, 2018).	Existing channel conditions.	The City has started construction of the 900 linear feet of restoration in Alvarado Creek in FY 15-16. Work will be completed before 2018.	The City is on track to achieve the goal for the Permit term due in 2018.
City of Santee					
Loads are reduced by 4.3% for Total Coliform; 4.3% for Fecal Coliform; 4.3% for *Enterococcus* from MS4 outfalls	Load reductions in MS4 discharges	Achieve during Permit Term (expires June 27, 2018).	1,727 x 10^{12} MPN during Water Year 2003 (based on modeling). This baseline may require updating as this baseline is not specific to MS4 discharges from the City of Santee only.	The City has developed more strict development requirements and more aggressive requirements for retrofits, partnered with SDSU to investigate bacteria levels in its jurisdiction, and is working with Padre Dan Municipal Water District to assess whether wastewater infrastructure is contributing to bacteria levels and whether human marker is present.	Santee has partnered with various organizations for regular volunteer trash cleanups. Santee Public Works, in partnership with the Sheriff's Department, conducts bi-monthly sweeps to identify and remove transient encampments.
City of San Diego					
Treat 58.4 acres of drainage area through construction of 4 green infrastructure BMPs.	Acres of drainage area treated	Achieve during Permit Term (expires June 27, 2018).	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL.	The City has begun the process for developing a green infrastructure policy.	The City implemented green infrastructure projects that treat 43.6 acres (Cabrillo Rain Garden- 6 acres, Park Ridge Structural BMP -37.6 acres) of drainage area and is expected to achieve the performance measure by implementing additional projects that treat 14.8 (Allied Gardens Bioretention-4.5 acre, Famosa Slough Bioretention-10.3 acres) acres of drainage area for a total of 58.4 acres treated by 2018.
County of San Diego					
Implement programmatic (non-structural) BMPs to achieve source reduction of bacteria loads from the storm drain outfalls	% bacterial load reduction. Interim compliance is implementation of strategies in accordance with schedule in WQIP.	Achieve during Permit Term (expires June 27, 2018).	1,727 x 10^{12} MPN during Water Year 2003	During FY 15-16 the County implemented all planned programmatic BMPs according to the schedule in the WQIP	The first year of BMP implementation was completed successfully; and the County is on track to achieve the goal via continued BMP implementation through 2018.
Reduce by 1% the baseline bacteria loads from distributed BMPs constructed between 2003 and 2009 during redevelopment.	Implementation and maintenance of BMPs. % bacterial load reduction is based on quantitative model.	Achieve during Permit Term (expires June 27, 2018).	1,727 x 10^{12} MPN during Water Year 2003	BMPs were constructed between 2003 and 2009 and have continued to be operated and maintained.	The County is on track to achieve the goal via continued BMP operation and maintenance through 2018.

a. A description of weight to volume trash conversion can be found in Appendix 4 Section 1.4 Special Study Results and Assessments.
b. Geosyntec Consultants, Technical Memorandum, *San Diego River Watershed Water Quality Improvement Plan City of La Mesa – Jurisdictional Load Reduction Summary*, October 10, 2014

5 Adaptive Management

This section presents a summary of the potential triggers for adaptation of the WQIP and the results of the adaptive management process for the San Diego River WMA after the 2015-2016 monitoring year, with additional detail provided in Appendix 5.

Adaptive management entails using an iterative approach to re-evaluate the water quality conditions, priorities, numeric goals, strategies, and schedules based on the requirements of the Permit. The adaptive management process details how the Participating Agencies use new data and information to improve the WQIP through updates to priorities, assessments of and adjustments to goals, updates to strategies to achieve the latest goals, and updates to the monitoring and assessment program to provide the necessary data to support the process.

The Permit describes various triggers that may warrant program adaptation, including exceedances of water quality standards in receiving waters, new information, recommendations from the Regional Board, and public participation. Effectiveness assessments of JRMP programs and strategies may also trigger adaptations to the WQIP. The adaptive management process is used in conjunction with water quality and programmatic data to evaluate whether modifications to numeric goals, schedules, and/or strategies are necessary to achieve compliance with the interim and final compliance numeric goals. The timing of the adaptive management requirements is typically either annually or at the end of the Permit term.

5.1 DRIVERS FOR ADAPTATION

The adaptive management process may be triggered when new information becomes available, including results of routine monitoring and special studies, new regulatory drivers, results of program effectiveness assessments and progress towards numeric goals, and recommendations from the public and/or Regional Board. Modifications may be made to the priority water quality conditions, goals, strategies, schedules, and/or the MAP. The potential triggers for adaptation that must be considered annually are summarized in Table 5-1. The assessments related to each of these potential triggers are included in Appendix 5.

Only one year of monitoring data have been collected under the WQIP's MAP and, with the acceptance of the WQIP in February 2016, the Participating Agencies have been officially implementing the WQIP for less than a year. Therefore, it is too early in the implementation process to have significant feedback necessary to drive the adaptive management process. Continued and further implementation of strategies and collection of additional monitoring and programmatic data is necessary for an evaluation that leads to meaningful adaptive management. The elements considered in the adaptive management process are identified in the section to follow; however, no changes to the WQIP based on the adaptive management process are recommended at this early stage of implementation.

Table 5-1. Causes for Adaptive Management within the Water Quality Improvement Plan

Trigger	Frequency for Assessment	Potential Area(s) for Adaptation			
		Priority Water Quality Conditions	Goals and Schedules	Strategies and Schedules	Monitoring and Assessment
Exceedances of Receiving Water Limitations	Annual			X	X
Exceedances of Non-stormwater Action Levels or Stormwater Action Levels	Annual			X	X
Special Studies Results	Annual, as results are available		X	X	X
New Regulatory Actions	Annual, as applicable	X	X	X	X
Regional Board Recommendations	Annual, as applicable	X	X	X	X
Program Effectiveness Assessments/ Progress Towards Goals	Annual			X	X

5.2 WATER QUALITY IMPROVEMENT PLAN ELEMENTS FOR ADAPTATION

The purpose of this section is to summarize changes to components of the WQIP, including priority water quality conditions, numeric goals, strategies, and/or schedules, if applicable, based on analyses and findings in this 2015-2016 Annual Report. Supporting information for these modifications would be detailed in Appendix 5, if applicable. The potential areas for adaptation were presented in Table 5-1, which also shows the information that may trigger adaptation.

In accordance with the Permit, the priority water quality conditions within the watershed *may* be re-evaluated as needed as part of the annual reporting process. In general, priority and highest priority water quality conditions and numeric goals are established based on longer periods of record compared to a monitoring year and their assessment would most appropriately be conducted following the collection of sufficient data to make scientifically-based decisions. At earliest, such consideration may be given during the preparation of the ROWD, due to the Regional Board in December 2017.

The 2015-2016 monitoring year was the first in accordance with the WQIP's MAP. Receiving water and storm drain outfall discharge monitoring results indicated that no modifications to the priority and highest priority water quality conditions identified by the WQIP are necessary at this time. Further, there have been no new regulatory actions or Regional Board recommendations since the acceptance of the WQIP that would warrant reconsideration of priorities for the San Diego River WMA through the annual reporting process.

On an annual schedule, it is more likely that modifications may be made to strategies and implementation schedules. These elements may require updates on a more frequent basis than the priorities to ensure effective implementation and assessment as the WQIP progresses. Evaluation of the current goals, strategies, and schedules is required by the Permit as part of this Annual Report. The information that may be used to modify these elements of the WQIP through adaptive management is summarized in Table 5-2.

No changes to numeric goals or schedules for achieving them as listed in the WQIP are proposed at this time. Minor administrative changes, including clarifications, correction of typos and errors, and edits to WQIP strategies, are proposed, primarily by the City of San Diego. These modifications are identified as markup to the Participating Agencies tables in Appendix 2. While one year of monitoring data have been collected in accordance with the MAP of the WQIP, only a few months of this time period have been under the accepted WQIP and implementation. The Participating Agencies in the San Diego River WMA have begun implementing their jurisdictional strategies intended to result in achievement of dry and wet weather interim goals for the term of the current Permit. These efforts to date have not identified the need for significant changes and, as described in Section 4, the Participating Agencies are demonstrating progress in implementing the existing strategies. Additional evaluation will be conducted and reported in the ROWD.

Table 5-2. Information Used to Modify Strategies and Schedules

Evidence	WQIP AR Sections	2015-2016 Status	Changes Triggered (Y/N)
Receiving water monitoring results.	Section 3, Appendix 4	No new information pertaining to receiving water exceedances not addressed by the WQIP.	N
Storm drain outfall monitoring results.	Section 3, Appendix 4	NAL and SAL exceedances are consistent with WMA priority constituents.	N
Special studies results.	Section 3, Appendix 4	Data from these studies will be useful for the re-evaluation of the Bacteria TMDL and to facilitate consideration of site-specific water quality criteria for bacteria.	N
New or updated regulations.	Section 5	No new regulatory drivers; adaptive management will be required as new TMDLs are approved and as the Trash Amendments are incorporated into the Permit.	N
Program effectiveness assessments.	Section 5	Additional data will be necessary to supplement 2015-2015 data before program effectiveness can be evaluated.	N
Progress towards achieving numeric goals.	Section 4	Initial results related to program effectiveness indicate that the Participating Agencies have made progress towards achieving each of their dry and wet weather interim goals for the current Permit term.	N

Similar to strategies and schedules, updates to the MAP may be necessary more often than priority water quality conditions and numeric goals and schedules. Changes to the MAP may be triggered by several factors including:

- Modifications to other elements of the WQIP, including priority water quality conditions, numeric goals and schedules, and/or strategies and schedules.
- Identification of data gaps through Permit-required assessments.
- Results of special studies.
- Requests/requirements from the Regional Board.

None of these triggers are applicable to the 2015-2016 monitoring year, and adaptive management of the MAP is not required at this time. Additional assessments are planned for the ROWD, including evaluation of the monitoring data and receiving water limitations.

6 Conclusions

Sections 1 through 5 and their associated appendices present the results and assessment findings derived from the 2015-2016 monitoring year in the San Diego River WMA. This was the first year of monitoring under the accepted WQIP and its associated MAP. The monitoring performed during 2015-2016 in the WMA, which was focused on addressing the HPWQC in the WMA (i.e., bacteria), is summarized in Table 6-1. Although the goals and strategies outlined in the WQIP are focused on bacteria, implementation of the chosen strategies will also improve conditions in relation to the PWQCs and other potential contaminants, providing a multi-benefit approach to implementation.

Table 6-1. Monitoring Conducted during the 2015-2016 Monitoring Year in the San Diego River WMA

Monitoring	Related to HPWQC? (Y/N)
Receiving Water Monitoring*	
SMC Regional Monitoring	N
TMDL	Y
Storm Drain Outfall Monitoring	
Dry Weather Field Screening	Y
Dry Weather Monitoring	Y
Wet Weather Monitoring	Y
Illicit Discharge Detection and Elimination	Y
Special Studies	
Reference Streams and Beaches Study	Y
Wet Weather Epidemiology Study	Y

* HMP monitoring was conducted regionally. One reference station was located in the San Diego River WMA. The objectives and results of the program are summarized in Appendix 4.

A summary of major findings and achievements as they pertain to bacteria is presented in Table 6-2. Detailed results and the related assessments required by the Permit are found in the referenced sections of Appendix 4.

The Participating Agencies implemented a broad range of strategies to target bacteria, as well as other constituents such as nutrients and trash during FY 15-16. Several key strategy types are highlighted below, with details provided for each Participating Agency in Section 4.1.1.

- **Preventing wastewater discharges to the storm drain system**. This strategy addresses human sources of bacteria, which are the highest priority from a public health perspective.
- **Trash cleanups**, including volunteer cleanup events and cleanups of trash associated with transient encampments, which remove trash and also address likely sources of bacteria.
- **Dry and wet weather runoff reduction programs**, which include rebates and actions at Participating Agencies' own facilities.

- **Retrofit and rehabilitation projects**, which address most pollutants and also often provide other benefits, such as aesthetic improvement or habitat enhancement.
- **Additional monitoring to investigate sources of dry weather flows**, which are a transport mechanism for bacteria and other pollutants.
- Increased residential, commercial, and industrial inspections.
- **Community outreach programs,** which inform and engage the community about issues such as water conservation, irrigation runoff, and trash disposal.

The WQIP requires implementation of an adaptive management process, used to evaluate whether updates to priorities, assessments of and adjustments to goals, updates to strategies to achieve the latest goals, and/or updates to the MAP are necessary. This process may be triggered when new information becomes available, including results of routine monitoring and special studies, new regulatory drivers, results of program effectiveness assessments and progress towards numeric goals, and recommendations from the public and/or Regional Board. With the acceptance of the WQIP in February 2016, the Copermittees have been officially implementing the WQIP for less than a year. Therefore, it is too early in the implementation process to have significant feedback necessary to drive the adaptive management process. Continued and further implementation of strategies and collection of additional monitoring and programmatic data is necessary for an evaluation that leads to meaningful adaptive management. Therefore, no changes to the WQIP due to the adaptive management process are recommended at this early stage of implementation. Minor administrative modifications to the strategies have been proposed including clarifications, correction of typos and errors, and edits to selected strategies. The proposed administrative changes are documented in Appendix 2.

Table 6-2. Major Findings and Achievements Related to the Highest Priority Water Quality Condition in the San Diego River WMA for the 2015-2016 Monitoring Year

Monitoring Element	Location of Detailed Results	Major Findings and Achievements
Receiving Water Monitoring		
TMDL	Section 3.1.3 Appendix 4 Section 4.1.6	• Interim and final receiving water limitations are being achieved for: o Fecal coliform wet season geometric mean at SDR-FC2 and SDR-MLS. o Fecal coliform dry and wet season geometric means at SDR-CDE. o All fecal coliform and total coliform goals, and *Enterococcus* wet season geometric mean and single-sample maximum at FM-010. • All other results did not meet the interim or final receiving water limitations which are not required to be achieved during this Permit term. However, because the first interim goals are not required to be achieved until April 2020 per the WQIP, the exceedances observed during the 2015-2016 monitoring year do not indicate non-compliance at this time.
Storm Drain Outfall Monitoring		
Dry Weather Field Screening	Section 3.2.1.1 Appendix 4 Section 4.2.1	• There was no trash or a low presence of trash during most (95%) of the trash assessments (n = 375) at visited outfalls. • Visual observations made during routine field screening visits indicated dry/no flow conditions for 59% of visits for the County of San Diego, 60% of visits for the City of El Cajon, 60% of visits for the City of Santee, 25% of visits for the City of San Diego, and 8% of visits for the City of La Mesa. Flowing water was observed during 30% or fewer of the field screening visits conducted by each jurisdiction. • When flow was observed, the majority of estimated flow rates were low, with 75 of 113 estimations categorized as less than five gallons per minute. • Flow determinations indicated that 77 major storm drain outfalls in the WMA had persistent flow; 64 had transient flow; 82 had dry/no flow conditions, and 2 were undetermined. The number of undetermined outfalls has been reduced from 7 to 2, and the number of persistent outfalls has increased by 11 based on the additional dry weather field screening observations made in the 2015-2016 year. • The highest priority outfalls in each jurisdiction were prioritized for dry weather monitoring.
Highest Priority Storm Drain Outfall Dry Weather Monitoring	Section 3.2.1.2 Appendix 4 Section 4.2.2	• Samples collected from most of the monitored outfalls exceeded the single sample maximum water quality objectives for *Enterococcus* and fecal coliform (HPWQCs in the WMA) and NALs for total nitrogen and total phosphorus (PWQCs in the WMA); this indicates that the HPWQC and PWQCs and the highest priority outfalls for the WMA were properly selected. • Data collected during this first monitoring year were used to estimate the non-stormwater volumes and pollutant loads collectively discharged from the major storm drain outfalls with persistent dry weather flows in each Copermittee's jurisdiction.
Storm Drain Outfall Wet Weather Monitoring	Section 3.2.2 Appendix 4 Section 4.2.5	• Samples collected from all five monitored outfalls exceeded the single sample maximum final effluent limitations for *Enterococcus* and fecal coliform. • A more robust data set was developed for the land-use based assessment of wet weather storm drain outfall discharges and land-use based EMCs were refined based on three years of monitoring.
Illicit Discharge Detection and Elimination Program	Section 3.2.1.3 Appendix 4 Section 4.2.4	• The highest priority outfalls with persistent non-stormwater flows were the focus for IDDE investigations. Irrigation runoff was the most common known or suspected source of dry weather flows, followed by groundwater infiltration.

Table 6-2. Major Findings and Achievements Related to the Highest Priority Water Quality Condition in the San Diego River WMA for the 2015-2016 Monitoring Year

Monitoring Element	Location of Detailed Results	Major Findings and Achievements
Special Studies		
Reference Streams and Beaches Studies	Section 3.3.1.1 Appendix 4 Section 4.3.1	• These studies measured concentrations of indicator bacteria that account for natural sources to establish the background concentrations, or “reference conditions”, for streams and beaches minimally disturbed by anthropogenic activities. Data will support the forthcoming re-evaluation of the Bacteria TMDL and numeric target development for future TMDLs.
Wet Weather Epidemiology Study	Section 3.3.1.2 Appendix 4 Section 4.3.2	• The excess risk of illness when entering the ocean in wet weather compared to not entering the ocean was quantified to be 12 surfers per 1,000. • An association was established between *Enterococcus* concentrations and illness rates fallowing REC-1 (surfing) activates during wet weather; the risk of illness was lower than what is predicted for *Enterococcus* concentrations exceeding the current water quality objectives. • A QMRA was performed to estimate the risks of gastrointestinal illness from recreational exposure to beaches impacted by wet weather storm drain outfall discharges. The study demonstrated the applicability of QMRA for recreational water risk estimates during wet weather and may facilitate consideration of site-specific water quality criteria.
Jurisdictional Programs		
Vary by Jurisdiction	Section 4 Appendix 2	• Participating Agencies in the San Diego River WMA have begun implementing jurisdictional strategies aimed at achieving their interim dry and wet weather goals for current Permit term and are demonstrating progress. This progress includes: o The City of El Cajon is on track to achieve or has already achieved its Permit-term goals. The City has calculated a dry weather flow baseline, demonstrated dry weather flow reductions, performed transient encampment removal events, sponsored cleanup events at Forester Creek, and began planning its pet waste management outreach program. o The City of La Mesa has started construction of the 900 linear feet of restoration in Alvarado Creek, and is on track to achieve the Permit-term goal. o The City of Santee is developing methodology to assess load reductions based on the monitoring data collected under the WQIP will be assessing progress to goals in subsequent reporting cycles. A comparison of dry weather major storm drain outfall flow data shows that average flow rates during the 2015-2016 monitoring year were less than 50% of the flow rates observed during the 2014-2015 monitoring year. o The City of San Diego is on track to achieve or has already achieved its FY 18 Performance Based goals. The City has reduced average dry weather flow from the calculated baseline average flow and has implemented green infrastructure projects treating about 75% of the acres to be treated by 2018 to achieve the FY 18 Performance Based goal. As required of the 2015-2016 Annual Report per the WQIP, the storm drain discharge baselines to be used for assessing progress toward dry and wet weather jurisdictional numeric goals for bacteria reductions due to be achieved in future permit terms were calculated and are presented in Table A3-9 and Table A3-10 of Appendix 3. o The County of San Diego is making progress toward achieving or has already achieved its Permit-term goals. The County has established a baseline for calculating dry weather flow reductions in subsequent years, has implemented non-structural BMPs according the schedule outlined in the WQIP to reduce wet weather bacteria loads, and has operated and maintained previously-constructed BMPs to reduce wet weather bacteria loads.

7 References

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APPENDIX 1

Crosswalk of Permit Requirements and Annual Report References

Appendix 1 – Crosswalk of Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix 2 Jurisdictional Information	Appendix 3 Numeric Goals	Appendix 4 Monitoring	Appendix 5 Adaptive Management
Provision A						
A.4.a.(2)	If ***exceedance(s) of water quality standards persist in receiving waters*** notwithstanding implementation of this Order, the Copermittees must comply with the following procedures: (2) Upon a **determination** by either the Copermittees or the San Diego Water Board that discharges from the MS4 are **causing or contributing to a new exceedance** of an applicable water quality standard **not addressed** by the Water Quality Improvement Plan, the Copermittees must submit the following updates to the Water Quality Improvement Plan pursuant to Provision F.2.c ***or as part of the Water Quality Improvement Plan Annual Report*** required under Provision F.3.b, unless the San Diego Water Board directs an earlier submittal:	Section 5.2			X	X
	(a) The water quality improvement ***strategies being implemented that are effective and will continue to be implemented***,	Section 5.2	X			
	(b) ***Water quality improvement strategies (i.e. BMPs, retrofitting projects, stream and/or habitat rehabilitation projects, adjustments to jurisdictional runoff management programs, etc.) that will be implemented*** to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards,	Section 5.2				X
	(c) ***Updates to the schedule for implementation*** of the existing and additional water quality improvement strategies, and	Section 5.2				X
	(d) ***Updates to the monitoring and assessment program*** to track progress toward achieving compliance with Provisions A.1.a, A.1.c and A.2.a of this Order;	Section 5.2				X
Provision B						
B.5.a.	a. The **priority water quality conditions** and potential **water quality improvement strategie**s included in the Water Quality Improvement Plan pursuant to Provisions B.2.c and B.2.e ***may be re-evaluated by the Copermittees as needed during the term of this Order as part of the Water Quality Improvement Plan Annual Report***. Re-evaluation and recommendations for modifications to the priority water quality conditions and potential water quality improvement strategies **must be provided in the Report of Waste Discharge**, and must consider the following: (1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan; (2) New information developed when the requirements of Provisions B.2.a-c have been re-evaluated; (3) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality conditions and implementation strategies to address the highest priority water quality conditions; (4) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees; (5) San Diego Water Board recommendations; and (6) Recommendations for modifications solicited through a public participation process.	Section 5.2			X	X
B.5.b.	b. The water quality improvement goals, strategies and schedules, included in the Water Quality Improvement Plan pursuant to Provisions B.3, ***must be reevaluated and adapted as new information becomes available*** to result in more effective and efficient measures to address the highest priority water quality conditions identified pursuant to Provision B.2.c. ***Re-evaluation of and modifications to the water quality improvement goals, strategies and schedules must be provided in the Water Quality Improvement Plan Annual Report***, and must consider the following:	Section 5.2		X		X
	(1) Modifications to the **priority water quality conditions** based on Provision B.5.a;	Section 5.2				X
	(2) Progress toward **achieving interim and final numeric goals** in receiving waters and MS4 discharges for the highest priority water quality conditions in the Watershed Management Area,	Section 4.2				
	(3) Progress toward achieving outcomes according to established schedules;	Section 4.2				
	(4) New policies or regulations that may affect identified numeric goals;					X
	(5) Measurable or demonstrable reductions of non-storm water discharges to and from each Copermittee's MS4;	Section 3.2			X	
	(6) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;	Section 3.2			X	
	(7) New information developed when the requirements of Provisions B.2.b and B.2.d have been re-evaluated;	Section 5.1			X	X
	(8) Efficiency in implementing the Water Quality Improvement Plan;	Section 5.1	X			X
	(9) San Diego Water Board recommendations; and	Section 5.1				X
	(10) Recommendations for modifications solicited through a public participation process.	Section 5				X

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix 2 Jurisdictional Information	Appendix 3 Numeric Goals	Appendix 4 Monitoring	Appendix 5 Adaptive Management
B.5.c.	c. The water quality improvement monitoring and assessment program, included in the Water Quality Improvement Plan pursuant to Provision B.4, ***must be reevaluated and adapted when new information becomes available***. Re-evaluation and recommendations for modifications to the monitoring and assessment program, pursuant to the requirements of Provision D, ***may be provided in the Water Quality Improvement Plan Annual Report***, but must be provided in the Report of Waste Discharge.	Section 5.1 Section 5.2			X	X
Provision D						
D.1.e.(2)(c)	**Sediment Quality Monitoring** (c) The Copermittees must incorporate a ***Sediment Monitoring Report as part of the Water Quality Improvement Plan Annual Report*** in accordance with the schedule contained in the Sediment Monitoring Plan, unless otherwise directed in writing by the San Diego Water Board Executive Officer. The Sediment Monitoring Report must contain the following information: (i) Analysis: An evaluation, interpretation and tabulation of the water and sediment monitoring data, including interpretations and conclusions as to whether applicable Receiving Water Limitations in this Order have been attained at each sample station; (ii) Sample Location Map: The locations, type, and number of samples must be identified and shown on a site map; and (iii) California Environmental Data Exchange Network: A statement certifying that the monitoring data and results have been uploaded into the California Environmental Data Exchange Network (CEDEN).	N/A			X	
D.2.b.(2)(b)(iv)	**Dry Weather MS4 Outfall Discharge Monitoring** (iv) Each Copermittee must document ***removal or re-prioritization of the highest priority persistent flow MS4 outfall monitoring stations identified under Provision D.2.b.(2)(a) in the Water Quality Improvement Plan Annual Report***. Persistent flow MS4 outfall monitoring stations that have been removed must be replaced with the next highest prioritized major MS4 outfall in the Watershed Management Area within its jurisdiction, unless there are no remaining qualifying major MS4 outfalls within the Copermittee's jurisdiction in the Watershed Management Area.	Section 3.2.1			X	
D.4.b.(1)(a)(ii)	**Non-Storm Water Dischargers Reduction Assessments** (a) Each Copermittee must assess and report the ***progress of its illicit discharge detection and elimination program***, required to be implemented pursuant to Provision E.2, toward effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction as follows: (ii) Based on the data collected pursuant to Provisions D.2.b, the ***assessments required under Provision D.4.b.(1)(c) must be included in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3).***	Section 3.2.1			X	
D.4.b.(1)(b)	(b) Based on the transitional dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.a.(2), each Copermittee must assess and report the following: (i) Identify the known and suspected controllable sources (e.g. facilities, areas, land uses, pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area; (ii) Identify sources of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area that have been reduced or eliminated; and (iii) Identify modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.	Section 3.2 Section 5.2			X	X

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix: Appendix 2 Jurisdictional Information	Appendix 3 Numeric Goals	Appendix 4 Monitoring	Appendix 5 Adaptive Management
D.4.b.(1)(c)	(c) Based on the **dry weather MS4 outfall discharge field screening monitoring** required pursuant to Provision D.2.b.(1), each Copermittee must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(1)(b); (ii) Based on the data collected and applicable NALs in the Water Quality Improvement Plan, rank the MS4 outfalls in the Copermittee's jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan, with the goal of eliminating persistent flow non-storm water discharges and/or pollutant loads in order of the ranked priority list through targeted programmatic actions and source investigations; (iii) For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identify the known and suspected sources within the Copermittee's jurisdiction in the Watershed Management Area that may cause or contribute to the NAL exceedances; (iv) Each Copermittee must analyze the data collected pursuant to Provision D.2.b, and utilize a model or other method, to calculate or estimate the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually. [a] Each Copermittee must calculate or estimate the annual non-storm water volumes and pollutant loads collectively discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall; [b] Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters.	Section 3.2.1			X	X
	(v) Each Copermittee must review the data collected pursuant to Provision D.2.b and findings from the assessments required pursuant to Provision D.4.b.(1)(c)(i)-(iv) at least once during the term of this Order to: [a] Identify reductions and progress in achieving reductions in non-storm water and illicit discharges to the Copermittee's MS4 in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction, with an estimate, if possible, of the non-storm water volume and/or pollutant load reductions attributable to specific water quality strategies implemented by the Copermittee; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittee in the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction. (vi) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(1)(c)(i)-(v).	Section 3.2.1 Section 5.1 Section 5.2			X	X
D.4.b.(2)(a)	**Storm Water Pollutant Discharge Reduction Assessments** (a) The Copermittees must assess and report the ***progress of the water quality improvement strategies, required to be implemented pursuant to Provisions B and E, toward reducing pollutants in storm water discharges*** from the MS4s within the Watershed Management Area as follows: (ii) Based on the data collected pursuant to Provisions D.2.c, the ***assessments required under <u>Provision D.4.b.(2)(c)</u> must be included in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).	Section 3.2.2 Section 5.1			X	X
D.4.b.(2)(b)	(b) Based on the transitional wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.a.(3) the Copermittees must assess and report the following: (i) The Copermittees must analyze the monitoring data collected pursuant to Provision D.2.a.(3), and utilize a watershed model or other method, to calculate or estimate the following for each monitoring year: [a] The average storm water runoff coefficient for each land use type within the Watershed Management Area; [b] The volume of storm water and pollutant loads discharged from each of the Copermittee's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch; [c] The total flow volume and pollutant loadings discharged from the Copermittee's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and [d] The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch.(ii) Identify modifications to the wet weather MS4 outfall discharge monitoring locations and frequencies necessary to identify pollutants in storm water discharges from the MS4s in the Watershed Management Area pursuant to Provision D.2.c.(1).	Section 3.2.2 Section 5.1			X	X

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix 2 Jurisdictional Information	Appendix 3 Numeric Goals	Appendix 4 Monitoring	Appendix 5 Adaptive Management
D.4.b.(2)(c)	(c) Based on the wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.c the Copermittees must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(2)(b); (ii) Based on the data collected and applicable SALs in the Water Quality Improvement Plan, analyze and compare the monitoring data to the analyses and assumptions used to develop the Water Quality Improvement Plans, including strategies developed pursuant to Provision B.3, and evaluate whether those analyses and assumptions should be updated as a component of the adaptive management efforts pursuant to Provision B.5 for follow-up action to update the Water Quality Improvement Plan; (iii) The Copermittees must review the data collected pursuant to Provision D.2.c and findings from the assessments required pursuant to Provisions D.4.b.(2)(c)(i)-(ii) at least once during the term of this Order to: [a] Identify reductions or progress in achieving reductions in pollutant concentrations and/or pollutant loads from different land uses and/or drainage areas discharging from the Copermittees' MS4s in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters within the Watershed Management Area to the MEP, with an estimate, if possible, of the pollutant load reductions attributable to specific water quality strategies implemented by the Copermittees; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittees in the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters in the Watershed Management Area to the MEP. (iv) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(2)(c)(i)-(iii).	Section 3.2.2 Section 5.1			X	X
D.4.b.(2)(d)	(d) The Copermittees must evaluate all the data collected pursuant to Provision D.2.c, and incorporate new outfall monitoring data into time series plots for each long-term monitoring constituent for the Watershed Management Area, and perform statistical trends analysis on the cumulative long-term wet weather MS4 outfall discharge water quality data set.	Section 3.2.2			X	
D.4.c.	**Special Studies Assessments** c. The Copermittees must ***annually evaluate the results and findings from the special studies developed and implemented pursuant to Provision D.3***, and assess their relevance to the Copermittees' efforts to characterize receiving water conditions, understand sources of pollutants and/or stressors, and control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters in the Watershed Management Area. The Copermittees must ***report the results of the special studies assessments applicable to the Watershed Management Area, and identify any necessary modifications or updates to the Water Quality Improvement Plan based on the results in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).	Section 3.3			X	X
D.4.d.	Integrated Assessment of Water Quality Improvement Plan d. As part of the ***iterative approach and adaptive management process*** required for the Water Quality Improvement Plan pursuant to Provision B.5, the Copermittees in each Watershed Management Area must integrate the data collected pursuant to Provisions D.1-D.3, the findings from the assessments required pursuant to Provisions D.4.a-c, and information collected during the implementation of the jurisdictional runoff management programs required pursuant to Provision E to assess the effectiveness of, and identify necessary modifications to, the Water Quality Improvement Plan as follows:	Section 5.1 Section 5.2			X	X
D.4.d.(1)	(1) The Copermittees ***must re-evaluate the priority water quality conditions and numeric goals for the Watershed Management Area, as needed, during the term of this Order pursuant to Provision B.5.a.*** The re-evaluation and recommendations for modifications to the priority water quality conditions, and/or numeric goals and corresponding schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The priority water quality conditions and numeric goals for the Watershed Management Area must be reevaluated as follows: (a) Re-evaluate the receiving water conditions in the Watershed Management Area in accordance with Provision B.2.a; (b) Re-evaluate the impacts on receiving waters in the Watershed Management Area from MS4 discharges in accordance with Provision B.2.b; (c) Re-evaluate the identification of MS4 sources of pollutants and/or stressors in accordance with Provision B.2.d; (d) Identify beneficial uses of the receiving waters that are protected in accordance with Provision D.4.a; (e) Evaluate the progress toward achieving the interim and final numeric goals for protecting impacted beneficial uses in the receiving waters.	Section 5.2			X	X

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix 2 Jurisdictional Information	Appendix 3 Numeric Goals	Appendix 4 Monitoring	Appendix 5 Adaptive Management
D.4.d.(2)	(2) The Copermittees ***must re-evaluate the water quality improvement strategies for the Watershed Management Area during the term of this Order pursuant to Provision B.5.b.*** The re-evaluation and recommendations for modifications to the water quality improvement strategies and schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The water quality improvement strategies for the Watershed Management Area must be re-evaluated as follows: (a) Identify the non-storm water and storm water pollutant loads from the Copermittees' MS4 outfalls in the Watershed Management Area, calculated or estimated pursuant to Provisions D.4.b; (b) Identify the non-storm water and storm water pollutant load reductions, or other improvements to receiving water or water quality conditions, that are necessary to attain the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters; (c) Identify the non-storm water and storm water pollutant load reductions, or other improvements to the quality of MS4 discharges, that are necessary for the Copermittees to demonstrate that non-storm water and storm water discharges from their MS4s are not causing or contributing to exceedances of receiving water limitations; (d) Evaluate the progress of the water quality improvement strategies toward achieving the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters.	Section 5.2	X			X
D.4.d.(3)	(3) The Copermittees ***must re-evaluate and adapt the water quality monitoring and assessment program for the Watershed Management Area when new information becomes available to improve the monitoring and assessment program pursuant to Provision B.5.c.*** The re-evaluation and recommendations for modifications to the monitoring and assessment program ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. Modifications to the water quality monitoring and assessment program must be consistent with the requirements of Provision D.1-D.3. The re-evaluation of the water quality monitoring and assessment program for the Watershed Management Area must consider the data gaps identified by the assessments required pursuant to Provisions D.4.a-b, and results of the special studies implemented pursuant to Provision D.4.c	Section 5.2			X	X
Provision E						
E.1.b.	**b.** With the first ***Water Quality Improvement Plan Annual Report*** *required pursuant to Provision F.3.b.(3),* ***each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority*** within its jurisdiction to implement and enforce each of the requirements contained in this Order.	Cert Statement	X			
E.2.d.(4)	(4) Each Copermittee must submit a ***summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its jurisdiction with each Water Quality Improvement Plan Annual Report required under Provision F.3.b.(3)*** of this Order.	Section 3.2.1.3			X	
E.8.c.	**c.** Each Copermittee must submit a ***summary of the annual fiscal analysis with each Water Quality Improvement Plan Annual Report required pursuant to Provision F.3.b.(3)***.		X			
Provision F						
F.1.b.(6)	(6) During implementation of the Water Quality Improvement Plan the Copermittees must ***correct any deficiencies in the Plan identified by the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report*** following a request by the Board to do so.	Section 5.1 Section 5.2				X
F.2.a.(2)	(2) Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the jurisdictional runoff management program document based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;***		X			X
F.2.a.(3)	(3) Each Copermittee must submit ***updates to its jurisdictional runoff management program, with the supporting rationale for the modifications, either in the Water Quality Improvement Plan Annual Report*** required pursuant to Provision F.3.b.(3), or as part of the Report of Waste Discharge required pursuant to Provision F.5.b	Section 5	X			X
F.2.b.(1)	(1) Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provisions E.3.a-d concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the BMP Design Manual based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;***	Section 5.1	X			
F.2.b.(2)	(2) Any ***future updates to the BMP Design Manual*** made after it update pursuant to Provision F.2.b.(1) is completed must be consistent with the requirements of Provisions E.3.a-d and ***must be submitted as part of the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b; and		X			

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix 2 Jurisdictional Information	Appendix 3 Numeric Goals	Appendix 4 Monitoring	Appendix 5 Adaptive Management
F.2.c.(1)(c)	(c) The Copermittees for each Watershed Management Area ***must submit 1) proposed updates to the Water Quality Improvement Plan and supporting rationale, and 2) recommendations received from the public and the Water Quality Improvement Consultation Panel and the rationale for the requested updates, either in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b.	Section 5.2				X
F.3.b.(3)(a-f)	(3) Water Quality Improvement Plan Annual Reports - The Copermittees for each Watershed Management Area must ***submit a Water Quality Improvement Plan Annual Report for each reporting period no later than January 31*** of the following year. The annual reporting period consists of two different periods: 1) July 1 to June 30 of the following year for the jurisdictional runoff management programs, 2) October 1 to September 30 of the following year for the monitoring and assessment programs. The Water Quality Improvement Plan Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each ***Annual Report must include the following***:	See below				
	(a) The receiving water and MS4 outfall discharge monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;	Section 3.1 Section 3.2			X	
	(b) The progress of the special studies required pursuant to Provision D.3, and the findings, interpretations and conclusions of a special study, or each phase of a special study, upon its completion;	Section 3.3			X	
	(c) The findings, interpretations and conclusions from the assessments required pursuant to Provision D.4;	Section 3			X	
	(d) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following: (i) The **progress toward achieving the interim and final numeric goals** for the highest water quality priorities for the Watershed Management Area;	Section 4				
	(ii) The water quality improvement **strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods**;	Section 5.1 Section 5.2	X			X
	(iii) The water quality improvement strategies planned for implementation during the next reporting period;	Section 4.1	X			X
	(iv) Proposed modifications to the water quality improvement strategies, the public comments received and the supporting rationale for the proposed modifications;	Section 5	X			X
	(v) Previous modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area; and	Section 5.2	X			X
	(vi) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;	Section 5.2	X			X
	(e) A completed Jurisdictional Runoff Management Program Annual Report Form (contained in Attachment D to this Order or a revised form accepted by the San Diego Water Board) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative; and	Section 1	X			
	(f) Each Copermittee must provide any data or documentation utilized in developing the Water Quality Improvement Plan Annual Report upon request by the San Diego Water Board. Any Copermittee monitoring data utilized in developing the Water Quality Improvement Plan Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN). Any Copermittee monitoring and assessment data utilized in developing the Water Quality Improvement Plan Annual Report must be available for access on the Regional Clearinghouse required pursuant to Provision F.4.	Section 1			X	
Attachment E						
Attachment E	Specific Monitoring and Assessment Requirements for each TMDL.TMDL monitoring and assessment results must be submitted as part of Water Quality Improvement Plan Annual Reports required under Provision F.3.b	Section 3.1.4			X	

APPENDIX 2

Jurisdictional Runoff Management Program Information

Appendix 2 – Jurisdictional Runoff Management Program Information

1 City of La Mesa

1.1 ANNUAL REPORT CERTIFICATION

SAN DIEGO RIVER WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the City of La Mesa has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 3rd day of January 2017, at the City of La Mesa.

Leon Firsht
Acting Director of Public Works/City Engineer
City of La Mesa

1/3/17
Date

1.2 ANNUAL REPORT FORM

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016 SAN DIEGO RIVER WATERSHED

I. COPERMITTEE INFORMATION

Copermittee Name: City of La Mesa

Copermittee Primary Contact Name: Joe Kuhn, Storm Water Program Manager

Copermittee Primary Contact Information:
Address: 8130 Allison Ave.
City: La Mesa County: San Diego State: CA Zip: 91942
Telephone: 619.667.1340 Fax: 619.667.1380 Email: jkuhn@ci.la-mesa.ca.us

II. LEGAL AUTHORITY

Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES	[X]
	NO	[ ]
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES	[X]
	NO	[ ]

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES	[X]
	NO	[ ]
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES	[X]
	NO	[ ]

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES	[X]
	NO	[ ]

Number of non-storm water discharges reported by the public	7
Number of non-storm water discharges detected by Copermittee staff or contractors	5
Number of non-storm water discharges investigated by the Copermittee	12
Number of sources of non-storm water discharges identified	5
Number of non-storm water discharges eliminated	4
Number of sources of illicit discharges or connections identified	3
Number of illicit discharges or connections eliminated	3
Number of enforcement actions issued	1
Number of escalated enforcement actions issued	0

V. DEVELOPMENT PLANNING PROGRAM

Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES	[X]
	NO	[ ]
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES	[X]
	NO	[ ]
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES	[X]
	NO	[ ]

Number of proposed development projects in review	14
Number of Priority Development Projects in review	14
Number of Priority Development Projects approved	3
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	0

Number of completed Priority Development Projects in inventory	15
Number of high priority Priority Development Project structural BMP inspections	15
Number of Priority Development Project structural BMP violations	0
Number of enforcement actions issued (For not returning form by deadline)	4
Number of escalated enforcement actions issued	0

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2014-2015

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001? **YES** ☒ **NO** ☐

Number of construction sites in inventory	13
Number of active construction sites in inventory	13
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	5
Number of construction site inspections	50
Number of construction site violations	4
Number of enforcement actions issued	4
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? **YES** ☒ **NO** ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	33	257	16	0
Number of existing development inspections	13	257	16	0
Number of follow-up inspections	0	35	0	0
Number of violations* Includes Corrective Actions	0	12	0	0
Number of enforcement actions issued	0	12	0	0
Number of escalated enforcement actions issued	0	0	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? **YES** ☒ **NO** ☐

Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? **YES** ☒ **NO** ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? **YES** ☒ **NO** ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature: [signature] | Date: 10/5/16

Print Name: Gregory P. Humora | Title: Director of Public Works/City Engineer

Telephone Number: 619.667.1146 | Email: ghumora@ci.la-mesa.ca.us

FISCAL ANALYSIS

The City's Sanitation Fund provides most of the funding for the Storm Water Program. There have not been any changes to this funding mechanism during this reporting period. During 2009/2010, a fiscal analysis reporting template was developed collectively by the Copermittees. The City has used this template to report the 2015/2016 expenditures and funding sources in this JURMP Annual Report.

San Diego County Copermittees Fiscal Analysis Report
for Urban Runoff Management Programs

EXPENDITURE SUMMARY

JURISDICTIONAL COMPONENTS	
Administration	$64,159
Development Planning	$14,393
Construction	$30,342
Municipal	$3,892
Industrial and Commercial	$71,155
Residential	$957
IDDE	$45,038
Education/Public Participation	$8,793
Special Investigations	$0
Non-Emergency Firefighting	$0
Jurisdictional Total	**$238,733**

WATERSHED	
Watershed 1 – San Diego River	$52.533
Watershed 2 – San Diego Bay	$49,171
Watershed Total	**$101,705**

REGIONAL	
Annual Permit Fee to Regional Board	$17,171
Copermittee Cost Share of Regional Budget	$29,308
Regional Total	**$46,479**

TOTAL COSTS	$386,917

FUND SUMMARY

FUNDING BY SOURCE	
General Fund	$7,474
Storm Water Fee	$0
Permit Fees	$0
Developer Deposits and Fees	$23,285
Registration and Inspection Fees	$18,550
Flood Control Fees	$0
Franchise Fees	$0
Gas Tax	$0
Utility Tax	$0
Road Fund	$0
Enterprise Funds	$252,308
Trust Funds	$0
Special Assessment Districts	$0
State Appropriated Funds	$0
Grant Funds	$0
Other	$0
Total	**$301,617**

ONE-TIME FUNDING	
Grants	$0
Donations	$0
Total	**$0**

TOTAL FUNDING	**$301,617**

Watershed Program

	Watershed 1 – San Diego River	Watershed 2 – San Diego Bay
Administration (1)	$4,786	$14,358
Cost Share	$47,947	$34,813
Watershed Activities	$0	$0
Other	$0	$0
TOTAL	$52,733	$49,171

(1) Administration – includes Watershed strategic planning, management, mapping, assessment, and reporting

Permit Requirements for Fiscal Analysis

1. Identification of the various categories of expenditures necessary to implement the requirements of this Order; including a description of the specific capital, operation and maintenance, and other expenditures items to be accounted for in each category of expenditures.

See page 1 of fiscal analysis. Watershed costs include costs for development of required submittal.

2. The staff resources needed and allocated to meet the requirements of this Order, including any development, implementation, and enforcement activities required.

Staff resources include:

(1) Storm Water Program Manager and (1) Engineering Technician II dedicated to the storm water protection program. These two employees complete the vast majority of the work associated with the Order. The City also has two local consulting firms who specialize in storm water management under As-Needed contract.

The City also has (1) Engineering Project Manager, and (1) Public Works Inspector II who is part time desiccated to storm water protection. Other City staff including (1) Associate Engineers, (1) Engineering Technician II, (1) Code Compliance Officer and several field public works operation staff may be utilized on an as needed basis for storm water tasks.

3. The estimated expenditures for Provisions E.8.b (1) and E.8.b (2) for the current fiscal year,

See expenditure summary on Page 1. Costs are anticipated to increase over the future fiscal years, and funding estimates will coincide with the development of the WQIP for the City's Watersheds, and the development of the City's new JURMP.

4. The sources of funds that are provided to meet the necessary expenditures described in Provisions E.8.b.(1) and E.8.b.(2), including legal restrictions on the use of such funds, for the current fiscal year and next fiscal year.

See funding summary on Page 2. Funding source is projected to remain similar next fiscal year.

1.3 JURISDICTIONAL STRATEGIES

~~Strikeouts~~ are text edits that have been made up to the current date since the WQIP September 2015 submittal.

Table A2-1. City of La Mesa Jurisdictional Strategies and Implementation Schedules for Illicit Discharge Detection and Elimination Program

San Diego River Illicit Discharge Detection and Elimination Program Strategies City of La Mesa	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Engage the public, jurisdictional staff, and other agency staff to proactively identify and report illicit discharges.					
Utilize municipal personnel and contractors to identify and report illicit discharges and connections.	●	●	A	N/A	City utilized staff and contractors to facilitate program.
Provide enhanced internal training for field staff related to illicit discharges.	X	X	P	N/A	Not conducted this FY.
Facilitate public reporting of illicit discharges and connections via telephone and email.	●	●	A	N/A	None
Clarify regulations ~~Coordinate~~ with Helix Water District regarding water line flushing and discharges to the MS4	◖	◖	A	Minor wording change to make strategy meaning clearer.	None
~~Coordinate with upstream entities to prevent illicit discharges from upstream sources from entering the MS4.~~				La Mesa's jurisdiction borders the watershed boundary, and there is minimal upstream area under other agencies' jurisdictions. Discharges from other agencies such as MTS or Caltrans have not been observed frequently but are dealt with as they arise via strategies described in Section 6 of this table.	None
2. Develop and implement approaches to address the impacts of septic systems within the watershed.					
Investigate and eliminate illicit discharges and connections.	●	●	A	N/A	None

Table A2-1. City of La Mesa Jurisdictional Strategies and Implementation Schedules for Illicit Discharge Detection and Elimination Program

San Diego River Illicit Discharge Detection and Elimination Program Strategies City of La Mesa	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Continue to assist property owners on septic who wish to connect to sewer.	●	●	A	N/A	Residents who wish to connect to sewer are provided the opportunity as permitted.
3. Develop and implement approaches to address the impacts of homeless activities within the watershed.					
Cleanup of encampment sites on public and private lands.	●	●	A	N/A	Public and private cleanup exists through code enforcement and the assistance of the police dept.
Coordination with La Mesa Police Department to perform routine sweeps	●	●	A	N/A	Public and private cleanup exists through code enforcement and the assistance of the police dept.
Perform Channel Restoration on Alvarado Creek.	●	●	A	N/A	In construction.
4. Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.					
Require all Food Service Establishments to install grease removal equipment to prevent fats, oils, and grease from obstructing sewer lines	●	●	A	N/A	Part of the City's FOG Program, which started in 2009.
Increase outreach to facilities and residences generating fats, oils, and grease.	●	●	A	N/A	Outreach is conducted annually through the City's FOG Inspection program.
Implement practices and procedures to prevent/limit infiltration of seepage from sanitary sewers to the MS4.	●	●	A	N/A	The City has several CIP projects in construction which will limit sewer I/I.
Implement practices and procedures to address spills with the potential to enter the MS4 via systematic smoke testing and infiltration studies.	●	●	A	N/A	The City has an I/I program which uses smoke testing to check areas for defects.
Implement sanitary sewer system rehabilitation program (e.g., condition assessments, prioritization, pipe replacement)	●	●	A	N/A	The City currently has a master plan with condition assessments and prioritization schedules.

Table A2-1. City of La Mesa Jurisdictional Strategies and Implementation Schedules for Illicit Discharge Detection and Elimination Program

San Diego River Illicit Discharge Detection and Elimination Program Strategies City of La Mesa	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Investigate and eliminate illicit discharges and connections.	●	●	A	N/A	The City does this through smoke testing and flow monitoring.
5. Implement monitoring programs to provide new information to refine the prioritization of drainage areas.					
Conduct transitional MS4 outfall discharge program to identify persistent/transient flows.	●	●	A	N/A	None
Conduct watershed specific MS4 outfall discharge program to identify persistent/transient flows.	●	●	A	N/A	None
6. Actively educate public on prohibitions related to illicit discharges and connections.					
Investigate and eliminate illicit discharges and connections.	●	●	A	N/A	Completed during inspection and monitoring programs.
Enforce legal authority to ensure all illicit discharges and connections that are identified are eliminated.	●	●	A	N/A	Municipal Code is up to date.

Notes:
● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented
A – Actual (active implementation), P – Planned (planning stage)

Table A2-2. City of La Mesa Jurisdictional Strategies and Implementation Schedules for Development Planning

San Diego River Development Planning Program Strategies City of La Mesa	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Provide updated materials, enhanced outreach, and training to convey land development requirements.					
Establish criteria designating priority development projects for new development and redevelopment projects.	●	●	A	N/A	The development manual was updated to reflect current regulation.
Update BMP design manual procedures to specify stormwater requirements applicable to development and redevelopment projects, identify and design appropriate BMPs, establish maintenance criteria, and establish alternative compliance options (where implemented).	●	●	A	N/A	The development manual was updated to reflect current regulation.
2. Implement a Watershed Management Area Analysis to develop watershed specific requirements for structural BMP implementation and identify a list of candidate projects that could be used as alternative compliance options for Priority Development Projects.					
Develop and implement a Watershed Management Area Analysis to develop watershed specific requirements for structural BMP implementation.	●	●	A	N/A	Developed for the watershed.
3. Implement an alternative compliance program for Priority Development Projects.					
Implement an alternative compliance program to provide off-site alternatives for pollutant control and hydromodification management.	X	◖	P	N/A	Planned for upcoming years.
4. Implement a post construction BMP program for development projects to ensure proper construction and maintenance.					
Implement source control, LID, and on-site structural controls for all priority development projects.	●	●	A	N/A	The development manual was updated to reflect current regulation.
Implement a program that ensures that all structural BMPs are designed, constructed, and maintained on PDPs.	●	●	A	N/A	The development manual was updated to reflect current regulation.

Table A2-2. City of La Mesa Jurisdictional Strategies and Implementation Schedules for Development Planning

San Diego River Development Planning Program Strategies City of La Mesa	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Inspect all high priority structural BMPs prior to the rainy season for Copermittees.	●	●	A	N/A	Inspected per JURMP requirements.
5. Enforce post construction requirements related to new and redevelopment.					
Require implementation of source control and low impact development (LID) BMPs for all development projects.	●	●	A	N/A	The development manual was updated to reflect current regulation.
Enforce legal authority to ensure all development projects are in compliance with all post construction requirements.	●	●	A	N/A	The development manual was updated to reflect current regulation.
Update ordinances to reflect new land development requirements.	●	●	A	N/A	The development manual was updated to reflect current regulation.

Notes:

● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented

A – Actual (active implementation), P – Planned (planning stage)

Table A2-3. City of La Mesa Jurisdictional Strategies and Implementation Schedules for Construction Management

San Diego River Construction Management Program Strategies City of La Mesa	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Ensure that minimum BMPs are designated and required for construction projects. Prioritize BMPs which address sources of bacteria.					
Require submittal of pollution control plan, construction BMP plan, and/or erosion and sediment control plan for projects requiring local permits involving soil disturbance activities.	●	●	A	N/A	None
Review and confirm that the submitted plan is in compliance.	●	●	A	N/A	None
Maintain, update, and prioritize a watershed based inventory of all projects issued local permits that allow soil disturbing activities.	●	●	A	N/A	List updated monthly.
Implement or require implementation of BMPs that are site specific, seasonally appropriate, and appropriate to the construction phase year round.	●	●	A	N/A	None
Inspect construction sites at an appropriate frequency to require and confirm compliance with local permits and ordinances, as well as the MS4 Permit requirements.	●	●	A	N/A	Sites are inspected based on H/M/L priority; biweekly, monthly, and once per rainy season.
Enforce legal authority to ensure inventoried construction projects are in compliance with all requirements.	●	●	A	N/A	None

Notes:
● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented
A – Actual (active implementation), P – Planned (planning stage)

Table A2-4. City of La Mesa Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of La Mesa	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Maintain and improve data tracking methods for existing development inventories where necessary.					
Maintain and update a watershed based inventory of existing development (i.e., commercial, industrial, and municipal facilities and residential areas).	●	●	A	N/A	Contained within the City's JURMP.
2. Develop and implement approaches to address the impacts of improper water use and irrigation runoff.					
Increase outreach regarding over irrigation and the transport of pollutants such as bacteria into the receiving waters.	●	●	A	N/A	Outreach to businesses has occurred during inspections.
Install weather based irrigation controllers in municipal parks.	●	●	A	N/A	IT controllers are active in City Parks.
Coordinate with Helix Water District regarding water conservation programs.	●	●	A	N/A	Related to compliant/violations the City forwards issues to Helix Water, and vice versa.
3. Improve and/or continue existing pet waste programs.					
Continue implementation of pet waste program with Parks, and outreach assistance to HOAs and property managers.	●	●	A	N/A	Pet waste bags are located within City Parks.
Provide focused outreach to residents using kiosks in municipal parks.	●	●	A	N/A	Six kiosks are located within City Parks.
4. Improve trash management strategies within the watershed.					
Coordinate with I Love a Clean San Diego to install cigarette ashcans throughout the downtown area.	●	●	A	N/A	Several ashcans are installed throughout the downtown village area.
Perform trash assessments and outreach targeting multi-family residential land uses.	X	●	P	N/A	Planned for 16-17. Initial work done prior to 2015.
Increase street sweeping frequencies in priority areas.	X	X	P	N/A	Planned.

Table A2-4. City of La Mesa Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of La Mesa	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
5. Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.					
Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	●	●	A	N/A	Systematic testing as well as replacement programs are active.
Perform coordinated inspections for stormwater and FOG at food service establishments.	●	●	A	N/A	The coordinated inspections are completed each year.
6. Improve and implement existing outreach programs to target key sources and pollutants.					
Provide enhanced internal training to parks staff.	●	●	A	N/A	Training given to lead workers.
Provide enhanced internal training to street maintenance staff.	●	●	A	N/A	Training given to lead workers.
7. Develop and implement targeted programs to address issues in residential areas.					
Prioritize residential management areas for focused inspections.	●	●	A	N/A	Program started in 2016.
8. Improve existing inspections programs to more efficiently target key sources.					
Perform evaluations of businesses for exposure to stormwater though increased patrols and inspections.	●	●	A	N/A	Performed through inspection program.

Table A2-4. City of La Mesa Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of La Mesa	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
9. Actively enforce stormwater and urban runoff requirements for existing development.					
Increase coordination with City Code Enforcement where properties are out of compliance.	●	●	A	N/A	Storm Water works closely with code enforcement regarding properties in violation.
Increased enforcement as appropriate as a result of increased business inspections.	●	●	A	N/A	Inspection program
10. Identify and facilitate retrofit opportunities in areas of existing development.					
Install weather based irrigation controllers in municipal parks.	●	●	A	N/A	ET controllers are used in City parks.
11. Improve coordination between agencies.					
Coordinate with Helix Water District regarding water conservation programs.	●	●	A	N/A	City works with Helix regarding enforcement and water waste issues.

Notes:

● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented

A – Actual (active implementation), P – Planned (planning stage)

Table A2-5. City of La Mesa Optional Jurisdictional Strategies and Implementation Schedules

San Diego River Optional Jurisdictional Strategies	Implementation Timeframe	FY15-16	FY16-17	Actual / Planned	Comments
Implement Alternative Compliance Program	FY 17-19	N/A, not scheduled for 15-16	If triggered	If triggered	The City participated in the development of Water Quality Equivalency standards and is following regional progress on alternative compliance development to assess how the program may be implemented in its jurisdiction.
Green street retrofits or other small scale retention or infiltration controls (existing development)	FY 17-19	N/A, not scheduled for 15-16	If triggered	If triggered	Evaluated on a case by case basis during design and scoping process for projects.

Notes:

No modifications to optional strategies are proposed.

● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented

A – Actual (active implementation), P – Planned (planning stage)

1.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The City of La Mesa BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. The City of La Mesa updated its BMP Design Manual in accordance with Municipal Permit requirements in February 2016; the BMP Design Manual replaced the Standard Urban Stormwater Mitigation Plan (SUSMP). No additional changes to the BMP Design Manual have been made since it went into effect in February 2016. The City of La Mesa BMP Design Manual can be accessed at: www.cityoflamesa.com/index.aspx?NID=988

1.5 MODIFICATIONS TO THE JRMP

No changes were made to the City's JRMP during the 2015-2016 fiscal year.

2 City of El Cajon

2.1 ANNUAL REPORT CERTIFICATION

The Valley of Opportunity

EL CAJON

Incorporated 1912

City Manager

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT

SAN DIEGO RIVER WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the City of El Cajon has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 9 day of January, 2017, at the City of El Cajon.

Douglas Williford
City Manager
City of El Cajon

City of El Cajon • 200 Civic Center Way • El Cajon, CA 92020
(619) 441-1716 • Fax (619) 441-1770
www.cityofelcajon.us

2.2 ANNUAL REPORT FORM

CITY OF EL CAJON

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FOR FISCAL YEAR 2015—16

FY 2015-2016

I. COPERMITTEE INFORMATION

Copermittee Name: City of El Cajon

Copermittee Primary Contact Name: Jaime Campos

Copermittee Primary Contact Information:
Address: 200 Civic Center Way
City: El Cajon County: San Diego State: CA Zip: 92020
Telephone: (619) 441-1653 Fax: (619) 579-5254 Email: jcampos@cityofelcajon.us

II. LEGAL AUTHORITY

Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES [X] NO [ ]
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES [X] NO [ ]

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES [X] NO [ ]
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES [X] NO [ ]

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES [X] NO [ ]

Number of non-storm water discharges reported by the public	75
Number of non-storm water discharges detected by Copermittee staff or contractors*	71 *
Number of non-storm water discharges investigated by the Copermittee	146
Number of sources of non-storm water discharges identified	78
Number of non-storm water discharges eliminated	73
Number of sources of illicit discharges or connections identified	73
Number of illicit discharges or connections eliminated	36
Number of enforcement actions issued	36
Number of escalated enforcement actions issued	17

4 were detected to be invalid reports from the onset.

V. DEVELOPMENT PLANNING PROGRAM

Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES [X] NO [ ]
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES [X] NO [ ]
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?.	YES [X] NO [ ]

Number of proposed development projects in review	261
Number of Priority Development Projects in review	22
Number of Priority Development Projects approved	8
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	3

Number of completed Priority Development Projects in inventory	71
Number of high priority Priority Development Project structural BMP inspections	23
Number of Priority Development Project structural BMP violations	0
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

Number of construction sites in inventory	52
Number of active construction sites in inventory	38
Number of inactive construction sites in inventory	14
Number of construction sites closed/completed during reporting period	21
Number of construction site inspections	440
Number of construction site violations	20
Number of enforcement actions issued	20
Number of escalated enforcement actions issued	9

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	34	681	140	4
Number of existing development inspections	21	239	72	78
Number of follow-up inspections	9	135	50	18
Number of violations	0	12	2	5
Number of enforcement actions issued	0	12	0	5
Number of escalated enforcement actions issued	0	6	0	3

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

X. CERTIFICATION

I [☒ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature: [signature]
Date: 10/28/16

Print Name: DOUGLAS WILLIFORD
Title: CITY MANANGER

Telephone Number: (619) 441-1718
Email: DWILLIFO@CITYOFELCAJON.US

ATTACHMENT FISCAL ANALYSIS

FISCAL ANALYSIS SUMMARY 1

1 INTRODUCTION 1

2 GENERAL BUDGET INFORMATION 1

3. FISCAL ANALYSIS RESULTS 2

3.1 EXPENDITURES 2

3.2 FUNDING SOURCES 3

FISCAL ANALYSIS SUMMARY

1 INTRODUCTION

A fiscal analysis of the Jurisdictional Runoff Management Program (JRMP) provides a vital assessment of resources for the current and upcoming Permit Years. This brief summary will incorporate guidance and standards developed collaboratively by the Copermittees and in accordance with the Municipal Permit.

In fiscal year (FY) 2003-04, the City Storm Water staff developed a separate budget from other Public Works wastewater activities sufficient to run the Storm Water Program. The Program continues to be adequately funded through the City's Waste Water Fund.

2 GENERAL BUDGET INFORMATION

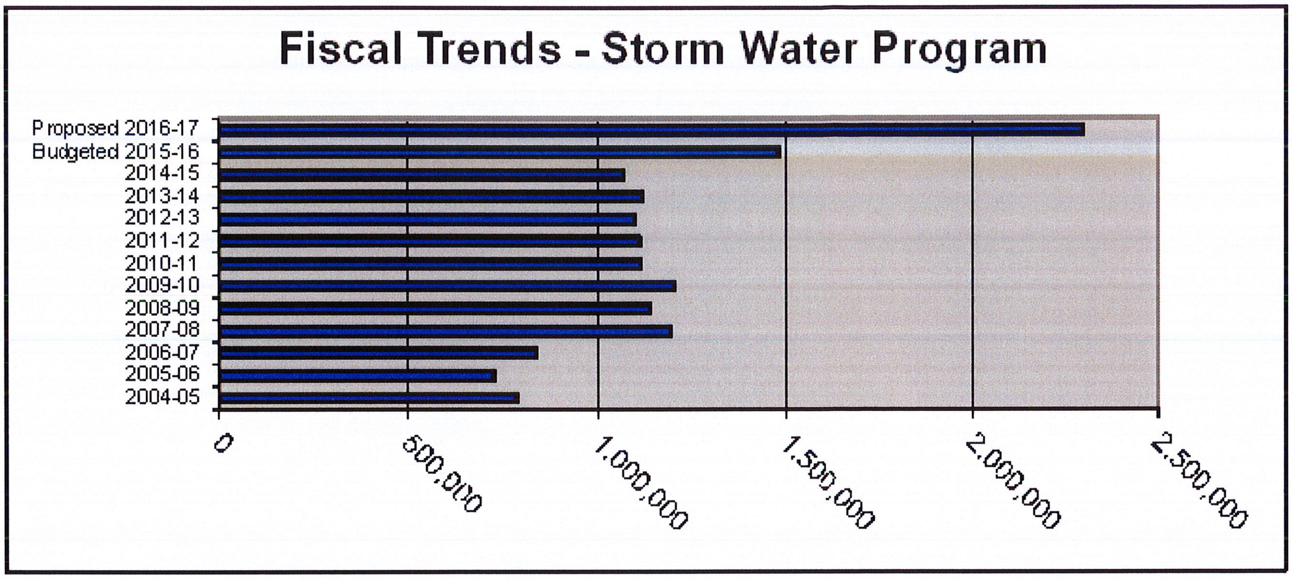
The following table shows actual expenditures from fiscal year 2009-10 through 2015-16, and the estimated fiscal year 2016-17 budget for the City's Urban Runoff Management Program.

Item	09-10	10-11	11-12	12-13	13-14	14-15	15-16	Estimated 16-17
Salaries (including benefits)	$781,174	$765,041	$735,187	$703,136	$689,699	$657,779	$621,543	$1,469,342
Materials, Services and Supplies	$421,181	$335,939	$364,750	$393,440	$426,132	$409,816	$506,344	$828,247
Capital Outlay		$10,873	$10,460					
TOTAL	**$1,202,355**	**$1,111,853**	**$1,110,397**	**$1,096,576**	**$1,115,831**	**$1,067,595**	**$1,127,887**	**$2,297,589**

Budgets have increased gradually since the inception of the Storm Water Program in 2001. The steep increase in the estimated fiscal year 2016-17 budget reflects all estimated costs for the City's JRMP, including expenditures to be incurred by the Storm Water Operations Field

Maintenance Division previously budgeted under wastewater collection. A copy of the budget is located in Appendix A.

The City's Jurisdictional Runoff Management Program funding was sufficient to meet the JRMP requirements in FY 2015-16 and is projected to be sufficient to meet requirements in FY 2016-17. The City has met its projected goal of continuously executing plans, procedures, and processes to implement JRMP requirements and assess the effectiveness of its programs.



3. Fiscal Analysis Results

3.1 Expenditures

The budget for FY 2015-16 included a Storm Water Program Manager, one Senior Engineering Technician, and one Compliance Officer. The estimated budget for FY 2016-17 includes the following positions:

- 1 Storm Water Program Manager
- 1 Senior Engineering Technician
- 1 Compliance Officer
- 1 Maintenance Supervisor
- 3 Street Sweeper Operators
- 3 Storm Drain and Channel Maintenance Equipment Operators
- 3 Maintenance Workers

The City also had an open contract with two consultants to provide as-needed services to ensure the City meets its JRMP implementation requirements.

3.2 Funding Sources

The Storm Water Program will continue to be funded to maintain permit compliance related to permit renewals and other requirements related to the Bacteria Total Maximum Daily Loads (TMDLs) and Trash Amendment. For fiscal year 2015-16 the City completed all inspections, monitoring, plan reviews, complaint investigations, and reporting, as well as other requirements under R9-2013-0001, with existing staff complemented by consultants.

Working efficiently is the goal of the JRMP. By consolidating forms to complete onsite inspections, track enforcement actions, and follow up on complaint/referral information has allowed the City to reduce the amount of time and paper to complete significant portions of the Municipal, Industrial, Commercial, Construction, Land Development Planning, and Residential JRMP Components of the Municipal Permit.

The City of El Cajon has, and will continue to be, an active member of the San Diego River Watershed group and work with the other San Diego River Watershed agencies to achieve the goals and objectives that are part of the Water Quality Improvement Plan and Municipal Permit. Working together will continue to eliminate the potential for duplicative efforts and enhance the effect across a wider range of challenges on a similar geographical area.

No regulatory comments were received for the Fiscal Analysis component of the JRMP for the Annual Report for Fiscal Year 2014-15.

Appendix A

Activity: **Public Works - NPDES Compliance** Activity #: 650750

ACCOUNT/ LINE ITEM NUMBER	JUSTIFICATION FOR SUPPLIES AND SERVICES BRIEF STATEMENTS & ESTIMATED AMOUNTS USED IN CALCULATING TOTALS FOR EACH LINE ITEM	FY2015-16 BUDGET AMOUNT	CHANGE REQUESTED	FY2016-17 BUDGET REQUEST
8150	**OFFICE SUPPLIES**	**4,900**	**0**	**4,900**
	a Toner cartridges for printing of reports and map books	4,900	0	4,900
8160	**OPERATING SUPPLIES**	**3,000**	**0**	**3,000**
	a Various materials and supplies needed for various educational and outreach programs	3,000	0	3,000
8345	**LEGAL SERVICES**	**7,500**	**0**	**7,500**
	a City Attorney's Office charges	7,500	0	7,500
8363	**SYSTEM / COMPUTER ANALYST**	**25,000**	**0**	**25,000**
	a GIS Consultant	25,000	0	25,000
8395	**OTHER/PROFESSIONAL/TECHNICAL SERVICES**	**480,000**	**(50,000)**	**430,000**
	a San Diego River Watershed Management and development of Water Quality Improvement Plan	145,000	0	145,000
	b Services to comply with the total maximum daily loads for bacteria	150,000	0	150,000
	c San Diego Regional Co-permittee Memorandum of Understanding Cost	50,000	0	50,000
	d Dry Weather Testing and Extended Dry Weather Testing	75,000	0	75,000
	e As needed on-call engineering services for plan check for SUSMP, Erosion Control Plans and Drainage Studies	10,000	0	10,000
	f Update of Jurisdictional Urban Runoff Management Program (recurs every five years)	0		0
	g Installation of bacteria treatment structural BMPs to conduct pilot study	0		0
	f Update of Jurisdictional Urban Runoff Management Program for compliance with new permit (recurs every five years)	50,000	(50,000)	0
8510	**OVERHEAD REIMBURSEMENT**	**140,079**	**79,898**	**219,977**
	a Provided by Finance	140,079	79,898	219,977
8511	**FLEET/EQUIPMENT MAINTENANCE**	**10,536**	**(5,295)**	**5,241**
	a Provided by Fleet Maintenance	10,536	(5,295)	5,241
8522	**ADVERTISING**	**500**	**0**	**500**
	a Advertising of Pollution Prevention Events	500	0	500
8528	**COMMUNICATIONS**	**1,000**	**0**	**1,000**
	a Telephone and cellular phone service	1,000	0	1,000
8530	**CONTRIBUTIONS**	**750**	**0**	**750**
	a Contribution to the San Diego River Coalition	500	0	500
	b Contribution to I Love A Clean San Diego	250	0	250
8532	**COPIER RENTAL/MAINTENANCE**	**200**	**0**	**200**
	a Color copies	200	0	200
8560	**PERMITS & FEES**	**51,000**	**0**	**51,000**
	a State Water Resources Control Board Fee	50,000	0	50,000
	b Recording fees County of San Diego	1,000	0	1,000
8570	**PRINTING & BINDING**	**8,000**	**0**	**8,000**
	a Utility bill inserts for Pollution Prevention Days	2,200	0	2,200
	b Outreach (Reprints of various storm water outreach materials)	1,700	0	1,700
	c City Newsletter Printing	4,100	0	4,100
8572	**PROMOTIONS**	**8,000**	**0**	**8,000**
	a Promotional items for education and outreach efforts including Pollution Prevention Days	8,000	0	8,000
8576	**REPAIRS & MAINTENANCE**	**3,359**	**0**	**3,359**

Activity: **Public Works - NPDES Compliance** Activity #: 650750

ACCOUNT/ LINE ITEM NUMBER	JUSTIFICATION FOR SUPPLIES AND SERVICES BRIEF STATEMENTS & ESTIMATED AMOUNTS USED IN CALCULATING TOTALS FOR EACH LINE ITEM	FY2015-16 BUDGET AMOUNT	CHANGE REQUESTED	FY2016-17 BUDGET REQUEST
	a Copier, printer, plotter and typewriter maintenance	3,359	0	3,359
8586	**SOFTWARE AGREEMENTS**	**49,820**	**0**	**49,820**
	a Business License Database	4,220	0	4,220
	b Miscellaneous Software Agreements	2,300	0	2,300
	c ESRI Maintenance Agreement - license for City wide license agreement	40,000	0	40,000
	d Permitting Software Maintenance Agreement	3,000	0	3,000
	e Share of QuickBase License	300	0	300
8594	**TRAINING, MEETINGS, & SCHOOLS**	**6,500**	**3,500**	**10,000**
	a Training for Stormwater personnel	2,000	2,000	4,000
	a Training for GIS personnel	4,500	1,500	6,000
	TOTAL MATERIALS, SUPPLIES, & SERVICES	**800,144**	**28,103**	**828,247**

City of El Cajon
Fiscal Year 2016 – 2017 Annual Budget

Acct #	Account Title	FY13-14 Actual	FY14-15 Actual	FY15-16 Budgeted	FY15-16 Estimated	FY16-17 Adopted
650750						WASTEWATER - NPDES
7110	SALARIES	446,028	410,422	442,203	383,366	844,688
7120	OVERTIME	-	-	500	-	500
7130	VACATION/SICK CONVERSION	4,443	5,834	9,127	15,008	13,878
7170	STIPEND	-	-	-	1,515	-
7310	PERS (EMPLOYER)	127,172	134,905	146,262	127,843	315,554
7311	OTHER RETIREMENT BENEFIT	-	237	-	-	-
7312	POST RETIREMENT BENEFITS	15,444	14,110	12,993	12,993	35,798
7315	MEDICARE TAX	6,798	6,390	7,518	6,367	14,360
7325	CAFETERIA	67,582	66,115	68,010	60,268	158,055
7330	COMPENSATED ABSENCES	6,882	6,651	-	-	-
7335	WORKERS COMPENSATION	13,005	10,954	15,682	12,233	82,805
7340	LIFE INSURANCE	1,111	959	1,059	866	1,688
7345	LTD INSURANCE	772	829	983	748	1,382
7350	STD INSURANCE	463	373	456	336	634
TOTAL	**SALARY & BENEFITS**	**689,699**	**657,779**	**704,793**	**621,543**	**1,469,342**
8150	OFFICE SUPPLIES	3,529	2,209	4,900	4,000	4,900
8160	OPERATING SUPPLIES	159	1,449	3,000	2,000	3,000
8345	LEGAL SERVICES	-	-	7,500	7,500	7,500
8363	SYSTEM / COMPUTER ANALYS	5,000	-	25,000	20,000	25,000
8395	OTHER PROF/TECH SERVICES	181,919	163,419	480,000	200,000	430,000
8510	OVERHEAD REIMBURSEMENT	133,284	142,821	140,079	140,079	219,977
8511	FLEET/EQUIP REIMBURSEMEN	14,304	14,604	10,536	10,536	5,241
8522	ADVERTISING	-	-	500	500	500
8528	COMMUNICATIONS	715	760	1,000	600	1,000
8530	CONTRIBUTIONS	500	250	750	750	750
8532	COPIER RENT/MAINTENANCE	-	-	200	200	200
8560	PERMITS AND FEES	40,187	36,985	51,000	50,000	51,000
8570	PRINTING AND BINDING	2,364	2,394	8,000	4,000	8,000
8572	PROMOTIONS	4,379	4,420	8,000	5,000	8,000
8576	REPAIRS AND MAINTENANCE	632	380	3,359	3,359	3,359
8586	SOFTWARE AGREEMENTS	39,160	39,200	49,820	49,820	49,820
8594	TRAINING/MEETINGS/SCHOOI	-	925	6,500	8,000	10,000
TOTAL	**MAT'L, SVC & SUPPLIES**	**426,132**	**409,816**	**800,144**	**506,344**	**828,247**
ACTIVITY TOTAL		**1,115,831**	**1,067,595**	**1,504,937**	**1,127,887**	**2,297,589**

2.3 JURISDICTIONAL STRATEGIES

Table A2-6. City of El Cajon Jurisdictional Strategies and Implementation Schedules for Illicit Discharge Detection and Elimination Program

San Diego River Illicit Discharge Detection and Elimination Program Strategies City of El Cajon	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Engage the public, jurisdictional staff, and other agency staff to proactively identify and report illicit discharges.					
Utilize municipal personnel and contractors to identify and report illicit discharges and connections.	●	●	A	N/A	
Facilitate public reporting of illicit discharges and connections via telephone and email.	●	●	A	N/A	
Coordinate with upstream entities to prevent illicit discharges from upstream sources from entering the MS4. This strategy will need coordination with water agencies.	◖	●	P	N/A	The conversation with water agencies started and it will continue in order to coordinate for better collaboration.
2. Develop and implement approaches to address the impacts of septic systems within the watershed.					
Investigate and eliminate illicit discharges and connections.	●	●	A	N/A	
3. Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.					
Implement practices and procedures to prevent/limit infiltration of seepage from sanitary sewers to the MS4.	●	●	A	N/A	Conducted during continuous maintenance operation program of sanitary sewer system.
Implement practices and procedures to address spills with the potential to enter the MS4.	●	●	A	N/A	
Investigate and eliminate illicit discharges and connections.	●	●	A	N/A	
4. Implement monitoring programs to provide new information to refine the prioritization of drainage areas.					
Conduct transitional MS4 outfall discharge program to identify persistent/transient flows.	●	●	A	N/A	

Table A2-6. City of El Cajon Jurisdictional Strategies and Implementation Schedules for Illicit Discharge Detection and Elimination Program

San Diego River Illicit Discharge Detection and Elimination Program Strategies City of El Cajon	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Conduct watershed specific MS4 outfall discharge program to identify persistent/transient flows.	●	●	A	N/A	
5. Actively educate public on prohibitions related to illicit discharges and connections.					
Investigate and eliminate illicit discharges and connections.	●	●	A	N/A	
Enforce legal authority to ensure all illicit discharges and connections that are identified are eliminated.	●	●	A	N/A	

Notes:
● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented
A – Actual (active implementation), P – Planned (planning stage)

Table A2-7. City of El Cajon Jurisdictional Strategies and Implementation Schedules for Development Planning

San Diego River Development Planning Program Strategies City of El Cajon	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Provide updated materials, enhanced outreach, and training to convey land development requirements.					
Establish criteria designating priority development projects for new development and redevelopment projects.	●	●	A	N/A	
Update BMP design manual procedures to specify stormwater requirements applicable to development and redevelopment projects, identify and design appropriate BMPs, establish maintenance criteria, and establish alternative compliance options (where implemented).	●	●	A	N/A	
2. Develop and implement LID programs to complement standard permit requirements.					
Implement downspout disconnection program for industrial, commercial, and residential projects.	X	◖	P	N/A	This is an optional strategy. The City has partnered with other agencies on their efforts, such as the Sustainable Landscapes program. The City has not yet implemented an incentive program directly funded by the City.
Implement proprietary BMPs where appropriate for industrial, commercial, and residential projects.	●	●	A	N/A	
Implement rainwater harvesting where appropriate for industrial, commercial, and residential projects.	◖	●	P	N/A	The City began to use a development manual that incorporates the implementation of LID BMPs, including rainwater harvesting.

Table A2-7. City of El Cajon Jurisdictional Strategies and Implementation Schedules for Development Planning

San Diego River Development Planning Program Strategies City of El Cajon	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
3. Implement a Watershed Management Area Analysis to develop watershed specific requirements for structural BMP implementation and identify a list of candidate projects that could be used as alternative compliance options for Priority Development Projects.					
Develop and implement a Watershed Management Area Analysis to develop watershed specific requirements for structural BMP implementation.	◖	●	P	N/A	
4. Implement a post construction BMP program for development projects to ensure proper construction and maintenance.					
Implement source control, LID, and on-site structural controls for all priority development projects.	●	●	A	N/A	
Implement a program that ensures that all structural BMPs are designed, constructed, and maintained on PDPs.	●	●	A	N/A	
Inspect all high priority structural BMPs prior to the rainy season.	●	●	A	N/A	
5. Enforce post construction requirements related to new and redevelopment.					
Require implementation of source control and low impact development (LID) BMPs for all development projects.	●	●	A	N/A	

Notes:

● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented

A – Actual (active implementation), P – Planned (planning stage)

Table A2-8. City of El Cajon Jurisdictional Strategies and Implementation Schedules for Construction Management

San Diego River Construction Management Program Strategies City of El Cajon	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Ensure that minimum BMPs are designated and required for construction projects. Prioritize BMPs which address sources of bacteria.					
Require submittal of pollution control plan, construction BMP plan, and/or erosion and sediment control plan for projects requiring local permits involving soil disturbance activities.	●	●	A	N/A	
Review and confirm that the submitted plan is in compliance.	●	●	A	N/A	
Implement or require implementation of BMPs that are site specific, seasonally appropriate, and appropriate to the construction phase year round.	●	●	A	N/A	
Inspect construction sites at an appropriate frequency to require and confirm compliance with local permits and ordinances, as well as the MS4 Permit requirements.	●	●	A	N/A	
Enforce legal authority to ensure inventoried construction projects are in compliance with all requirements.	●	●	A	N/A	

Notes:

● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented

A – Actual (active implementation), P – Planned (planning stage)

Table A2-9. City of El Cajon Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of El Cajon	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Maintain and improve data tracking methods for existing development inventories where necessary.					
Maintain and update a watershed based inventory of existing development (i.e., commercial, industrial, and municipal facilities and residential areas).	●	●	A	N/A	
2. Develop and implement approaches to address the impacts of improper water use and irrigation runoff.					
Provide or expand targeted outreach to home owners associations	●	●	A	N/A	Information was provided to Home Owners Associations, outreach efforts are planned to increase.
3. Improve and/or continue existing pet waste programs.					
Continue implementation of pet waste bag dispensers in public parks	●	●	A	N/A	
4. Improve trash management strategies within the watershed.					
Implement a schedule of operation and maintenance for public streets, unpaved roads, paved roads, and paved highways.	●	●	A	N/A	
5. Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.					
Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	●	●	A	N/A	The City has an aggressive sanitary sewer operation maintenance program.
6. Improve and implement existing outreach programs to target key sources and pollutants.					
Provide targeted outreach via printed materials to residential areas	●	●	A	N/A	It includes, at minimum, a total of four Storm Water articles in the City's Fall/Spring newsletters.

Table A2-9. City of El Cajon Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of El Cajon	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
7. Enhance existing MS4 maintenance programs.					
Implement a schedule of operation and maintenance activities for the MS4 and related structures.	●	●	A	N/A	
Implement dry weather flow diversions (dependent on outcome of Watershed Management Area Analysis and feasibility)	X	◖	P	N/A	This is an optional strategy. Will start the feasibility phase of dry weather diversion in FY 16-17.
8. Develop and implement targeted programs to address issues in residential areas.					
Conduct residential management area focused inspections.	●	●	A	N/A	
9. Improve existing inspections programs to more efficiently target key sources.					
Conduct inspections of inventoried existing development to ensure compliance. Each area/activity inspected once every five years minimum, with equivalent of 20% of inventory inspected annually.	●	●	A	N/A	
10. Actively enforce stormwater and urban runoff requirements for existing development.					
Designate and require minimum set of BMPs required for all inventoried existing development.	●	●	A	N/A	
Enforce legal authority to ensure inventoried existing development facilities and/or areas are in compliance with all requirements.	●	●	A	N/A	
11. Identify and facilitate retrofit opportunities in areas of existing development.					
Identify opportunities and facilitate the implementation of retrofit projects in areas of existing development.	●	●	A	N/A	
Implement green streets (dependent on WMAA results)	X	◖	P	N/A	The City considers green street opportunities as they arise. No qualifying projects during FY 15-16.

Notes:
● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented
A – Actual (active implementation), P – Planned (planning stage)

Table A2-10. City of El Cajon Optional Jurisdictional Strategies and Implementation Schedules

San Diego River Optional Jurisdictional Strategies	Implementation Timeframe	FY15-16	FY16-17	Actual / Planned	Comments
Dry weather flow diversion	FY 15-16 through FY 18-19	X	◖	P	Will start the feasibility phase of dry weather diversion in FY 16-17.
Implement roof runoff rebate program for existing developments (residential and commercial) properties to help encourage the installation of roof runoff structural BMP controls to reduce discharge of pollutant and stressors and stormwater flows.	1st Permit Term 2013-2018; continues through 2nd Permit Term (2018-2023) until funding sources expire	X	◖	P	The City has partnered with other agencies on their efforts, such as the Sustainable Landscapes program. The City has not yet implemented an incentive program directly funded by the City.
Flood Control Channel Rehabilitation Projects (e.g., removal of impervious lining in flood control channel and replacement with pervious, earthen, or vegetated surface)	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Not triggered	If triggered	If triggered	While this strategy has not been triggered, the City continues to evaluate opportunities for potential grant-funded rehabilitation projects.

Notes:
No modifications to optional strategies are proposed.
● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented
A – Actual (active implementation), P – Planned (planning stage)

2.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The City of El Cajon BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. The City of El Cajon updated its BMP Design Manual in accordance with Municipal Permit requirements in February 2016; the BMP Design Manual replaced the Standard Urban Stormwater Mitigation Plan (SUSMP). No additional changes to the BMP Design Manual have been made since it went into effect in February 2016. The City of El Cajon BMP Design Manual can be accessed at: http://www.cityofelcajon.us/i-want-to/view/documents-forms-library/-folder-137 . Stormwater requirements for development projects are also included in Chapter 16.60 of the El Cajon Municipal Code, which can be accessed at http://www.qcode.us/codes/elcajon/ ..

2.5 MODIFICATIONS TO THE JRMP

No changes were made to the City's JRMP during the 2015-2016 fiscal year.

3 County of San Diego

3.1 ANNUAL REPORT CERTIFICATION

County of San Diego

SARAH E. AGHASSI
DEPUTY CHIEF ADMINISTRATIVE OFFICER

LAND USE AND ENVIRONMENT GROUP
1600 PACIFIC HIGHWAY, ROOM 212, SAN DIEGO, CA 92101
(619) 531-6256 • Fax (619) 531-5476
www.sdcounty.ca.gov/lueg

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT SAN DIEGO RIVER WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the County of San Diego has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 6th day of January, 2017, at the County of San Diego.

Sarah Aghassi
SARAH E. AGHASSI
Deputy Chief Administrative Officer

Date 1/6/17

3.2 ANNUAL REPORT FORM

ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM

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JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM

FY 2015-2016

I. COPERMITTEE INFORMATION		
I.A Copermittee Name: County of San Diego (PIN 255223)		
I.B Copermittee Primary Contact Name: Todd Snyder		
I.C Copermittee Primary Contact Information: Address: 5510 Overland Avenue, Suite 410 City: San Diego County: San Diego State: California Zip: 92123 Telephone: (858) 694-3672 Fax: (858) 495-5623 Email: Todd.Snyder@sdcounty.ca.gov		
II. LEGAL AUTHORITY		
II.A Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
II.B A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☒ ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
III.A Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☒ ☐
III.B If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☒ ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
IV.A Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
IV.B.1 Number of non-storm water discharges reported by the public	286	
IV.B.2 Number of non-storm water discharges detected by Copermittee staff or contractors	95	
IV.B.3 Number of non-storm water discharges investigated by the Copermittee	375	
IV.B.4 Number of sources of non-storm water discharges identified	115	
IV.B.5 Number of non-storm water discharges eliminated	112	
IV.B.6 Number of sources of illicit discharges or connections identified	85	
IV.B.7 Number of illicit discharges or connections eliminated	84	
IV.B.8 Number of enforcement actions issued	93	
IV.B.9 Number of escalated enforcement actions issued	1	
V. DEVELOPMENT PLANNING PROGRAM		
V.A Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
V.B Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	☒ ☐
V.C If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☒ ☐
V.D.1 Number of proposed development projects in review	925	
V.D.2 Number of Priority Development Projects in review	237	
V.D.3 Number of Priority Development Projects approved	96	
V.D.4 Number of approved Priority Development Projects exempt from any BMP requirements	0	
V.D.5 Number of approved Priority Development Projects allowed alternative compliance	0	
V.D.6 Number of Priority Development Projects granted occupancy	62	
V.E.1 Number of completed Priority Development Projects in inventory	410	
V.E.2 Number of high priority Priority Development Project structural BMP inspections	691	
V.E.3 Number of Priority Development Project structural BMP violations	170	
V.E.4 Number of enforcement actions issued	170	
V.E.5 Number of escalated enforcement actions issued	0	

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM	
VI. A Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
VI.B.1 Number of construction sites in inventory	2,748
VI.B.2 Number of active construction sites in inventory	2,684
VI.B.3 Number of inactive construction sites in inventory	0
VI.B.4 Number of construction sites closed/completed during reporting period	1,124
VI.B.5 Number of construction site inspections	18,858
VI.B.6 Number of construction site violations	416
VI.B.7 Number of enforcement actions issued	590
VI.B.8 Number of escalated enforcement actions issued	38

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM				
VII.A Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?				YES ☒ NO ☐
	Municipal	**Commercial**	**Industrial**	**Residential**
VII.B.1 Number of facilities or areas in inventory	a. 263	b. 1,779	c. 150	d.110
VII.B.2 Number of existing development inspections	a. 1,885	b. 974	c. 38	d.468
VII.B.3 Number of follow-up inspections	a. 23	b. 131	c. 12	d.165
VII.B.4 Number of violations	a. 46	b. 279	c. 31	d.346
VII.B.5 Number of enforcement actions issued	a. 28	b. 130	c. 10	d.0
VII.B.6 Number of escalated enforcement actions issued	a.0	b.1	c.0	d.0

VIII. PUBLIC EDUCATION AND PARTICIPATION	
VIII.A Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
VIII.B Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

IX. FISCAL ANALYSIS	
Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Sarah Aghassi
Signature

10/26/16
Date

SARAH E. AGHASSI
Print Name

LAND USE AND ENVIRONMENT GROUP
DEPUTY CHIEF ADMINISTRATIVE OFFICER
Title

(619) 531-5451
Telephone Number

SARAH.AGHASSI@SDCOUNTY.CA.GOV
Email

ATTACHMENT D.1

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM BY WATERSHED

JRMP ANNUAL REPORT ATTACHMENT D.1 by WATERSHED

Fiscal Year 2015-2016

			SANTA MARGARITA *(902.00)	SAN LUIS REY *(903.00)	CARLSBAD *(904.00)	SAN DIEGUITO *(905.00)	PENASQUITOS *(906.00)	SAN DIEGO RIVER *(907.00)	SAN DIEGO BAY *(908.00, 909.00, 910.00)	TIJUANA RIVER *(911.00)	JURISDICTION TOTALS
IV.	**ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM**										
IV.B.1	Number of non-storm water discharges reported by the public		12	46	30	40	2	78	72	6	286
IV.B.2	Number of non-storm water discharges detected by Copermittee staff or contractors		9	11	7	14	1	28	24	1	95
IV.B.3	Number of non-storm water discharges investigated by the Copermittee		15	57	37	51	3	106	99	7	375
IV.B.4	Number of sources of non-storm water discharges identified		4	22	17	11	1	30	28	2	115
IV.B.5	Number of non-storm water discharges eliminated		4	21	16	10	1	30	28	2	112
IV.B.6	Number of sources of illicit discharges or connections identified		4	14	16	8	0	18	23	2	85
IV.B.7	Number of illicit discharges or connections eliminated		4	14	15	8	0	18	23	2	84
IV.B.8	Number of enforcement actions issued		4	21	17	9	1	23	16	2	93
IV.B.9	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	1	1
V.	**DEVELOPMENT PLANNING PROGRAM**										
V.D.1	Number of proposed development projects in review		27	219	109	189	0	158	183	40	925
V.D.2	Number of Priority Development Projects in review		2	53	30	53	0	43	50	6	237
V.D.3	Number of Priority Development Projects approved		4	23	11	21	0	20	11	6	96
V.D.4	Number of approved Priority Development Projects exempt from any BMP requirements		0	0	0	0	0	0	0	0	0
V.D.5	Number of approved Priority Development Projects allowed alternative compliance		0	0	0	0	0	0	0	0	0
V.D.6	Number of Priority Development Projects granted occupancy		2	16	5	8	0	18	12	1	62
V.E.1	Number of completed Priority Development Projects in inventory		12	89	54	85	0	66	93	11	410
V.E.2	Number of high priority Priority Development Project structural BMP inspections		1	100	70	273	0	110	82	55	691
V.E.3	Number of Priority Development Project structural BMP violations		1	43	31	53	0	24	8	10	170
V.E.4	Number of enforcement actions issued		1	43	31	53	0	24	8	10	170
V.E.5	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	0	0
VI.	**CONSTRUCTION MANAGEMENT PROGRAM**										
VI.B.1	Number of construction sites in inventory		63	637	397	636	2	438	513	62	2748
VI.B.2	Number of active construction sites in inventory		60	622	393	627	2	424	496	60	2684
VI.B.3	Number of inactive construction sites in inventory		0	0	0	0	0	0	0	0	0
VI.B.4	Number of construction sites closed/completed during reporting period		20	314	137	235	1	175	219	23	1124
VI.B.5	Number of construction site inspections		245	3655	4473	3934	3	2868	3361	319	18858
VI.B.6	Number of construction site violations		1	50	55	38	0	64	205	3	416
VI.B.7	Number of enforcement actions issued		1	66	64	66	0	104	286	3	590
VI.B.8	Number of escalated enforcement actions issued		1	6	8	9	0	3	9	2	38
VII.	**EXISTING DEVELOPMENT MANAGEMENT PROGRAM**										
VII.B.1	Number of facilities or areas in inventory	a. Municipal	8	23	27	34	4	63	82	22	263
		b. Commercial	154	315	196	210	2	466	410	26	1779
		c. Industrial	15	4	5	22	0	67	36	1	150
		d. Residential	12	11	11	22	1	15	21	17	110
VII.B.2	Number of existing development inspections	a. Municipal	48	181	239	244	41	421	561	150	1885
		b. Commercial	106	155	115	102	0	180	309	7	974
		c. Industrial	1	5	5	12	0	2	13	0	38
		d. Residential	17	55	67	107	2	109	77	34	468
VII.B.3	Number of follow-up inspections	a. Municipal	0	3	0	0	0	2	14	4	23
		b. Commercial	7	10	10	13	0	22	65	4	131
		c. Industrial	1	3	0	2	0	0	6	0	12
		d. Residential	3	22	30	43	0	34	24	9	165
VII.B.4	Number of violations	a. Municipal	0	7	0	1	0	5	26	7	46
		b. Commercial	15	21	25	16	0	51	140	11	279
		c. Industrial	0	7	0	4	0	0	20	0	31
		d. Residential	4	47	59	85	0	70	50	31	346
VII.B.5	Number of enforcement actions issued	a. Municipal	0	2	0	0	0	3	19	4	28
		b. Commercial	10	13	11	7	0	21	65	3	130
		c. Industrial	0	2	0	2	0	0	6	0	10
		d. Residential	0	0	0	0	0	0	0	0	0
VII.B.6	Number of escalated enforcement actions issued	a. Municipal	0	0	0	0	0	0	0	0	0
		b. Commercial	0	0	0	0	0	0	0	1	1
		c. Industrial	0	0	0	0	0	0	0	0	0
		d. Residential	0	0	0	0	0	0	0	0	0

ATTACHMENT D.2

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FISCAL ANALYSIS

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FISCAL ANALYSIS COMPONENT **1**

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FISCAL ANALYSIS COMPONENT

1.1. Introduction

This section presents an estimated annual budget for the County's runoff management programs for FY 2015-16.

1.2. Fiscal Analysis Methods

This section continues to utilize the methodologies and standards established in *Fiscal Analysis Method* submitted by the Copermittees in January 2009.

1.3. Fiscal Analysis Results

As shown the County estimated its total FY 2015-16 expenditures at $27,414,216. This fiscal analysis addresses each of the County's Runoff Management Program elements (jurisdictional, watershed, and regional activities) for the current reporting period (FY 2015-16). Expenditures are described by department and major program area. They represent an estimate of the expenditures that the County incurred in meeting its compliance obligations for FY 2015-16. They should not be interpreted as either budgeted or actual expenditures. Because stormwater program expenditures are distributed throughout a considerable number of County programs, a single consolidated "budget" does not exist for the program as a whole. As such, these figures should be considered best estimates of stormwater-related expenditures.

1.3.1 Expenditures

1.3.1.1. Jurisdictional

Table 1.1 presents the County's estimated jurisdictional expenditures for FY 2015-16.

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
1	**ADMINISTRATION**	**$6,840,583**	These costs correspond to the DPW WPP development, administrative oversight, and assessment of the County's stormwater programs. The WPP is responsible for the development of new and augmented County stormwater programs, regulatory reporting, and program assessment. Some administrative costs are associated with other specific functions shown below, but are included here because they could not be separated out.
2	**DEVELOPMENT PLANNING**	**$1,109,654**	
A	**Land Use Planning**	$0	Expenditures not reported for FY 2015-16; included in other elements.
B	**Environmental Review**	$0	Expenditures not reported for FY 2015-16; included in other elements.
C	**Development Project Approval and Verification**	**$1,109,654**	
C1	**Public Projects (CIP)**	$824,219	
	Project Planning and Engineering	$570,229	Costs include: preparing and reviewing plans and specifications for stormwater BMPs, and SWPPP/WPCP review. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$15,000	
	BMP Implementation	$238,990	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
C2	**Private Projects**	$285,435	
	Permitting and Licensing	$285,435	This cost covers PDS plan reviews at permitted sites. Total costs are estimated as fixed percentages of annual plan-checking fees.
3	**CONSTRUCTION**	**$4,500,593**	
A	**Public Projects (CIP)**	$2,886,893	Costs include: BMP compliance inspections during construction, and implementation of construction phase BMPs. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$1,613,880	
	BMP Implementation	$1,273,013	
B	**Private Projects**	$1,613,700	
	Compliance Inspection and Enforcement	$1,613,700	This cost primarily covers DPW and PDS construction inspections at permitted sites. Total costs are estimated as fixed percentages of inspection program fees.
4	**MUNICIPAL**	**$7,572,297**	
A	**Administration**	$267,805	Expenditures associated with the administrative oversight of the stormwater programs, regulatory reporting, and program assessment of municipal facilities by the DPW - Watershed Protection Program.
B	**Streets, Roads, and Highways Element**	$2,256,091	
	Administration	$291,160	Founded road operations activities include: culvert inspections and cleaning;

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	Maintenance Inspections	$1,890,813	increased culvert waste disposal costs, street sweeping, installation and maintenance of BMPs and road structures, and the placement of additional controls. 10% of the Maintenance and Inspections and BMP Implementation is reported as Administration cost.
	BMP Implementation	$74,118	
	Other	$0	
C	**MS4 Element**	$1,530,000	
	Administration	$191,000	The combined costs shown here apply across (1) DPW Flood Control -- conversion of existing concrete lined channels to natural bottom channels, updating flood control master plans, increased maintenance of flood control systems, and construction and maintenance of regional treatment BMPs; and (2) DPW Flood Control MS4 Operation & Maintenance -- maintenance on flood control facilities throughout the unincorporated areas of the County, exclusive of facilities within road rights-of-way (included in 4.B above). Other includes the cost of disposal of debris removed from MS4.
	Maintenance Inspections	$1,046,900	
	BMP Implementation	$290,500	
	Other	$2,500	
D	**Solid Waste Facilities Element**	$406,618	
	Administration	$35,047	Costs include Regional Board stormwater permit fees, consultant costs associated with stormwater upgrade and repair projects, and office staff time.
	Maintenance Inspections	$16,922	Costs include staff time to perform site inspections.
	BMP Implementation	$79,149	Costs include stormwater consultant site inspections, sampling/testing and BMP materials.
	Other (construction)	$275,500	Drainage improvement projects and BMP site maintenance projects.
E	**Wastewater Facilities Element**	$187,000	
	Administration	$10,000	This includes costs associated with JRMP report, the sanitary sewer system and facilities including: pump stations, sewage treatment plants and Spring Valley Operations facility. Also includes the cost of BMP design, acquisition,
	Maintenance Inspections	$127,000	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$50,000	maintenance and monitoring, for wastewater Capital Improvement Projects, and Major maintenance projects, and at various wastewater facilities.
	Other	$0	
F	**Road Stations Element**	$919,867	
	Administration	$83,624	This includes DPW road station operations related to Permit compliance. The Administration cost is determined as 10% of the total costs of maintenance and Inspections and BMP Implementation as reported by the DPW Roads Divisions.
	Maintenance Inspections	$799,414	
	BMP Implementation	$36,829	
	Other	$0	
G	**Fleet Maintenance Element**	$11,722	
	Administration	$1,036	This includes costs associated with operation of the County's fleet maintenance and fueling facilities.
	Maintenance Inspections	$7,392	
	BMP Implementation	$3,294	
	Other	$0	
H	**Municipal Airfields Element**	$338,110	These costs involve site inspections, annual reporting, and maintenance of BMPs at airports, including oversight of tenant operations. The BMP implementation item includes Palomar asphalt cap repairs.
	Administration	$12,737	
	Maintenance Inspections	$0	
	Compliance Inspection and Enforcement	$0	
	BMP Implementation	$300,623	
	Other (sampling and analysis)	$24,750	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
I	**Parks & Recreational Facilities Element**	$1,214,562	
	Administration	$121,362	This includes: coordinating all training requirements, preparing and reviewing reports, and overseeing the overall implementation of the stormwater program for DPR.
	BMP Implementation	$991,603	This includes costs associated with implementation of BMPs at County parks.
	Compliance Inspection and Enforcement	$101,597	Costs are for DPR enforcement of stormwater requirements at County parks.
	Other	$0	
J	**Office Buildings & Other Municipal Facilities Element**	$297,867	
	Administration	$0	DGS conducts a variety of storm water activities including: inspections and clean-up of County-owned, occupied, and leased facilities and vacant lands; maintenance and signage of storm drain inlet inserts and trash dumpsters; placement of inlet filters; maintenance of coverage and containment improvements for on-site supplies and materials; parking lot sweeping and controlled parking lot power washing; and application of erosion and sediment control measures. These costs are exclusive of fleet maintenance and fueling operations.
	Maintenance Inspections	$99,808	
	BMP Implementation	$198,059	
	Other	$0	
	Management of Pesticides, Herbicides, & Fertilizers	$142,656	
	Administration	$142,656	Integrated Pest Control Program within the Department of Agriculture, Weights and Measures (AWM) performs eradication and control of invasive weeds. This program also provides weed control on roadsides, airports, flood control channels,
	Maintenance Inspections	$0	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$0	sewage treatment plants and inactive landfills. It also provides structural pest control to facilities owned and operated by the county.
	Other	$0	
5	**INDUSTRIAL and COMMERCIAL**	**$1,575,635**	
	Administration	$253,047	DPW and AWM conduct inspections of a variety of businesses in the unincorporated County, provide regulatory oversight of mobile businesses, and conduct follow-up and enforcement of stormwater violations.
	Compliance Inspection and Enforcement	$1,245,279	
	Educational Outreach	$77,309	
	Other expenditures	$0	
6	**RESIDENTIAL**	**$1,205,386**	
	Compliance Inspection and Enforcement	$688,453	DPW conducts complaint investigations for residential sources in the unincorporated County, and conduct follow-up and enforcement of stormwater violations. DPW also operates a regional hotline.
	Educational Outreach	$516,933	Several County departments coordinate and provide outreach to the residential sector and schoolchildren in support of Permit Section D.5 requirements. Costs reported here correspond to DPW only. Funded activities include developing pollution prevention content and providing direct outreach to various target audiences within the general residential and schoolchildren target audiences.
7	**IDDE**	**$321,523**	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

Jurisdictional Worksheet Component			Explanation/Notes
		$321,523	DPW conducts monitoring programs, assesses scientific data, and provides technical and scientific support to other County program staff. They also provide support for all technical and scientific aspects of JRMP development and implementation. These costs are exclusive of the regional monitoring program which is addressed separately under regional costs.
8	**EDUCATION**	**$0**	Education costs are included in other sections as applicable.
9	**PUBLIC PARTICIPATION**	**$0**	Public participation costs are included in other sections as applicable.
10	**SPECIAL INVESTIGATIONS**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.
11	**NON-EMERGENCY FIREFIGHTING**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.
		$23,125,671	

1.3.1.2 Watershed

Table 1.2 presents the County's estimated watershed expenditures for FY 2015-16.

Table 1.2 – Estimated Watershed Expenditures for FY 2015-16

	Santa Margarita WMA	San Luis Rey WMA	Carlsbad WMA	San Dieguito WMA	Peñasquitos WMA	San Diego River WMA	San Diego Bay WMA	Tijuana WMA
Administration	$37,583	$201,492	$82,653	$113,035	$75,309	$105,117	$37,583	$75,309
Cost Share Contribution	$0	$62,494	$46,204	$8,885	$1,062	$68,970	$6,659	$2,346
Watershed Activities	$626,917	$119,390	$14,860	$171,640	$26,423	$125,705	$111,491	$80,300
Other	$0	$0	$0	$0	$0	$0	$0	$0
Total Estimated Watershed Costs	**$664,500**	**$383,376**	**$143,717**	**$293,560**	**$102,794**	**$299,792**	**$155,733**	**$157,955**

1.3.1.3 Regional

Table 1.3 presents the County's estimated regional expenditures for FY 2015-16. This includes only those expenditures associated with the Copermittees' adopted Regional Budget and Work Plan. Other costs associated with regional participation (meeting attendance, etc.) are included within the jurisdictional expenditures presented above.

Table 1.3 – Estimated Regional Expenditures for FY 2015-16

Regional Programs	County Costs
Administration	$0
Cost Share Contribution	$2,087,118
Regional Activities	$0
Other	$0
Total Estimated Regional Costs	**$2,087,118**

1.3.1.4 Total Expenditures

Table 1.4 presents the County's total estimated expenditures for FY 2015-16 (jurisdictional, watershed, and regional).

Table 1.4 – Total Estimated County Expenditures for FY 2015-16

Component / Sub-component	Estimated Expenditures
Jurisdictional	
Administration	$6,840,583
Development Planning	$1,109,654
Construction	$4,500,593
Municipal	$7,572,297
Industrial And Commercial	$1,575,635
Residential	$1,205,386
IDDE	$321,523
Education	$0
Public Participation	$0
Special Investigations	$0
Non-emergency Firefighting	$0
Jurisdictional Total	**$23,125,671**
Watershed	
Santa Margarita WMA	$664,500
San Luis Rey WMA	$383,376
Carlsbad WMA	$143,717
San Dieguito WMA	$293,560
Peñasquitos WMA	$102,794
San Diego River WMA	$299,792
San Diego Bay WMA	$155,733
Tijuana WMA	$157,955
Watershed Total	**$2,201,427**
Regional	**$2,087,118**
Total Estimated County Costs	***$27,414,216***

1.3.2 Funding Source

Table 1.5 shows the major sources of funding for the County's urban runoff management programs in FY 2015-16, and describes the legal restrictions applicable to the use of each.

Table 1.5 – Legal Restrictions on the Use of Program Funding

Funding Source	Legal Restrictions
General Fund	There are no restrictions on the use of general fund for County water quality programs and activities except that they must be used only for the purposes for which they are budgeted and allocated by the County Board of Supervisors.
Flood Control District Fees	Revenue generated from these fees must be expended for activities related to flood and storm management.
Developer Deposits / Permit Fees	Deposits / fees may be used only to fund activities related to the work for which the permits are issued.
Gas Tax	Gas Tax is collected by the state and allocated to local government for transportation-related work including maintenance of existing transportation systems and construction of new transportation facilities. These funds may not be used for other purposes.
Sanitary District Fees	Sanitary District Fees are used for work related to the maintenance of sewer lines, pump stations, force mains, and several treatment plants that serve the unincorporated areas. They may be used only for such maintenance-related purposes within the respective sewer district for which they are collected.
Other Funding Sources	Other funding sources collectively account for a relatively small portion of ongoing expenditures. However, all funding for the County's stormwater compliance programs is expended within applicable legal restrictions and limitations.

1.4. Conclusions and Recommendations

The figures presented here are an estimate of the expenditures that the County incurred to meet its compliance obligations for FY 2015-16. For the reasons explained above, they should be considered only best estimates of stormwater-related expenditures.

3.3 JURISDICTIONAL STRATEGIES

Table A2-11. County of San Diego Jurisdictional Strategies and Implementation Information

	Strategies Implemented by Jurisdictions	Implemented in FY16? *(Fully/Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(If None, N/A)*	Planned Implementation into next FY *(Y/N)*
	Illicit Discharge, Detection, and Elimination (IDDE) Program					
1	Maintain stormwater conveyance system map to facilitate IDDE program	●	Updated as needed	N	N/A	Y
2	Utilize municipal personnel and contractors to identify and report Illicit Connections and Discharges	●	IDDE Program	N	N/A	Y
3	Updated focused training for County field staff	●	Updated training for BMP Design Manual and Stormwater Implementers	N	N/A	Y
4	Collect effluent on the ground (EOG), sanitary sewer overflow (SSO) data	●	Approximately 87 EOG complaints related to septic systems and 14 SSO events recorded and responded to throughout the County's jurisdiction.	N	N/A	Y
5	Address septic system failures where observed	●	Suspected septic discharges are reported to DEH HIRT Response line when they occur after hours and DEH Land and Water Quality Division during normal hours. All complaints resolved during 15-16.	N	N/A	Y
6	Facilitate public reporting of ICID via telephone and email	●	Bilingual hotline, dedicated e-mail address, and multiple online reporting tools	N	N/A	Y
7	Refer homeless issue complaints to Sheriff or appropriate jurisdictions	●	Collaborate with multi-departmental group to address homeless encampments	N	N/A	Y
8	Bilingual hotline answered by a live operator (I Love a Clean San Diego) to provide better customer service	●	Bilingual hotline operated by ILACSD	N	N/A	Y
9	Implement practices and procedures to address spills with the potential to enter the storm drain system	●	NOV issued by DEH for failing septic systems when effluent could reach the storm drain. Prompt follow up and mitigation is implemented. Such cases are rare; <5 in 15-16 throughout the County's jurisdiction.	N	N/A	Y
10	Coordinate spill response with responsible sewer agencies	●	Major DEH role is to inform the public of risks associated with sewer spills, conducting sampling, reporting, posting signs, etc.	N	N/A	Y
11	Implement practices and procedures to prevent/limit infiltration of seepage from sanitary sewers	●	If illicit connections are identified as part of an IDDE investigation, investigations are conducted to define and eliminate the source.	N	N/A	Y
12	Coordinate with upstream entities to prevent illicit discharges from upstream sources entering into the storm drain system	●	If illicit connections are identified as part of an IDDE investigation, investigations are conducted to define and eliminate the source. If determined to be from an upstream entity coordination will occur.	N	N/A	Y
13	Utilize municipal personnel and Contractors to monitor stormwater outfalls for discharges of potential ICIDs	●	This is part of the IDDE Program	N	N/A	Y

Table A2-11. County of San Diego Jurisdictional Strategies and Implementation Information

	Strategies Implemented by Jurisdictions	Implemented in FY16? *(Fully/Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(If None, N/A)*	Planned Implementation into next FY *(Y/N)*
14	Develop and implement a strategy for investigating and addressing ICIDs.	●	Focused, collaborative investigations with Planning and Science staff of high priority outfalls.	N	N/A	Y
	Development Planning					
15	Require implementation of source control and Low Impact Development (LID) BMPs for all development projects.	●	The County BMP Design Manual (DM) requires all projects regardless of size and location to implement source control (SC) and SD BMPs. These requirements are captured in the Watershed Protection Ordinance (WPO) and County's BMP DM.	N	N/A	Y
16	Priority Development Projects (PDP): In addition to requirement for all development projects, implement or require implementation of onsite structural BMPs to control pollutants and manage hydromodification for PDPs.	●	The County BMP DM requires all PDPs to implement pollutant control and hydromodification management BMPs. These requirements are captured in the WPO and County's BMP DM.	N	N/A	Y
17	Update BMP Design Manual procedures to specify stormwater requirements applicable to development and redevelopment projects, identify and design appropriate BMPs, establish maintenance criteria, and establish where implemented alternative compliance options.	●	Updated County BMP DM to reflect the Regional Model BMP DM with additional changes to incorporate County implementation practices. BMP DM became effective on February 26, 2015.	N	N/A	N
18	Conduct internal (staff) training on the updated BMP Manual	●	The County conducts internal training every fiscal year and after release of new guidance documents	N	N/A	N
19	Hold external land development workshops targeting the development community	●	The County conducts external training regularly and after release of new guidance documents	N	N/A	N
20	Implement a program that ensures that all structural and Low Impact Development (LID) BMPs are designed, constructed and maintained on Priority Development and Redevelopment Projects.	●	Structural BMPs and LID BMPs are designed and constructed per the BMP Design Manual. In addition, Structural BMPs and LID BMPs at PDPs are tracked for maintenance through inspections and self verification letters.	N	N/A	Y
21	Impose legal authority to ensure all development and redevelopment projects are in compliance with all post construction requirements.	●	The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated Permit and the inclusion of applicant-implement offsite alternative compliance.	N	N/A	Y
22	Update County codes, ordinances, and stormwater design standards consistent with the permit and the updated BMP Manual	●	The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated Permit and the inclusion of applicant-implement offsite alternative compliance. WPO update became effective on February 26, 2016.	N	N/A	N
	Construction Management					
23	Maintain, update and prioritize a watershed based inventory of all projects issued local permits that allow soil disturbing activities.	●	Projects that are issued local permits that allow soil disturbance activities are part of the inventory that is watershed-based.	N	N/A	Y

Table A2-11. County of San Diego Jurisdictional Strategies and Implementation Information

	Strategies Implemented by Jurisdictions	Implemented in FY16? *(Fully/Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(If None, N/A)*	Planned Implementation into next FY *(Y/N)*
24	Require implementation of BMPs that are site specific, seasonally appropriate and appropriate to the construction phase, year round.	●	Every project requires implementation of site specific construction BMPs, seasonally appropriate and appropriate to the construction phase.	N	N/A	Y
25	Impose legal authority to ensure inventoried construction projects are in compliance with all requirements.	●	The Watershed Protection Ordinance is the current legal authority to ensure inventoried construction projects are in compliance with all requirements.	N	N/A	Y
26	Make updates to County ordinances related to construction; reference to existing grading ordinance	●	County ordinances are updated with subsequent Construction General Permit updates; the Watershed Protection Ordinance will be updated as necessary as a result of the future Grading Ordinance Update.	N	N/A	N
27	Provide internal staff training related to construction storm water management.	●	The County conducts construction stormwater training annually, and it targets construction inspectors in DPW-PDCI, PDS-Building, and CIP Inspectors in DPW and DGS.	N	N/A	Y
Existing Development						
28	Maintain and update a watershed-based inventory of existing development (i.e. commercial, industrial, municipal and residential areas).	●	Inventory is tracked in Accela Automation. Database is continually updated to increase accuracy and efficiency.	N	N/A	Y
29	Improve the tracking of watershed based inventories via consolidated database	●	See the comments for Strategy 28 above.	N	N/A	Y
30	Designate a minimum set of BMPs required for all existing development inventories, including special event venues. The designated minimum BMPs must be specific to facility or area types and pollutant generating activities, as appropriate.	●	The JRMP establishes minimum BMPs for all existing development land use types.	N	N/A	Y
31	Create an Equestrian BMP Handbook	X	Handbook created in FY2014-15. Handbook will be revised in FY2016-17 to encompass additional BMPs and be more user-friendly.	N	N/A	Y
32	Require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types and pollutant generating activities, as appropriate.	●	See the comments for Strategy 30 above.	N	N/A	Y
33	Pet waste management and outreach in County Parks.	●	Mutt-mitt dispensers are installed and maintained in many County parks, providing people who are walking their dogs with waste disposal bags to use to pick up after their pets.	N	N/A	Y

Table A2-11. County of San Diego Jurisdictional Strategies and Implementation Information

	Strategies Implemented by Jurisdictions	Implemented in FY16? *(Fully/Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(If None, N/A)*	Planned Implementation into next FY *(Y/N)*
34	Implement a schedule or operation and maintenance activities for the stormwater conveyance system and related structures.	●	Stormwater maintenance is referred to appropriate departments when needed.	N	N/A	Y
35	Implement a schedule of operation and maintenance for County paved and unpaved roads.	●	County Road Crews employ a schedule for maintenance of County Roads.	N	N/A	Y
36	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	●	1. 450 Facilities throughout the County's jurisdiction received the Agricultural Water Quality Best Management Practices for Pesticides through annual registration notifications. 2. Inspections were conducted at 83 Commercial Ag Facilities throughout the County's jurisdiction.	N	N/A	Y
37	Promote and encourage implementation of designated BMPs in residential areas.	●	Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas. All Residential Management Areas were inspected in FY15-16	N	N/A	Y
38	Conduct inspections of inventoried existing development to ensure compliance	●	Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas.	N	N/A	Y
39	Conduct focused residential inspections based on strategic assessments.	●	Focused, collaborative investigations with Planning and Science staff of high priority outfalls.	N	N/A	Y
40	Develop a residential inspections tracking program via mobile platform - miles, violations, etc.	●	In pilot testing phase. Modifications are being made based on pilot testing phase to increase effectiveness.	N	N/A	Y
41	Improve inspections data tracking through mobile phone applications	●	See comments for Strategy 40 above.	N	N/A	Y
42	Enforce legal authority established for all inventoried existing development to achieve compliance	●	The Watershed Protection Ordinance provides legal authority; see JRMP for additional details.	N	N/A	Y
43	Update county ordinance related to existing development; reference to existing guidance documents	●	Watershed Protection Ordinance was updated; see JRMP for additional details.	N	N/A	N
44	Promote incentive program for BMP retrofits (e.g. water smart irrigation controllers, turf replacements programs, residential landscape evaluation program).	●	The County continues to collaborate with and promote the efforts of partner agencies' incentive programs.	N	N/A	N
45	Collaborate with partner agencies and groups to promote non-County sponsored incentive programs for BMP retrofits, including rain barrels, smart controllers, soil sensors, turf replacement, etc.	●	The County continues to collaborate with and promote the efforts of partner agencies' incentive programs.	N	N/A	Y
46	Identify candidate areas of existing development for stream, channel, and/or habitat rehabilitation projects and facilitate implementation of such projects.	●	N/A	N	N/A	N

Table A2-11. County of San Diego Jurisdictional Strategies and Implementation Information

Strategies Implemented by Jurisdictions		Implemented in FY16? *(Fully/Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(If None, N/A)*	Planned Implementation into next FY *(Y/N)*
			Outreach and Public Participation			
47	Develop, improve, distribute outreach materials.	●	Improved outreach materials through a focused Community-based Social Marketing approach. Continual improvement of existing materials, including translation into Spanish.	N	N/A	Y
48	Give outreach presentations to elementary, middle, and high school students	●	Offer presentations to elementary, middle, and high schools serving unincorporated communities.	N	N/A	Y
49	Outreach to mobile landscaping service providers	●	Pesticide Regulation Program collaboration with the California Department of Pesticide Regulation on a pilot program to offer workshops for maintenance gardeners. Two workshops were held where attendees were provided training materials and concluded with a pesticide certification exam. Attendees at both workshops had high success rates for the exam.	N	N/A	Y
50	Conduct large residential property pet waste management outreach	X	Unable to implement due to lack of community service organization partners	N	N/A	N
51	Conduct over irrigation outreach pilot study	●	Community-based Social Marketing pilot study on the effectiveness of irrigation runoff prevention materials.	N	N/A	Y
52	Conduct Homeowners Associations Outreach and Coordination Pilot Study	◖	HOA Outreach materials in draft format. Additional development will take place in FY2016-17.	N	N/A	Y
53	Expand Homeowners Associations Outreach and Coordination based on the pilot project within San Luis Rey, San Dieguito, or San Diego River as needed and as funding is identified	X	Additional development may occur based on pilot study in FY2016-17	N	N/A	N
54	Collaborate with watershed partners to develop consistent messaging to targeted audiences such as commercial, residents to conserve water and reduce dry weather flows	●	Collaboration between the Regional Education Workgroup and Think Blue San Diego Region to develop and distribute educational materials such as the "Be the Solution to Pollution" booklet which includes irrigation and runoff reduction measures. Other items developed under this included posters, calendars and coloring books	N	N/A	Y
55	Sponsor Trash Collection Events through public outreach and participation	●	The County sponsors ILACSD to establish cleanup sites at the Coastal Cleanup Day and Creek to Bay events.	N	N/A	Y
56	Educational Workshops on Integrated Pest Management, manure management and others as needed	●	Various workshops presented throughout the year by County staff including UCCE, FHA and contractors.	N	N/A	Y

Table A2-11. County of San Diego Jurisdictional Strategies and Implementation Information

	Strategies Implemented by Jurisdictions	Implemented in FY16? *(Fully/Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(If None, N/A)*	Planned Implementation into next FY *(Y/N)*
57	Partner with Master Gardeners Programs to provide education opportunities on water use and practices for gardening	●	Various workshops presented throughout the year by County staff including UCCE, FHA and contractors.	N	N/A	Y
58	Conduct Effectiveness Surveys on Education & Outreach programs	●	Surveys to determine the efficacy of watershed education to unincorporated elementary, middle, and high schools serving unincorporated communities	N	N/A	Y
	Enforcement Response Plan					
59	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	●	County implemented the Enforcement Response Plan (ERP) as described in the JRMP.	N	N/A	Y
60	Notify the SDWB by email (RB9_Nonfilers@waterboards.ca.gov) within five (5) calendar days of issuing escalated enforcement to a construction site that poses a significant threat to water quality as a result of violations or other noncompliance	●	County implemented the ERP as described in the JRMP.	N	N/A	Y
61	Notify the SDWB by email (RB9_Nonfilers@waterboards.ca.gov) any persons required to obtain coverage under the statewide Industrial General Permit and Construction General Permit and failing to do so, within five (5) calendar days from the time the Copermittee become aware of the circumstances.	●	County implemented the ERP as described in the JRMP.	N	N/A	Y
	Public Education and Participation					
62	Implement a public education and participation program to promote and encourage development of programs, management practices and behaviors that reduce the discharge of pollutants in storm water prioritized by high risk behaviors, pollutants of concern, and target audiences.	●	The County completes numerous education and public participation programs for diverse target audiences. See JRMP.	N	N/A	Y

Notes:
● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented

Table A2-12. County of San Diego Optional Jurisdictional Strategies and Implementation Information

	Optional Strategies Implemented by Jurisdictions	Implementation Timeframe	Triggers	Resources	Triggered *(Y/N)*	Implemented in FY16 *(Fully/ Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY *(Y/N)*
Provision B.3.b.(1)(b)(i) - BMPs, incentives, or programs that may be implemented that are in addition to requirements of Provision B.3.b.(1)(a)										
1	Implement Sustainable Landscapes Program to encourage landscape retrofits.	FY 2016-17; Continuous until grant funding and incentives are depleted	Implementation of this strategy may be triggered if (1) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (2) all of the necessary resources have been secured. Continue implementation when the funding and incentives items are secured.	Staff resources, Grant funding, Incentive items, Partnerships	No	◖	Not triggered or scheduled to be implemented in FY 15-16, but guideline development and some initial outreach was completed. This work is considered partial implementation. Expanded program implementation is planned in FY 16-17.	N	N/A	Y
2	Implement an incentive program for BMP Retrofits (Public-Private Partnerships - a County sponsored program to offer incentives for rain barrel installation, downspout disconnects from the stormwater system, etc.)	FY 2015-16 Continuous, as resources allow	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Incentive items, Partnerships	No	◖	Not triggered in FY 15-16, but partially implemented. Partner agencies (water districts) offer rebates for rain barrels, and the Sustainable Landscapes program design now includes BMP retrofit components such as downspout disconnection. Free classes in landscape "makeovers" are also an incentive; a professional landscaper will assist with the development of plans, and the guidebook is grant funded (free to residents).	N	N/A	Y
3	Implement a program that provides rebates or incentives for pumping septic systems, with a focus in high risk areas adjacent to waterways (within 600 feet).	Once triggered, Pilot program 1 -2 years, as needed thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Incentive items	No	X	Funding source not identified. All 4 triggers have not been met.	N	N/A	No
4	Identify where sewer and stormwater infrastructure are in close proximity and subsequently, confirm the absence of flow at nearby stormwater MS4 outfall during dry weather.	Once triggered, 2-3 years; one-time	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	N/A, Not Triggered	N/A, Not Triggered	N		

Table A2-12. County of San Diego Optional Jurisdictional Strategies and Implementation Information

Optional Strategies Implemented by Jurisdictions		Implementation Timeframe	Triggers	Resources	Triggered *(Y/N)*	Implemented in FY16 *(Fully/ Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY *(Y/N)*
5	Implement a program for on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	Once triggered, 2-3 years	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) septic systems have been determined to be a pollutant sources to the MS4; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	◖	Under the Local Area Management Plan (LAMP) for onsite wastewater treatment systems the treatment systems with supplemental treatment are required to be permitted annually. The annual operating permit will define the monitoring and maintenance requirements as specified by the manufacturer and/or qualified professional who designed the system. The LAMP ordinance can be found at: http://www.sandiegocounty.gov/content/dam/sdc/deh/lwqd/RWQCB%20Approved%20LAMP%20Final%202-24-15.pdf	N	N/A	Y
6	Divert persistent dry weather flows from storm drains to sewer	Once triggered, 3-6 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) permission is granted from sewer agency; and (4) ground water or permitted discharges have been ruled out; and (5) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Engineering design, Environmental review, Permits, Ongoing funding for operation/maintenance	No	N/A, Not Triggered	Diversions are a last resort strategy and will be reviewed for outfalls that are persistently flowing after all other implementation strategies have been exhausted.	N	N/A	N
Provision B.3.b.(1)(b)(ii) - Incentives or programs that may be implemented to encourage or implement projects to retrofit areas of existing development										
7	Implement trash capture program (e.g., retrofit storm drain intakes with trash capture devices)	Baseline study 2-3 years; FY 15-16 implementation as needed and as resources allow	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) baseline study completion and success; and (4) focus areas identification; and (5) detailed inlet inventory of focus areas; and (6) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Equipment, Permits, Ongoing funding for operation/maintenance	No	◖	The County of San Diego is in process of conducting several studies to develop Baseline Trash Generation Rates.	N	N/A	Y

Table A2-12. County of San Diego Optional Jurisdictional Strategies and Implementation Information

Optional Strategies Implemented by Jurisdictions		Implementation Timeframe	Triggers	Resources	Triggered *(Y/N)*	Implemented in FY16 *(Fully/ Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY *(Y/N)*
8	Implement a Green Streets Retrofits Program	Once triggered, 3-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered on a project-by-project basis if (1) a specified interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Each green street retrofit project is preliminary estimated to cost an average of $5,500,000 per linear mile of retrofit for construction. Resources include: Staff resources, Grant funding or alternative source, Contractor funding, Engineering or landscaping design, Permits, Environmental review, Right of way acquisition, Ongoing funding for operation/maintenance	No	◖	Design standards and specifications have been developed. Green streets are now being used to meet compliance for all retrofit and/or redeveloped road projects that in the Capital Improvement Projects plan. Pursuing Grant Funding	N	N/A	Y
9	Construct Treatment Control BMPs (retrofits projects)	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Engineering or landscaping design, Permits, Environmental review, Ongoing funding for operation/maintenance	No	N/A, Not Triggered	N/A, Not Triggered	N	N/A	N

Table A2-12. County of San Diego Optional Jurisdictional Strategies and Implementation Information

	Optional Strategies Implemented by Jurisdictions	Implementation Timeframe	Triggers	Resources	Triggered *(Y/N)*	Implemented in FY16 *(Fully/ Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY *(Y/N)*
10	Implement an alternative compliance program to enable "offsite" compliance for new and redevelopment projects.	Once triggered, 3-6 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Engineering design , Permits, Environmental review, Right of way acquisition (if needed), Ongoing funding for operation/maintenance	No	◖	Currently applicant implemented offsite alternative compliance is available for use by the development community. The Water Quality Equivalency (WQE) provides the currency for structural BMPs and some natural system management practices (NSMPs). Additional work on the WQE will be conducted during FY17. The County is not currently pursuing a credit system but is participating as a stakeholder on the City of San Diego TAC and as a member of the Western Riverside Coalition of Governments (WRCOG) discussion on offsite alternative compliance.	N	N/A	Y
Provision B.3.b.(1)(b)(iii) - Incentives or programs that may be implemented to encourage or implement projects that will rehabilitate the conditions of channels or habitats										
11	Flood Control Channel Rehabilitation Projects (e.g., removal of impervious lining in flood control channel and replacement with earthen or vegetated surface)	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (4) engineering design, monitoring, and outreach plans are approved; and (5) all of the necessary resources have been secured.	Project costs vary by size and complexity. Resources include: Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Engineering design, Permits, Environmental review, Right of way acquisition (if needed), Ongoing funding for operation/maintenance	No	◖	One project has been identified in SDR for retrofit/rehabilitation. Project planning, design and environmental review will begin in FY17.	N	N/A	Y

Table A2-12. County of San Diego Optional Jurisdictional Strategies and Implementation Information

	Optional Strategies Implemented by Jurisdictions	Implementation Timeframe	Triggers	Resources	Triggered *(Y/N)*	Implemented in FY16 *(Fully/ Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY *(Y/N)*
12	Implement a program to remove invasive non-native plants (i.e. *Arundo*) upstream areas rivers or tributaries.	Once triggered, 1-2 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) community support and partnerships established; and (4) it has been determined that invasive plants have been found to have an impact on water quality; and (5) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	N/A, Not Triggered	N/A, Not Triggered			N
13	Habitat Restoration and rehabilitation projects in County Parks	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Restoration / Rehabilitation Designs Approved, Environmental Permits issued, CEQA / NEPA Environmental review, Ongoing funding for maintenance and monitoring	No	N/A, Not Triggered	N/A, Not Triggered	N	N/A	Y
	Structural BMPs Identified in WQIPs									
14	Construct structural BMPs to reduce bacteria and other priority pollutants, as needed	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Each structural BMP project will require the following resources: Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Engineering design, Permits, Environmental review, Right of way acquisition (if needed),	No	N/A, Not Triggered	N/A, Not Triggered	N	N/A	N
21*	SDR WQIP - SDCo-R-01, wet pond/subsurface flow wetland				No	N/A, Not Triggered	N/A, Not Triggered	N	N/A	N
22	SDR WQIP - SDCo-R-02, infiltration basin				No	N/A, Not Triggered	N/A, Not Triggered	N	N/A	N
23	SDR WQIP - SDCo-R-03, enhanced constructed wetland				No	N/A, Not Triggered	N/A, Not Triggered	N	N/A	N

Table A2-12. County of San Diego Optional Jurisdictional Strategies and Implementation Information

Optional Strategies Implemented by Jurisdictions		Implementation Timeframe	Triggers	Resources	Triggered *(Y/N)*	Implemented in FY16 *(Fully/ Partially/No)*	Comments on Implementation	Proposed Modifications *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY *(Y/N)*
24	SDR WQIP - MJ-R-01, gross solids and trash removal			Ongoing funding for operation/maintenance	No	N/A, Not Triggered	N/A, Not Triggered	N	N/A	N
25	SDR WQIP - MJ-R-02, infiltration basin				No	N/A, Not Triggered	N/A, Not Triggered	N	N/A	N

Notes:
* Optional strategies 15-20 do not apply to the San Diego River WMA and therefore are not included in this table.
● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented

3.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The County of San Diego BMP Design Manual (BMP DM) provides guidance for land development and public improvement projects to comply with the 2013 Municipal Separate Storm Sewer System (MS4) Permit (Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100). This Manual replaces County of San Diego Standard Urban Stormwater Mitigation Plan (SUSMP). It is focused on project design requirements and related post-construction requirements, not on the construction process itself. No modifications to the BMP DM have been made since its publication on February 2016. The BMP DM is available online on the County of San Diego's website:

http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/DevelopmentandConstruction/BMP_Design_Manual.html.

3.5 MODIFICATIONS TO THE JRMP

The County's Jurisdictional Runoff Management Program (JRMP) was prepared in response to new regulatory requirements adopted by the Regional Water Quality Control Board. The purpose of the JRMP document is to guide implementation of programs and strategies to reduce pollutants discharged from the County's storm drain system to receiving waters. No modifications were made to the JRMP during the 2015-2016 fiscal year. The JRMP is accessible from the Project Clean Water website at: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=105:jurmp-plan&catid=34

4 City of Santee

4.1 ANNUAL REPORT CERTIFICATION

CITY OF SANTEE

STATEMENT OF CERTIFICATION

SAN DIEGO RIVER WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

Executed on the 19th day of January, 2017 at the City of Santee.

Marlene D. Best

MARLENE BEST
CITY MANAGER
CITY OF SANTEE

Indian Wells
(760) 568-2611
Irvine
(949) 263-2600
Los Angeles
(213) 617-8100
Ontario
(909) 989-8584

BBK
BEST BEST & KRIEGER
ATTORNEYS AT LAW

655 West Broadway, 15th Floor, San Diego, CA 92101
Phone: (619) 525-1300 | Fax: (619) 233-6118 | www.bbklaw.com

Riverside
(951) 686-1450
Sacramento
(916) 325-4000
Walnut Creek
(925) 977-3300
Washington, DC
(202) 785-0600

Rebecca Andrews
(619) 525-1392
rebecca.andrews@bbklaw.com
File No. 60139.00001

June 26, 2015

VIA U.S. MAIL

David W. Gibson
Executive Officer
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Re: Statement of Legal Authority in Compliance with San Diego Regional Water Quality Control Board Order No. R9-2013-0001

Dear Mr. Gibson:

The City of Santee ("City") hereby submits this statement in its capacity as a Co-Permittee in accordance with Provision E.1 of San Diego Regional Water Quality Control Board Order No. R9-2013-0001, National Pollution Discharge Elimination System ("NPDES") Permit and Waste Discharge Requirements for the Municipal Separate Storm Sewer Systems ("MS4") Draining the Watersheds Within the San Diego Region ("Permit").

STATEMENT OF LEGAL AUTHORITY

The undersigned attorney for the City does hereby state that the City has obtained adequate legal authority to comply with the legal requirements imposed on the City under the Permit, consistent with the requirements set forth in the regulations to the Clean Water Act, 40 CFR [Code of Federal Regulations] 122.26(d)(2)(i)(A-F), and to the extent permitted by State and Federal law and subject to the limitations on municipal action under the California and United States Constitutions. Subject to those limitations, this includes the authority to:

- Prohibit and eliminate all illicit discharges and illicit connections to its MS4 (Santee Municipal Code ("SMC"), § 13.42.060(A) [prohibition and requirement to eliminate].)

- Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites, including industrial and construction sites which have coverage under the statewide General Permit for Discharges of Storm

Water Associated with Industrial Activities (Industrial General Permit) or General Permit for Discharges of Storm Water Associated with Construction Activities (Construction General Permit), as well as to those sites which do not. (SMC, §§ 13.42.095 [industrial], 13.42.090 [construction].)

- Control the discharge of spills, dumping, or disposal of materials other than storm water into its MS4. (SMC, §§ 13.42.060 [prohibition of discharge of pollutants and non-storm water], 13.42.120 [notification of spills].)

- Control through interagency agreements among Copermittees the contribution of pollutants from one portion of the MS4 to another portion of the MS4. (Gov. Code, §§ 37350, 37355 [authority to control city property by contract].)

- Control, by coordinating and cooperating with other owners of the MS4 such as Caltrans, the U.S. federal government, or sovereign Native American Tribes through interagency agreements, where possible, the contribution of pollutants from their portion of the MS4 to the portion of the MS4 within the Copermittee's jurisdiction. (Gov. Code, §§ 37350, 37355 [authority to control city property by contract].)

- Require compliance with conditions in its statutes, ordinances, permits, contracts or orders, or similar means to hold dischargers to its MS4 accountable for their contributions of pollutants and flows. (SMC, §§ 13.42.070 [discharge in violation of permit], 13.42.150 [violations constituting misdemeanors], 13.42.160 [penalties for violation], 13.42.170 [continuing violations], 13.42.200 [administrative enforcement powers].)

- Require the use of BMPs to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP. (SMC, § 13.42.080 [BMPs required to reduce discharge of pollutants].)

- Require documentation on the effectiveness of BMPs implemented to prevent or reduce the discharge of pollutants in storm water from its MS4 to the MEP. (SMC, §§ 13.42.080 [requiring implementation and maintenance], 13.42.130 [requiring monitoring and documentation].)

- Utilize enforcement mechanisms to require compliance with its statutes, ordinances, permits, contracts, orders, or similar means. (SMC, §§ 13.42.150 [violations constituting misdemeanors], 13.42.160 [penalties for violation], 13.42.200 [administrative enforcement powers].)

- Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with its statutes, ordinances, permits, contracts, orders, or similar means and with the requirements of this Order, including the prohibition of illicit discharges and connections to its MS4; the Copermittee must also have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities, including construction sites, discharging into its MS4. (SMC, §§ 13.42.100 [authorizing City to inspect] 13.42.130 [authorizing City to require testing, monitoring and reporting], 13.42.140 [authorizing City to enter and inspect].)

CONCLUSION

Thank you for your attention to this matter. Please do not hesitate to contact the undersigned if you have any questions or need any additional information.

Sincerely,

Rebecca Andrews

Rebecca Andrews
for BEST BEST & KRIEGER LLP

60139.00001\11737911.1

4.2 ANNUAL REPORT FORM

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM FY 15/16

I. COPERMITTEE INFORMATION		
Copermittee Name: City of Santee		
Copermittee Primary Contact Name: Cecilia Tipton		
Copermittee Primary Contact Information: Address: 10601 Magnolia Avenue City: Santee County: San Diego State: CA Zip: 92071 Telephone: 619-258-4100, x. 177 Fax: 619-562-9376 Email: ctipton@cityofsanteeca.gov		
II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☒ ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☐ ☒
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
Number of non-storm water discharges reported by the public		46
Number of non-storm water discharges detected by Copermittee staff or contractors		84
Number of non-storm water discharges investigated by the Copermittee		84
Number of sources of non-storm water discharges identified		129
Number of non-storm water discharges eliminated		129
Number of sources of illicit discharges or connections identified		82
Number of illicit discharges or connections eliminated		82
Number of enforcement actions issued		23
Number of escalated enforcement actions issued		7
V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board? N/A	YES NO	☐ ☒
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☐ ☐
Number of proposed development projects in review		13
Number of Priority Development Projects in review		11
Number of Priority Development Projects approved		13
Number of approved Priority Development Projects exempt from any BMP requirements		0
Number of approved Priority Development Projects allowed alternative compliance		0
Number of Priority Development Projects granted occupancy		5
Number of completed Priority Development Projects in inventory		48
Number of high priority Priority Development Project structural BMP inspections		6
Number of Priority Development Project structural BMP violations		4
Number of enforcement actions issued		13
Number of escalated enforcement actions issued		12

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM FY 15/16

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Number of construction sites in inventory	26
Number of active construction sites in inventory	21
Number of inactive construction sites in inventory	5
Number of construction sites closed/completed during reporting period	12
Number of construction site inspections	55
Number of construction site violations	148
Number of enforcement actions issued	18
Number of escalated enforcement actions issued	7

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	17	460	167	0
Number of existing development inspections	3	48	0	
Number of follow-up inspections	5	27		
Number of violations	0	28		
Number of enforcement actions issued	0	21		
Number of escalated enforcement actions issued	0	10		

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Cecilia Tipton
Signature

1/19/17
Date

CECILIA TIPTON
Print Name

STORM WATER PROGRAM MANAGER
Title

619-258-4100, 177
Telephone Number

CTIPTON@CITYOFSANTEECA.GOV
Email

FISCAL ANALYSIS 2015/2016

As requested in Municipal Permit (Order No. R9-2013-0001), the City of Santee has prepared the following Fiscal Analysis per section E.8.

A. In response to Permit Section E.8.b.(1): This section reports on the total expenditures in the categories of capital, operation and maintenance, and other expenditure items. Most costs are devoted to operation and maintenance (O&M) expenses, both done by City staff and through outside contracts. See Table 1 for a breakdown summary of budget and expenditures.

1. Estimated expenditures in this category (Capital, O&M, other) for the current fiscal year are: $516,645.
2. The source of funds for the current fiscal year and next fiscal year are primarily General Fund, Flood Control, and Gas Tax.

B. In response to Permit Section E.8.b.(2): This section reports on the staffing resources and expenditures required to meet the requirements of this Order. See Table 1 for a breakdown summary of budget and expenditures.

1. Estimated expenditures in this category (staffing/labor) for the current fiscal year are: $336,213.
2. The source of funds for the current fiscal year and next fiscal year are primarily General Fund, but also include other sources as identified in Table 2.

Regional programs include Copermittee shared costs for monitoring, education, and other regional expenses, as well as the Water Quality Improvement Plan.

The City anticipates using the same funding sources as shown in Table 2, along with Grant Funds received through Prop 84 and Prop 1 for 2016/17.

Table 1: 2015/2016 Estimated Expenditure Summary

Jurisdictional Components	Total
Permit Fee	$17,171
Staff Time/Labor: Development Services	$160,158
Staff Time/Labor: Public Services	$176,055
Dog Station Maintenance	$7,500
Street Sweeping (includes contractor and disposal costs)	$191,412
Storm Drain and Channel Maintenance	$213,600
Specialized Equipment (Public Services)	$3,000
Waste Disposal (volunteer river cleanups)	$6,500
Legal Expenses	$10,500
Miscellaneous Expenses (Supplies, Printing, Postage, apparel, rainy season sand bags, etc.)	$12,261
Monitoring	$49,533
Professional Development	$5,168
Jurisdictional Program Total	**$852,858**

Regional Programs Total (Santee Share)	**$98,460**

Total Program Implementation Costs **Grand Total**	**$951,318**

Table 2: 2015/2016 Funding Source Summary

Funding by Source	Amount
General Fund	$341,972*
Storm Water Business License Fee	$5,141
Administrative Citations	$14,000
Flood Control	$290,016
Gas Tax	$174,264
Total Funding	**$825,393**

** Does not include funding which is secured through developer deposits and fees.*

4.3 JURISDICTIONAL STRATEGIES

~~Strikeouts~~ and blue text are text edits that have been made up to the current date since the WQIP September 2015 submittal.

Table A2-13. City of Santee Jurisdictional Strategies and Implementation Schedules for Illicit Discharge Detection and Elimination Program

San Diego River Illicit Discharge Detection and Elimination Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Engage the public, jurisdictional staff, and other agency staff to proactively identify and report illicit discharges.					
Facilitate public reporting of illicit discharges and connections via telephone and email.	●	●	A		The City created a storm water / water quality general awareness post card and mailed it out to all postal customers in the City.
Coordination with Padre Dam Municipal Water District regarding sanitary sewer overflow notifications and cleanup.	●	●	A		
Coordinate with upstream entities to prevent illicit discharges from upstream sources from entering the MS4.	●	●	A		
Utilize municipal personnel and contractors to identify and report illicit discharges and connections.	●	●	A		Two ICID trainings were conducted which has resulted in an increase in ICID reporting by internal customers.
2. Develop and implement approaches to address the impacts of septic systems within the watershed.					
Routinely conduct river "sweeps" to address homeless encampments ~~twice per month~~.	●	●	A	The City cannot commit resources to achieve the twice per month goal.	The sheriff routinely targets and 'sweeps' problem areas and notifies the City of the timeframe in which the debris can be removed. Due to limited resources, the City is unable to meet the 2 x per month commitment. Instead, the City relies on public reporting, local volunteer groups, and the sheriff to help identify problem areas and more effectively utilize resources for encampment debris removal.

Table A2-13. City of Santee Jurisdictional Strategies and Implementation Schedules for Illicit Discharge Detection and Elimination Program

San Diego River Illicit Discharge Detection and Elimination Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Weekly patrols of known encampment areas.	●	●	A	The City cannot commit resources to achieve the weekly goal.	The sheriff routinely targets and 'sweeps' problem areas and notifies the City of the timeframe in which the debris can be removed. Due to limited resources, the City is unable to meet the 2 x per month commitment. Instead, the City relies on public reporting, local volunteer groups, and the sheriff to help identify problem areas and more effectively utilize resources for encampment debris removal.
Implement Bicycle Patrol Team in conjunction with San Diego County Sherriff's Department.	●	●	A		During this reporting cycle, the Sherriff Department acquired bicycles, trained and assigned staff, and started routine patrols.
Improved coordination between Public Works staff and San Diego County Sherriff's Department.	●	●	A		Both Departments now utilize GPS devices to share and report information.
Provide waste stations for homeless encampments (e.g., portable toilets, trash receptacles)	●	●	P		The City is evaluating viable locations for a pilot program.
Continue coordination of Enforcement Team including the Fire Marshall, Code Enforcement, Storm Water Program Manager, City Attorney, and Sherriff's Department.	●	●	A		The City initiated quarterly meetings for all parties to discuss concerns, review compliance cases, and collaborate on solutions.
3. Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.					
Coordination with Padre Dam Municipal Water District regarding sanitary sewer overflow notifications and cleanup.	●	●	A		
Revise fact sheet for sewer maintenance and coordinate distribution with Padre Dam MWD.	●	●	A		

Table A2-13. City of Santee Jurisdictional Strategies and Implementation Schedules for Illicit Discharge Detection and Elimination Program

San Diego River Illicit Discharge Detection and Elimination Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Implement practices and procedures to prevent/limit infiltration of seepage from sanitary sewers to the MS4.	●	●	P		
Implement practices and procedures to address spills with the potential to enter the MS4.	●	●	A		The City is working to improve this process through outreach, training, and through enhanced coordination with Heartland Fire and the Department of Environmental Health.
In addition to standard JRMP IDDE requirements, proactively investigate and eliminate illicit discharges and connections.	●	●	A		Increased awareness of how to identify and report IC/ID, has resulted in an increase in City staff, contractor, and partner agency reports. As a result, discharges from pools and irrigation are more frequently identified and eliminated.
4. Implement monitoring programs to provide new information to refine the prioritization of drainage areas.					
Conduct transitional MS4 outfall discharge program to identify persistent/transient flows.	●	●	A		
Conduct watershed specific MS4 outfall discharge program to identify persistent/transient flows.	●	●	A		
5. Actively educate public on prohibitions related to illicit discharges and connections.					
Investigate and eliminate illicit discharges and connections.	●	●	A		
Enforce legal authority to ensure all illicit discharges and connections that are identified are eliminated.	●	●	A		The City has and will continue to utilize its Enforcement Response Plan to escalate enforcement actions to achieve compliance in a timely manner.

Table A2-14. City of Santee Jurisdictional Strategies and Implementation Schedules for Development Planning

San Diego River Development Planning Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Provide updated materials, enhanced outreach, and training to convey land development requirements.					
Establish criteria designating priority development projects for new development and redevelopment projects.	●	●	A		
Update BMP design manual procedures to specify storm water requirements applicable to development and redevelopment projects, identify and design appropriate BMPs, establish maintenance criteria, and establish alternative compliance options (where implemented).	●	●	P		
2. Develop and implement LID programs to complement standard permit requirements.					
Require full enclosures for trash areas.	●	●	A		All new and significant redevelopment projects are now required to either retrofit existing, or install new, fully enclosed trash enclosures, with all openings / gaps screened to prevent wind dispersal. Poor waste management and repeat violations also trigger this requirement for existing development.
3. Implement a Watershed Management Area Analysis to develop watershed specific requirements for structural BMP implementation and identify a list of candidate projects that could be used as alternative compliance options for Priority Development Projects.					
Develop and implement a Watershed Management Area Analysis to develop watershed specific requirements for structural BMP implementation.	●	●	A		Developed collaboratively through a regional effort with other Copermittees.

Table A2-14. City of Santee Jurisdictional Strategies and Implementation Schedules for Development Planning

San Diego River Development Planning Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
4. Implement an alternative compliance program for Priority Development Projects.					
Implementation of an alternative compliance program will provide off-site alternatives to restore, retrofit, and rehabilitate. Prioritize areas through “hotspot” identification and those sites that are ideal for retrofit/rehabilitation.	●	●	A		The City partnered with SDSU through the SAGE program to have three separate but complimentary studies completed. One of the identified priority locations was recently submitted and awarded as a grant project.
5. Implement a post construction BMP program for development projects to ensure proper construction and maintenance.					
Implement source control, LID, and on-site structural controls for all priority development projects.	●	●	A		This strategy has been enhanced to include all development (priority and standard).
Implement a program that ensures that all structural BMPs are designed, constructed, and maintained on PDPs.	●	●	A		The City now requires the engineer of record to certify installation of all structural BMPs. This includes a signed and stamped form, along with supporting documentation (receipts, photos) demonstrating installation per specification. This also includes the final landscaping of the feature, not just the structural design and sizing.
Inspect all high priority structural BMPs prior to the rainy season.	●	●	A		

Table A2-14. City of Santee Jurisdictional Strategies and Implementation Schedules for Development Planning

San Diego River Development Planning Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
6. Enforce post construction requirements related to new and redevelopment.					
Require implementation of source control and low impact development (LID) BMPs for all development projects.	●	●	A		At a minimum, all projects, regardless of size, must disconnect impervious surfaces by routing runoff to landscape, eliminate all non-storm water runoff sources, utilize native and drought tolerant plantings, mulch, and irrigation systems, and install full trash enclosures.
Enforce legal authority to ensure all development projects are in compliance with all post construction requirements.	●	●	A		The City has and will continue to enforce the routine maintenance and upkeep of all source and structural BMPs to ensure they remain effective and operating as intended. This includes escalating enforcement actions and utilizing administrative citations to achieve compliance.

Table A2-15. City of Santee Jurisdictional Strategies and Implementation Schedules for Construction Management

San Diego River Construction Management Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Ensure that minimum BMPs are designated and required for construction projects.					
Require submittal of pollution control plan, construction BMP plan, and/or erosion and sediment control plan for projects requiring local permits involving soil disturbance activities.	●	●	A		
Review and confirm that the submitted plan is in compliance.	●	●	A		The City ensures that all projects, including interior remodel projects, demonstrate on their site plan all minimum BMPs required for the activity to be performed.
Maintain, update, and prioritize a watershed based inventory of all projects issued local permits that allow soil disturbing activities.	●	●	A		All projects disturbing soil, whether they qualify for a CGP permit or not, are now included on the City's Construction Site Inventory.
Implement or require implementation of BMPs that are site specific, seasonally appropriate, and appropriate to the construction phase year round.	●	●	A		All projects involving grading are required to attend a pre-grade meeting at City Hall. At this meeting, each project representative and contractor is provided a BMP packet, and a presentation is given highlighting key concepts such as minimum BMPs required at all times, erosion and sediment control, and the inspection – corrective action response process.
Inspect construction sites at an appropriate frequency to require and confirm compliance with local permits and ordinances, as well as the MS4 Permit requirements.	●	●	A		

San Diego River Construction Management Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Enforce legal authority to ensure inventoried construction projects are in compliance with all requirements.	●	●	A		The City has and will continue to utilize its Enforcement Response Plan to escalate enforcement actions to achieve compliance in a timely manner.
Target construction sites with increased enforcement as appropriate, especially related to trash management.	●	●	A		
2. Provide enhanced outreach and coordination to convey construction requirements.					
Provide internal staff training related to construction storm water management.	●	●	A		One construction site compliance training was held for all City Engineers.
Provide public education and outreach targeting the construction industry.	●	●	A		The City routinely emails reminders and updates to all inventoried construction sites throughout the year. The City also provides materials and verbal guidance at each pre-grade meeting. The City's web page and fact sheets have all been updated with construction outreach materials, and the City is working on creating a mock site plan with BMPs for a typical construction site.
Coordination with engineering and building inspection divisions to address SSOs caused by debris in sanitary sewer lines following new construction; review sign off procedures to ensure that debris in lines is avoided.	●	●	P		

Table A2-16. City of Santee Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Maintain and improve data tracking methods for existing development inventories where necessary.					
Maintain and update a watershed based inventory of existing development (i.e., commercial, industrial, and municipal facilities and residential areas).	●	●	P		Staff have started conducting a thorough review and cross-verification of all inventories. This includes a review of current Business Licenses.
2. Develop and implement approaches to address the impacts of improper water use and irrigation runoff.					
Coordinate with Padre Dam Municipal Water District to encourage proper enforcement of water conservation requirements.	●	●	A		Coordination has led to increased reporting/cross reporting of issues, the development of cross messaged material, and dual (combined agency) enforcement actions.
Coordinate with Padre Dam Municipal Water District to provide joint outreach to residents and businesses regarding irrigation practices.	●	●	A		New fact sheets have been created which highlight the cross benefit of water conservation, reduction of water waste, water runoff, and water quality.
Coordinate with Padre Dam Municipal Water District to increase incentive programs	●	●	A		Padre Dam shared some of their regional supplies such as the County Water Authority buckets for cross outreach. Both agencies cross promote the County Water Authority and SoCalWaterSmart for incentive programs.
Coordinate with County of San Diego to promote Sustainable Landscapes Program.	●	●	P		The City hopes to bring workshops to east county by offering City Hall as a venue for classes, coordinating with Padre Dam, and assisting with field trips.

Table A2-16. City of Santee Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Coordinate with Santee School District to improve operations and maintenance of irrigation systems at school facilities	●	●	A		The City supported the successful application for a DROPS grant for Santee Schools. The grant program involves the implementation of rain gardens, bioswales, disconnecting impervious surfaces, and rainwater harvesting. An education and outreach component is included which will teach the students about the projects and how they can be replicated at home. Additionally, through Dry Weather Monitoring, it was identified that discolored runoff was originating from one of the school track and fields. The City worked with the school district to rectify the issue.
Develop education and outreach to reduce over-irrigation.	●	●	A		
Revisions to landscape ordinance	●	●	A		Revisions to the City's Landscape Ordinance were completed this reporting year in conjunction with the drought and water conservation regulations that went into effect. The City utilized this opportunity to reinforce storm water and water quality requirements.
3. Improve and/or continue existing pet waste programs.					
Pet Waste Bag Dispenser Stations in City Parks and Residential Areas	●	●	A		The City operates and maintains over 40 dog stations. Combined, approximately 20,000 bags are dispensed each month.
4. Improve trash management strategies within the watershed.					
Develop and distribute "Keep Lids Closed" stickers for dumpsters.	●	●	P		

Table A2-16. City of Santee Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Target commercial centers for increased enforcement, especially related to trash management.	●	●	A		Several problem areas have been identified through the City's Complete Property Inspection Program. These areas have been addressed through mandatory outreach to tenants, retrofits to trash enclosures, requiring the development and submittal of a Facilities Operations and Maintenance Plan, and escalating enforcement actions.
Coordination with Santee School District for trash management.	●	●	A		
Implement a schedule of operation and maintenance for public streets, unpaved roads, paved roads, and paved highways.	●	●	P		The City will reevaluate and reprioritize its roadway maintenance program in FY17-18. The City plans include a routine assessment and maintenance plan for both private and unpaved roads.
Require sweeping and maintenance of private roads in targeted areas.	●	●	A		New developments with proposed private roads are now required to include routine street and storm drain maintenance as part of their Storm Water Quality Management Operation and Maintenance Plans. In addition, as RMA inspections are completed, should road maintenance deficiencies be identified, the City requires the community/property owner to clean their roadways and implement a routine maintenance plan.
Continue reporting and evaluating volumes of trash removed from illegal dumping activities	●	●	A		The City facilitated the removal of approximately 65,415 pounds of trash.

Table A2-16. City of Santee Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Develop outreach program similar to the "Don't Trash California" campaign, including updates to existing outreach materials.	●	●	P		
Enhance and expand trash cleanups through community-based organizations involving target audiences.	●	●	A		The City supports volunteer organizations by providing clean up materials and tools, and providing waste hauling and disposal services.
5. Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.					
Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	●	●	A		Many of the City's underground storm drain systems have been and are being relined to improve integrity.
Develop a strategy to identify and provide outreach to gray water system owners	●	●	P		
6. Improve and implement existing outreach programs to target key sources and pollutants.					
Increase seasonal specific outreach related to water use via business journals.	●	●	A		The City has initiated outreach though partnerships with the local Chamber of Commerce, and Business Associations.
Enhanced outreach to pool owners and maintenance companies - due to economic downturn, people have stopped maintaining pools, when flushed, may contain bacteria.	●	●	A		All Santee based pool maintenance providers were provided notification and outreach regarding proper maintenance and disposal practices. Outreach materials have also been provided to HOAs and the local pool supply store.
Golf Course - outreach specific to management of landscaping and water use; bio solids use as fertilizer/storage.	●	●	A		

Table A2-16. City of Santee Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
SDR Trail Expansion (City Parks) - interpretive signage; demonstration project for drought tolerant/native landscaping, permeable surfaces, and other LID.	●	●	P		
Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	●	●	A		All Storm Water Program web pages have been refreshed with new content, more tools and resources.
Enhance school and recreation-based education and outreach.	●	●	A		The City has partnered with several of the Santee schools to provide presentation, provide outreach materials such as calendars and coloring books, and cohosted a 4th grade field trip to the Sand Diego River. In addition, the City requires that permitted use special events complete and submit both pre and post event inspections to ensure that BMPs are put into place, and the site is cleaned to pre-event conditions. The City required this documentation for 7 City events and 3 private events.
7. Enhance existing MS4 maintenance programs.					
Prioritized MS4 cleaning program based on land use density and traffic flows.	●	●	P		The City plans to reevaluate and reprioritize the MS4 maintenance program in FY17-18.
Investigate potential to use ultra-violet lights in the MS4.	●	●	P		The City will research and identify opportunities to implement UV on a pilot project, as funding allows.
Implement invasive species removal projects in coordination with San Diego River Conservancy.	●	●	A		

Table A2-16. City of Santee Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
8. Improve existing inspections programs to more efficiently target key sources.					
Prioritize residential management areas for focused inspections.	●	●	A		RMAs have been prioritized based on their proximity to pollutant hot spots.
Provide or expand targeted outreach to homeowners associations.	●	●	P		
Provide targeted outreach via printed materials to residential areas.	●	●	A		In preparation for an anticipated El Nino rainy season, the City mailed out 1,115 notification letters were sent to private property owners explaining the importance of maintaining their private drainage systems, including brow ditches and swales.
Conduct inspections of inventoried existing development to ensure compliance. Each area/activity inspected once every five years minimum, with equivalent of 20% of inventory inspected annually.	●	●	A		
Complete property inspection program	●	●	A		Complete property inspections have commenced at locations directly tributary to a known pollutant 'Hot Spot'.
9. Actively enforce stormwater and urban runoff requirements for existing development.					
Designate and require minimum set of BMPs required for all inventoried existing development.	●	●	A		This was strategy is complete. A new fact sheet has been created, and minimum conditions of approval have been developed.
Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	●	●	A		

Table A2-16. City of Santee Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Enforce legal authority to ensure inventoried existing development facilities and/or areas are in compliance with all requirements.	●	●	A		
10. Identify and facilitate retrofit opportunities in areas of existing development.					
Develop a strategy to identify opportunities and facilitate the implementation of retrofit projects in areas of existing development.	●	●	A		This strategy was initiated through the partnership with SDSU. To date, efforts have led to the successful award of a grant project, and the incorporation of water quality improvements into existing (pre-planned) Capital Improvement Projects.
Implement green streets depending on WMAA results.	●	●	P		Although a plan is not currently in place, one pilot project was completed as part of the Prospect Avenue Corridor enhancement project.
Coordinate with Padre Dam Municipal Water District to increase incentive programs	●	●	P		The City looks forward to partnering on a rain barrel incentive program.
Coordinate with County of San Diego to promote Sustainable Landscapes Program.	●	●	P		

Table A2-16. City of Santee Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies City of Santee	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
11. Improve coordination between agencies.					
Increased public outreach through external professional organizations (e.g., APWA, ASCE, Chamber of Commerce) - leveraging groups/contacts/newsletter.	●	●	A		The Storm Water Program has forged relationships with the Santee Chamber of Commerce and the East County Manufacturing Association to participate in events, share materials, and provide news article content.
Coordinate with Padre Dam Municipal Water District to encourage proper enforcement of water conservation requirements.	●	●	A		Although the drought alert level has lowered, the City has worked with Padre Dam to cross post information about water conservation and water quality. Both agencies now cross refer citizen complaints/reports as applicable.
Coordinate with Padre Dam Municipal Water District to provide joint outreach to residents and businesses regarding irrigation practices.	●	●	P		
Coordinate with Padre Dam Municipal Water District to increase incentive programs.	●	●	P		The City is planning to partner with Padre Dam to host a rain barrel sales event.
Coordinate with County of San Diego to promote Sustainable Landscapes Program.	●	●	P		

Table A2-17. City of Santee Optional Jurisdictional Strategies and Implementation Schedules

San Diego River Optional Jurisdictional Strategies	Implementation Timeframe	FY15-16	FY16-17	Actual / Planned	Comments
Maintain MS4 map to facilitate implementation of the IDDE Program; add private drainages	FY 15-16 FY 16-17	◖	◖	A	The City has updated its MS4 map. Through a partnership with SDSU, the City has begun identifying and adding private drainage systems to the City's MS4 map and GIS files. To date, efforts have been focused on collecting data in the city's center, where the heart of development is.
Implement Alternative Compliance Program for Priority Development Projects to encourage rehabilitation.	2017-2020	NA	◖	P	The City has and will continue participating in the development of a regional alternative compliance program in partnership with the region's Copermittees. Through a partnership with SDSU, the City has completed an initial review, evaluation, and prioritization of potential candidate sites for off-site improvement projects.
Implement a Green Streets (aka Complete Streets) Program	2017-2020	NA	X	P	The City has implemented one green street as a part of the planned improvements to Prospect Avenue. The City will begin developing strategies to incorporate green streets to its existing Capital Improvement Program in FY2017-2018.

San Diego River Optional Jurisdictional Strategies	Implementation Timeframe	FY15-16	FY16-17	Actual / Planned	Comments
Update standard Conditions of Approval to require all non-PDP redevelopment sites as well as significant tenant improvements to retrofit the entire property to incorporate minimum trash controls (fully covered/contained trash enclosure, inlet retrofits/trash baskets, etc.) and redirecting runoff to pervious areas.	2016-2018	●	●	A	The City has begun implementing this strategy with successful implementation at more than four locations thus far.

Notes:

● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented, NA – Not Applicable

A – Actual (active implementation), P – Planned (planning stage)

4.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

The City of Santee BMP Design Manual provides guidance for land development and public improvement projects to comply with relevant development planning requirements in the Municipal Permit. The City of Santee updated its BMP Design Manual in accordance with Municipal Permit requirements in February 2016; the BMP Design Manual replaced the Standard Urban Stormwater Mitigation Plan (SUSMP). Over the first year of implementation, the City has found clerical errors, formatting errors, and has updated the forms to combined submittals in a form-fillable format. No content changes to the BMP Design Manual have been made since it went into effect in February 2016. The City of Santee BMP Design Manual can be accessed at: www.SanteeH2o.org via the "Development Planning Can Protect Water Quality" link in the left menu bar or via the "New Development" link at the bottom of the page.

4.5 MODIFICATIONS TO THE JRMP

The City made some minor editorial clarifications to its JRMP during the 2015-2016 fiscal year. A copy of the JRMP can be obtained by calling 619-258-4100, x 177.

5 City of San Diego

5.1 ANNUAL REPORT CERTIFICATION

THE CITY OF SAN DIEGO

STATEMENT OF CERTIFICATION

San Diego River Watershed Management Area Water Quality Improvement Plan

2015-2016 Annual Report

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Andrew Kleis

Drew Kleis
Deputy Director
Transportation & Storm Water Department

1/12/17
Date

Transportation & Storm Water Department
9370 Chesapeake Drive, Suite 100, MS 1900 • San Diego, CA 92123
Hotline (619) 235-1000 Fax (858) 541-4350

CITY OF SAN DIEGO

SCOTT CHADWICK
CHIEF OPERATING OFFICER

January 27, 2017

Mr. David W. Gibson, Executive Officer
Regional Water Quality Control Board
San Diego Region
2375 Northside Drive, Suite 100
San Diego, CA 92108

Subject: Certification of Adequate Legal Authority

Dear Mr. Gibson:

Pursuant to San Diego Regional Water Quality Control Board Order No. R9-2013-0001, as amended by Order No. R9-2015-0100 (Municipal Permit or Permit), Provision E.1.b, the City of San Diego, as a Copermittee in the above referenced permit, submits this certification of adequate legal authority with the first Water Quality Improvement Plan Annual Report. The City has adequate legal authority to implement and enforce each requirement contained in 40 C.F.R. section 122.26(d)(2)(i)(A)-(F), and the Municipal Permit (including Provision E.1.a(1)-(10)). The San Diego Municipal Code, including the following provisions, provides the City with adequate legal authority as required by the Municipal Permit:

1. Storm Water Management and Discharge Control, sections 43.0301 through 43.0312. These provisions are being amended, although the current version also complies with the requirements of the Municipal Permit.
2. General Construction Permit Authority and Procedures, sections 129.0101 through 129.0120.
3. Grading Regulations, sections 142.0101 through 142.0150.
4. Storm Water Runoff Control and Drainage Regulations, sections 142.0201 through 142.0230.

The City looks forward to working with you and the Regional Board on storm water management matters. If you have any questions, please contact Senior Planner Jim Harry at (858) 541-4353 or email JHarry@sandiego.gov.

Sincerely,

Scott Chadwick
Chief Operating Officer

AK/jph

cc: Mara Elliott, City Attorney, Office of the City Attorney
Stephen Puetz, Chief of Staff, Office of the Mayor
Stacey LoMedico, Assistant Chief Operating Officer
Mike Hansen, Deputy Chief of Staff and Chief of Policy, Office of the Mayor
Paz Gomez, Deputy Chief Operating Officer, Infrastructure/Public Works
Alejandra Gavaldon, Director of Federal Government Affairs & Water Policy, Office of the Mayor
Kris McFadden, Director, Transportation & Storm Water Department
Drew Kleis, Deputy Director, Transportation & Storm Water Department
Davin Widgerow, Deputy City Attorney, Office of the City Attorney
Clem Brown, Program Manager, Transportation & Storm Water Department
Ruth Kolb, Program Manager, Transportation & Storm Water Department
Jim Harry, Senior Planner, Transportation & Storm Water Department

5.2 ANNUAL REPORT FORM

I. COPERMITTEE INFORMATION			
Copermittee Name: **City of San Diego (San Diego River WMA)**			
Copermittee Primary Contact Name: **Drew Kleis, Deputy Director, Storm Water Division, Transportation & Storm Water Department**			
Copermittee Primary Contact Information:			
Address: **9370 Chesapeake Drive, Suite 100**			
City: **San Diego**	County: **San Diego**	State: **CA**	Zip: **92123**
Telephone: **858-541-4320**	Fax: **858-541-4350**	Email: **Akleis@sandiego.gov**	

II. LEGAL AUTHORITY	
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	**YES** ☒ **NO** ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE	
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	**YES**[1] ☒ **NO** ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	**YES** ☒ **NO** ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM[2]	
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
Number of non-storm water discharges reported by the public	**368**
Number of non-storm water discharges detected by Copermittee staff or contractors	**314**
Number of non-storm water discharges investigated by the Copermittee	**683**
Number of sources of non-storm water discharges identified	**559**
Number of non-storm water discharges eliminated	**553**
Number of sources of illicit discharges or connections identified	**551**
Number of illicit discharges or connections eliminated	**545**[3]
Number of enforcement actions issued	**553**[3]
Number of escalated enforcement actions issued	**349**
V. DEVELOPMENT PLANNING PROGRAM[2]	
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	**YES** ☒ **NO** ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	**YES**[4] ☒ **NO** ☐
Number of proposed development projects in review	**233**[5]
Number of Priority Development Projects in review	**21**[6]
Number of Priority Development Projects approved	**61**[7]
Number of approved Priority Development Projects exempt from any BMP requirements	**0**
Number of approved Priority Development Projects allowed alternative compliance	**0**
Number of Priority Development Projects granted occupancy	**32**[8]
Number of completed Priority Development Projects in inventory	**113**[9]
Number of high priority Priority Development Project structural BMP inspections	**1**
Number of Priority Development Project structural BMP violations	**1**[10]
Number of enforcement actions issued	**3**[11]
Number of escalated enforcement actions issued	**1**

VI. CONSTRUCTION MANAGEMENT PROGRAM[2]	
Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES[1,12] ☒ NO ☐
Number of construction sites in inventory	1,830
Number of active construction sites in inventory	38
Number of inactive construction sites in inventory	188
Number of construction sites closed/completed during reporting period	258
Number of construction site inspections	8,875
Number of construction site violations	78
Number of enforcement actions issued	51
Number of escalated enforcement actions issued	25

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM[2]				
Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?				YES[1] ☒ NO ☐
	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	121	10,175 (includes mobile)	513	33[13]
Number of existing development inspections	114	2,573	99	5[13]
Number of follow-up inspections	0	193	5	4
Number of violations	10	420	11	481[13]
Number of enforcement actions issued	16	514	13	365[13]
Number of escalated enforcement actions issued	0	172	0	236

VIII. PUBLIC EDUCATION AND PARTICIPATION	
Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐

IX. FISCAL ANALYSIS	
Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES[1,14] ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

[signature]	1/12/17
Signature	Date
Drew Kleis	Deputy Director
Print Name	Title
(858) 541-4320	Akleis@sandiego.gov
Telephone Number	Email

[1] The City of San Diego approved an update to the Jurisdictional Runoff Management Plan (JRMP) in FY 16. The update of the JRMP was done in compliance with Order No. R9-2013-0001.
[2] See the JRMP Annual Report FY 2016 Attachment 1 for a citywide summary of this data.
[3] The number of enforcement actions issued does not equal the number of identified illicit discharges or connections because some discharge complaints in the last quarter of FY 2016 were still under investigation at the end of FY 2016.
[4] The Storm Water Standards Manual (Part 1: BMP Design Manual, and Part 2: Construction BMP Standards) was updated in January 2016.
[5] The number of ongoing Standard and Priority Development Projects in review as of 6/30/16. The Development Services Department processes other types of permits, in addition to those included in the JRMP Annual Report, that are not subject to the requirements of the municipal permit.
[6] The number of ongoing Priority Development Projects in review as of 6/30/16. Only a portion of the projects that the Development Services Department processes qualify as a priority development project.
[7] The number of Priority Development Projects approved in FY 2016.
[8] This number includes the City's Priority Development Projects that received final inspection in FY 2016 as well as certain Priority Development buildings and grading projects that did not require a Certificate of Occupancy, that were completed in FY 2016.
[9] Represents the total number of completed Priority Development Projects in the City's inventory as of the end of FY 2016. These projects include projects entered into the inventory as complete in previous years.
[10] The number of Priority Development Project structural BMP violations included Notices of Violation, Notices of Deficient Maintenance, and Administrative Citations issued to public and private entities within the City's jurisdiction in this watershed.
[11] The number of enforcement actions included Notices of Violation and Notices of Deficient Maintenance issued to public and private entities within the City's jurisdiction in this watershed. The City has achieved compliance at 146 of the 150 sites identified in the San Diego RWQCB's Notice of Violation (Order Number R9-2014-0034). The San Diego RWQCB granted the City an extension to achieve compliance at the remaining four sites by May 26, 2017.
During the process of achieving compliance for the aforementioned 150 identified sites, the City has discovered an additional 74 sites which initially appear to be out of compliance due to varying degrees of circumstances. Each of these potential violations consist of post-construction BMP issues. Continuing the same process as outlined in our quarterly reports to the RWQCB, the City is currently researching each case. After initial research to verify non-compliance or not, we will follow our established procedures to have each site be in conformance to the MS4 permit under which it was permitted.
[12] Responses in this report are based on the City's internal data. Potential program deficiencies were identified by the Board in FY 2016, however, the City has taken steps to correct issues identified by the Board as detailed in the JRMP Annual Report FY 2016 Appendix. The City has implemented several improvements that address the Regional Board's concerns. These improvements ranged from procedural changes to creating multi-language brochures for contractors. Several operating and internal procedures have been refined to improve enforcement actions, add clarity to how sites are inspected, and to better define the staff's roles and expectations.
[13] Existing facilities for residential uses are characterized as Residential Management Areas (RMA), which could include hundreds of residences. When all of the residences in an RMA are inspected by City staff that is only counted as one inspection. However, all individual issues noted at each residence during an RMA inspection is counted as a separate violation and/or enforcement action.
[14] See the JRMP Annual Report FY 2016 Appendix for the FY 2016 Fiscal Analysis.

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The City of
SAN DIEGO
Development Services Department
Engineering Division

January 12, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Development Services Department Engineering Division Contributions

Please accept this letter as certification of the City of San Diego Development Services Department Engineering Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Edric Doringo, Program Manager at 619-446-5098 or email edoringo@sandiego.gov.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Development Services Department, Engineering Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

Gregory Hopkins

Gregory Hopkins
Deputy Director, Development Services Department

GH/cmm

Enclosure:
cc: Robert Vacchi, Director, Development Services Department
Drew Kleis, Deputy Director, Transportation and Storm Water Department

1222 First Avenue, M.S. 501
San Diego, CA 92101-4155

T (619) 446-5291
sandiego.gov

The City of
SAN DIEGO

Development Services Department
Inspection Services Division

January 24, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Development Services Department Inspection Services Division Contributions

Please accept this letter as certification of the City of San Diego Development Services Department Inspection Services Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Senior Inspector Sam Lindsey or Project Manager Xavier Del Valle at (858) 492-5070.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Development Services Department, Inspection Services Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

William Barrañón
Inspection Services Manager

The City of SAN DIEGO

Public Works Department

Construction Management and Field Services Division

November 3, 2016

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Public Works Department, Construction Management and Field Services Division Contributions

Please accept this letter as certification of the City of San Diego Public Works Department Construction Management and Field Services Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Julie Ballesteros, Senior Civil Engineer, at (858) 573-5012.

I certify under penalty of law that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Public Works Department Field Engineering Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, to the best of my knowledge and belief, is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Myrna M. Dayton, PE, QSP, QSD, DCE
Deputy Director

9485 Aero Drive, Mail Station 18
San Diego, CA 92123
engineering@sandiego.gov

T (858) 627-3200
sandiego.gov

THE CITY OF SAN DIEGO

January 30, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Public Works Department, Project Implementation Division Contributions

Please accept this letter as certification of the City of San Diego Public Works Department, Project Implementation Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Catherine Dungca, Senior Civil Engineer, at (619) 533-3778.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Public Works Department, Project Implementation Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

Marnell Gibson
Assistant Director
Public Works Department

APPENDIX

1 OPERATIONAL ADAPTIVE MANAGEMENT

In Fiscal Year (FY) 2016 the City of San Diego (City) completed technical and non-technical monitoring, special studies, pilot studies, and various other efforts related to its Storm Water Program. The City gained valuable information that led to effective adaptation of procedures and operations, which ultimately led to more effective implementation of its Storm Water Program and the Jurisdictional Runoff Management Plan (JRMP). The following are operational adaptive management improvements that the City made during FY 2016:

- **Get it Done Application**
  In late FY 2016, the City released the Get it Done Application (App), which provides a modern, efficient method for members of the public to report issues to the City. One of the App's features allows illicit discharges to be reported by taking a photo with a phone that includes Global Positioning System (GPS) coordinates, and uploading it to the App. According to a recent City survey, 83 percent of respondents stated that they did not want to call the City government to report a problem. The new Get It Done App eliminates the need to call the City for various problems, by allowing residents to report issues online, which was the preferred method of 50 percent of survey respondents. The App also allows residents to report problems using their name or anonymously.

- **Phase V Street Sweeping Pilot**
  The City completed the fifth and final pilot study of the Targeted Aggressive Street Sweeping Pilot Program in FY 2016, which tested the effectiveness of posting limited-hour "no parking" signs on traditionally non-posted street sweeping routes. After two years of data collection on two subject routes, the study confirmed the hypothesis that a significant amount of additional debris (48% and 58% over baseline on the subject routes) can be removed from posting no parking signs on traditionally non-posted roadways. Based on this finding, the City will consider posting additional routes if supported by the community.

- **Enhanced Catch Basin Cleaning Optimization**
  Enhanced catch basin cleaning is a strategy to address pollutant removal from the Municipal Separate Storm Sewer System (MS4) in three of the City's six watersheds. While most catch basins are inspected once per year, this strategy involves inspecting catch basins within the specified watersheds between two and four times per year. The optimization study assigned priorities to individual basins and watersheds based on eight years of historic debris removal. This optimization focused efforts by reducing the number of inspections performed per year, while increasing total debris removal from those inspections. This enhancement will allow the City to target high priority drains to maximize pollutant removal while maintaining cost efficiencies. In FY 2016, approximately 2,500 additional catch basin inspections and cleanings (if necessary) were completed in the Chollas Creek area of the San Diego Bay Watershed.

- **Flood Control Pump Stations**
  To help minimize the risk of flooding in flood-prone areas during storm events, the City utilizes a number of pump stations to increase the flow of water through the conveyance network. Considering the pump stations are connected to the electric network, they only

function when power is running. In FY 2016, a 2,400 volt automatic transfer switch and generator were installed at a critical pump station that are capable of pumping 130,000 gallons of water per minute. This significantly decreases the risk of flooding in the related drainage area because the pump station will continue to operate during a storm event. The City also replaced or refurbished 11 other critical pump stations. Additionally, the City modernized operations at 14 pump stations by installing a telemetry system that remotely alerts staff of failures, allowing for a more immediate response.

- **Storm Drain Inspections**
  To help prioritize replacement of corrugated metal piping in the City's conveyance network, the City used closed-circuit televising at 62 locations in FY 2016 to assess pipe conditions. The City assessed the condition of 28,000 linear feet of corrugated metal piping in FY 2016.

- **Property-Based Inspections**
  In FY 2016, the City further committed to implementing property-based inspections to increase the business inspection program's efficiency and effectiveness. A previously conducted pilot study on inspection practices found property-based inspections more effective at identifying and resolving water quality issues (e.g., improper trash disposal practices and irrigation runoff, etc.) associated with commercial and industrial businesses. The inspections are focused on areas and activities associated with businesses that would not otherwise be inspected for storm water compliance. The inspections greatly increase the number of businesses subjected to storm water inspections while focusing on the pollution generating areas and activities without unduly increasing the inspection load of City inspectors. In FY 2016, the City performed 835 property-based inspections that accounted for over 4,700 business inspections.

- **Tiger Team**
  The Tiger Team was established in FY 2016 to identify, locate and eliminate sources of human specific bacteria sources in the MS4. The Transportation & Storm Water Department (TSW) leads this effort in partnership with the Public Utilities Department. After a specific portion of the MS4 with elevated human specific bacteria was identified, the Tiger Team performed escalated enforcement activities through TSW Code Enforcement, MS4 sampling, MS4 sanitary sewer line televising, and MS4 and sanitary sewer cleaning. Over several months during the reporting year, one problem area within the City was investigated extensively and a source of human specific bacteria in the MS4 was identified and abated.

- **Increased Non-Stormwater Discharge Investigations**
  The City received 215 more complaints of non-stormwater discharges in FY 2016. Approximately 81% of the complaints citywide were resolved. A majority of the investigations that were resolved involved irrigation runoff. Cases were unresolved either because the source could not be identified or the source was groundwater.

  The identification and elimination of irrigation efforts in FY 2016 involved the following:
  1) Special irrigation patrols were conducted on a monthly basis. All violating properties were issued notices of violation and/or a citation.
  2) TSW code compliance partnered with the Public Utilities Department. If a complaint of irrigation with runoff was received, a storm water code compliance officer would issue a notice of violation. If the property had multiple complaints,

that property would become part of an irrigation patrol and could result in a citation.

- **Waterways Maintenance Plan**
  The City began development of the Waterways Maintenance Plan in FY 2016, which will replace the Master Storm Water System Maintenance Program, which expires in 2018. The goals of the Plan are to create an overall holistic storm water management strategy with standard mitigation measures and streamlined maintenance approvals. Objectives of the Plan include flood risk reduction, infrastructure sustainability and resource protection and restoration. In addition to technical scoring criteria, the Plan also includes a unique public input metric so that public concerns are given a tangible value. Planning efforts will continue in FY 2017, with implementation beginning in FY 2019.

- **Off-Site Alternative Compliance Program**
  In FY 2016, the City implemented phase I of the Alternative Compliance Program. This gives development projects that would require on-site structural Best Management Practices (BMPs) to comply with pollutant control and hydromodification management the option to propose off-site alternative compliance projects. The development of phase II also began in FY 2016 and includes establishing an in-lieu fee structure and credit system as an alternative to installing on-site stormwater BMPs.

- **Watershed Master Planning**
  To provide the high-resolution data needed to drive systematic and cost-effective implementation of green infrastructure (GI) projects, the City has developed a comprehensive and dynamic Watershed Master Plan (WMP) in the Chollas Creek Watershed that quantifies progress towards water quality goals and incorporates synergies with other municipal programs. The WMP has the capability to dynamically assess the cost-based water quality benefits of specific GI projects against one another and incorporates a robust prioritization logic that realizes the complex nature of implementing retrofit GI facilities within a highly urbanized environment. Ultimately, the output of this project gives the City a project-by-project roadmap that is prioritized to implement high-impact and high-efficiency BMPs first, leaving less desirable projects for later implementation.

- **Bacteria Regrowth Study**
  The bacteria regrowth study currently being completed by the City includes monitoring to characterize the magnitude and extent of potential *Enterococcus* loading due to regrowth within the City's storm drain system. This study will quantify the amount of bacteria in receiving water samples that are harmless to humans and would potentially be used to refine bacteria water quality standards of the Bacteria TMDL as a part of the re-opener process.

- **Los Peñasquitos Lagoon Restoration Project**
  Modeling was completed in FY 2016 to confirm the preferred alternative for the Los Peñasquitos Lagoon Restoration project. The City was identified as the "lead" for the project. The upcoming tasks in FY 2017 include completing the concept design and starting the public outreach process. In coordination with Copermittees, Caltrans and SANDAG completed the environmental and construction phases for various rail and transit, highway, and environmental protection projects.

2 Stormwater Program Accomplishments/Notable Updates

The City continued to implement the key elements of the JRMP. The following are stormwater accomplishments and notable updates that occurred during the FY 2016 reporting period.

- **Water Quality Improvement Plans**

  In FY 2016, the San Diego Regional Water Quality Control Board (Regional Board) accepted the six Water Quality Improvement Plans (WQIPs) that included City jurisdiction. The goal of the WQIPs is to protect, preserve, enhance, and restore the water quality of receiving water bodies. These WQIPs identify the adaptive planning and management process necessary to address the highest priority water quality conditions within a watershed. The WQIPs also identify strategies to achieve improvements in the quality of discharges from the Responsible Agencies' storm drain systems. The City is the lead on the WQIP for the San Dieguito, Los Penasquitos, and Mission Bay watersheds. The City is also a participating agency in the San Diego River, San Diego Bay, and Tijuana River watersheds.

- **JRMP Refinements**

  In FY 2016, the City identified refinements to the JRMP. These refinements were incorporated into the JRMP and will be completed in mid FY 2017. Refinements included minor changes to text to update the discussions of WQIP strategies, updates to the fiscal analysis, updates to the minimum BMPs to address pesticide applications, and updated references to the Storm Water Standards Manual that was adopted in FY 2016. The updated JRMP can be viewed at https://www.sandiego.gov/stormwater/plansreports/jrmp.

- **General Plan and Community Plan Amendments**

  Southeastern San Diego and Encanto Neighborhoods Community Plan Updates:

  The recently adopted Southeastern San Diego and Encanto Neighborhoods Community Plans incorporate language, policies and recommendations concerning the reduction of urban runoff and storm water quality. Stormwater quality plays a significant role in both of these communities since Chollas Creek is a significant feature within both plan areas lead directly to the San Diego Bay. A primary recommendation in both community plans is the restoration and enhancement of the creek, consistent with the Chollas Creek Enhancement Program, which includes the reduction of pollutants that enter the storm water system from nearby uses (see respective Conservation Elements). Specific stormwater language and policies have been adopted for the newly updated Southeastern San Diego and Encanto Neighborhoods Community Plans (adopted October 2015 by City Council).

The following policies have been adopted and will be used to implement BMPs for new development projects in Encanto as an example:

- PLU-53:
  - Facilitate urban gardening as a strategy for creating local healthy food systems and fighting chronic obesity related illnesses, contributing to stormwater retention, and fostering community interaction;
  - Figure 3-4 in the Southeastern San Diego and Encanto Neighborhoods Community Plan illustrates stormwater treatment for streets;
  - Images on page 4-15 in the Southeastern San Diego Encanto Neighborhoods Community Plan illustrate stormwater treatment images;

- P-UD-88: Utilize permeable paving, bioswales, green alleys and/or other stormwater design features that will manage rain water and irrigation runoff while supporting the heavy load vehicles that would service the loading docks and refuse containers;

- Upgrade infrastructure for water and sewer facilities and institute a program to clean the storm drain system prior to the rainy season.

- Install infrastructure that includes components to capture, minimize, and/or prevent pollutants in urban runoff from reaching San Diego Bay and Chollas Creek. (See also Urban Runoff Management in the Conservation and Sustainability Element.)

- P-RE-20: Require that all stormwater and urban runoff drainage be filtered or treated before entering into open space lands.

Draft North Park Community Plan: The draft North Park Community Plan, scheduled to be adopted by City Council in October 2016, also contains specific Stormwater and BMP language in the Conservation Element of the Community Plan as well as in the appendices. The draft North Park Community Plan incorporates language, policies and recommendations concerning the reduction of urban runoff and storm water quality specifically in relation to tree planting as well as “Green Streets”. Specific policies include:

- PF-1.15 Implement water improvements programs so there are systematic improvements and gradual replacement of water and wastewater facilities throughout the community. Also see General Plan PF-F.6 PF-G.2, PFH. 3, and PF-I.1.
  - Implement Green Infrastructure strategies to address storm water runoff throughout North Park.

- SE-3.17 Encourage property owners to design or retrofit landscaped or impervious areas to better capture stormwater runoff.

Draft Uptown and Golden Hill Community Plans: Public review drafts of the community plans for Uptown and Golden Hill plan updates were made available for public review in June 2016. The Conservation Elements of the draft community plans address conservation of the natural resources in each community, including open space, natural habitats, canyon sewer maintenance, and management of water resources and

urban runoff. The Public Facilities, Services and Safety Elements also address water, sewer and stormwater infrastructure. The discussion and policies related to these topics are intended to guide sustainable development practices that will minimize ecological footprints within each community and preserve natural features and resources. The Draft Programmatic Environmental Impact Reports were released in the summer of 2016. Adoption of the community plans are anticipated at the end of 2016.

San Ysidro Community Plan Update: A comprehensive community plan update started in San Ysidro in June of 2010 and aims to reflect the current conditions, improve mobility, include the pedestrian environment, and address quality of life issues. A Community Plan Update Stakeholders Advisory Committee (Advisory Committee) was established as part of the plan update effort and consists of diverse representation from the residents, property owners, various business interests, local community organizations, and not-for-profit groups, and participating public agencies within the plan update boundary. The San Ysidro Community Planning Group, which provides City decision-makers with input and recommendations regarding land use plans and development proposals within the San Ysidro plan boundary, makes up the majority of the Advisory Committee members. The Plan update effort is informed by technical studies and the City's 2008 General Plan which promotes current storm water, urban runoff, and water conservation policies. A discussion draft of the plan was released in June 2014 and a public review draft was released in April 2015 and 2016. The plan includes a Conservation Element as well as a Public Facilities Services and Safety Element, and contains specific policies related to reducing storm water runoff in the San Ysidro Community planning area. The plan is anticipated to be adopted in fall 2016.

- **Notices of Violation**

Treatment Control BMPs Notice of Violation: The City has achieved compliance at 146 of the 150 sites identified in the Regional Board's Notice of Violation (Order Number R9-2014-0034). The Regional Board granted the City an extension to achieve compliance at the remaining four sites by May 26, 2017.

During the process of achieving compliance for the aforementioned 150 identified sites, the City has discovered an additional 74 sites which initially appear to be out of compliance due to varying degrees of circumstances. Each of these potential violations consist of post-construction BMP issues. The City is continuing the same process outlined in its quarterly reports to the Regional Board, and is researching each case. After initial research to verify non-compliance or not, the City will follow its established procedures to achieve compliance at each site as required by the MS4 permit that it was permitted.

Administrative Civil Liability Complaint: The Regional Board conducted an audit of the City's construction management program during the 2014-2015 rainy season, and issued an Administrative Civil Liability Complaint in July 2016 for several alleged violations involving the City's construction oversight and enforcement practices. The City has worked diligently to address their initial concerns, and will continue to evaluate and implement strategies to ensure long-term success.

Since 2011, there has been a steady increase in the number of construction projects citywide. This surge in activity required the City to respond in a manner that would

enable the staff to keep up with the demand and allow the managers to effectively oversee the growth.

Several substantial improvements have been made, ranging from updating our standard procedures and increasing our outreach efforts to improving the City's escalating enforcement practices and issuing Administrative Citations and Administrative Civil Penalties to repeat offenders. In addition, the City established bi-weekly coordination meetings with the Storm Water teams from Public Works, Development Services and TSW to more effectively share up-to-date project information, discuss various strategies, collaborate on solutions, and coordinate enforcement on a more routine basis so that escalated enforcement is effective.

Another significant improvement involves the development of a unified storm water enforcement database. This will ensure collaboration between Resident Engineers (RE) and storm water inspectors while in the field so they will know the full inspection and enforcement history prior to entering a site. This resource is expected to be available in FY 2017.

Updating the Storm Water Standards Manual is another milestone improvement that was completed during FY 2016. The additional clarity that's now provided in the Construction BMP Standards section (Part 2) gives the responsible party increased guidance to help prevent construction activities from adversely impacting water quality downstream.

The frequency of the citywide storm water training has increased and proven to be a key factor in equipping and empowering our staff to properly address various field challenges and confidently communicate concerns and violations to the responsible parties. Some of the trainings included mandatory annual storm water training for the REs, Inspectors and Code Enforcement Officers, as well as training for our operations staff from the Public Utilities Department and TSW Streets Division.

3 FISCAL ANALYSIS

3.1 GENERAL BUDGET INFORMATION

The Storm Water Division is responsible for reporting annually on the jurisdictional, watershed and regional fiscal analyses to the Regional Board in accordance with the regional Fiscal Analysis Method developed by the Copermittees in response to Regional Board Order No. R9-2007-0001 (2007 Permit). During the reporting period, the Storm Water Division collected and analyzed financial information from 23 City departments/divisions through its "Annual Report Form" questionnaire, as well as from within the Storm Water Division. A summary of the findings is included below.

FY 2016 fell within the transitional period, as defined under Regional Board Order No. R9-2013-0001, as amended by Order No. R9-2015-0001 (Municipal Permit). During the transitional period, most of the jurisdictional portions of the City's program continue to follow the requirements of the 2007 Permit, while the JRMP and WQIPs were being developed in response to the current Municipal Permit. The WQIPs were approved by the Regional Board at the end of FY 2016. The expenditures described for FY 2015 therefore reflect costs to comply with the transitional period stormwater requirements in effect during FY 2015, which are a combination of 2007 Permit and current Municipal Permit standards. Since the WQIPs were approved during FY 2016, partial implementation began, but full implementation will commence in FY 2017.

It is expected that the City will begin full implementation of current Municipal Permit requirements during FY 2017. The City will implement the revised JRMP, which updates the City's jurisdictional stormwater program to follow the current Municipal Permit requirements rather than the 2007 Permit requirements. The City's fiscal analysis reporting structure in turn will change, reporting expenditures, and funding sources in the following three main categories: JRMP (jurisdictional), WQIP (watershed), and flood risk management. That structure is consistent with the framework described in the City's Watershed Asset Management Plan (WAMP), the WQIPs to which the City is a party, and the JRMP. FY 2015 is the last year in which JRMP and flood risk management will be lumped together under the heading of "Jurisdictional Component" rather than reported separately.

3.2 FISCAL ANALYSIS METHODS

While the City used the format and guidelines included in the Fiscal Analysis Method for reporting purposes, a few modifications were necessary to address how the City tracks accounts internally. Modifications to the expenditure categories are described in the relevant sections below. In many cases, estimated percentages were used to allocate expenditures into the appropriate municipal permit component categories, including watershed and regional.

3.2.1 Fiscal Analysis Results

3.2.1.1 Expenditures

The City's FY 2016 Transitional JRMP Regional Program total expenditures ($75,934,083) for implementing the Municipal Permit requirements are summarized in Table 1.

Table 1: FY 2016 Jurisdictional, Watershed, and Regional Expenditures Summary

Jurisdictional Component	
Administration	$11,179,605
Development Planning (including public and private projects)	$1,897,784
Construction (including public and private projects)	$632,646
Municipal (including Non-emergency Fire Fighting expenditures)	$30,146,109
Storm Water Division Capital Improvements Program (CIP)	$7,929,308
Industrial and Commercial	$2,001,544
Residential, Education, and Public Participation	$2,159,991
Illicit Discharge Detection and Elimination (IDDE)	$11,339,120
Jurisdictional Total	**$67,286,108**
Watershed Component[1]	
San Dieguito Watershed	$1,105,348
Los Peñasquitos Watershed	$2,061,071
Mission Bay Watershed	$1,242,769
San Diego River Watershed	$680,843
San Diego Bay Watershed	$2,165,456
Tijuana River Watershed	$686,584
Watershed Total	**$7,942,071**
Regional Component	
Total Copermittee Cost Share for the City of San Diego	$342,001
Additional Regional Costs for education efforts, monitoring, document reviews, regional meeting attendance, and special projects	$363,903
Regional Total	**$705,904**
Total Costs	**$75,934,083**

[1] Watershed Component costs do not include Capital Improvements Program (CIP) costs. CIP costs are only included in the Jurisdictional Component's Storm Water Division Capital Improvements Program Category.

Transitional JRMP Expenditures

The City's FY 2016 Citywide expenditures for implementing the jurisdictional Municipal Permit requirements are depicted in Figure 1. Expenditures were provided as actual costs in most cases, and when the actual costs could not be determined, estimates of actual costs were provided. The Storm Water Division used the expenditure categories detailed in the Fiscal Analysis Method for jurisdictional reporting. However, because of implementation overlap with the City's education, public participation, and residential Municipal Permit components, it is difficult to separate out individual component costs. Therefore, the expenditures for residential, education, and public participation are reported as one expenditure category.

A total of $67,286,108 was expended in FY 2016 to implement JRMP activities citywide. This amount includes costs paid by sewer and water rate payers (which are used for sewer and water-related services) and costs reimbursed by project applicants. An overview of the expenditures reflected in this component is described below.

Administration ($11,179,605)

Activities identified in this section represent personnel and non-personnel expenses for administration and contracts, grant management, citywide management, staff training, reporting, and assessment of the Municipal Permit.

Development Planning ($1,897,784)

Activities identified in this section represent personnel and non-personnel expenses for plan check reviews, incorporating BMPs into project designs, BMP Design Manual development, and General Plan updates. This category includes expenses for private and public projects.

Construction ($632,646)

Activities identified in this section represent personnel and non-personnel expenses for plan check review services, field inspections related to grading permits, public improvements, and building activities. This category includes expenses for private and public projects.

Municipal ($30,146,109)

Activities identified in this section represent personnel and non-personnel expenses for street sweeping, storm drain and channel maintenance, BMP implementation, and municipal facility and activity inspections. Additionally, this section includes the expenditures for Fire Department activities not related to emergency firefighting, such as facility inspections, stormwater BMPs, etc.

Capital Improvement Program ($7,929,308)

Activities identified in this section represent personnel and non-personnel expenses for implementation of new construction and planned improvements to existing facilities for storm water management. Projects may include, but are not limited to, the construction, purchase, or major renovation of buildings, utility systems, and other facilities to achieve storm water requirements. In addition, they may also include land acquisitions and roadway projects to install storm water facilities.

Industrial and Commercial ($2,001,544)

Activities identified in this section represent personnel and non-personnel expenses for inspection of industrial and commercial facilities. This also includes personnel and non-personnel expenses for the stormwater components of Food Establishment Wastewater Discharge Program (FEWD) and Industrial Wastewater Control Program (IWCP) inspections.

Residential, Education, and Public Participation ($2,159,991)

Activities identified in this section represent personnel and non-personnel expenses for educational materials, outreach efforts and events, public service announcements (PSAs), household hazardous waste (HHW) and used oil outreach, and community events.

Illicit Discharge Detection and Elimination ($11,339,120)

Activities identified in this section represent personnel and non-personnel expenses for identification and elimination of illicit discharges, enforcing the City's stormwater ordinance and implementation of the administrative civil penalties and citation process, and the urban runoff monitoring program.

Watershed Expenditures

The City's watershed expenditures during FY 2016 for the implementation of the watershed Municipal Permit requirements were provided as actual costs and when the actual costs could not be determined, estimates of actual costs were provided. The Storm Water Division used the expenditure categories (administration, watershed activities, cost share contribution, and other) detailed in the Fiscal Analysis Method for watershed reporting. The watershed expenditures included in this report only capture City expenditures and do not account for any expenditure disbursed by other Copermittees within the watershed(s).

In total, $7,942,071 was expended in FY 2016 for the implementation of citywide watershed activities. This amount includes costs for the implementation of applicable TMDLs along with special studies.

Regional Expenditures

The City's FY 2016 regional expenditures ($705,904) for the implementation of the regional Municipal Permit requirements are primarily the City's share of regional Copermittee stormwater program costs. Additional costs include estimated staff time to attend regional meetings and other related administration costs. The Storm Water Division used the expenditure categories (administration, cost share contribution, regional activities, and other) detailed in the Fiscal Analysis Method for regional reporting. The regional expenditures included in this report only capture City expenditures, and do not account for any expenditure disbursed by other Copermittees in the region.

3.2.1.2 Grant Funding for Special Studies

In addition to resources identified for Municipal Permit requirements, the City actively seeks grants, and other funding sources, for special studies and Capital Improvement Projects. For the most part, funding for these projects may be limited to the projects specified and the City may restrict funding reallocation to other projects. Therefore, these resources are currently not incorporated in calculations for total Municipal Permit requirements expenditures detailed in Section 2.2.1.4 above. Table 2 lists projects that were initiated and/or in progress during FY 2016. It is important to note that the projects span multiple years and the amounts listed below are not just representative of FY 2016.

Table 2: Funding for Special Projects

Funding Source	Project	Amount	Matching Fund Amount	Total Amount[2]
San Diego County Water Authority (SDCWA)	Memorial Park Infiltration Basin Construction	$255,651.00	$295,904.00	$551,555.00
State Water Resources Control Board (SWRCB)	43rd & Logan Monitoring & Assessment	$689,300.00	$85,362.00	$774,662.00
SDCWA	Bannock Avenue Infiltration Construction	$630,500.00	$893,300.00	$1,523,800.00
SWRCB	Southcrest Park Infiltration Project	$1,880,070.00	$777,970.00	$2,658,040.00
Total Grant Funding		**$3.5 million**	**$2.0 million**	**$5.5 million**

2 Amounts span multiple years and not just FY 2016

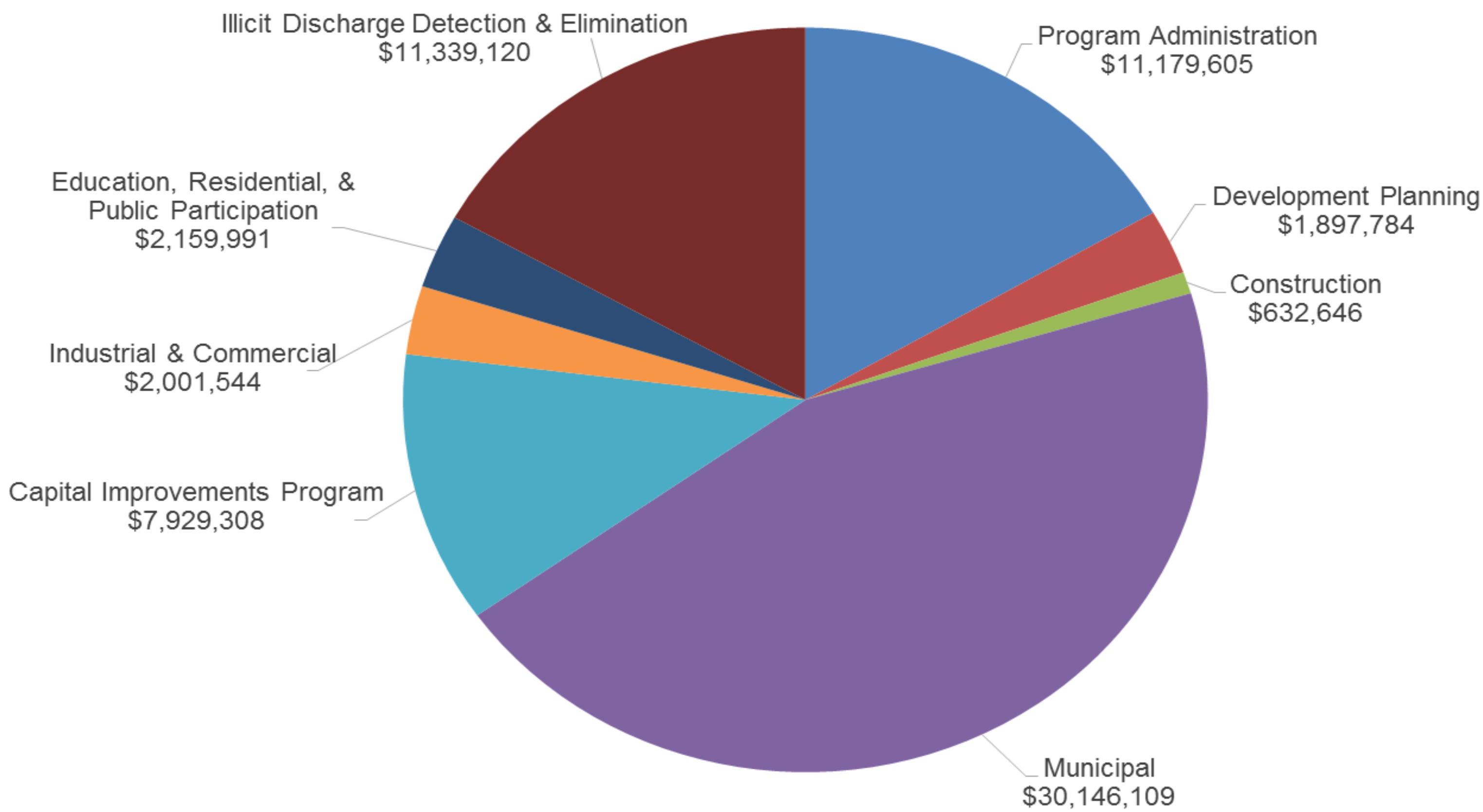

Figure 1: FY 2016 Citywide JRMP Expenditures by Permit Area

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3.2.2 Funding Sources
Citywide implementation of Municipal Permit requirements is funded through four main types of governmental funds: the General Fund, Special Revenue Funds, Enterprise Funds, and Internal Service Funds.

3.2.2.1.1 General Fund
The General Fund is the main fund for the City and is supported by major revenue sources, including property tax, sales tax, transient occupancy tax, and franchise fees. Departments funded by the General Fund provide core community services.

3.2.2.1.2 Special Revenue Funds
Special Revenue Funds account for revenues received for specifically identified purposes. Some of the larger funds that fall under this category include TransNet, Gas Tax, and Special Promotion programs.

3.2.2.1.3 Enterprise Funds
Enterprise Funds are initiated for specific purposes and funded through fees for services. This funding type is designated for the operations, management, maintenance, and development of the department providing the service. For implementation of citywide JRMP activities, activities are funded through the following enterprise funds:

- Airports Fund
- Development Services Enterprise Fund
- Golf Course Enterprise Fund
- Recycling Fund
- Refuse Disposal Fund
- Sewer Revenue Funds
- Water Utility Fund

3.2.2.1.4 Internal Service Funds
Internal Service Funds are comprised of fees for services provided by one City department to another City department or division. For implementation of citywide JRMP activities, activities are funded through the following internal service funds:

- Engineering and Capital Projects Fund
- Equipment Division Funds

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City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 1: Summary of Watershed Specific Data from the IDDE Program

JRMP Annual Report Form – Section IV. Illicit Discharge Detection and Elimination Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of non-storm water discharges reported by the public	119	353	541	368	634	47	**2,062**
Number of non-storm water discharges detected by Copermittee staff or contractors	60	172	317	314	393	50	**1,306**
Number of non-storm water discharges investigated by the Copermittee	171	518	845	683	1,021	97	**3,335**
Number of sources of non-storm water discharges identified	143	442	736	559	828	94	**2,802**
Number of non-storm water discharges eliminated	141	434	697	553	819	92	**2,736**
Number of sources of illicit discharges or connections identified	142	437	715	551	805	94	**2,744**
Number of illicit discharges or connections eliminated	140	429	676	545	796	92	**2,678**
Number of enforcement actions issued	141	436	709	553	819	93	**2,751**
Number of escalated enforcement actions issued	69	197	351	349	445	61	**1,472**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 2: Summary of Watershed Specific Data from the Development Planning Program

JRMP Annual Report Form – Section V. Development Planning Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/ La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of proposed development projects in review	70	241	332	233	561	60	**1,497**
Number of Priority Development Projects in review	5	32	15	21	38	8	**119**
Number of Priority Development Projects approved	88	110	76	61	138	27	**500**
Number of approved Priority Development Projects exempt from any BMP requirements	0	0	0	0	0	0	**0**
Number of approved Priority Development Projects allowed alternative compliance	0	0	0	0	0	0	**0**
Number of Priority Development Projects granted occupancy	75	63	7	30	40	9	**224**
Number of completed Priority Development Projects in inventory	118	178	141	113	213	89	**852**
Number of high priority Priority Development Project structural BMP inspections	1	9	0	1	1	5	**17**
Number of Priority development project structural violations	1	8	0	1	1	5	**16**
Number of enforcement actions issued	1	15	0	3	4	12	**35**
Number of escalated enforcement actions issued	0	3	0	1	1	1	**6**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 3: Summary of Watershed Specific Data from the Construction Managment Program

JRMP Annual Report Form – Section VI. Construction Management Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/ La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of construction sites in inventory	1,364	4,300	2,091	1,830	3,870	448	**13,903**
Number of active construction sites in inventory	26	47	37	38	51	8	**207**
Number of inactive construction sites in inventory	12	112	216	188	425	36	**989**
Number of construction sites closed/completed during reporting period	23	169	276	258	518	44	**1,288**
Number of construction site inspections	10,074	27,037	9,404	8,875	18,737	2,801	**76,928**
Number of construction site violations	169	270	195	78	211	154	**1,077**
Number of enforcement actions issued	114	164	183	51	187	150	**849**
Number of escalated enforcement actions issued	65	91	16	25	32	6	**235**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 4: Summary of Watershed Specific Data from the Existing Development Managment Program

JRMP Annual Report Form – Section VII. Existing Development Management Program	San Dieguito Watershed				Los Peñasquitos Watershed				Mission Bay/La Jolla Watershed				San Diego River Watershed				San Diego Bay Watershed				Tijuana River Watershed				Total Citywide			
	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES
Number of facilities or areas in inventory	23	1,542	81	12	123	8,282	915	27	218	8,911	464	32	121	10,175	513	33	197	14,085	690	70	20	2,075	369	6	702	45,070	3,032	180
Number of existing development inspections	22	308	6	1	117	1,533	140	4	159	4,801	186	5	114	2,573	99	5	195	3,197	102	5	19	233	41	2	626	12,645	574	22
Number of follow-up inspections	0	14	0	0	0	263	13	0	0	166	4	3	0	193	5	4	0	270	44	4	0	31	7	0	0	937	73	11
Number of violations	3	49	0	109	18	388	37	375	34	413	6	424	10	420	11	481	23	511	34	709	1	60	19	69	89	1,841	107	1,819
Number of enforcement actions issued	4	58	0	107	22	490	48	285	46	462	9	407	16	514	13	365	41	623	44	543	1	65	21	62	130	2,212	135	1,790
Number of escalated enforcement actions issued	0	23	0	50	2	148	8	134	0	205	3	182	0	172	0	236	6	217	11	291	0	26	13	36	8	791	35	884

MUN Municipal
COM Commercial
IND Industrial
RES Residential

5.3 JURISDICTIONAL STRATEGIES

Administrative Changes for the San Diego River Water Quality Improvement Plan

The City of San Diego is proposing the following administrative changes to the San Diego River Water Quality Improvement Plan. The proposed administrative changes include clarifications, corrections to errors and typos, and other minor edits that only apply to the City of San Diego.

	WQIP Section	Administrative Changes
1	Section 3.2.10 Alternative BMP Implementation Scenario for Refinement of Water Quality Regulations	Included the following text: "Cost comparison between the Primary and Alternative Scenario presented in this section are a snapshot in time and are based on the best information available at the time they were prepared. As program implementation progresses, updates to estimated funding needs are likely to change. For the most recent estimate of funding needs, refer to the WAMP available at the Storm Water Division website, www.sandiego.gov/stormwater/plansreports.
2	Appendix 3B – Jurisdictional Strategies and Funding Needs	Included the following text: "Funding needs presented in this section are a snapshot in time and are based on the best information available at the time they were prepared. As program implementation progresses, updates to estimated funding needs are likely to change. For the most recent estimate of funding needs, refer to the WAMP available at the Storm Water Division website, www.sandiego.gov/stormwater/plansreports.
3	Appendix 3B – Jurisdictional Strategies and Schedules; Table A-1 City of San Diego Jurisdictional Strategies	Refined the text (shown as track changes in red text in Appendix 2) to provide greater clarity and/or to correct errors and typos.
4	Appendix 3B – Jurisdictional Strategies and Schedules; Table A-1 City of San Diego Jurisdictional Strategies	Changed strategy identification numbering system (See Appendix 2).
5	Appendix 3B – Jurisdictional Strategies and Schedules; Table A-1 City of San Diego Jurisdictional Strategies	Structural Strategies, Priority Development Project (PDP) BMPs: All PDP BMPs have been combined into a single strategy for ease of viewing. A table with an updated list of PDP BMPs is included in the WQIP Annual Report (See Appendix 2).
6	Appendix 3B – Jurisdictional Strategies and Schedules; Table A-1 City of San Diego Jurisdictional Strategies	Structural Strategies, Multi Use Treatment Areas (MUTAs): Planned MUTAs that are not yet built have been combined into a single strategy for ease of viewing. The total sum of drainage area treated (level of commitment) has not changed. A table with all structural strategies (MUTAs, Green Infrastructure, Green Streets, etc.) is included in the WQIP Annual Report (See Appendix 2).

Jurisdictional Strategies Tables

The City of San Diego's strategies are detailed in Tables A2-18 to A2-21. ~~Strikeouts~~ and red text are text edits that have been made up to the current date since the WQIP September 2015 submittal.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Jurisdictional Strategies								
Note: Strategy IDs with an asterisk indicate those strategies that are considered "jurisdictional" in the MS4 Permit, but are considered enhancements to the JRMP to target highest priority water quality conditions.								
JRMP (E.2-E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
CSD-JRMP-01	Establish guidelines and standards for all development projects; provide technical support related to implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area or implement easements to protect water quality, where applicable and feasible le. Includes internal coordination and collaboration between City departments (DSD, PWD, and Engineering) to improve success and long-term benefits of BMPs.	Refer to JRMP Section 4. ~~All high priority projects will be inspected annually prior to the rainy season. 20 percent of all projects will be inspected annually. Maintenance inspections include examination of all structural BMPs at a project to verify that each structural BMP is working, being maintained properly, and is in compliance with all applicable City ordinances and permits.~~ May include providing technical support and consultation for other City departments that review project submittals for compliance with Storm Water Standards Manual requirements. May also include review of City projects for compliance with Storm Water Standards Manual requirements.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Revised Storm Water Standards Manual went into effect on February 16, 2016. FY17 Notes: The Storm Water Standards will be revised to include Critical Coarse Sediment Yield Area mitigation measures that were developed through a TAC process, along with other minor clarifications.
CSD-JRMP-02	Develop Design Standards for Public LID BMPs.	Improve quality of design to ensure efficiency and reliability in public designs.	FY14-FY15	Continuous- As needed	Yes	No Change	Yes	FY16 Notes: Draft Green Infrastructure standard drawings and specifications are currently in the review process. FY17 Notes: Plan to develop more standard drawings and specifications for other green infrastructure components.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-JRMP-03	Outreach to impacted ~~industry~~ commercial, industrial, municipal, and residential development regarding minimum BMP requirement updates.	~~Affects commercial, industrial, and residential development.~~ May include onsite education at the time of inspections, city staff training, and mailers to business owners and prospective business owners.	FY15	Continuous- As needed	Yes	Revised to clarify strategy.	Yes	<u>FY16 Notes:</u> Sent out monthly business Tax License renewal mass mailings, which included information about storm water BMPs. Violation location information from the Residential Patrol Program is used to target outreach.
CSD-JRMP-04*	Train staff on LID regulatory changes and LID practices.	Formal training is required for all staff involved in development plan review to increase knowledge of LID BMPs. Goal of training associated with LID practices and regulations is to promote LID implementation and to avoid adverse conditions such as trees planted within swales, or planned drainage patterns which obstruct or inhibit LID performance.	FY16	Continuous- As needed	Yes	No Change	Yes	<u>FY16 Notes:</u> Presented at a PWD training to discuss the revised Storm Water Standards Manual. Provided a plan check training for plan reviewers at DSD and PWD staff in May 2016.
CSD-JRMP-05*	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities to support compliance with the MS4 Permit and TMDLs in a reasonable manner. Ensure consistency with the City of San Diego's BMP Design Manual. Update the Storm Water Standards Manual accordingly.	Municipal codes and ordinances will be brought to City Council for consideration to encourage LID implementation (e.g., runoff detention and filtration using natural filters and stormwater retention for reuse). LID stormwater management will be encouraged in proposed codes and ordinances associated with development and redevelopment projects, which are brought to City Council for consideration.	FY15	Continuous- As needed	Yes	No Change	No	None
CSD-JRMP-06	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	Technical education and outreach to the development community includes outreach on design standards, City design manuals, and the WMAA.	Prior to FY16	Continuous- Ongoing	Yes	No Change	Yes	<u>FY16 Notes:</u> Presented the revised draft Storm Water Standards at two public workshops in September 2016.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
Priority Development Projects (PDPs)								
CSD-JRMP-07	For PDPs, administer a program and provide technical support to other City departments to ensure implementation of on-site structural BMPs to control pollutants and manage hydromodification by developing City wide storm water development standards and design guidelines.	Administer a program in coordination with other City departments to promote and confirm a thorough understanding of requirements for implementing structural BMPs that control pollutants and manage hydromodification. Includes requirements to confirm proper design and construction through processes controlled by other City departments. Please see Attachment 1 for details on PDP related BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City enhanced the Storm Water Quality Management Plan (SWQMP) template that was developed as a Copermittee effort for developers to use.
CSD-JRMP-08	Institute a program to verify and enforce maintenance and performance of treatment control BMPs.	Refer to JRMP Section 4.5. The Storm Water Division is responsible for annually verifying that all structural BMPs within its inventory are being properly maintained. The Storm Water Division performs verification through an Annual Maintenance Verification mailing and a direct maintenance inspection program. Parties responsible for maintenance of structural BMPs are required to complete and sign the Annual Maintenance Verification, certifying that the structural BMPs are being properly maintained. Direct maintenance inspections will be performed at all projects for which an Annual Maintenance Verification Form was not completed. All high priority projects will be inspected annually prior to the rainy season. 20 percent of all projects will be inspected annually. Inspect additional BMPs as needed. Medium and low priority projects will not require inspection if they have completed their Annual Maintenance Verification form, unless they are part of the 20 percent of projects that are annually inspected.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY17 Notes: For porous pavement BMPs, staff plan to use an infiltrometer to measure BMP effectiveness.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-JRMP-09	Update ~~BMP Design Manual procedures~~ Storm Water Standards Manual to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP Section 4. Storm Water Standards Manual will be updated in accordance with the Permit and made available on the City's website.	FY15	Continuous every 5 years/ permit cycle	Yes	Revised to clarify strategy.	Yes	FY17 Notes: The Storm Water Standards will be revised to include Critical Coarse Sediment Yield Area mitigation measures that were developed through a TAC process, along with other minor clarifications.
CSD-JRMP-10*	Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	Amend BMP Design Manual and zoning standards/requirements which address reduction of pollutants for common areas of trash build-up (e.g. restaurants, supermarkets, "big box" retail stores with food, pet stores). Most effective method for source control of bacteria and trash is to employ four-sized trash enclosures with a cover over trash areas.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on trash enclosures (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-11*	Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, groomers, and pet care stores.	Amend BMP Design Manual and zoning requirements (including retrofits) to provide supplemental standards for animal facilities (including animal shelters, dog daycares, veterinary clinics, groomers, pet car stores, and breeding, boarding, and training facilities). Supplemental standards may include requiring covered trash enclosures, identification of landscaped relief areas on site plans, ensuring drainage connections and treatment swales for areas that will not drain to the sanitary sewer, as well as inspection of grading, drainage, and landscaping for outdoor exercise areas.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on animal facilities(See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-12*	Amend BMP Design Manual for nurseries and garden centers.	Amend BMP Design Manual to provide supplemental standards for plant nurseries and garden centers. Standards will focus on reducing irrigation runoff, and loading of sediment, pesticides, and nutrients. Measures may include: covered outdoor storage, green waste management BMPs, improved irrigation efficiency to reduce dry-weather runoff, and containment of runoff from impervious areas where plants and materials are stored.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on nurseries (See Part 1, Appendix E of the Storm Water Standards).

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-JRMP-13*	Amend BMP Design Manual for auto-related uses.	Amend BMP Design Manual to provide supplemental standards for automotive-related uses to reduce loading of metals, oils, grease, and trash. Measures may include: four-sized covered trash enclosures, and careful review of auto-related usage areas (e.g. garage bays at repair shops) for grading, drainage, and drain connections to sanitary sewer systems.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on auto-related facilities (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-14*	~~Develop and administer an alternative compliance program for on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects). Refer to Section 4.2.5.~~ Offsite Alternative Compliance Option	Refer to JRMP Section 4.2.3.1. WMAA and Water Quality Equivalency Study completed in FY15. Phase I, applicant implemented projects, is anticipated to be in effect by the end of FY16 contingent on Regional Board's approval of the WQIPs. Phase II, the expansion of the program to include other alternative compliance options, is expected to begin in FY16.	FY15	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Phase 1 of the Alternative Compliance Program (ACP) went into effect on 2/16/16. Development on Phase 2 of the ACP, including public involvement via Technical Advisory Committee (TAC) meetings, began during FY16. FY17 Notes: Continue developing Phase 2 of ACP. Topics to discuss include: environmental permitting, long-term facility maintenance, legal agreements and credit tracking, maintenance and permitting rules, and credit tracking and legal rules. Public involvement via TAC meetings will continue.

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E.4 Construction Management								
CSD-JRMP-15	Administer a program to oversee implementation of temporary BMPs that control sediment and other pollutants during the construction phase of projects. Includes requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other City departments.	Refer to JRMP Section 5. Inspections performed by the City or City staff provide verification that each site is in conformance with the Construction Storm Water BMP Performance Standards in the Storm Water Standards Manual. Inspections are tracked to ensure that they meet the minimum inspection frequencies. High priority active and inactive sites are inspected bi-weekly during the rainy season. Medium priority sites are inspected monthly during the rainy season. Low priority sites are inspected as-needed during the rainy season. All sites are inspected as-needed during the dry season. Please see Attachment 1 for details on construction BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
CSD-JRMP-17	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP Sections 6, 7, and 8. All industrial and commercial areas are inspected once within ~~the Permit term~~ ~~(~~five years~~)~~. At a minimum, 20 percent of industrial and commercial areas receive onsite inspections every year. Municipal facilities are inspected twice annually, once prior to the rainy season, and once during the rainy season. Residential management areas (RMAs) within the City are to be inspected once within five years ~~the Permit term~~, at a minimum. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	<u>FY16 Notes:</u> The City began patrols of residential management areas in FY16. See the City's JRMP Annual Report form, also included in Appendix 2, for numbers of inspections, violations, and enforcement actions for all types of existing development.
CSD-JRMP-18	Update minimum BMPs for existing residential, commercial, and industrial development. Specific updates to BMPs include required street sweeping, catch basin cleaning, and maintenance of private roads and parking lots in targeted areas.	Refer to JRMP Appendix IX. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY15	Continuous every 5 years/ permit cycle	Yes	No Change	Completed	None

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CSD-JRMP-19	Outreach to property managers and trash haulers to elevate the emphasis of power washing as a pollutant source.	Emphasis will be placed on non-compliant washing as an enforceable violation. Will occur city-wide in residential, commercial, and industrial areas.	FY15	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: City staff utilized a new fact sheet consistent with updated permit conditions to inform non-compliant power-washing operators of BMP requirements. The fact sheet was also provided to the San Diego Downtown Partnership as part of the Division's education and outreach effort for downtown businesses. FY17 Notes: The City anticipates distributing a comprehensive BMP guidebook to businesses and business district leaders in areas with regular power-washing activities.
CSD-JRMP-20	Implement property based inspections.	Property-based inspections increase awareness and responsibility for individual properties to tackle issues associated with trash, landscapes, and parking areas. Expanding beyond the business-level inspections will achieve different and more effective opportunities for education, outreach, inspection, and enforcement to encourage water conservation strategies. Inspection frequency dependent on type of facility. See CSD-9 for inspection frequency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Inventoried properties have been mapped in GIS. The City's inspection data management system has also been set up to track and map the properties inspected each fiscal year and over the Permit cycle.
CSD-JRMP-21	Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	Verify and bring to City Council for consideration an update (as needed) for the City's Municipal Code (43.0301) to meet new permit requirements for swimming pool discharges.	FY15	Continuous- As needed	Yes	No Change	Completed	None

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CSD-JRMP-22*	Promote and encourage implementation of designated BMPs for residential and non-residential areas.	Landscape-based rebates are a "gateway" for adoption of other beneficial practices and are one of the nonstructural methods which address impacts from single-family residential areas (City of San Diego 2011 program development background study). Residential incentives can include: education and training ~~(neighborhood watershed field days)~~, and aggressive subsidies or rebates for grass replacement and rainwater harvesting. Existing programs will be expanded overall, and ~~also have targeted expansion within specific subwatershed, particularly with highest water quality priority conditions. W~~will occur city-wide in residential, commercial, and industrial areas.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None

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MS4 Infrastructure								
CSD-JRMP-23	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels as allowed by resource agencies, detention basins, pump stations, etc.) for water quality improvement and for flood control risk management.	Refer to JRMP Section 7. Storm drain inlets are inspected ~~at least once per year~~ generally annually, and cleaned when accumulated materials are present. Other MS4 and related structures are inspected as needed.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: 5,485 storm drain inspections were completed in the WMA, and 130 tons of sediment, trash, and debris were removed during storm drain cleaning. In addition to routine maintenance of the MS4, across its entire jurisdiction the City repaired or replaced 12 pump stations and modernized another 14 pump stations, televised 28,000 linear feet of pipe in 62 locations, and began the development of the Waterways Maintenance Plan and Channel Maintenance Prioritization Plan. Removed 2.56 tons of trash from routine open channel trash cleaning and approximately 96 tons each of sediment and trash from channel maintenance activities that required resource agency permits.
CSD-JRMP-28	Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	In order to limit inflow of pollutants and reduce pollutant loads, proactive measures will be taken to improve, repair, and replace MS4 components. The City of San Diego will start a multi-year program of repairing and replacing storm drain pipes to reduce sediment loading to the MS4. Development of an assessment management program and bond issues will be addressed. Exploration of daylighting pipes will take place where feasible and appropriate.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-JRMP-29	Replacement of hard assets.	Includes needed replacement of storm drains and structures.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None

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CSD-JRMP-30	Coordinate with other City departments (PUD) to implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	Refer to JRMP Section 7.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The Tiger Team was established in the FY16 as a joint effort between TSW & PUD to identify and eliminate exfiltration sources from the sanitary sewer system to the MS4. Since the team was created, it has successfully eliminated one major source. FY17 Notes: For FY17, the team is focusing on two sites within the City and are identifying more.
CSD-JRMP-31*	Identify sewer leaks and areas for sewer pipe replacement prioritization.	Risk assessment to include identifying targeted areas (age, location, proximity to MS4), coming up with methodology, pilot, desktop exercise/analysis.	FY16	Continuous- As needed	Yes	No Change	Yes	None
Roads, Streets, and Parking Lots								
CSD-JRMP-32	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP Section 7.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: 17,094 curb miles were swept in the San Diego River watershed management area.
Pesticides, Herbicides, and Fertilizer BMP Program								
CSD-JRMP-37	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education. ~~permits, and certifications.~~	Refer to JRMP Sections 7, 8, and 9.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None

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Retrofit and Rehabilitation in Areas of Existing Development								
CSD-JRMP-38	Development of a strategy and identification of candidate areas of existing development necessary for implementing retrofit projects and facilitate the implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program will include methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to high priority water quality conditions, potential pollutant load removal effectiveness, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards. Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None
CSD-JRMP-39	Development of a strategy and identification of candidate areas necessary to implement stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program ~~(Section 4.2.5.4 and Appendix P)~~ will include methods for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas. Rehabilitation project selection will be based upon a variety of factors including existing stream or habitat degradation, potential future cumulative stream or habitat impacts, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy.	NA, Not scheduled to be implemented in FY17	None

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E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
CSD-JRMP-40	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP Section 3. ~~The City must visually inspect at least 500 identified and prioritized major MS4 outfalls at least annually during dry weather conditions.~~ Inspections of major MS4 outfalls conducted in response to public reports and staff or contractor reports and notifications may count toward the required visual inspections of MS4 outfall discharge monitoring stations. Please see Attachment 1 for details on how the IDDE Program will address sources causing or contributing to the HPWQC.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: 683 cases were investigated, including 368 reported by the public; 553 illicit discharges or illicit connections were eliminated; and 553 enforcement actions and 349 escalated enforcement actions were issued in the WMA. City-wide, the number of discharges investigated has almost tripled since FY14 (1,186 in FY14 to 3,335 in FY16). The increase is believed to be mainly due to increased reports of irrigation runoff discharges from the public and from PUD.
E.7 Public Education and Participation (B.3.b(1)(a)(iii))								
CSD-JRMP-42	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Section 9.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City continued its extensive education and outreach effort across each of the six watershed areas in the City. This included regular attendance at community events to share education materials and the continuing sponsorship of community clean-up and pollution prevention education events with the City's Non-Governmental Organization partners, including I Love A Clean San Diego and San Diego Coastkeeper.

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CSD-JRMP-43	Continue implementation of a Pet Waste Program.	Pet Waste Program includes outreach on "Scoop the poop", installation of posts for dispensers, distribution of lawn signs, and attendance at dog-related community activities.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Printed and distributed more pet waste signage. FY17 Notes: New bag dispensers will be installed and there will be outreach at community events. More signage will be installed..
CSD-JRMP-44	Promote and encourage implementation of designated BMPs in commercial and industrial areas.	Provide education and outreach on BMPs for commercial businesses and industrial facilities. Will occur city-wide in non-residential areas.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City continued its mandated commercial and industrial facility inspection effort sharing industry specific education materials with business and property owners when BMP deficiencies were discovered. FY17 Notes: The City will continue its inspection and education effort while also introducing alternative compliance strategies for new developments and sharing the updated Storm Water Standards Manual with target audiences
CSD-JRMP-45*	Expand outreach to homeowners' association (HOA) common lands and HOA incentives.	Approaches to consider include: offering incentives to HOAs and maintenance districts to adopt water-conserving/efficiency and stormwater-reduction changes to their landscapes, irrigation, and maintenance; conducting workshops with property managers; providing supplemental standards, inspection, or enforcement for HOA-managed properties.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Finalized updated code compliance fact sheets applicable to common lands activities. Coordinated water conservation pollution prevention incentive programming with PUD

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CSD-JRMP-46*	Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	Approaches to engage HOAs and property managers include: conducting workshops with property managers, providing supplemental standards, inspections or enforcement around HOA properties, and offering incentives to HOAs and maintenance districts to adopt changes to landscapes, irrigation, or maintenance which promote water conservation or stormwater reduction. Property managers are also a target for enhanced outreach.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-JRMP-48	Enhance school and recreation-based education and outreach.	Develop curriculum and establish distribution in public schools. Includes education on water conservation.	FY15	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City worked with its NGO partners to expand the number of children reached through school-aged education programs. The Division updated curriculum materials for Project Swell in conjunction with San Diego Coastkeeper and provided printed education materials to leaders with the Ocean Discovery Institute in hope of establishing new partnerships with that organization. FY17 Notes: The Division will be expanding the Blue Brigade Middle and High School program sponsored with I Love A Clean San Diego. The Division will also distribute written education materials through the newly completed Ocean Discovery Institute headquarters.

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CSD-JRMP-49	Develop education and outreach to reduce irrigation runoff.	Example approaches to reduce or eliminate irrigation runoff may include: education and outreach, prohibition, enhanced enforcement of existing prohibitions, and pilot projects such as the City of Del Mar's pilot door hanger project.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The Division used communication materials designed to address potential threats from El Nino rains as a new vehicle for educating the public about the need to eliminate irrigation runoff. FY17 Notes: The Division is working with partner agencies and other City operations to develop new education and outreach efforts targeting urban runoff.
CSD-JRMP-50*	Develop and distribute regional training materials for water-using mobile businesses.	Consider development of supplemental standards for mobile businesses including: covered trash enclosures, careful review of washing areas (grading, drainage, landscaping, sanitary sewer system connectivity), and appropriate signage (either through zoning for retrofits or "best fix" approaches, or through BMP Design Manual standards). Businesses may include carpet cleaners, tile installers, plumbers, etc.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: The Division updated its suite of fact sheets related to mobile business activities to bring them up-to-date with current permit requirements.

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CSD-JRMP-51*	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	Use effectiveness surveys to enhance existing education and outreach programs while proactively keeping up with and incorporating changing regulatory requirements.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The Division annually conducts thousands of event-based surveys gathering information about public understanding of pollution prevention and about the City's storm water management efforts. The survey effort continued in FY16 and allowed the Division to update its education materials and strategies based on current findings about public awareness. FY17 Notes: The Division will contract with a new public opinion research firm to perform a statistically valid assessment of general public awareness. The finding from that effort will be combined with the discoveries of the ongoing event survey effort to drive future outreach priorities.
CSD-JRMP-52	Continue to promote and encourage implementation of Integrated Pest Management (IPM) for residents and businesses.	The City will continue to provide education on IPM techniques during presentations and on the City's Think Blue website.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None

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CSD-JRMP-53*	Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	Websites will be updated to provide a user-friendly format and clarity for stormwater violations, conditions which citizens can and should report, and how to make such reports. Examples of reports for common incidents will be developed and posted which may vary locally and regionally. Photographs of allowable practices as well as illegal practices should be shown for utmost clarity. Displaying hotline numbers prominently on the website and near the photographs of illegal practices will ensure that those seeking to report will be able to do so easily. Also ensure hotline number and website are searchable and can be retrieved by simple internet searches.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City completely revamped its website improving public access and availability of web-based resources including the storm water management and pollution prevention materials developed and posted by the Division. The Division also brought forward the environmental response documents associated with its channel maintenance efforts. These documents include descriptions of water quality protections undertaken by the City allowing the public to view our agency's watershed protection strategies. FY17 Notes: The Division will review and renew the entire portfolio of education materials available for public downloading from the City's website.
E.6 Enforcement Response Plan								
CSD-JRMP-54	Continue to implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Storm Water Code Enforcement Unit's Standard Operating Procedures (SOPs) - Enforcement Response Plan.	Refer to JRMP Appendix XIII.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None

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CSD-JRMP-55*	~~Increase~~ Focused enforcement of irrigation runoff.	~~Increased~~ Focused enforcement policies against irrigation runoff will be established in tandem with the education and outreach programs on how these actions lead to pollutant loading. By shifting to property-based inspections irrigation runoff can be handled as enforceable violations once the public is well-informed.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Performed irrigation patrols and Residential Management Area Patrols throughout FY16. Also receive referrals from Water Conservation at PUD for over irrigation cases that have runoff entering the curb and gutter.
CSD-JRMP-56*	~~Increase~~ Focused enforcement of water-using mobile businesses.	In addition to education, pollution associated with mobile business sources can be handled through policy, code development, inspections of business practices, and enforcement.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Performed early morning patrols to find mobile sources and over-irrigation to the MS4.
CSD-JRMP-57*	~~Increase~~ Focused enforcement of all minimum BMPs for existing residential, commercial, and industrial development.	~~Increased~~ Focused enforcement of existing development minimum BMPs.	FY16	Continuous- As needed	Yes	Revised to clarify strategy.	Yes	None
CSD-JRMP-58*	~~Increase~~ Focused enforcement associated with property-based inspections.	Shifting inspections from businesses-specific to property-based will increase effectiveness and sense of responsibility and ownership. Education and outreach must be followed up with inspection and enforcement of regulations to encourage proper landscape and water conservation strategies.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-JRMP-59*	~~Increase~~ Focused enforcement of sweeping and maintenance of private roads and parking lots in targeted areas.	Refer to Minimum BMPs in JRMP (Appendix IX).	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None

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CSD-JRMP-60*	~~Increase~~ Focused identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	Eroding and unstable slope areas on private property (excluding construction sites) will be identified as potential sediment loading sources and subject to enforcement. In the short term, this will target enhanced inspection and enforcement programs to ensure inspectors address erosion and slope instability for the purpose of education.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: City staff completed patrols of construction sites that included sediment discharges. They also began the Residential Patrol Program, which notes and addresses sediment discharges in residential areas.
Non-JRMP Strategies (Optional Strategies, B.3.b(1)(b))								
Nonstructural Strategies								
CSD-NS-02	Investigation and research of emerging BMP technology.	Annually the Construction & Development Standards Group identifies new tasks to conduct literature review, communication with researchers outside of the City, physical testing and experimentation of new or emerging technologies, and other research with the goal of updating tools available for reducing pollutant loads from development and redevelopment sites. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous- As needed	Yes	No Change	Yes	FY16 Notes: Continued monitoring and assessment of the biofiltration basin and curbside filtration units at 43rd and Logan.
CSD-NS-03	Approve and implement a green infrastructure policy.	The City will begin developing a policy in FY16 that will increase the green infrastructure requirements for City CIP projects. This policy will be coordinated with ongoing efforts to update City design manuals and LID design standards for public LID BMPs. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous- As needed	Yes	No Change	Yes	None
CSD-NS-04	Create a manual that outlines right-of-way design standards.	Create a manual that includes flood control performance standards, permanent BMP elements design standards, design standards for green streets and other BMPs, and maintenance access. Provides drainage and streets design standards. Opportunity to merge various existing manuals and provide consistency. Funding and resources were secured for FY2015.	FY15	Completed within schedule	Yes	No Change	Yes	FY17 Notes: Will be published in FY17.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-05	Create a fund that allows habitat acquisition, protection enhancement, and restoration in conjunction with other cooperating entities including community groups, academic institutions, state county, and federal agencies, etc.	This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired or restored lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. It is anticipated that a minimum of 1 FTE will be needed to implement the program. Once initiated, the time frame for planning to initial implementation is expected to be 3 years. Implementation is in perpetuity as long as funding is retained.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None
CSD-NS-06	Residential and Commercial BMP: Rain Barrel	The existing PUD rebate program will continue for residential properties and expand for commercial properties for water collection, conservation, and reuse with rain barrels. Will occur city-wide in residential areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates for rain barrels were issued to capture 772,740 gallons of rainwater City-wide.
CSD-NS-07	Residential and Commercial BMP: Grass Replacement	The existing PUD grass replacement cash rebate program will continue and expand for residential and commercial properties. Program encourages a reduction in water use through the conversion of non-artificial grass to water wise plant material, while maintaining a high level of living landscape to benefit the environment. Program does not allow for conversion to artificial turf. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates were issued to convert 68,236 sq. ft. of turf in the WMA.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

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CSD-NS-08	Residential and Commercial BMP: Downspout Disconnect	Disconnecting downspouts provide alternate runoff pathways from rooftops, sidewalks, driveways, and roads. Disconnecting downspouts from residential areas to pervious land can allow for depression storage and infiltration. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Completed downspout redirect guidelines in collaboration with PUD.
CSD-NS-09	Residential and Commercial BMP: Microirrigation	The existing PUD micro-irrigation rebate program will continue and increase for residential and commercial properties. Application of microirrigation aims to improve the efficiency of landscape irrigation through the precise application of water. Will occur city-wide in residential areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates were issued for installing microirrigation for 5,876 sq. ft. of landscaping in the WMA.
CSD-NS-10	Provide Onsite Water Conservation Surveys.	Provide free onsite water conservation surveys to commercial and residential customers to reduce overirrigation and to encourage water conservation. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-11	Enhance and expand trash cleanups through community-based organizations involving target audiences.	Increase effectiveness and reach of trash/beach cleanups and community based efforts by engaging community groups to self-define and carry-out trash clean-ups. Longstanding partnerships and sponsorships with I Love A Clean San Diego and others are recommended to be continued and enhanced. To effectively target stream clean-up efforts, focus on partnerships with community organizations which provide strong engagement with target audiences and communities. Cleanups target trash, however a reduction in trash also reduces other pollutants such as bacteria and nutrients that can attach to food waste wrappers and yard waste. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY 16 Notes: The City partnered with I Love a Clean San Diego on five clean-ups, which resulted in the removal of 23,887 pounds of trash and debris in the WMA. Additionally, the City partnered with the SD River Park Partnership to remove 102,215 pounds of trash and debris.
CSD-NS-16	Conduct a Comprehensive Benefits Analysis to identify benefits other than water quality that are applicable to each of the specific WQIP strategies.	The analysis identifies which other benefits apply to each strategy, and documents the assumptions making those linkages. The delineation of other benefits to strategies includes a general description of each benefit, and a listing of the assumptions that were made to link those benefits to strategies. In addition, the other benefits are characterized with respect to who is directly affected: the city, local residents, local businesses, or visitors. This analysis may be used as part of the adaptive management process to modify future strategies. Funding and resources were secured for FY2015.	FY15	Completed within schedule	Yes	No Change	No	None
CSD-NS-17	Address and clean up trash from transient encampments with collaboration from the Environmental Services Department, which consults with the Homeless Outreach Team.	Coordinate with the Environmental Services Department, in conjunction with the Homeless Outreach Team, to respond to transient encampment trash complaints. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-18	Continue participating in source reduction initiatives.	Source reduction initiatives are ultimately the most effective measure to remove pollutants from surface waters, where feasible. Bans or progressive phase-outs that may be considered include: leaf blowers, plastic bags, architectural copper (generally a legacy issue), as well as prohibiting or more aggressively regulating vehicle washing. Additional source reduction initiatives to consider include pesticide sales at hardware stores and irrigation supply stores. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City began development of plastic bag ban ordinance. FY17 Notes: Pursuit of City-specific plastic bag ban ordinance will depend on whether Statewide plastic bag ban ballot initiative passes.
CSD-NS-19	Coordinate with Fleet Services to replace City-owned vehicle brake pads with copper-free brake pads as they become commercially available.	Consider legislative mandate and cooperative implementation of copper-free brake pads on city-owned vehicle to reduce pollutant deposition. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None
CSD-NS-22	~~Proactively~~ Coordinate with appropriate City Departments that monitor for erosion, and complete minor repair and slope stabilization on municipal property.	~~Actively~~ Coordinate with Streets Division and other appropriate City Departments that identify and repair eroding slopes that may be contributing to sediment loading. Prepare an inventory and assessment of eroding areas and their risk to surface waters. Follow assessment with a schedule for ongoing inspection and stabilization (potentially based on a number or percentage of sites annually). Consider Caltrans program as a template. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-NS-23	Conduct special studies.	Special studies will be conducted to gather data to identify pollutant sources, appropriate targets, or other information. Includes collaboration with universities. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: San Diego Regional Reference Streams and Beaches, San Diego Wet Weather Epidemiology Study

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CSD-NS-26	Participate in Reference Watershed Study.	The San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for "natural sources" to establish the concentrations or loads from streams in a minimally disturbed or "reference" condition. Refer to Section 5.1 for further details. Will occur region-wide. Funding and resources were previously secured.	Prior to FY16	Completed within schedule	Yes	No Change	Completed	FY16 Notes: See Section4.3.1.1 in Appendix 4for more information.
CSD-NS-27	Participate in Reference Beach Study.	The San Diego Regional Reference Beach Study (currently being conducted by the Southern California Coastal Water Research Project) will develop numeric targets that account for "natural sources" to establish the concentrations or loads from the beach in a minimally disturbed or "reference" condition. The purpose of this monitoring program is to advise the public of potential health risks that could occur with water contact recreation at local beaches. DEH will post a health advisory notice or close a beach when FIB results are above REC-1 water quality standards. Will occur region-wide in the Los Peñasquitos, San Dieguito River, Mission Bay, and San Diego River WMAs. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	One time	Yes	Revised to clarify strategy.	Completed	FY16 Notes: See Section 4.3.1.2 in Appendix 4for more information.
CSD-NS-32	Conduct a Storm Water Fee Study~~Cost of Service Study~~.	Conduct a Storm Water Fee Study~~Cost of Service Study~~ that will examine the full cost of flood control and storm water strategies needed to comply with storm water regulations for the City of San Diego. The City of San Diego's Watershed Asset Management Plan will be used as the basis for the study. Funding and resources have been secured for FY2016.	FY16	Completed within schedule	Yes	No Change	Yes	FY16 Notes: Significant progress was made on the fee study; it will be finalized and posted on the City website in FY17. FY17 Notes: Study results to be posted in FY17.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

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CSD-NS-33	Conduct Sustainable Return on Investment (SROI) analysis to estimate strategies' co-benefits and impacts to the public and the private sector on a common scale.	SROI is an economics-based framework for evaluating quantitative and qualitative performance metrics and monetizing them, if possible, along a triple bottom line (i.e. financial, societal, and environmental). This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated one-time cost to implement is $115,000. Once initiated, the analysis is expected to be complete in 1 year.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

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						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-NS-34	Collaborate with the County, if a County-led regional social services effort is established, to provide sanitation and trash management for individuals experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	Support a non-profit or consortium to provide sanitation services associated with hygiene as well as trash management for persons experiencing homelessness. Rented or purchased shower/sanitary trailers providing mobile showers may be organized at specifically scheduled locations and times. This provision has been proposed as a method for preventing surface water usage for sanitation and bathing, as well as opportunity for outreach and referral by social service agencies. The trash management services will include providing trash bags, trash collection areas, and shower/sanitary facilities at centers which provide daytime shelter to their clients, or on a mobile-basis for known transit camps. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy includes an initial first year planning cost of $30,000 and implementation is expected to cost $10,000 annually thereafter. Once initiated, development of the program is expected in 1 year. Implementation is in perpetuity as long as funding is available.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

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CSD-NS-37	Participate in an assessment to determine if implementation of an urban tree canopy (UTC) program would benefit water quality and other City goals, where feasible.	Perform a feasibility study to determine if implementing an UTC program would be beneficial to the City's goals. UTC intercepts rainfall through increased coverage of leaves, branches, and stems and reduces runoff from the storm drainage system. Benefits associated with enhancing an UTC include reducing heat island effects and air pollution in addition to aesthetics and community benefits. Where feasible, native trees will be utilized to prevent invasive trees from migrating to open spaces and to conserve water. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, implementation and assessment is expected in 2 years.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

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CSD-NS-38	Conduct a feasibility study to test Permeable Friction Course (PFC), a porous asphalt that overlays impermeable asphalt.	Perform an assessment to determine the feasibility of implementing PFC on City streets. PFC, an overlay of porous asphalt, is an innovative roadway material that improves driving conditions in wet weather and water quality. Placed in a layer 25-50mm thick on top of regular impermeable pavement, PFC allows rainfall to drain within the porous layer rather than on top of the pavement. PFC has also been shown to reduce concentrations of pollutants commonly observed in highway runoff. PFC incorporates stormwater treatment into the roadway surface and does not require additional right-of-way. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy is $50,000. Once initiated, implementation and assessment is expected in 2 years.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

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CSD-NS-39	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas, creating permanent open space protections on undeveloped city-owned land, and accepting privately-owned undeveloped open areas.	This strategy may be implemented if there is interest in participation by the public or private entity with current control of the land. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) identification of partners, if needed (public, private, non-profit), 2) identification of costs and potential sources of funding, 3) final agreement by public or private entity with current control of the land, 4) final agreement by all other participating partners including acceptance by intended land- or asset-owning City department, and 5) funding in place. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The time frame for implementation will vary by project. Implementation is in perpetuity as long as funding is available.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None
CSD-NS-44	Participate in a watershed council or group if one is established.	This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) partners have been identified and formal MOUs have been developed and 2) consensus and community support has been achieved. Resources necessary to implement this strategy include a coordinator or project manager. Projected funding needs may be met through award of a grant, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, development of the program is expected in 2 years. Implementation would be in perpetuity as long as funding is retained.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

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CSD-NS-47	Coordinate with Development Services Department to ~~P~~prohibit introduction of invasive plants in new development and redevelopment projects.	Coordinate with the City's Development Services Department to continue to prohibit introduction of invasive species such as *Arundo donax* and *Cortaderia selloana* for new development or redevelopment projects as specified in the City's municipal code for landscape. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-NS-51	Collaboration with the Regional Board.	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit, 2) enforcement of the Ag Waiver, 3) enforcement of other non-MS4 dischargers, and 4) Bacteria TMDL updates, as appropriate for each WMA. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	City-specific version of WMA strategy.	Yes	FY16 Notes: Provided written comments to the Regional Board, State Water Board, and US Environmental Protection Agency (EPA) regarding proposed rules and regulations.

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CSD-NS-53	Refinement of Water Quality Regulations	Collaborate with other Responsible Agencies and the Regional Board to refine the accuracy of regulations to ensure that Non-MS4 dischargers are regulated appropriately. The goal of this exercise is to begin a dialog with the Regional Board that may lead to the following outcomes: 1) Removal of Non-MS4 discharges and the associated BMPs needed to treat those discharges from the Responsible Agencies' burden, 2) amendment of current TMDLs and the MS4 Permit to correctly assign responsibilities for Non-MS4 discharges to the appropriate entities, and 3) strengthening of Non-MS4 NPDES permits that are directly tied to the requirements of existing and future TMDLs. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Resources to implement this strategy include staff time and are currently secured.	Prior to FY16	Continuous-Ongoing	Yes	City-specific version of WMA strategy.	Yes	FY16 Notes: City coordinated with the Regional Board to discuss addressing non-MS4 contributions in TMDL and other water quality regulations.
CSD-NS-60	Coordinate with Development Services Department to implement Sustainable Landscapes Program to encourage landscape retrofits.	Collaborate with other San Diego River WMA Responsible Agencies to implement a Sustainable Landscapes Program. Implementation of this strategy may be triggered if (1) an interim goal has not been met, (2) it has been determined though adaptive management that implementation is necessary, and (3) all of the resources have been identified and secured. The following resources must be secured for each fiscal year that this program is implemented: (1) Partners must be identified and each partner must agree to terms of partnership, (2) funding must be identified and secured by each of the partners for their portion of the overall cost, (3) staff resources must be identified and secured, (4) the scope of the program (target location(s), type and value of incentives, etc.) must be identified, and (5) consensus and community support has been achieved.	Must be triggered	Continuous-Ongoing	Not Triggered	City-specific version of WMA strategy.	If Triggered	None

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CSD-NS-61	Implement wastewater management program to prevent sanitary sewer overflows.	Collaborate with other San Diego River WMA Responsible Agencies to implement wastewater management strategies targeting Fats, Oils, and Grease (FOG) to reduce sanitary sewer overflows (SSOs). Develop and print guidance materials that address septic system maintenance and FOG management. Conduct workshops, training sessions, and other media outreach. This effort will require community support and partnerships to be established. Resources and funding include Grant funding from Proposition 1. Implementation of this strategy may be triggered if (1) an interim goal has not been met, (2) it has been determined though adaptive management that implementation is necessary, and (3) all of the resources have been identified and secured. The following resources must be secured for each fiscal year that this program is implemented: (1) Partners must be identified and each partner must agree to terms of partnership, (2) funding must be identified and secured by each of the partners for their portion of the overall cost, (3) staff resources must be identified and secured, (4) the scope of the program (target location(s), type and value of incentives, etc.) must be identified, and (5) consensus and community support has been achieved.	Must be triggered	Completed within schedule	Not Triggered	City-specific version of WMA strategy.	If Triggered	None

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ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Structural Strategies								
CSD-STRUCT-02	San Diego River Restoration and Trash Removal Project: The City of San Diego will implement a project involving restoration of native habitat and trash removal along 5,750 feet of the San Diego River covering approximately 57 acres. Work on this project is scheduled to begin in 2016 and be completed by 2022.	The City of San Diego will implement a project that will restore native habitat and involve trash removal along 5,750 feet of the San Diego River. The City will be completing the project design and obtaining the necessary permits and approval from City Council in FY 16. The following resources, funds, and steps are needed to implement the project by the end of FY 16: 1) Hire design consultant to develop detailed construction plans and construction cost estimates 2) Complete construction contractor bid and award process for construction phase 3) Construct project 4) Operation and maintenance will be in perpetuity. Funds and staff resources for this function will be approved by City Council as part of the City's annual budget	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Received USACOE Nationwide verification letter and CADFW Streambed Alteration Agreement. FY17 Notes: Planned activities in FY 17 include removal of all trash, non-native vegetation, and illegal encampments from the project area. A temporary irrigation system will be installed, along with native container plants and native seed. Prior to the end of FY 17, the goal is to start the 120 Day Plant Establishment Period.
Green Infrastructure								
CSD-GI-07	Bioretention at Allied Gardens Recreation Area.	Bioretention designed for Allied Gardens Recreation Area to treat a drainage area of 4.5 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY17 Notes: Construction finishing in FY17. See Table A2-19 for a current list of completed and planned Structural Projects.
CSD-GI-08	Bioretention at Famosa Slough.	Bioretention designed for Famosa Slough to treat a drainage area of 10.3 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY17	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	Yes	FY17 Notes: Design team will investigate project feasibility.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-GI-09	~~20.1~~ 16 acres of bioretention and 4.1 acres of permeable pavement have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 522.33 acres (total drainage area of 1510 ac) with a total storage volume of 23.97 acre-feet.	To meet the San Diego River WMA numeric goals and schedules presented in Section 3, the City of San Diego will implement the following structural strategies. Staggered construction, operation, and maintenance of ~~20.1~~ 16 acres of bioretention and 4.1 acres of permeable pavement to treat an impervious drainage area of 522.33 acres (total drainage area of 1510 ac) with a total storage volume of 23.97 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY22	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy.	NA, Not scheduled to be implemented in FY17	See Table A2-19 for a current list of completed and planned Structural Projects.
CSD-GI-14	Cabrillo Heights Rain Garden	Rain garden constructed on Kearny Villa Rd. used to treat a drainage area of 6 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY17 Notes: Increase inspection & cleaning to a minimum of 2 annually. See Table A2-19 for a current list of completed and planned Structural Projects.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Green Streets								
CSD-GS-10	43.61 acres of green streets (35.77 acres of bioretention and 7.84 acres of permeable pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 10,715.24 acres with a total storage volume of 88.02 acre-feet.	To meet the San Diego River WMA numeric goals and schedules presented in Section 3, the City of San Diego will implement the following structural strategies. Staggered construction, operation and maintenance of 43.61 acres of green streets (35.77 acres of bioretention and 7.84 acres of permeable pavement) to treat a total drainage area of 10,715.24 acres with a total storage volume of 88.02 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY24	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy.	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table A2-19.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Multiuse Treatment Areas								
Infiltration and Detention Basins								
CSD-MUTA-09	Multiuse Treatment Area BMPs in the San Diego River WMA.	To meet the San Diego River WMA numeric goals and schedules presented in Section 3, the City of San Diego will implement the following structural strategies. Modeled MUTA BMPs with footprints of 4.3 acres (ac) in FY19 (total drainage area of 571 ac), 18.6 ac in FY20 (total drainage area of 1309 ac), 5.3 ac in FY21 (total drainage area of 591 ac), and 2.3 ac in FY22 (total drainage area of 315 ac). These can be wetland, infiltration, retention and/or detentions systems. An updated inventory of MUTA projects will be maintained in the WQIP Annual Report. The following resources, funds, and steps are needed to implement this strategy: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	FY19, FY20, FY21, FY22	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Multiple similar strategies were compiled into this new strategy listing to simplify recordkeeping and reporting.	NA, Not scheduled to be implemented in FY17	None. Future projects will be listed in Table A2-19.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Stream, Channel and Habitat Rehabilitation Projects (B.3.b.(1)(b)(iii))								
CSD-MUTA-20	If interim load reduction goals are not met and additional stream, channel, and habitat rehabilitation projects are required, implement as needed.	This strategy may be triggered as 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, 4) permits required by regulatory agencies are secured, and 5) recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Water Quality Improvement BMPs								
Priority Development Projects (PDPs)								
CSD-PDP-04	Priority Development Project BMPs in San Diego River WMA.	Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. Funding and resources have been secured for PDPs implemented prior to FY16. Funding for PDP BMPs constructed in future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16, FY17	Continuous-Ongoing	Yes	Multiple similar strategies were compiled into this new strategy listing to simplify recordkeeping and reporting.	Yes	See Table A2-20 for a current list of PDP BMPs.
Proprietary BMPs								
~~(Removed)~~	~~3 Drain Inserts in Complex Street Green Mall.~~	~~3 drainage inserts planned for implementation in Complex Street Green Mall. The following resources, funds, and steps are needed to implement this strategy:~~ ~~1) Identify project locations (3-6 months)~~ ~~2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs)~~ ~~3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May)~~ ~~4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project)~~ ~~5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project)~~ ~~6) Complete construction contractor bid and award process for construction phase (6 months)~~ ~~7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project).~~ ~~8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.~~	~~FY17~~	~~Continuous-Ongoing~~	Cancelled	This project has been cancelled since it is unlikely to provide a significant water quality benefit.	No	This project was originally conceived in 2010. Recent Storm Water Division research has indicated that drainage inserts are not effective at removing pollutants from storm water.

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-WQBMP-03	Park Ridge hydrodynamic separator	A hydrodynamic separator used to treat onsite runoff of 37.6 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY17	Continuous-Ongoing	Yes	No Change	Yes	FY17 Notes: Increase inspection & cleaning to a minimum of 2 annually
Dry Weather Flow Separation and Treatment Projects								
CSD-WQBMP-09	If interim load reduction goals are not met and additional dry weather flow separation and treatment projects are required, implement as needed.	Construction of dry weather flow separation and treatment projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
Trash Segregation								
CSD-WQBMP-10	If interim load reduction goals are not met and additional trash segregation projects are required, implement as needed.	Construction of trash segregation (Trash Guards, etc.) projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in high loading areas city-wide. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; approx $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-6	Offsite Alternative Compliance Option ~~(WMAA)~~	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, ~~anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015,~~ which was submitted and approved in FY 2016. Following this approval, jurisdictions can formally implement an optional Alternative Compliance Program by ~~December 2015~~ February 2016 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Phase 1 of the Alternative Compliance Program (ACP) went into effect on 2/16/16. FY17 Notes: Proposed Water Quality Equivalency (WQE) guideline development for stream restoration.
WMA-9	Collaboration with the Regional Board.	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of other non-MS4 dischargers and 2) Bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Working with Regional Board to include non-Phase I MS4s in general permits, waivers, and Waste Discharge Requirements (WDRs).

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
WMA-12	Refinement of Water Quality Regulations	The Responsible Agencies will collaborate with the Regional Board to refine the accuracy of regulations to ensure that Non-MS4 dischargers are regulated appropriately. The goal of this exercise is to begin a dialog with the Regional Board that may lead to the following outcomes: 1) Removal of Non-MS4 discharges and the associated BMPs needed to treat those discharges from the Responsible Agencies' burden, 2) amendment of current TMDLs and the MS4 Permit to correctly assign responsibilities for Non-MS4 discharges to the appropriate entities, and 3) strengthening of Non-MS4 NPDES permits that are directly tied to the requirements of existing and future TMDLs. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Resources to implement this strategy include staff time and are currently secured.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: City coordinated with Regional Board to discuss bacteria TMDL addressing non-MS4 contributions.
WMA-21	Coordinate with Development Services Department to implement Sustainable Landscapes Program to encourage landscape retrofits.	Implementation of this strategy may be triggered if (1) an interim goal has not been met, (2) it has been determined though adaptive management that implementation is necessary, and (3) all of the resources have been identified and secured. The following resources must be secured for each fiscal year that this program is implemented: (1) Partners must be identified and each partner must agree to terms of partnership, (2) funding must be identified and secured by each of the partners for their portion of the overall cost, (3) staff resources must be identified and secured, (4) the scope of the program (target location(s), type and value of incentives, etc.) must be identified, and (5) consensus and community support has been achieved.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table A2-18. City of San Diego Jurisdictional Strategies for San Diego River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-22	Implement wastewater management program to prevent sanitary sewer overflows.	Develop and print guidance materials that address septic system maintenance and Fats, Oils, and Grease (FOG) management. Conduct workshops, training sessions, and other media outreach. This effort will require community support and partnerships to be established. Resources and funding include Grant funding from Proposition 1. Implementation of this strategy may be triggered if (1) an interim goal has not been met, (2) it has been determined though adaptive management that implementation is necessary, and (3) all of the resources have been identified and secured. The following resources must be secured for each fiscal year that this program is implemented: (1) Partners must be identified and each partner must agree to terms of partnership, (2) funding must be identified and secured by each of the partners for their portion of the overall cost, (3) staff resources must be identified and secured, (4) the scope of the program (target location(s), type and value of incentives, etc.) must be identified, and (5) consensus and community support has been achieved.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table A2-19. City of San Diego Structural BMP Implementation Status for San Diego River WMA

Strategy Number	Strategy	Implementation Approach	Total Drainage Area (Ac)	Implementation Year*	Status	Permit Term Goal**
Green Infrastructure		Total Acres Treated Required for Green Infrastructure:	1,520.50			
CSD-GI-07	Bioretention at Allied Gardens Recreation Area.	Bioretention designed for Allied Gardens Recreation Area to treat a drainage area of 4.5 acres.	4.5	FY16	Construction	✓
CSD-GI-14	Cabrillo Heights Rain Garden	Rain garden constructed on Kearny Villa Rd. used to treat a drainage area of 6 acres.	6	Prior to FY16	Completed	✓
CSD-GI-09	16 acres of bioretention and 4.1 acres of permeable pavement have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 522.33 acres (total drainage area of 1510 ac) with a total storage volume of 23.97 acre-feet.	Staggered construction, operation, and maintenance of 16 acres of bioretention and 4.1 acres of permeable pavement to treat an impervious drainage area of 522.33 acres (total drainage area of 1510 ac) with a total storage volume of 23.97 acre-feet. An updated inventory of green infrastructure projects will be maintained in the WQIP Annual Report.	1,510	FY22	Varies, see below	Varies, see below
	Project Name	Project Description	Total Drainage Area (Ac)	Implementation Year	Status	Permit Term Goal
	Serra Mesa GI	Shawn Ave near Bantam Ave, Palace Dr near Bantam Ave, Larabee Pl	22	FY 19	Design	
	Kearny Mesa GI	Murphy Canyon Road north of Clairemont Mesa Boulevard	255	FY 20	Design	
Green Streets		Total Acres Treated Required for Green Streets:	10,715.24			
CSD-GS-10	43.61 acres of green streets (35.77 acres of bioretention and 7.84 acres of permeable pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 10,715.24 acres with a total storage volume of 88.02 acre-feet.	Staggered construction, operation and maintenance of 43.61 acres of green streets (35.77 acres of bioretention and 7.84 acres of permeable pavement) to treat a total drainage area of 10,715.24 acres with a total storage volume of 88.02 acre-feet. An updated inventory of green streets projects will be maintained in the WQIP Annual Report.	10,715.24	FY24	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
	Project Name	Project Description	Total Drainage Area (Ac)	Implementation Year	Status	Permit Term Goal
	(Projects will be added as they reach the design stage)					
Multiuse Treatment Areas		Total Acres Treated Required for MUTAs:	2,786			
CSD-MUTA-09	Multiuse Treatment Area BMPs in the San Diego River WMA.	Modeled MUTA BMPs with footprints of 4.3 acres (ac) in FY19 (total drainage area of 571 ac), 18.6 ac in FY20 (total drainage area of 1309 ac), 5.3 ac in FY21 (total drainage area of 591 ac), and 2.3 ac in FY22 (total drainage area of 315 ac). These can be wetland, infiltration, retention and/or detentions systems. An updated inventory of MUTA projects will be maintained in the WQIP Annual Report.	571	FY19	*(Overall amounts of projects have been determined through modeling or similar means. Details of specific projects initiated as part of this strategy are entered below once they enter the design stage.)*	
			1,309	FY20		
			591	FY21		
			315	FY22		
	Project Name	Project Description	Total Drainage Area (Ac)	Implementation Year	Status	Permit Term Goal
	(Projects will be added as they reach the design stage)					
Water Quality Improvement BMPs		Total Acres Treated Required for WQI BMPs:	37.6			
CSD-WQBMP-03	Park Ridge hydrodynamic separator	A hydrodynamic separator used to treat onsite runoff of 37.6 acres.	37.6	FY17	Completed	✓

*For additional details, please see the schedule following the City's strategy table in the WQIP.

** Projects with a check in the "Permit Term Goal" column are counted toward the green infrastructure installation goal applicable to the current Permit term. See Table A2-21 for a summary

Table A2-20. City of San Diego Priority Development Project Implementation Status for San Diego River WMA

San Diego River PDP BMP Ledger (CSD-PDP-04)					
Project Name	Project Description	Total Drainage Area (Ac)	Implementation Year	Status	Permit Term Goal
6 Vegetated Swales in Mission Trails Regional Park E. Fortuna Equestrian Staging Area	6 Vegetated Swales planned for Mission Trails Regional Park E. Fortuna Equestrian Staging Area.	unknown	FY17	Completed	
El Capitan Reservoir	3 drainage inserts planned for implementation in El Capitan Reservoir.	unknown	Prior to FY16	Completed	
Murray Reservoir	5 drainage inserts planned for implementation in Murray Reservoir.	unknown	Prior to FY16	Completed	
San Vicente Reservoir	1 drainage insert planned for implementation in San Vicente Reservoir.	unknown	Prior to FY16	Completed	
Serra Mesa/Kearny Mesa Library	A hydrodynamic separator used to treat onsite runoff at Serra Mesa/Kearny Mesa Library.	unknown	Prior to FY16	Completed	

* Projects with a check in the “Permit Term Goal” column are counted toward the green infrastructure installation goal applicable to the current Permit term. See Table A2-21 for a summary.

Table A2-21. Summary of City of San Diego Priority Structural BMP Implementation Status for San Diego River WMA

Permit Term Goal FY2018	Total Drainage Area (Ac)
Structural BMP Total Acres Treated Required by FY 18	58.40 (Required by FY 18)
Total Completed/Planned BMPs	48.10
Total Completed/Planned PDP BMPs	
Remaining to Goal	10.30
Final Goals FY2031*	**Total Drainage Area (Ac)**
Green Infrastructure Total Acres Treated Required	1,520.50
Total Completed/Planned	287.50
Remaining to Final Amount of Acres Treated	1,233.00
Green Streets Total Acres Treated Required	10,715.24
Total Completed/Planned	0.00
Remaining to Final Amount of Acres Treated	10,715.24
MUTA Total Acres Treated Required	2,786.00
Total Completed/Planned	0.00
Remaining to Final Amount of Acres Treated	2,786.00
WQI BMP Total Acres Treated Required	37.60
Total Completed/Planned	37.60
Remaining to Final Amount of Acres Treated	0.00

*Based on the “MS4 Discharges: Implement Accepted WQIP” compliance pathway. Final compliance is implementation of BMPs based on modeling analysis results.

5.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

In FY16 the City, along with other government agencies, professional engineers and members of the local development community, developed a new Regional Best Management Practices (BMP) Design Manual that conforms to the 2013 Municipal Storm Water Permit (Order No. R9-2013-0001, as amended by R9-2015-0001 and R9-2015-0100). The Manual supersedes the San Diego County-wide Model Standard Urban Runoff Storm Water Management Plan (SUSMP) and provides technical guidance and regional standards for pollutant and flow control requirements for new development and significant redevelopment. The City of San Diego's local version of the BMP Design Manual, the Storm Water Standards Manual, became effective on February 16, 2016.

5.5 MODIFICATIONS TO THE JRMP

The City of San Diego is proposing administrative changes to its JRMP. The updated JRMP can be viewed at https://www.sandiego.gov/stormwater/plansreports/jrmp. These changes are summarized below.

	JRMP Section / Appendix	JRMP Update
1	Executive Summary	Strategy categories and definitions were modified to align with the categories and definitions in the Municipal Storm Water Permit and San Diego Water Board's approved Water Quality Improvement Plans (WQIPs).
2	Section 2.3	In accordance with the Municipal Storm Water Permit, Section 2.3 was updated to state that JRMP updates can be proposed/submitted as part of the WQIP Annual Reports.
3	Section 7.3.13-8	Updated BMP #16 to provide greater clarity.
4	Section 7.3.14	Updated section to include new BMPs for herbicide application.
5	Section 10	Strategy categories and definitions were modified to align with the categories and definitions in the Municipal Storm Water Permit and San Diego Water Board's approved WQIPs. Updated tables, graphs, charts, and text to reflect funding needs to meet the goals and schedules identified in the WQIPs. Added language stating "Estimates of funding needs presented were based on the best information available at the time they were prepared."
6	Sections 7.3.1, 7.3.2, and 7.3.4-15	Updated Minimum BMP language to reflect changes to Appendix IX.

	JRMP Section / Appendix	JRMP Update
7	Section 3, Section 4, Section 5, Section 6, Section 7, Section 8, Section 9	Based on updates made to the categories and definitions of strategies noted above, the "JRMP Strategies Identified in the WQIPs" tables and "Additional Public Education and Participation Program WQIP Strategies" tables for these sections have been updated for consistency. The strategy identification numbering system and text was updated to reflect administrative changes included in the WQIP Annual Reports.
8	Appendix VI- Residential Management Areas and Patrol Protocols	Updated the residential management areas maps and included newly developed patrol protocols.
9	Appendix IX - Minimum BMPs for Residential, Industrial, Commercial, and Municipal Sites/Sources	Updated references to ordinance sections, changed the "Think Blue" references to the Storm Water Division, and made minor changes to some BMP and description wording for clarification.
10	Appendix XIV- Certificate of Adequate Legal Authority	Signed Certificate of Adequate Legal Authority was added.
11	Appendix XX- Water Quality Improvement Plan Strategies	Updated strategies to reflect the administrative changes made to strategies in the Fiscal Year 2016 WQIP Annual Reports.
12	Appendix XXII- Storm Water Division Projected Funding Needs, 2016-2035	Updated Appendix XX to reflect the funding needs to meet the goals and schedules identified in the WQIPs.

6 Caltrans

6.1 ANNUAL REPORT CERTIFICATION

DEPARTMENT OF TRANSPORTATION
DISTRICT 11
4050 TAYLOR STREET, M.S. 120
SAN DIEGO, CA 92110
PHONE (619) 688-0100
FAX (619) 688-4237
TTY 711
www.dot.ca.gov

Serious drought.
Help save water!

January 4, 2017

STATEMENT OF CERTIFICATION

San Diego River Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

BRUCE L. APRIL
Deputy District Director, Environmental

1/6/17
Date

6.2 JURISDICTIONAL STRATEGIES

~~Strikeouts~~ are text edits that have been made up to the current date since the WQIP September 2015 submittal.

Table A2-22. Caltrans Jurisdictional Strategies and Implementation Schedules for Development Planning

San Diego River Development Planning Program Strategies Caltrans	FY15-16	FY16-17	Actual /	Rationale for Modification to the Strategy	Comments
1. Provide updated materials, enhanced outreach, and training to convey land development requirements.					
Stormwater Treatment BMP Technology Report and Stormwater Monitoring and BMP Development Status Report	●	●	A		*Stormwater Monitoring and BMP Development Status Report: Fiscal Year 2015-2016 Update*, September 2015, which provides an update on the status of stormwater treatment technology studies, source control studies (including erosion control studies), and stormwater quality characterization
2. Implement a post construction BMP program for development projects to ensure proper construction and maintenance.					
Implement a program that ensures that all structural BMPs are designed, constructed, and maintained ~~on PDPs~~.	●	●	A	Caltrans implements structural BMPs but does not have Priority Development Projects.	Created a new website application (CT Portal) dedicated for reporting all structural BMPs that were designed, constructed and maintained.
Structural BMPs (which retain water for more than 96 hours) inventory	●	●	A		
Inspect all high priority structural BMPs annually.	●	●	A	Clarified frequency.	
3. Enforce post construction requirements related to new and redevelopment.					
Enforce legal authority to ensure all development projects are in compliance with all post construction requirements.	●	●	A		

Notes:
● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented
A – Actual (active implementation), P – Planned (planning stage)

Table A2-23 Caltrans Jurisdictional Strategies and Implementation Schedules for Construction Management

San Diego River Construction Management Program Strategies Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Ensure that minimum BMPs are designated and required for construction projects.					
Implement or require implementation of BMPs that are site specific, seasonally appropriate, and appropriate to the construction phase year round.	●	●	A		Caltrans continued to track new and/or emerging post-construction stormwater treatment technologies
2. Provide enhanced outreach and coordination to convey construction requirements.					
Provide internal staff training related to construction stormwater management.	●	●	A		During the fiscal year, construction stormwater classes were offered to Construction personnel on stormwater topics.
Provide public education and outreach targeting the construction industry.	●	●	A		
Develop and implement new construction guidance as needed to comply with new Statewide Construction General Permit (CGP)	●	●	A		Full implementation of the CGP occurred in this fiscal year.

Notes:

● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented

A – Actual (active implementation), P – Planned (planning stage)

Table A2-24. Caltrans Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Improve trash management strategies within the watershed.					
Implement "Don't Trash California" campaign.	●	●	A		Caltrans collects trash through several activities that District Maintenance personnel perform on a regular basis. These activities include storm drain maintenance, roadway sweeping, District crew/California Conservation Corps (CCC) trash collection, and the Adopt-A-Highway Program, and public education emphasizing trash and litter prevention.
Implementation of Adopt-A-Highway Statewide Program through coordination with local organizations.	●	●	A		The Caltrans Adopt-A-Highway Program provides an avenue for individuals, organizations, or businesses to help maintain sections of roadside for various activities including litter removal within California's State Highway System.
Report and evaluate trash and litter activities.	●	●	A		
Implement a schedule of operation and maintenance for highways.	●	●	A		The Division of Construction staff continued providing the coordinates of treatment BMPs to facilitate transfer to the Division of Maintenance using a designated handoff form. The Division of Maintenance uses its Integrated Maintenance Management System (IMMS) to track maintenance records of treatment BMPs as provided by the Districts.
Implement highway maintenance activities as required.	●	●	A		

Table A2-24. Caltrans Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
2. Actively educate public on prohibitions related to illicit discharges and connections.					
Implement and annually evaluate public education program.	●	●	A		The Division of Maintenance helps sponsor the California Statewide Litter Collection, Enforcement and Beautification Day event held in the spring on or around Earth Day each year. Caltrans staff volunteers to collect litter and raise public awareness of the issue. Caltrans participates in supporting the California "Keep California Beautiful" campaign with Caltrans' "Protect Every Drop" campaign
Co-sponsor CASQA's Water Quality Newsflash	●	●	A		
Implementation of Statewide Storm Drain Stenciling Program	●	●	A		
Develop and implement Facility Pollution Prevention Plans.	●	●	A		Year- End Performance Report FY 2015-2016, A Summary of Maintenance Activity Storm Water Compliance Reviews, September 2015, which summarizes the stormwater compliance reviews of Maintenance activities. Caltrans is required to develop a Facility Pollution Prevention Plan (FPPP) for each of its maintenance facilities. Each FPPP describes the activities conducted at the facility and the BMPs to reduce or eliminate the discharge of pollutants in stormwater runoff from the facility. All FPPPs will be updated or revised as needed during each year.

Table A2-24. Caltrans Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
Develop and implement guidance to ensure ~~industrial~~ construction activities and facilities are covered by the ~~Industrial~~ Construction General Permit (CGP) as required.	●	●	A	Caltrans does not have facilities subject to the IGP within the watershed, but Caltrans has construction projects subject to the CGP.	Full implementation of the CGP occurred in this fiscal year.
Develop and implement a Municipal Coordination Plan	●	●	A		Caltrans' Municipal Coordination Plan was under development during the reporting period. In the interim, the Districts participated in municipal coordination activities by attending meetings, taking part in special studies, and collaborating with local agencies. District staff attended meetings statewide with municipal stormwater permittees to coordinate public education and outreach, regional planning, and other related activities.
3. Enhance existing maintenance programs.					
Implement a schedule of operation and maintenance activities for related structures.	●	●	A		The Division of Construction staff continued providing the coordinates of treatment BMPs to facilitate transfer to the Division of Maintenance using a designated handoff form. The Division of Maintenance uses its Integrated Maintenance Management System (IMMS) to track maintenance records of treatment BMPs as provided by the Districts.

Table A2-24. Caltrans Jurisdictional Strategies and Implementation Schedules for Existing Development Management

San Diego River Existing Development Program Strategies Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
4. Improve existing inspections programs to more efficiently target key sources.					
Conduct inspections of inventoried existing development to ensure compliance. ~~Each area/activity inspected once every five years minimum, with equivalent of 20% of inventory inspected annually.~~	●	●	A	Frequency stated is from the Phase I municipalities' MS4 Permit. Caltrans conducts inspections in accordance with the requirements of its Permit.	
5. Identify and facilitate retrofit opportunities in areas of existing development.					
Develop a strategy to identify opportunities and facilitate the implementation of retrofit projects in areas of existing development.	●	●	A		

Notes:

● - Fully implemented; ◖ - Partially Implemented, X – Not Implemented

A – Actual (active implementation), P – Planned (planning stage)

APPENDIX 3

Water Quality Improvement Plan Numeric Goals

Appendix 3 Water Quality Improvement Plan Numeric Goals

Compliance with the Bacteria Total Maximum Daily Load (TMDL) may be demonstrated via several methods. Since each compliance pathway provides an independent option to demonstrate progress and ultimately compliance with the TMDL, any one of the following compliance pathways may be used for assessment purposes. The pathways that may be used to demonstrate progress toward the interim and final TMDL goals in the San Diego River Watershed Management Area (WMA or Watershed) are presented below in Table A3-1 and Table A3-2, respectively. These tables, along with additional details regarding these pathways, can be found in Sections 3.1.1 (for interim pathways) and 3.1.2 (for final pathways) of the San Diego River Water Quality Improvement Plan (WQIP). The Participating Agencies have developed individual jurisdictional goals for Pathway 6, which are shown in Tables A3-3 through A3-6, and these numeric goals were used to assess progress in this 2015-2016 WQIP Annual Report.

Table A3-1. Pathways to Achieve Required Interim TMDL Goals

Pathway	Title	Interim Target	Metric	Values to be met		
				Indicator	Dry[c]	Wet
1 OR	Meet bacteria allowable exceedance frequency of receiving water objectives	No exceedances of the interim receiving water limitations;	Exceedance frequencies as measured in receiving waters.	Total Coliform[a]	.28% AEF[d]	46% AEF
				Fecal Coliform	0% AEF	43% AEF
				Enterococcus	1.5% AEF	49%(creeks) 51% (Beaches) AEF
2 OR	No discharge from stormwater drain outfalls	No direct or indirect discharge from the Participating Agencies' storm drain outfalls to the receiving water;	Assessment of presence/absence of flow and connectivity with receiving water.	Flow observations or measurements		
3 OR	Reduce loads at storm drain outfalls	The pollutant load reductions for discharges from the Participating Agencies' outfalls are greater than the required load reduction;	Pollutant load reductions.	Total Coliform	37.02% reduction	17.3% reduction
				Fecal Coliform	34.72% reduction	17.3% reduction
				Enterococcus	46.98% reduction	17.3 % reduction
4 OR	Show Exceedances are from natural sources	Demonstrate that exceedances of final receiving water limitations are due to loads from natural sources	Implement Natural Source Exclusion (NSE) Approach	Monitoring and assessment of receiving water and watershed which supports the NSE approach		
5 OR	No exceedances of final receiving water limitations	There are no exceedances of the final receiving water limitations in the receiving water at, or downstream of Participating Agencies' storm drain outfalls	Assessment of receiving water	Monitoring and assessment of receiving water indicating limitations have not been exceeded		
6	Implement Plan and use adaptive management	The Participating Agencies develop and implement an accepted Plan[b]	Implementation of jurisdictional strategies	Implementation of jurisdictional strategies as developed in accepted Plan and designed to meet interim goals 1, 2 and/or 3.		

a. Receiving water limitations for total coliform only apply to beaches.
b. The Plan must provide reasonable assurance that the interim TMDL compliance requirements in Attachment E of the Permit will be met via implementation, must be accepted by the Regional Board, and must be fully implemented by the Participating Agencies.
c. Dry weather measurements at beaches.
d. AEF - allowable exceedance frequency is the percent of samples that can exceed the single sample maximum of geometric mean and still be in compliance; the AEF is calculated based on the presence of bacteria loading from natural sources.

Table A3-2. Pathways to Achieve Required Final TMDL Goals

Compliance Pathway	Final Target	Final Metric	Measurement: Indicator	Dry Weather			Wet Weather	
1 OR	No exceedances of the final receiving water limitations in the receiving water;	Bacteria concentrations (MPN or CFU/100 ml) and exceedance frequencies in receiving waters are less than or equal to allowable values;		SSM[a]	GM[b]	AEF[c]	SSM	AEF
			Total Coliform[d]	10,000	1,000	0%	10,000	22%
			Fecal Coliform	400	200	0%	400	22%
			Enterococcus (beaches)	104	35	0%	104	22%
			Enterococcus (creeks)	61	33		61	
2 OR	No direct or indirect discharge from the Participating Agencies' storm drain outfalls to the receiving water;	Assessment of presence/absence of flow and connectivity with receiving water;	Flow observations or measurements.					
3 OR	There are no exceedances of the final effluent limitations at the Participating Agencies' storm drain outfalls;	Bacteria concentrations (MPN or CFU/100 ml) and exceedance frequencies in discharges;		Dry			Wet	
				SSM	GM	AEF[e]	SSM	AEF[f]
			Total Coliform[g]	10,000	1,000	0%	10,000	22%
			Fecal Coliform	400	200	0%	400	22%
			Enterococcus (beaches)[h]	104	35	0%	104	22%
			Enterococcus (creeks)[i]	61	33		61	
4 OR	The pollutant load reductions for discharges from the Participating Agencies' storm drain outfalls are greater than or equal to the final load reductions;	Load reductions in discharges are greater than or equal to required load reductions. The calculation requires an understanding of the baseline load, which can be used to estimate a target load reduction;		Percent Reduction (Dry)			Percent Reduction (Wet)[j]	
			Total Coliform	74.03%			34.7%	
			Fecal Coliform	69.44%			34.7%	
			Enterococcus	93.96%			34.7%	
5 OR	Exceedances of the final receiving water limitations in the receiving water are due to loads from natural sources and pollutant loads from the Participating Agencies' storm drain outfalls are not causing or contributing to the exceedances;	Microbial source tracking results as measured in the receiving water downstream of stormwater drain outfalls;	Microbial source tracking results show anthropogenic markers are below the limits of reporting in the receiving water at the time of the exceedance in most samples.					
6	The Participating Agencies develop and implement an adopted Water Quality Improvement Plan that includes a watershed model or other watershed analytical tool(s)	Implementation of jurisdictional strategies designed to meet goals. Use an adaptive management approach to improve implementation of jurisdictional strategies to reach goals.	Implementation of jurisdictional strategies as outlined in the Plan, and of the required monitoring and assessment program.					

a. SSM = single sample maximum or the highest allowable concentration of bacteria contained in one discreet sample

b. GM = geometric mean calculated based on multiple samples over a given time frame as defined by the Ocean Plan

c. AEF = allowable exceedance frequency is the percent of samples that can exceed the single sample maximum of geometric mean and still be in compliance; the AEF is calculated based on the presence of bacteria loading from natural sources

d. Receiving water limitations for total coliform only apply to beaches.

e. For dry weather days, the dry weather bacteria densities must be consistent with the single sample maximum REC-1 water quality objectives in the Ocean Plan for discharges to beaches and the Basin Plan for discharges to creeks and creek mouths.

f. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days.

g. Total coliform effluent limitations only apply to storm drain outfalls that discharge to the Pacific Ocean Shorelines and creek mouths listed in Table 6.0 of Attachment E of Order R9-2013-0001.

h. This enterococcus effluent limitation applies to storm drain discharges to segments of areas of the Pacific Ocean Shoreline listed in Table 6.0 of Attachment E of Order R9-2013-0001.

i. This enterococcus effluent limitation applies to storm drain discharges to segments of areas of the creeks or creek mouths listed in Table 6.0 of Attachment E of Order R9-2013-0001.

j. The baseline loads for the lower watershed were determined through modeling, and are presented in Appendix 3C. Wet weather target load reductions (TLRs) for this Plan were taken from the City of San Diego Phase II Comprehensive Load Reduction Plan (Tetra Tech 2013). Fecal coliform was used to represent all bacteria for the purposes of this modeling. Appendix 3C discusses the use of the load reduction estimates in the City of San Diego Phase II Comprehensive Load Reduction Plan (Tetra Tech 2013) and their relationship to this plan.

The jurisdictional goals identified by the Participating Agencies in the San Diego River WMA to demonstrate progress toward compliance with the Bacteria TMDL are presented below in Table A3-3 through Table A3-12, followed by goals developed by Caltrans. These tables, along with additional details regarding these jurisdictional goals, can be found in Section 3.1.3 of the San Diego River WMA WQIP.

3.1 CITY OF EL CAJON JURISDICTIONAL GOALS

Table A3-3. City of El Cajon Dry Weather Jurisdictional Numeric Goals

Title	Metric	Baseline	Outcome	1st Permit Term Numeric Goals 2013 - 2018	2nd Permit Term Numeric Goals 2018 - 2023	
					TMDL Interim Compliance Date April 4, 2020 [(a)(b)]	TMDL Final Compliance Date April 4, 2021
Reduce controllable dry weather persistent flows	% reduction of flow volume or number of outfalls with flows mitigated from persistently flowing storm drain outfalls.	Baseline will be developed from previous dry weather monitoring data.	Effectively reduce controllable dry weather flow from storm drain outfalls to receiving water.	Reduce the volume of dry weather flows or the number of storm drains with dry weather flows by 10%.	Maintain 10% reduction in flows or the number of storm drains with dry weather flows and expand reduction based on results of previous actions and availability of funds.	Effectively reduce dry weather discharges from storm drain outfalls to the receiving water.
Transient encampment removal events	Increase the number of annual transient encampment removal events throughout the City's drainage channels.	Yearly average of five (5) removal events during R9-2007-0001 Permit cycle to help remove 25 cubic yards of trash and debris.	Increase annual transient encampment removal events to a minimum of eight (8) annual events to increase to 40 cubic yards of trash and debris to help reduce bacterial pollutant loads for total coliform fecal coliform and enterococcus.	Reduce gross pollutants that may contribute to bacteria loads by increasing the number of cubic yards of debris collected from drainage channels.	Continue to conduct a minimum of 8 transient encampment removal events per year and adjust the number of events accordingly to achieve compliance.	Continue to conduct a minimum of 8 transient encampment removal events per year and adjust the number of events accordingly and achieve compliance to achieve compliance with load reduction of 74.03% total coliform, 69.44% fecal coliform and 93.96% enterococcus.

a. Request moving Interim TMDL Compliance Date from April 4, 2018 (per Attachment E, 6.c(1)) to April 4, 2020 to allow adequate time to investigate and mitigate bacteria sources, and monitor progress and adjust implementation through the adaptive management process.

b. Percent Load Reductions reported in Table 6.3 (Final) and Table 6.6 (Interim) of Attachment E to Order R9-2013-0001 are compared to pollutant loads from 2001 and 2002 as noted in the table footnotes.

Table A3-4. City of El Cajon Wet Weather Jurisdictional Numeric Goals

Title	Metric	Baseline	Outcome	1st Permit Term 2013 - 2018	2nd Permit Term 2018 - 2023	3rd Permit Term 2023 - 2028	4th Permit Term 2028 - 2033
						Meet TMDL Interim Compliance Date April 4, 2028 [(a) (b)]	Meet TMDL Final Compliance Date April 4, 2031
Non-structural BMP (Creek Cleanup)	Reduce bacterial loads in Forrester Creek	5 cubic yards of solid waste (i.e. trash and debris) per cleanup event	Reduce trash and debris to help reduce bacteria loads.	Sponsor, coordinate with jurisdictions creek clean-up events in 1 focused management area, bi-annually; segregate and quantify waste materials.	Sponsor, coordinate with jurisdictions creek clean-up events in 1 focused management area, bi-annually; segregate and quantify waste materials.	Sponsor, coordinate with jurisdictions creek clean-up events in 1 focused management area, bi-annually; segregate and quantify waste materials.	Reduce bacteria[(c)] loads by 34.7% from the storm drain outfalls by continued implementation of programmatic Non-structural BMPs.
Non-structural BMP (Pet Waste Outreach)	Reduce bacterial loads in Forrester Creek	5 cubic yards of solid waste (i.e. trash and debris) per event	Reduce trash and debris to help reduce bacteria loads.	Expand pet waste management outreach to 1 focused management area; or to large properties owners (i.e. apartments, commercial facilities).	Expand pet waste management outreach to 1 focused management area; or to large properties owners (i.e. apartments, commercial facilities).	Expand pet waste management outreach to 1 focused management area; or to large properties owners (i.e. apartments, commercial facilities and educational institutions).	Reduce bacteria[(c)] loads by 34.7%from the storm drain outfalls by continued implementation of programmatic Non-structural BMPs.

a. Request moving Interim TMDL Compliance Date from April 4, 2021 (per Attachment E, 6.c(1)) to April 4, 2028 to allow adequate time to investigate and mitigate bacteria sources, and monitor progress and adjust implementation through the adaptive management process.

b. In accordance with Sections 6.b(3)(a)-(e) and 6.c.(3)(a)-(g) of Attachment E to Order R9-2013-0001.

c. Final Wet weather load reduction values as indicated in Table 6.3 of Attachment E to Order R9-2013-0001 for Fecal Coliform and Enterococcus were updated, with San Diego Water Board concurrence, to reflect load reduction modeling utilizing Water Year 2003 (considered an average rainfall year for the SDR Watershed) instead of Water Year 1993 as utilized in the 2010 TMDL model. This updated modeling analysis and the results are presented in the City of San Diego – San Diego River Watershed Comprehensive Load Reduction Plan – Phase II (available from the City of San Diego Storm Water Division website, under Plans and Reports tab at: http://www.sandiego.gov/stormwater/pdf/sdrclrpupdate.pdf). This resulted in the required final load reduction for Fecal Coliform, for example, to change from 53.22% (Table 6.3, Att. E of 2013 Permit) to 34.7%.

3.2 CITY OF LA MESA JURISDICTIONAL GOALS

Table A3-5. City of La Mesa Dry Weather Jurisdictional Numeric Goals

Title	Metric	Baseline	Outcome	1st Permit Term Numeric Goals 2013 - 2018	2nd Permit Term Numeric Goals 2018 - 2023	
					TMDL Interim Compliance Date April 4, 2020 (a)	TMDL Final Compliance Date April 4, 2021(b)
Creek Restoration Project	Linear Feet of Structural Projects	Existing Channel Conditions	Structural Project Completion, Increased CRAM channel assessment value. Higher biologic and habitat integrity.	Perform 900 LF of Alvarado Creek Restoration	Conduct Alvarado Trunk Sewer Main Replacement Project which will replace approx. 0.75 miles of trunk sewer. Reduction in infiltration/exfiltration resulting in reduction in bacteria to meet TMDL Interim Compliance Requirements [Attachment E, 6.c.(3)]	Meet TMDL Final Compliance Requirements [Attachment E, 6.b(3)]

a. Request moving Interim TMDL Compliance Date from April 4, 2018 (per Attachment E, 6.c(1)) to April 4, 2020 to allow adequate time to investigate and mitigate bacteria sources, and monitor progress and adjust implementation through the adaptive management process.

b. In accordance with Sections 6.b(3)(a)-(e) and 6.c.(3)(a)-(g) of Attachment E to Order R9-2013-0001.

Table A3-6. City of La Mesa Wet Weather Jurisdictional Numeric Goals

Title	Metric	Baseline	Outcome	1st Permit Term 2013 - 2018	2nd Permit Term 2018 - 2023	3rd Permit Term 2023 - 2028	4th Permit Term 2028 - 2033
						Meet TMDL Interim Compliance Date April 4, 2028 (a) (b)	Meet TMDL Final Compliance Date April 4, 2031
Creek Restoration Project	Linear Feet of Structural Projects	Existing Channel Conditions	Structural Project Completion. Increased CRAM channel assessment value. Higher biologic and habitat integrity.	Perform 900 Linear Feet of Alvarado Creek Restoration resulting in a 6.3% reduction in bacteria loading form municipal land use.[c]	Conduct Alvarado Trunk Sewer Main Replacement Project which will replace .75 miles of trunk sewer. Reduction in infiltration/ exfiltration, reduction in bacteria.	Comply with any of the TMDL Interim Compliance Requirements [Attachment E, 6.c(3)]	Comply with any of the TMDL Final Compliance Requirements [Attachment E, 6.b(3)]

a. Request moving Interim TMDL Compliance Date from April 4, 2021 (per Attachment E, 6.c(1)) to April 4, 2028 to allow adequate time to investigate and mitigate bacteria sources, and monitor progress and adjust implementation through the adaptive management process.

b. In accordance with Sections 6.b(3)(a)-(e) and 6.c.(3)(a)-(g) of Attachment E to Order R9-2013-0001.

c. Geosyntec Consultants, Technical Memorandum, *San Diego River Watershed Water Quality Improvement Plan City of La Mesa – Jurisdictional Load Reduction Summary*, October 10, 2014

3.3 CITY OF SANTEE JURISDICTIONAL GOALS

Table A3-7. City of Santee Dry Weather Jurisdictional Numeric Goals

Title	Metric	Baseline	Outcome	1st Permit Term Numeric Goals 2013 - 2018	2nd Permit Term Numeric Goals 2018 - 2023	
					TMDL Interim Compliance Date April 4, 2020 [a]	TMDL Final Compliance Date April 4, 2021
MS4 Discharge Load Reduction	Load reductions in MS4 discharges	33.6 x 10^{12} MPN during Water Year 2003 (based on TMDL modeling) [b]	Reach mandatory reduction of dry weather bacteria loading from MS4 discharges identified in Attachment E	Loads[c] are reduced by 18.5% for Total Coliform; 17.4% for Fecal Coliform; 23.5% for Enterococcus from MS4 outfalls	Loads[d] are reduced by 37.02% for Total Coliform (TC), 34.72% for Fecal Coliform (FC), 46.98% for *Enterococcus (Ent)* from the MS4 outfalls	Loads[e] are reduced by 74.03% for Total Coliform (TC), 69.44% for Fecal Coliform (FC), 93.96% *for Enterococcus (Ent)* from the MS4 outfalls

a. In accordance with Permit Provisions 6.b.(3)(a)-(e) and 6.c.(3)(a)-(g) of Attachment E to Order R9-2013-0001.

b. Value from table on page A33 of Attachment A to TMDL Resolution No.R9-2010-0001; monthly value translated in annual load by multiplying by 12, then City of San Diego contribution estimated to be 43% of the overall load (as a proportion of the watershed area) was subtracted.

c. Values calculated as half of the interim goals.

d. Values taken from Table 6.6 of Attachment E to Order R9-2013-0001: Anticipated load reductions for WQIP strategies were modeled using Fecal Coliform (FC) as a surrogate for all Fecal Indicator Bacteria as noted in WQIP Appendices 3C and 3F, therefore target FC load reductions were set according to the largest required indicator bacteria reduction (among TC, FC and *Ent*) to be conservative; *Enterococcus* is the controlling indicator.

e. Values taken from Table 6.3 of Attachment E to Order R9-2013-0001: Anticipated load reductions for WQIP strategies were modeled using Fecal Coliform (FC) as a surrogate for all Fecal Indicator Bacteria as noted in WQIP Appendices 3C and 3F, therefore target FC load reductions were set according to the largest required indicator bacteria reduction (among TC, FC and *Ent*) to be conservative; *Enterococcus* is the controlling indicator.

Table A3-8. City of Santee Wet Weather Jurisdictional Numeric Goals

Title	Metric	Baseline	Outcome	1st Permit Term 2013 - 2018	2nd Permit Term 2018 - 2023	3rd Permit Term 2023 - 2028	4th Permit Term 2028 - 2033
						Meet TMDL Interim Compliance Date April 4, 2028 [a, b]	Meet TMDL Final Compliance Date April 4, 2031
MS4 Discharge Load Reduction	Load reductions in MS4 discharges; or	1,727 x 10^{12} MPN during Water Year 2003 (based on modeling) [c]	Reach mandatory reduction of dry weather bacteria loading from MS4 discharges identified in Attachment E	Loads[d] are reduced by 4.3% for Total Coliform; 4.3% for Fecal Coliform; 4.3% for Enterococcus from MS4 outfalls	Loads[e] are reduced by 8.7% for Total Coliform; 8.7% for Fecal Coliform; 8.7% for Enterococcus from MS4 outfalls	Loads[f] are reduced by 17.3% for Total Coliform; 17.3 for Fecal Coliform; 17.3% for Enterococcus from MS4 outfalls	Loads[g] are reduced by 34.7% for Total Coliform; 34.7% for Fecal Coliform; 34.7% for Enterococcus from MS4 outfalls

a. In accordance with Permit Provisions 6.b.(3)(a)-(e) and 6.c.(3)(a)-(g) of Attachment E to Order R9-2013-0001.

b. Request moving Interim TMDL Compliance Date from April 4, 2017 (per Attachment E, 6.c(1)) to April 4, 2020 to allow adequate time to investigate and mitigate bacteria sources, and monitor progress and adjust implementation through the adaptive management process.

c. Value from modeled baseline load as indicated in Appendix 3C of the WQIP.

d. Values calculated as half of the 2nd Permit Term goals.

e. Values calculated as half of the interim goals

f. Values calculated as half of the final goals

g. Values taken from City of San Diego Phase II CLRP: values deviate from final wet weather load reductions indicated in Table 6.3 of Attachment E to Order R9-2013-0001 because the modeling was updated, with San Diego Water Board concurrence, from Water Year 1993 performed in the 2010 TMDL to Water Year 2003 (considered an average rainfall year for the SDR Watershed) performed in the Phase II CLRP. This resulted in the required final load reduction for Fecal Coliform, for example, to change from 53.22% (Table 6.3, Att. E of 2013 Permit) to 34.7%.

3.4 City of San Diego Jurisdictional Goals

Table A3-9. City of San Diego Dry Weather Jurisdictional Numeric Goals

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term	FY 16-20	FY 21-25
			FY18	FY19[a]	FY21[a]
Receiving Water % Days Exceeding WQO	Fecal coliform	12.6% Days Exceeding WQO (2002[b])	See performance measures	6.3%	0%
	Enterococcus	19% Days Exceeding WQO (2002[b])		9.5%	0%
	Total coliform (shoreline only)	0.65% Days Exceeding WQO (2010[b])		0.33%	0%
Or					
Storm Drain Discharges % Days Exceeding WQO	Fecal coliform	88% Days Exceeding [c]	See performance measures	0%	0%
	Enterococcus	100% Days Exceeding [c]		0%	0%
	Total coliform (shoreline only)	97% Days Exceeding [c]		0%	0%
Or					
Storm Drain Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures	49.4%	98.8%
	Enterococcus			49.9%	99.9%
	Total coliform (shoreline only)			49.4%	98.8%
Or					
Storm Drain Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is storm drain discharge % load reduction (above). Interim compliance is implementation of strategies and schedule based on analysis results (Appendix 3F of the WQIP). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See WQIP Section 3.2.3 and Appendix 3F for modeling discussion.			

Table A3-9. City of San Diego Dry Weather Jurisdictional Numeric Goals

<table>
<tr><th colspan="2" rowspan="3">Compliance Pathways</th><th rowspan="3">Baseline</th><th colspan="3">Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term</th><th>FY 16-20</th><th>FY 21-25</th></tr>
<tr><th>FY18</th><th>FY19[a]</th><th>FY21[a]</th></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td>Storm Drain Discharges
# of Direct or Indirect MS4 Discharges to Receiving Water</td><td>Discharges</td><td>65 discharges (major MS4 outfalls)</td><td>See performance measures</td><td>0</td><td>0</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td rowspan="3">% Exceedances of Final Receiving Water WQOs Due to Natural Sources[d]</td><td>Fecal coliform</td><td rowspan="3">Not available</td><td>100%</td><td>100%</td><td>100%</td></tr>
<tr><td>Enterococcus</td><td>100%</td><td>100%</td><td>100%</td></tr>
<tr><td>Total coliform (shoreline only)</td><td>100%</td><td>100%</td><td>100%</td></tr>
<tr><th colspan="6">Performance Measures</th></tr>
<tr><th colspan="2">Suite of Strategies to Measure Performance During First Permit Term</th><th>Baseline</th><th colspan="3">FY18</th></tr>
<tr><td colspan="2">Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather</td><td>0 acres treated in 2002, the year used as baseline in the Bacteria TMDL</td><td colspan="3">58.4 acres of drainage area treated through construction of 4 green infrastructure BMPs</td></tr>
<tr><td colspan="2">Implement runoff reduction programs, including targeted education and outreach, enhanced inspections, rebates[e], and increased enforcement</td><td><u>Average Dry Weather Flow:[f]</u>
117.8 gallons per minute</td><td colspan="3">10% reduction in prohibited[g] dry weather flow from baseline measured at persistently flowing outfalls in the watershed</td></tr>
</table>

Table A3-9. City of San Diego Dry Weather Jurisdictional Numeric Goals

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year		
		Current Permit Term	FY 16-20	FY 21-25
		FY18	FY19[a]	FY21[a]

a. Denotes total maximum daily load (TMDL) interim and final water quality-based effluent limitation (WQBEL). An alternative interim dry weather compliance date of April 4, 2019 is proposed as allowed per Attachment E.6.c.(1).

b. The existing exceedance frequency was calculated based on available monitoring data between 1996 and 2002 per Permit requirements and presented in more detail in Appendix 3C. The existing exceedance frequency for total coliform was calculated based on available monitoring data between 2004 and 2010 per Permit requirements and presented in more detail in Appendix 3C.

c. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of days in exceedance for the historical 5-year period.

d. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from the stormwater conveyance system are not causing or contributing to exceedances.

e. City of San Diego rebates include grass replacement, rainwater harvesting, downspout disconnect, and micro irrigation.

f. Historic dry weather flow observations in the San Diego River WMA occurred at different outfalls than the FY 15-16 dry weather flow observations. The outfalls observed recently have very different characteristics compared to the outfalls sampled historically, so the average flows for the two time periods are not comparable. To account for this, the baseline dry weather flow for the San Diego River WMA was calculated based on the FY 15-16 outfall data from persistently flowing City of San Diego outfalls in the WMA (average FY 15-16 flow = 62.8 gallons per minute). An average of the reductions in dry weather flow observed for FY 15-16 in the Los Peñasquitos, San Dieguito River, Chollas Creek, and Mission Bay WMAs was calculated (-46.7% change). The same percent change was assumed for the San Diego River WMA, which resulted in a baseline dry weather flow of 117.8 gallons per minute.

g. Does not include allowable discharges as defined in Provision A and Provision E.2.a of the Permit.

% = percent; FY = fiscal year; WQO = Water Quality Objective

Table A3-10. City of San Diego Wet Weather Jurisdictional Numeric Goals

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14-FY18)	FY 16-20	FY 21-25	FY 26-30	FY 31-36
			FY18	FY19	FY21[a]	FY29	FY31[a]
Receiving Water % Days Exceeding WQO	Fecal coliform	72% Days Exceeding WQO (2002 TMDL Model)	See performance measures	72%[b]	43%	35%	22%
	Enterococcus – San Diego River	78% Days Exceeding WQO (2002 TMDL Model)		78%[b]	49%	36%	22%
	Enterococcus – Pacific Ocean Shoreline	81% Days Exceeding WQO (2002 TMDL Model)		81%	51%	37%	22%
Or							
Storm Drain Discharges % Days Exceeding WQO	Fecal coliform	100% Days Exceeding[c]	See performance measures	22%	22%	22%	22%
	Enterococcus	100% Days Exceeding[c]		22%	22%	22%	22%
	Total coliform (Shoreline only)	96% Days Exceeding[c]		22%	22%	22%	22%
Or							
Storm Drain Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures	5.2%	17.3%	23.9%	34.7%
	Enterococcus			4.2%	14.1%	19.5%	28.2%
	Total coliform (Shoreline only)			3.8%	12.6%	17.6%	25.1%
Or							
Storm Drain Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is storm drain discharge % load reduction (above). Interim compliance is implementation of strategies and schedule based on analysis results (WQIP Appendix 3C). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See WQIP Section 3.2.4 and Appendix 3E for modeling results.					
Or							
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	65 [d]	See performance measures	0	0	0	0
Or							

Table A3-10. City of San Diego Wet Weather Jurisdictional Numeric Goals

<table>
<tr><th colspan="2" rowspan="3">Compliance Pathways</th><th rowspan="3">Baseline</th><th colspan="5">Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term (FY14-FY18)</th><th>FY 16-20</th><th>FY 21-25</th><th>FY 26-30</th><th>FY 31-36</th></tr>
<tr><th>FY18</th><th>FY19</th><th>FY21[a]</th><th>FY29</th><th>FY31[a]</th></tr>
<tr><td rowspan="3">% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[e]</td><td>Fecal coliform</td><td rowspan="3">Not available</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td></tr>
<tr><td>Enterococcus</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td></tr>
<tr><td>Total coliform (Shoreline only)</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td></tr>
</table>

<table>
<tr><th colspan="3">Performance Measures</th></tr>
<tr><th>Suite of Strategies To Measure Performance During First Permit Term</th><th>Baseline</th><th>FY18</th></tr>
<tr><td>Develop green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather</td><td>0 acres treated in 2002, the year used as baseline in the Bacteria TMDL</td><td>58.4 acres of drainage area treated through construction of 4 green infrastructure BMPs</td></tr>
</table>

a. Denotes total maximum daily load (TMDL) interim and final water quality-based effluent limitation (WQBEL). An alternative interim wet weather compliance data of April 4, 2024 is proposed as allowed per Attachment E.6.c.(1).

b. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Participating Agencies by maintaining the existing wet weather exceedance frequency.]

c. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period.

d. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring. Assumed to be all 65 of City's major outfalls in WMA.

e. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from stormwater conveyance systems are not causing or contributing to exceedances.

3.5 COUNTY OF SAN DIEGO JURISDICTIONAL GOALS

Table A3-11. County of San Diego Dry Weather Jurisdictional Numeric Goals

Compliance Pathway	Title	Metric[a]	Baseline	Final Outcome	1st Permit Term 2013 – 2018	2nd Permit Term 2018 – 2023	
						TMDL Interim Compliance Date April 4, 2020[b]	TMDL Final Compliance Date April 4, 2021
1; or	No Discharge from MS4; or	Discharge from MS4 outfalls; or	To be established during FY 15-16 monitoring	Elimination of flow[k] from MS4 discharges	Flow eliminated from 25% of outfalls or cumulative flow from storm drain outfalls reduced by 25%	Flow eliminated from 50% of outfalls or cumulative flow from storm drain outfalls reduced by 50%	Flow eliminated from 100%[c] of outfalls or cumulative flow from storm drain outfalls reduced by 100%[c]
2; or	Meet TMDL Limits in Receiving Water; or	Bacteria concentrations & exceedance percentage in receiving waters; or	Not applicable	Achievement of WQOs or allowed exceedance percentage for bacteria	None	Bacteria concentrations at the compliance point identified in the Monitoring and Assessment Pan are below the applicable WQO (e.g., 400 MPN/100mL single sample maximum for Fecal Coliform)[l] or TMDL allowed exceedance percentage[d] of 0.28% for Total Coliform; 0% for Fecal Coliform; 1.5% for *Enterococcus*	Bacteria concentrations at the compliance point identified in the Monitoring and Assessment Pan are below the applicable WQO or TMDL allowed exceedance percentage[e] of 0% for Total Coliform, Fecal Coliform and *Enterococcus*
3; or	MS4 Discharge Meets TMDL Limits; or	Bacteria concentrations & exceedance percentage in MS4discharges; or					
4; or	MS4 Discharge Load Reduction; or	Load reductions in MS4 discharges; or	14.4×10^{12} MPN during Water Year 2003 (based on TMDL modeling) [f]	Reach mandatory reduction of dry weather bacteria loading from MS4 discharges identified in Attachment E	Loads[g] are reduced by 18.5% for Total Coliform; 17.4% for Fecal Coliform; 23.5% for Enterococcus from MS4 outfalls[k]	Loads[h] are reduced by 37.02% for Total Coliform (TC), 34.72% for Fecal Coliform (FC), 46.98% for *Enterococcus (Ent)* from the MS4 outfalls[k]	Loads[i] are reduced by 74.03% for Total Coliform (TC), 69.44% for Fecal Coliform (FC), 93.96% *for Enterococcus (Ent)* from the MS4 outfalls[k]
5; or	Exceedance due to Natural Sources; or	Exceedances due to natural sources, and MS4 outfall loads not causing or contributing to exceedances; or	To be established during FY 14-15 monitoring	Elimination of human and dog fecal markers from MS4 discharges and MS4 outfall loads not causing or contributing to exceedances	Number of MS4 outfalls with human and dog fecal markers detected are reduced by 25% and MS4 outfall loads not causing or contributing to exceedances	Number of MS4 outfalls with human and dog fecal markers detected are reduced by 50% and MS4 outfall loads not causing or contributing to exceedances	Number of MS4 outfalls with human and dog fecal markers detected are reduced by 100% [j] and MS4 outfall loads not causing or contributing to exceedances
6	Water Quality Improvement Plan (WQIP)	Implement WQIP	Not Applicable	Implementation of the WQIP in accordance with Attachment E of Permit	Implement WQIP supported by a reasonable assurance as accepted by the San Diego Water Board	Submit and fully implement WQIP, accepted by the San Diego Water Board, which provides reasonable assurance that interim TMDL compliance requirements will be achieved by the interim compliance dates	Develop and implement WQIP as follows: (i) incorporate BMPs required under Permit Provision 6.b.(2)(c) in WQIP (ii) Include analysis to demonstrate that implementation of BMPs required by Provision 6.b.(2)(c) achieves compliance with Specific Provisions 6.b.(3)(a), 6.b.(3)(b), 6.b.(3)(c), 6.b.(3)(d), and/or 6.b.(3)(e) (iii) The results analysis must be accepted San Diego Water Boards as part of the WQIP (iv) Responsible Copermittee continue to implement the BMPs in (i), AND (v) Responsible Copermittee continue to perform specific monitoring and assessments from Provision 6.d to demonstrate compliance with Specific Provisions 6.b.(3)(a), 6.b.(3)(b), 6.b.(3)(c), 6.b.(3)(d), 6.b.(3)(e), and/or 6.b.(3)(f)

Table A3-11. County of San Diego Dry Weather Jurisdictional Numeric Goals

Compliance Pathway	Title	Metric[a]	Baseline	Final Outcome	1st Permit Term 2013 – 2018	2nd Permit Term 2018 – 2023	
						TMDL Interim Compliance Date April 4, 2020[b]	TMDL Final Compliance Date April 4, 2021
WQIP Pathway							
6a	Eliminate anthropogenic dry weather flows [l] from storm drain outfalls	% reduction of flow volume or number of outfalls with persistent flows	To be established FY 15-16 using dry weather flow measurements.	Effectively eliminate anthropogenic dry weather flow from storm drain outfalls to receiving water.	Reduce by 20% the aggregate flow volume or the number of persistently flowing outfalls.	Reduce by 75% the aggregate flow volume or the number of persistently flowing outfalls.	Eliminate 100% anthropogenic dry weather discharges and accompanying bacteria loads from storm drain outfalls to the receiving water.

a. In accordance with Permit Provisions 6.b.(3)(a)-(e) and 6.c.(3)(a)-(g) of Attachment E to Order R9-2013-0001.

b. Request moving Interim TMDL Compliance Date from April 4, 2018 (per Attachment E, 6.c(1)) to April 4, 2020 to allow adequate time to investigate and mitigate bacteria sources, and monitor progress and adjust implementation through the adaptive management process.

c. Goal of 100% flow elimination in accordance with Provision 6.b.(3)(a).

d. Interim dry weather Allowable Exceedance Percentages were calculated based on half the value of the existing 30-day Geometric Mean of exceedance percentages based on beach sample data from 2004 through 2010; Annual Bacteria TMDL Monitoring Report is included in Appendix L of the Transitional Monitoring and Assessment Report for the San Diego River Watershed Management Area (2012-2014) (http://www.projectcleanwater.org/images/stories/Docs/San-Diego-River/SDR_TMAR_2015.zip). From this report, the San Diego River watershed compliance reduction milestones/existing and interim and final exceedance frequencies are provided in Table 1 – 2 on page 1 – 8 (specifically, footnote “a” under the table). The interim and existing exceedance frequency calculation methodology is summarized in section 2.4 on page 2 – 9 of the document.

e. Final dry weather Allowable Exceedance Percentages are from Tables 6.2a, 6.2b, and 6.2c of Attachment E to Order No.R9-2013-0001.

f. Value derived from table on page A33 of Attachment A to TMDL Resolution No.R9-2010-0001 for the San Diego River watershed; monthly value translated in annual load for watershed by multiplying by 12. Baseline load for County of San Diego was calculated as a proportion of County land area to that of the overall watershed, i.e. approximately 24%

g. Values calculated as half of the interim goals.

h. Values taken from Table 6.6 of Attachment E to Order R9-2013-0001: Anticipated load reductions for WQIP strategies were modeled using Fecal Coliform (FC) as a surrogate for all Fecal Indicator Bacteria as noted in WQIP Appendices 3C and 3F, therefore target FC load reductions were set according to the largest required indicator bacteria reduction (among TC, FC and *Ent*) to be conservative; *Enterococcus* is the controlling indicator.

i. Values taken from Table 6.3 of Attachment E to Order R9-2013-0001: Anticipated load reductions for WQIP strategies were modeled using Fecal Coliform (FC) as a surrogate for all Fecal Indicator Bacteria as noted in WQIP Appendices 3C and 3F, therefore target FC load reductions were set according to the largest required indicator bacteria reduction (among TC, FC and *Ent*) to be conservative; *Enterococcus* is the controlling indicator.

j. Goal of 100% of exceedances demonstrated to be due to natural sources in accordance with Provision 6.b.(3)(e).

k. There are a total of 5 compliance points in the San Diego River watershed; Total Coliform is only applicable in the ocean.

l. Flow is defined as all dry weather flows excluding groundwater, other exempt or permitted non-stormwater flows, and sanitary sewer overflows.

Table A3-12. County of San Diego Wet Weather Jurisdictional Numeric Goals

Compliance Pathway	Title	Metric[a]	Baseline	Final Outcome	1st Permit Term 2013 – 2018	2nd Permit Term 2018 – 2023	3rd Permit Term 2023 – 2028	4th Permit Term 2028 – 2033
							Meet TMDL Interim Compliance Date April 4, 2028[b]	Meet TMDL Final Compliance Date April 4, 2031
1; or	No Discharge from MS4; or	Discharge from MS4 outfalls; or	To be established during FY 15-16 monitoring	Elimination of flow from MS4 discharges	Flow eliminated from 10% of outfalls or cumulative flow from storm drain outfalls reduced by 10%	Flow eliminated from 25% of outfalls or cumulative flow from storm drain outfalls reduced by 25%	Flow eliminated from 50% of outfalls or cumulative flow from storm drain outfalls reduced by 50%	Flow eliminated from 100%[c] of outfalls or cumulative flow from storm drain outfalls reduced by 100 %[c]
2; or	Meet TMDL Limits in Receiving Water; or	Bacteria concentrations & exceedance percentage in receiving waters; or	Not applicable	Achievement of allowed exceedance percentage for bacteria	None	None	Bacteria concentrations are below the applicable WQO (e.g., 400 MPN/100mL single sample maximum for Fecal Coliform)[n] or TMDL allowed exceedance percentage [d] of 46% for Total Coliform (Beach); 43% for Fecal Coliform; 49%(creeks) & 51%(beaches) for *Enterococcus*	Bacteria concentrations are below the applicable WQO or TMDL allowed exceedance percentage[e] of 22% for Total Coliform, Fecal Coliform and *Enterococcus*
3; or	MS4 Discharge Meets TMDL Limits; or	Bacteria concentrations & exceedance percentage in MS4discharges; or						
4; or	MS4 Discharge Load Reduction; or	Load reductions in MS4 discharges; or	1,727 x 10^{12} MPN during Water Year 2003 (based on modeling) [f]	Reach mandatory reduction of dry weather bacteria loading from MS4 discharges identified in Attachment E	Loads[g] are reduced by 4.3% for Fecal Coliform; 3.5% for *Enterococcus* from MS4 outfalls	Loads[h] are reduced by 8.7% for Fecal Coliform; 7.1% for *Enterococcus* from MS4 outfalls	Loads[i] are reduced by 17.3 for Fecal Coliform; 14.1% for *Enterococcus* from MS4 outfalls	Loads[j] are reduced by 34.7% for Fecal Coliform; 28.2% for Enterococcus from MS4 outfalls
5; or	Exceedance due to Natural Sources; or	Exceedances due to natural sources, and MS4 outfall loads not causing or contributing to exceedances; or	To be established during FY 14-15 monitoring	Elimination of human and dog fecal markers from MS4 discharges and MS4 outfall loads not causing or contributing to exceedances	Number of MS4 outfalls with human and dog fecal markers detected are reduced by 25%	Number of MS4 outfalls with human and dog fecal markers detected are reduced by 50% and MS4 outfall loads not causing or contributing to exceedances	Number of MS4 outfalls with human and dog fecal markers detected are reduced by 75% and MS4 outfall loads not causing or contributing to exceedances	Number of MS4 outfalls with human and dog fecal markers detected are reduced by 100%[k] and MS4 outfall loads not causing or contributing to exceedances
6	Water Quality Improvement Plan (WQIP)[l]	Implement WQIP	Not Applicable	Implementation of the WQIP in accordance with Attachment E of Permit	Implement WQIP supported by a reasonable assurance as accepted by the San Diego Water Board	Implement WQIP supported by a reasonable assurance as accepted by the San Diego Water Board	Submit and fully implement WQIP, accepted by the San Diego Water Board, which provides reasonable assurance that interim TMDL compliance requirements will be achieved by the interim compliance dates	Develop and implement WQIP as follows: (i) incorporate BMPs required under Permit Provision 6.b.(2)(c) in WQIP (ii) Include analysis to demonstrate that implementation of BMPs required by Provision 6.b.(2)(c) achieves compliance with Specific Provisions 6.b.(3)(a), 6.b.(3)(b), 6.b.(3)(c), 6.b.(3)(d), and/or 6.b.(3)(e) (iii) The results analysis must be accepted San Diego Water Boards as part of the WQIP (iv) Responsible Copermittee continue to implement the BMPs in (i), AND (v) Responsible Copermittee continue to perform specific monitoring and assessments from Provision 6.d to demonstrate compliance with Specific Provisions 6.b.(3)(a), 6.b.(3)(b), 6.b.(3)(c), 6.b.(3)(d), 6.b.(3)(e), and/or 6.b.(3)(f)

Table A3-12. County of San Diego Wet Weather Jurisdictional Numeric Goals

Compliance Pathway	Title	Metric[a]	Baseline	Final Outcome	1st Permit Term 2013 – 2018	2nd Permit Term 2018 – 2023	3rd Permit Term 2023 – 2028	4th Permit Term 2028 – 2033
							Meet TMDL Interim Compliance Date April 4, 2028[b]	Meet TMDL Final Compliance Date April 4, 2031
WQIP Pathway								
6a	Implement Plan with focus on programmatic BMPs and use adaptive management to increase effectiveness	% bacterial load reduction	1,727 x 10^{12} MPN during Water Year 2003	Reduce baseline bacteria loads by 10% from storm drain outfalls to meet TMDL required load reductions.	Implement programmatic (non-structural) BMPs to achieve source reduction of bacteria loads from the storm drain outfalls.	Reduce bacteria loads by 2% from the storm drain outfalls through continued implementation of programmatic BMPs and, based on adaptive management, focus and enhance efforts where needed.	Reduce bacteria loads by an additional 4% (total 6%) from the storm drain outfalls by continued implementation of programmatic BMPs.	Reduce bacteria loads by an additional 4% (total 10%) from the storm drain outfalls by continued implementation of programmatic BMPs.
6b	Structural BMPs[m] (as needed and as funding is available)	% bacterial load reduction based on quantitative model	1,727 x 10^{12} MPN during Water Year 2003	Reduce baseline bacteria loads by 24.7% from storm drain outfalls to receiving water to meet TMDL required load reductions.	Reduce by 1% the baseline bacteria loads from distributed BMPs constructed between 2003 and 2009 during redevelopment.	Reduce bacteria loads by an additional 2% (total 3%) through participation in the public private partnership program. Begin planning & design for additional long-term structural BMPs.	Reduce bacteria loads by an additional 8.8% (total 11.8%) through additional participation in the public private partnership program (5.5%) and reduction through BMPs required through redevelopment (3.3 %); Continue planning & permitting for long-term structural BMPs.	Reduce bacteria loads by 12.9% (total 24.7%) from constructed distributed and regional structural BMPs (10.6%), and participation in the public private partnership program (2.3%).

a. In accordance with Permit Provisions 6.b.(3)(a)-(e) and 6.c.(3)(a)-(g) of Attachment E to Order R9-2013-0001.
b. Request moving Interim TMDL Compliance Date from April 4, 2021 (per Attachment E, 6.c(1)) to April 4, 2028 to allow adequate time to investigate and mitigate bacteria sources, and monitor progress and adjust implementation through the adaptive management process.
c. Goal of 100% flow elimination in accordance with Provision 6.b.(3)(a).
d. Interim wet weather Allowable Exceedance Percentages are from Tables 6.5 of Attachment E to Order No.R9-2013-0001.
e. Final wet weather Allowable Exceedance Percentages are from Tables 6.2a, 6.2b, and 6.2c of Attachment E to Order No.R9-2013-0001.
f. Value from modeled baseline load as indicated in Section 3.1.3.5 of the WQIP.
g. Values calculated as half of the 2nd Permit Term goals.
h. Values calculated as half of the interim goals
i. Values calculated as half of the final goals
j. Final Wet weather load reduction values as indicated in Table 6.3 of Attachment E to Order R9-2013-0001 for Fecal Coliform and *Enterococcus* were updated, with San Diego Water Board concurrence, to reflect load reduction modeling utilizing Water Year 2003 (considered an average rainfall year for the SDR Watershed) instead of Water Year 1993 as utilized in the 2010 TMDL model. This updated modeling analysis and the results are presented in the City of San Diego – San Diego River Watershed Comprehensive Load Reduction Plan – Phase II (available from the City of San Diego Storm Water Division website, under Plans and Reports tab at: http://www.sandiego.gov/stormwater/pdf/sdrclrpupdate.pdf). This resulted in the required final load reduction for Fecal Coliform, for example, to change from 53.22% (Table 6.3, Att. E of 2013 Permit) to 34.7%.
k. Goal of 100% of exceedances demonstrated to be due to natural sources in accordance with Provision 6.b.(3)(e).
l. To meet the final wet weather target load reduction of 34.7% for Fecal Coliform, the County through quantitative modeling has demonstrated a 10% reduction from programmatic BMPs and a 24.7% reduction from structural BMPs. Progress will be monitored and adjustments through adaptive management will be used to update the plan.
m. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance.

3.6 CALTRANS

Caltrans storm water flows are not included in the Municipal Stormwater Permit; however, Caltrans is subject to similar requirements through its own stormwater permit (State Water Resources Control Board [SWRCB], 2012). Caltrans has voluntarily contributed to the WQIP effort to provide a consistent and subwatershed-wide approach to meeting applicable TMDL requirements. The baseline strategies are continuously implemented and augmented as resources become available. Attachment IV to the Caltrans Stormwater Permit outlines a methodology for prioritizing stream segments included in TMDLs to which Caltrans is subject. The Permit establishes best management practice (BMP) implementation requirements, evaluated in terms of compliance units. Caltrans is expected to achieve 1,650 compliance units per year through the implementation of retrofit BMPs, cooperative implementation, and post-construction treatment beyond Permit requirements.

Impaired reaches throughout the state will be prioritized on the basis of several factors, including, but not limited to, percent reduction needed, Caltrans drainage area contributing to the reach, and proximity to receiving waters. Reaches with metals TMDLs will likely be prioritized. This prioritization list is currently under negotiation between Caltrans Head Quarters and the State Board.

Caltrans' jurisdiction areas include roadways, land adjacent to roadways, and facilities. Caltrans' jurisdictional strategies specifically focus on BMP implementation to reduce known pollutants within these areas. Caltrans' strategies vary from those of other Participating Agencies (in both type and name) to best address freeway characterization discharges from its right-of-way. Strategies include programs developed by Caltrans Headquarters for statewide execution and District 11 implementation. Caltrans' implementation of strategies with the watershed is dependent on legislative approval. For Bacteria TMDLs, Caltrans is expected to eliminate dry weather flows by implementing control measures to ensure effective prohibition (Provision B.2 of the Stormwater Permit). For wet weather flows, Caltrans is expected to implement control measures or BMPs to prevent discharge of bacteria from the right-of-way; this can be source control and preemptive activities such as street sweeping, cleanup of illegal dumping, and public education on littering. Implementation of these controls is per the TMDL prioritization list.

APPENDIX 4

Monitoring and Assessment Results

Appendix 4 Monitoring and Assessment Results

The purpose of this appendix is to provide the monitoring and assessment results for the 2015-2016 monitoring year for the San Diego River Watershed Management Area (WMA or Watershed). Whereas Section 3 of this Annual Report focuses on the highest priority water quality condition (HPWQC) in the WMA (i.e., bacteria), this appendix will present all of the receiving water and storm drain outfall monitoring data collected during the 2015-2016 monitoring year, including monitoring and assessment results for priority water quality conditions (PWQCs). The PWQCs for the watershed include eutrophic conditions, total dissolved solids (TDS), nitrogen, phosphorus, the Index of Biotic Integrity (IBI), and total nitrogen as N during dry conditions. Also described below are monitoring programs required by the Permit for which no data were collected during the 2015-2016 monitoring year because the monitoring requirement has been met or will be met in future years of the Permit term. Caltrans is not a Participating Agency for the monitoring and assessment program described in this section, as Caltrans is regulated under a separate permit from the State Water Resource Control Board (SWRCB).

4.1 Receiving Water Monitoring

For the San Diego River WMA, the long-term receiving water monitoring and sediment monitoring requirements of the Permit were met during the 2013-2014 monitoring year. Detailed results for all analytes evaluated can be found in the *Transitional Monitoring and Assessment Program Report for the San Diego River Watershed Management Area (2012-2014)* (WESTON, 2015a) and the Sediment Monitoring Report (WESTON, 2015b). Receiving water monitoring in the San Diego River WMA during the 2015-2016 monitoring year included participation in the Southern California Stormwater Monitoring Coalition (SMC) and Hydromodification Monitoring Program (HMP) regional monitoring programs. Total maximum daily load (TMDL) monitoring for indicator bacteria was also conducted in receiving waters during 2015-2016. Receiving water results collected under these programs are summarized below.

The receiving water assessments required by Permit Provision D.4.a will be addressed in the Regional Monitoring and Assessment Report (RMAR), which will be submitted to the Regional Board in December 2017 with the Report of Waste Discharge (ROWD) in accordance with Provision D.4.a.1.(b).

4.1.1 Stormwater Monitoring Coalition Regional Monitoring

Since 2001, the Copermittees have partnered with regulated stormwater municipalities in southern California, the Regional Boards of Southern California, and the Southern California Coastal Water Research Project (SCCWRP) to form the SMC. The goal of the SMC is to develop the technical information necessary to better understand stormwater mechanisms and impacts and develop the tools to improve stormwater decision-making (SMC, 2016).

The Copermittees are continuing to participate in the SMC Regional Freshwater Stream Bioassessment Monitoring Program (SMC Regional Bioassessment Program). In 2015, a new five-year SMC program began that extended the initial survey to answer key management questions about the impacts of stormwater on stream conditions. Several modifications were made to the previous surveys to emphasize detection of trends and to address data gaps. Specifically, monitoring of high-priority stressors (i.e., habitat, nutrients, and ionic composition) was continued, whereas monitoring of low-priority stressors (i.e., water column metals, pyrethroids, and toxicity) was discontinued. Flow regime (hydrologic state checklist derived from Gallart et al. [2010] and water level loggers), vertebrate occurrence, and new stressors of interest (i.e., sediment pyrethroids and toxicity) were added to the list of monitored parameters, although sediment sampling has been deferred until further action by the SMC Executive Committee. In addition, the physical habitat assessment has been enhanced with hydromodification screening (modified from Bledsoe et al., 2010) at unarmored or partially armored condition sites and a channel engineering checklist at all condition sites. The hydromodification screening and channel engineering checklist will also be assessed at trend sites at least once during the five-year study. The trend sites were selected from previously sampled sites under earlier probabilistic surveys in order to estimate changes in regional conditions over time, and the condition sites were selected from a new probabilistic sample draw in order to estimate current regional conditions.

The 2015-2016 monitoring year was the second under the updated 2015-2019 SMC Regional Bioassessment Program. Monitoring was conducted at three condition locations in the San Diego River WMA, 907M23331 in Los Coches Creek in the Coches hydrologic subarea (HSA) (907.14), 907M23327 in Alpine Creek in the Alpine HSA (907.33), and 907M23330 in Cedar Creek in the Inaja HSA (907.41) (Table A4-1, Figure A4-1).

Table A4-1. 2015-2016 Bioassessment Monitoring Locations in the San Diego River WMA

Site ID	Site Type	Land Use	Date Sampled	Latitude	Longitude
907M23327 – Alpine Creek	Condition	Urban	6/8/2016	32.83692	-116.78855
907M23330 – Cedar Creek	Condition	Open	6/9/2016	33.00327	-116.70560
907M23331 – Los Coches Creek	Condition	Urban	6/8/2016	32.83996	-116.90709

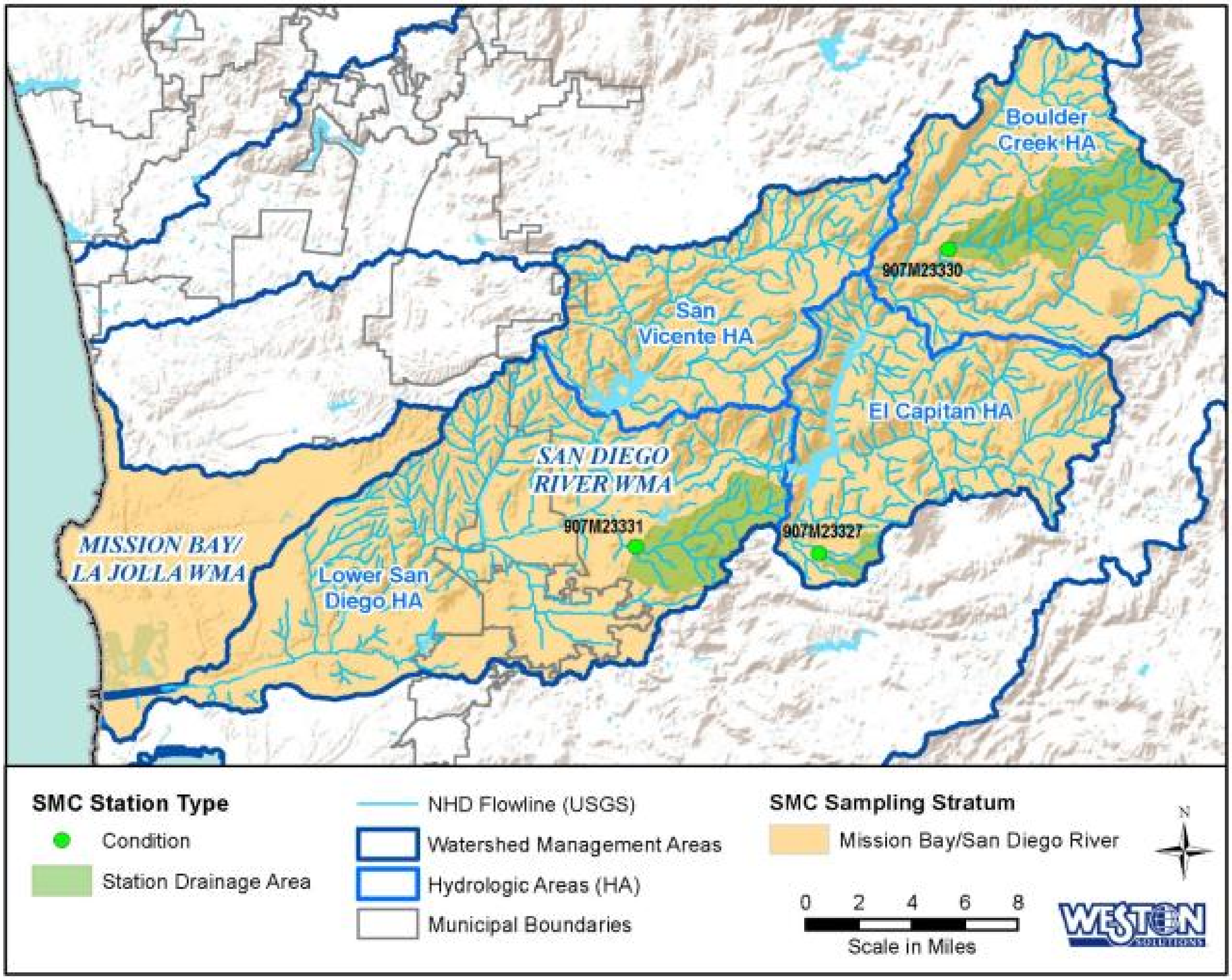

Figure A4-1. 2015-2016 Bioassessment Monitoring Locations in the San Diego River WMA, Mission Bay/San Diego River Stratum

Laboratory analyses included benthic macroinvertebrate (BMI) taxonomy by Ecoanalysts Inc., BMI taxonomic QC analysis by the California Department of Fish and Wildlife (CDFW) Aquatic Bioassessment Laboratory, benthic algae taxonomy by California State University – San Marcos (soft algae and diatoms), and chemistry analyses by Weck Laboratories, Inc. and PHYSIS Environmental Laboratories, Inc. Samples were collected following the protocols outlined in the Bioassessment Survey of the Stormwater Monitoring Coalition (SCCWRP, 2015). BMI data analyses included a taxonomic listing of all BMIs identified in the surveys and calculation of the biological metrics listed in the California Stream Bioassessment Procedure (CSBP). Additionally, the calculation of the California Stream Condition Index (CSCI), an index that rates the overall BMI community quality, was performed. The CSCI is a newly developed analytical tool, finalized in 2013 (Mazor et al., 2016), that is applicable statewide in California and is now being utilized in place of the IBI to assess the health of freshwater streams. The CSCI combines a predictive multi-metric index (pMMI) (a measure of ecological structure) with a predictive observed to expected (O/E) ratio index (a measure of taxonomic completeness), and also incorporates local watershed geology and climate factors. The predictive components of the CSCI scoring tool allow for comparisons of the site being scored to a subset of other sites in California that the CSCI determines to be most similar. Algal data analyses included a taxonomic listing of all taxa identified and calculation of algal metrics and three algal IBIs (Fetscher et al., 2014 and SCCWRP, 2014). These data are typically available in February of the year following the survey (i.e., February 2017).

Bioassessment monitoring results for the Los Coches Creek, Alpine Creek, and Cedar Creek locations are summarized in Table A4-2 (CSCI scores), Table A4-3 (physical habitat assessment scores), and Table A4-4 (chemistry results). Additional data are provided in Attachment 4A to this appendix, including Taxonomic Listing of Benthic Macroinvertebrates (4A-1), Ranked Abundance of Benthic Macroinvertebrates (4A-2), and CSCI Metrics (4A-3). A Quality Assurance/Quality Control (QA/QC) report is provided as Attachment 4A-4. Results are summarized below, and more detailed results will be available in the interim and final reports developed by the SMC Workgroup. Interim reports are expected every one to two years, and the final report produced under the 2015-2019 Workplan is anticipated in Spring 2021 (SCCWRP, 2015).

Whereas data related to bacteria are not collected under the SMC Regional Bioassessment Program, data are collected for nitrogen and phosphorus, which are PWQCs for the watershed. At least one of these nutrients was above the water quality objectives at the Los Coches Creek and Alpine Creek locations, whereas all measured nutrients were below water quality objectives at the Cedar Creek location in the upper watershed.

4.1.1.1 Los Coches Creek

The CSCI score for the Los Coches Creek location, 907M23331, indicated that the benthic community is likely altered. The score was only two points below the possibly intact range (Table A4-2). Taxa richness was only slightly below the predicted taxonomic richness at this location (Attachment 4A-3). The BMI community was dominated by the mayfly *Fallceon sp.* and the crustacean class *Ostracoda* (34% and 17% of the composition of the sample, respectively) (Attachment 4A-2). The numbers of several types of taxa that tend to decrease in response to impairment were below predicted numbers, although some only slightly (the site-specific predicted numbers are those expected if the site was healthy) (Attachment 4A-3). Physical habitat quality as measured by the California Rapid Assessment Method (CRAM) score was moderate (Table A4-3).

Chemistry data was collected for physical and general chemistry, periphyton (ash-free dry mass [AFDM] and chlorophyll-a), and nutrients. Results indicated that total nitrogen and total phosphorus were slightly above benchmarks. All other parameters met water quality objectives, where applicable, although specific conductivity was elevated (Table A4-4). High specific conductance may have an effect on BMI. Specific conductivity is a measurement of the ability of water to conduct electricity where dissolved ions (i.e., Na+, Ca+2, SO4-2, etc.) serve as the conductor (SWRCB Fact Sheet-3.1.3.0(EC)V2e). Thus, specific conductance is related to TDS content. Although the effect of elevated TDS on BMI is variable among different taxa and not well understood, a number of studies have demonstrated a correlation between changes in conductivity/TDS with both altered BMI (Minshall and Minshall, 1978) and algal communities (Leland and Porter, 2000). Results from the first SMC five-year report suggest that elevated TDS is a condition common to the entire region, affecting 76% of stream miles in Southern California (Mazor, 2015).

4.1.1.2 Alpine Creek

At the Alpine Creek location, 907M223327, the CSCI score indicated that the benthic community is very likely altered. The score was one point below the likely altered range (Table A4-2). Taxa richness was below the predicted taxonomic richness at this location (Attachment 4A-3), and the BMI community was dominated by the freshwater snail *Physa sp.* and the crustacean class *Ostracoda* (43% and 35% of the composition of the sample, respectively) (Attachment 4A-2). The numbers of several types of taxa that tend to decrease in response to impairment were below predicted numbers (Attachment 4A-3). Physical habitat quality as measured by the CRAM score was moderate (Table A4-3).

Chemistry results indicated that dissolved oxygen did not meet water quality objectives (concentration was below minimum level), and chloride, sulfate, and total nitrogen were above their respective water quality objectives (concentrations exceeded standards). All other parameters met water quality objectives, where applicable, although specific conductivity was elevated (Table A4-4).

4.1.1.3 Cedar Creek

At the Cedar Creek location, 907M23330, the CSCI score indicated that the benthic community is likely intact (Table A4-2). Taxa richness was above the predicted taxonomic richness at this location (Attachment 4A-3). The highest numbers observed in the BMI community were the mayfly *Callibaetis sp.*, the damselfly *Coenagrionidae*, and the freshwater snail *Physa sp.* (18%, 15%, and 14% of the composition of the sample, respectively) (Attachment 4A-2). The numbers of some taxa that tend to decrease in response to impairment were close to or above predicted numbers (Attachment 4A-3). Physical habitat quality as measured by the CRAM score was moderate, one point below the high range (Table A4-3).

Chemistry results for chloride were above the water quality objective. All other parameters met water quality objectives, where applicable (Table A4-4). The specific conductivity value was below the other two stations in the WMA that received comparatively lower bioassessment scores.

Table A4-2. 2016 CSCI Scores for the San Diego River WMA

StationCode	Count	E	Mean_O	OoverE	MMI	CSCI
907M23331 – Los Coches Creek	672	6.98	6.00	0.86	0.70	0.78
907M23327 – Alpine Creek	675	6.81	5.00	0.73	0.50	0.62
907M23330 – Cedar Creek	653	7.61	8.55	1.12	0.99	1.06

Count - the total number of organisms in the sample; E-the sum of all capture probabilities >0.5 at a site (# of common taxa); Mean_O - The number of common taxa observed at a site; OoverE - O/E as calculated; MMI - the pMMI score, a minimum threshold has not been established, but low values should be considered indicative of degradation; CSCI - the CSCI score, calculated as the average of the O/E and the pMMI. CSCI scores indicate benthic communities that are very likely altered (scores of 0.00 to 0.62), likely altered (0.63 to 0.79), possibly intact (0.80 to 0.91), or likely intact (above 0.92).

Table A4-3. 2016 Physical Habitat Assessment Scores for the San Diego River WMA

Physical Habitat Measures	Los Coches Creek	Alpine Creek	Cedar Creek
	907.14	907.33	907.41
	907M23331	907M23327	907M23330
	6/8/2016	6/8/2016	6/9/2016
Elevation (feet)	160	474	551
CRAM Physical Habitat Score*	57	59	75
Canopy Cover (% of reach)	56%	81%	29%
Macroalgal Cover (% of reach)	44%	37%	27%
Substrate Composition			
Fines	4%	0%	0%
Sand	84%	55%	21%
Gravel	5%	3%	9%
Cobble	0%	1%	4%
Boulder	1%	7%	1%
Roots	1%	21%	5%
Wood	0%	2%	0%
Consolidated Sediment	1%	0%	0%
Bedrock	4%	10%	61%
Concrete	1%	1%	0%
Water Quality			
Temperature (C)	22.24	17.23	20.8
pH	8	7.58	7.31
Specific Conductance (µS/cm)	2,359	1,837	803
Salinity (ppt)	1.22	0.94	0.39
Alkalinity (mg/L)**	390	340	240
Dissolved Oxygen (mg/L)	7.86	5.07	6.9
Turbidity (NTU)	1.3	0.2	0

*CRAM score is 25-100; <50 = low, 50-75 = moderate, >75 = high
** May be measured in the field or laboratory. Laboratory result is reported.

Table A4-4. 2016 Chemistry Results for the San Diego River WMA

Analyte	Units	Water Quality Objectives (WQOs)	WQO References	Los Coches Creek 907.14 907M23331 6/8/2016	Alpine Creek 907.33 907M23327 6/8/2016	Cedar Creek 907.41 907M23330 6/9/2016
Physical Chemistry						
Temperature	Celsius			22.24	17.23	20.8
pH	pH units	6.5-9.0	Basin Plan	8	7.58	7.31
Specific Conductance	µS/cm			2,359	1,837	803
Salinity	ppt			1.22	0.94	0.39
Alkalinity	mg/L			390	340	240
Dissolved Oxygen	mg/L	<5.0 / <6.0 (a)	Basin Plan	7.86	**5.07**	6.9
Turbidity	NTU	20	Basin Plan	1.3	0.2	0
Periphyton						
Ash-Free Dry Weight	g/m²			46.0404	45.2399	108.6582
Chlorophyll-a	mg/m²			167.7	212.3	63.4
General Chemistry						
Chloride	mg/L	50-400	Basin Plan	330	**240**	**61**
Sulfate	mg/L	65-500	Basin Plan	420	**230**	58
Total Suspended Solids	mg/L			5	2	1
Total Hardness	mg $CaCO_3$/L			740	681	281
Nutrients						
Ammonia as N	mg/L	(b)	USEPA Freshwater Criteria	<0.048	<0.048	<0.048
Nitrate + Nitrite as N	mg/L	10	Basin Plan	1.4	1.9	0.19
Orthophosphate as P	mg/L	N:P Ratio of 10:1	Basin Plan	0.12	0.038	<0.00083
Total Kjeldahl Nitrogen	mg/L			0.47	0.29	0.33
Total Nitrogen	mg/L	N:P Ratio of 10:1	Basin Plan	**1.9**	**2.2**	0.52
Total Phosphorus	mg/L	0.1 (flowing waters)	Basin Plan	**0.11**	0.021	0.0067J

<-Results less than the method detection limit.

NS - Not sampled.

[a] Water Quality Objective is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective on or before April 4, 2011) and may vary by hydrologic area.

[b] Water Quality Objective is based on the criterion continuous concentration (CCC) using water temperature and pH as described in the U.S. EPA, 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, EPA-822-R-13-001, April 2013.

J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

Bolded/shaded results do not meet water quality objectives.

4.1.2 Regional Hydromodification Monitoring Program (HMP)

Hydromodification is the potential alteration and erosion of creeks, streams, and natural habitats that may be associated with urbanization of the tributary watershed. A regional Hydromodification Management Plan has been developed to manage increased runoff discharge rates and durations and address impacts to beneficial uses and stream habitat (County of San Diego, 2011). A regional HMP was also developed to evaluate the criteria established in the Hydromodification Management Plan. While only one reference station was located within the San Diego River WMA, the Hydromodification Management Plan criteria will apply to future development in the WMA, and therefore the regional results of this monitoring program are applicable.

The 2011 HMP represents a five-year monitoring program that involved channel sediment transport assessments, and continuous flow monitoring of pre-project, post-project, and reference conditions. An iterative and phased approach was used in implementation of each year of monitoring. The fifth and final year of monitoring was completed in 2015-2016. Results of the HMP are presented in the *Effectiveness Assessment of the San Diego Hydromodification Management Plan*, which is available online at:
http://www.projectcleanwater.org/attachments/article/75/2016_LDW_HMPrpt.pdf.

The results of the HMP indicate that the Hydromodification Management Plan is working as planned. Sediment rating curves were developed based on extensive wet weather monitoring data collected from the 2011-2012 to 2015-2016 wet weather seasons. Analysis of these curves shows that the Plan's channel susceptibility tools appropriately define flow rates that initiate the movement of channel and bank materials (ESA et al., 2016). As shown by monitoring of stream cross sections, no major changes in channel stability were observed to occur within the nine monitored channel sites that were located throughout the San Diego Region. Wet weather data from 2015-2016 indicated that a constructed best management practice (BMP) system worked as designed to prevent hydromodification across a wide range of geomorphically significant conditions. Collectively, this shows that the Plan provides for the protection of the beneficial uses of receiving waters from the effect of hydromodification from new and redevelopment. Based on these findings, the HMP effectiveness assessment monitoring is completed and no additional monitoring is recommended (ESA et al., 2016).

4.1.3 Total Maximum Daily Load Monitoring

In February 2010, the San Diego Regional Water Quality Control Board (Regional Board) adopted Resolution No. R9-2010-0001, *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)* (Bacteria TMDL) (Regional Board, 2010). This TMDL amendment to the Water Quality Control Plan for the San Diego Region (Basin Plan) (Regional Board, 1994) includes three segments within the San Diego River WMA, Forester Creek, the Lower San Diego River, and the Pacific Ocean Shoreline at San Diego River mouth at Dog Beach. The TMDL was approved by the SWRCB on December 14, 2010; by the Office of Administrative Law on April 4, 2011; and by the United States Environmental Protection Agency (USEPA) on June 22, 2011. The TMDL became effective under state law on April 4, 2011, the date of Office of Administrative Law approval. The responsible Agencies within the San Diego River WMA regulated under the Permit include the cities of El Cajon and Santee and the County of San Diego for Forester Creek and the cities of El

Cajon, La Mesa, San Diego and Santee, and the County of San Diego for the Lower San Diego River and Pacific Ocean Shoreline at San Diego River mouth at Dog Beach. The compliance requirements and monitoring and reporting requirements of the TMDL have been incorporated into Attachment E.6 of the Permit.

The goal of the Bacteria TMDL is to achieve the necessary pollutant load reductions to restore and protect the designated beneficial use of water contact recreation (REC-1), as it is designated within the Basin Plan. The purpose of the TMDL monitoring program is to assess progress toward achieving compliance with interim and final TMDL water quality based effluent limitations (WQBELs). Wet and dry weather sampling is conducted each year at the compliance points. The data generated is used to address the following questions:

- Are TMDL numeric targets for indicators being met at the compliance monitoring locations?
- Are levels of bacteria decreasing at the compliance monitoring locations?

Sampling was conducted for the 2015–2016 compliance monitoring year (October 1, 2015 through September 30, 2016) during wet and dry weather at five receiving water monitoring locations: one beach location, Pacific Ocean Shoreline at Dog Beach (FM-010), and four creek locations, two along Forester Creek in the Santee HSA and two along the Lower San Diego River in the Mission San Diego HSA (Table A4-5, Figure A4-2). This was the third year of monitoring in compliance with Provision 6.d of Attachment E of the Permit. A summary of the monitoring conducted is presented in Table A4-6 for creek locations and Table A4-7 for the beach location. Samples were analyzed for the indicator bacteria compliance constituents (fecal coliform and *Enterococcus* for creeks; total coliform, fecal coliform, and *Enterococcus* for beaches) in accordance with the requirements of Attachment E.6 of the Permit. Additionally, *E. coli* which is not a Bacteria TMDL compliance constituent, was sampled at the creek locations. These data are available in the laboratory reports provided in Attachment 4B to this appendix and will be uploaded to the California Environmental Data Exchange Network (CEDEN) as provided in Attachment L.

Table A4-5. 2015-2016 Bacteria TMDL Beach Monitoring Locations in the San Diego River WMA

Site ID	Site Name	Site Type	Latitude	Longitude
SDR-FC1	Forester Creek at Lower Forester Creek	Freshwater Creek	32.83986	-117.00395
SDR-FC2	Lower Forester Creek at Prospect Ave	Freshwater Creek	32.83130	-116.98572
SDR-CDE	Lower San Diego River at Camino Del Este	Freshwater Creek	32.77255	-117.14456
SDR-MLS	San Diego River MLS at Lower San Diego River	Freshwater Creek	32.76515	-117.16863
FM-010	Dog Beach at San Diego River Mouth	Pacific Ocean Shoreline	32.75527	-117.25358

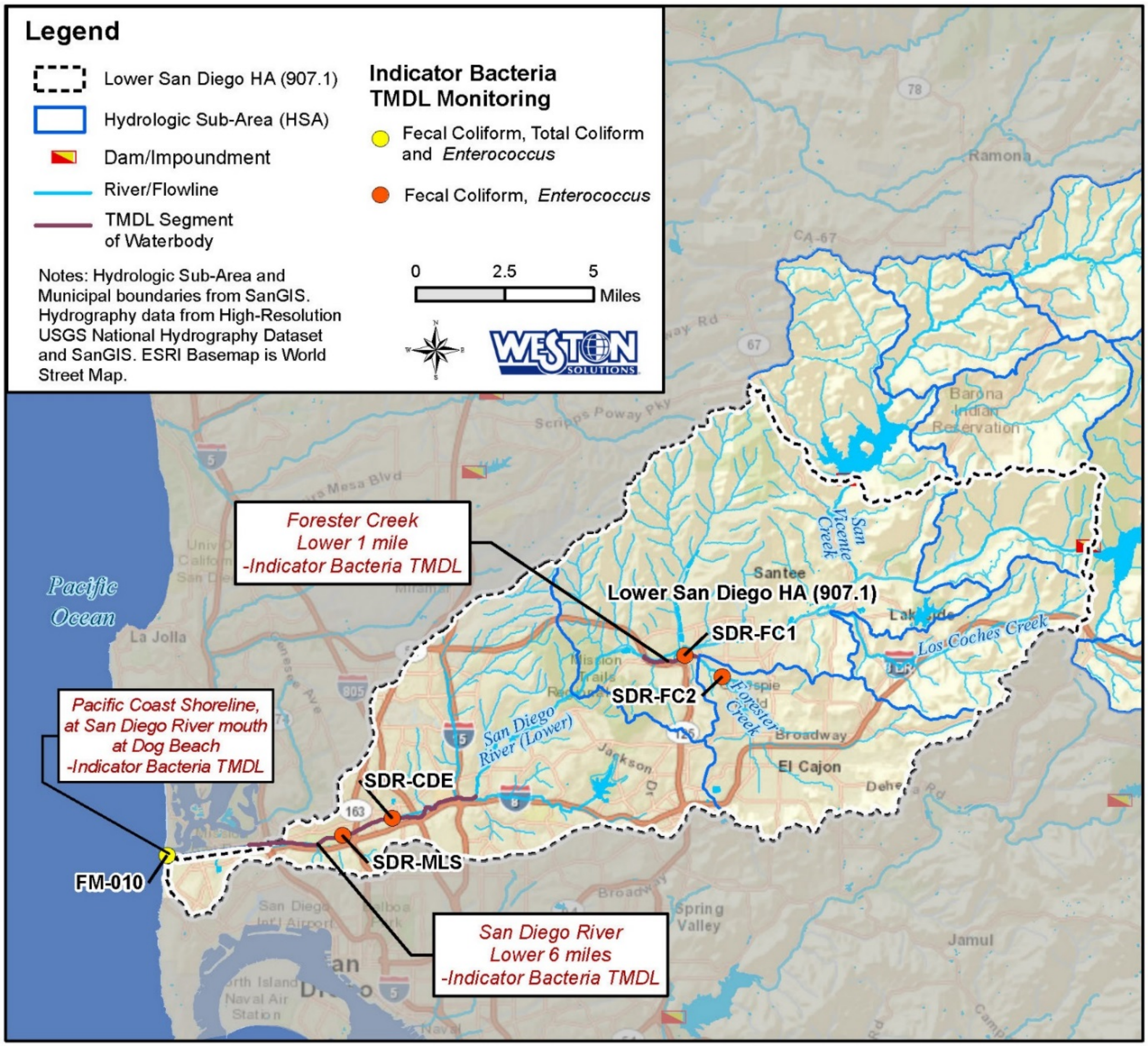

Figure A4-2. Bacteria TMDL Compliance Monitoring Locations in the San Diego River WMA

Table A4-6. 2015-2016 Bacteria TMDL Beach Monitoring Summary for the San Diego River WMA

Season	Date Range	Event Type	Event Frequency	Monitoring Location	Samples Per Site Per Event[a]	Total Number of Samples
2015-2016 Wet Season	10/01/2015-04/30/2015	Wet	Three storm events	FM-010	1	3
	10/01/2015-03/30/2016	Dry	Monthly			6
	04/01/2016-04/30/2016	Dry	Weekly[b]			5
2016 Dry Season	05/01/2016-09/30/2016	Dry	Weekly[b]			25

[a] Quality assurance (QA) or replicate samples are not included in the count.

[b] A minimum of 5 samples are collected in a 30-day period.

Table A4-7. 2015-2016 Bacteria TMDL Creek Monitoring Summary for the San Diego River WMA

Season	Date Range	Event Type	Event Frequency	Monitoring Location	Samples Per Site Per Event[a]	Total Number of Samples
2015-2016 Wet Season	10/01/2015-04/30/2015	Wet	Three storm events	SDR-MLS SDR-CDE SDR-FC1 SDR-FC2	1	12
	10/01/2015-03/30/2016	Dry	Monthly			24
	04/01/2016-04/30/2016	Dry	Weekly[b]			20
2016 Dry Season	05/01/2016-09/30/2016	Dry	Weekly[b]			100

[a] Quality assurance (QA) or replicate samples are not included in the count.

[b] A minimum of 5 samples are collected in a 30-day period.

Table A4-8 presents the exceedance rates for each indicator bacteria across the five monitored stations within the San Diego River WMA. The exceedances observed during the 2015-2016 monitoring year do not indicate non-compliance with the Permit or the Bacteria TMDL at this time. Progress toward meeting WQBELs, in terms of interim and final receiving water limitations, is presented in Table A4-9 for each analyzed constituent at the five monitoring stations. Interim WQBELs are not required to be met until 2020 for dry weather and 2028 for wet weather, while final WQBELS must be met by 2021 for dry weather and 2031 for wet weather. Based on the sampling data from the 2015-2016 monitoring year, receiving water limitations that have already been achieved are indicated by (●), whereas receiving water limitations that have not yet been achieved are indicated by (X).

In summary, interim and final WQBELs are being met at FM-010 with the exception of the dry season geometric mean for *Enterococcus*. There were also no exceedances of geometric means for fecal coliform at SDR-CDE during the dry and wet seasons, and at SDR-FC2 and SDR-MLS during the wet season. Both interim and final receiving water limitations are being achieved for these analytes at these locations. All other results did not achieve the interim or final receiving water limitations. Additional details are presented in the TMDL report provided as Attachment 4B to this appendix, and CEDEN data submittals can be found in Attachment L.

Table A4-8. 2015–2016 Exceedance Frequency Results: San Diego River WMA

Segment	Monitoring Location	Bacteria TMDL Constituent	2016 Dry Season Geometric Mean (CFU/100 mL)	2015-2016 Wet Season Geometric Mean (CFU/100 mL)	2015-2016 Wet Weather Single-Sample Maximum (CFU/100 mL)
Forester Creek	SDR-FC1	*Enterococcus*	100%	100%	100%
		Fecal Coliform	100%	80%	100%
	SDR-FC2	*Enterococcus*	100%	100%	100%
		Fecal Coliform	52%	0%	100%
San Diego River	SDR-MLS	*Enterococcus*	100%	90%	100%
		Fecal Coliform	33%	0%	93%
	SDR-CDE	*Enterococcus*	52%	90%	100%
		Fecal Coliform	0%	0%	94%
Pacific Ocean Shoreline	FM-010	*Enterococcus*	19%	0%	0%
		Fecal Coliform	0%	0%	0%
		Total Coliform	0%	0%	0%

CFU - colony-forming units per 100 milliliters. The Permit identifies WQBELs in most probable number per 100 mL (MPN/100 mL); the laboratory methods provide results in CFU. CFU and MPN units are comparable.

Table A4-9. 2015–2016 General Progress Toward Interim and Final Goals: San Diego River WMA

Monitoring Location	Bacterial TMDL Constituent	2015-2016 Dry Season Geometric Means		2015-2016 Wet Season Geometric Means		2015-2016 Wet Season Single-Sample Maximum	
		Interim	Final	Interim	Final	Interim	Final
SDR-FC1	*Enterococcus*	X	X	X	X	X	X
	Fecal Coliform	X	X	X	X	X	X
SDR-FC2	*Enterococcus*	X	X	X	X	X	X
	Fecal Coliform	X	X	●	●	X	X
SDR-MLS	*Enterococcus*	X	X	X	X	X	X
	Fecal Coliform	X	X	●	●	X	X
SDR-CDE	*Enterococcus*	X	X	X	X	X	X
	Fecal Coliform	●	●	●	●	X	X
FM-010	*Enterococcus*	X	X	●	●	●	●
	Fecal Coliform	●	●	●	●	●	●
	Total Coliform	●	●	●	●	●	●

● = Receiving water limitations are met; X= Receiving water limitations are not met.

4.2 Storm Drain Outfall Monitoring

As part of the WQIP process, the Participating Agencies in the San Diego River WMA have developed a program to monitor discharges from storm drain outfalls during dry and wet weather that meets the requirements of Provisions D.2.b and D.2.c of the Permit. The purpose of storm drain outfall monitoring is to evaluate the potential impacts from storm drain outfall discharges on the beneficial uses of a waterbody during dry and wet weather conditions. In addition, under dry conditions, the program is used to assess the ability of jurisdictional and watershed programs to effectively eliminate non-stormwater discharges to waterbodies. The data generated are used to identify persistently flowing outfalls, pollutants in discharges, guide pollutant source identification and non-stormwater discharge elimination efforts, and track progress towards achieving numeric goals set forth in the WQIP.

During the 2013-2014 monitoring year, the inventory of major storm drain outfalls discharging directly to a receiving water was developed in accordance with Provision D.2.a.(1) of the Permit, and refinements were made during the 2014-2015 monitoring year. The major storm drain outfalls currently included in the storm drain outfall discharge monitoring station inventory for the San Diego River WMA are shown in Figure A4-3. Storm drain outfall dry weather monitoring locations are also shown in Figure A4-3. Storm drain outfall wet weather monitoring locations and drainage areas are shown on a separate map in Section 4.2.5.

The number of major outfalls monitored under each element of storm drain outfall monitoring by each Participating Agency in the San Diego River WMA is provided in Table A4-10. In accordance with Provision D.2.b.(1) of the Permit, Participating Agencies with fewer than 125 major storm drain outfalls in their inventory must conduct field screening at 80% of these major outfalls twice per year. The City of San Diego has more than 500 major storm drain outfalls within its jurisdiction and is required to annually screen 500 of these outfalls city-wide (but not within each watershed) in accordance with Provision D.2.a.(2)(a)(iv). The number of major outfalls monitored per year is subject to change based on new information, updates to storm drain outfall inventories, changes in transient or persistent flow classifications, and/or changes or updates to the priority water quality conditions over the life of the WQIP.

Table A4-10. Number of Major Storm Drain Outfalls Monitored per Participating Agency

Participating Agency	Field Screening (Provision D.2.b(1))	Dry Weather Monitoring (Provision D.2.b(2))	Wet Weather Monitoring (Provision D.2.c)
County of San Diego	51	5	1
City of El Cajon	33	5	1
City of La Mesa	13	5	1
City of Santee	63	5	1
City of San Diego	65	5	1

Program descriptions, monitoring results, and assessments conducted during the 2015-2016 monitoring year under the Storm Drain Outfall Monitoring Program are presented in the following subsections. Methodology is described in greater detail in the WQIP Monitoring and Assessment Plan (MAP).

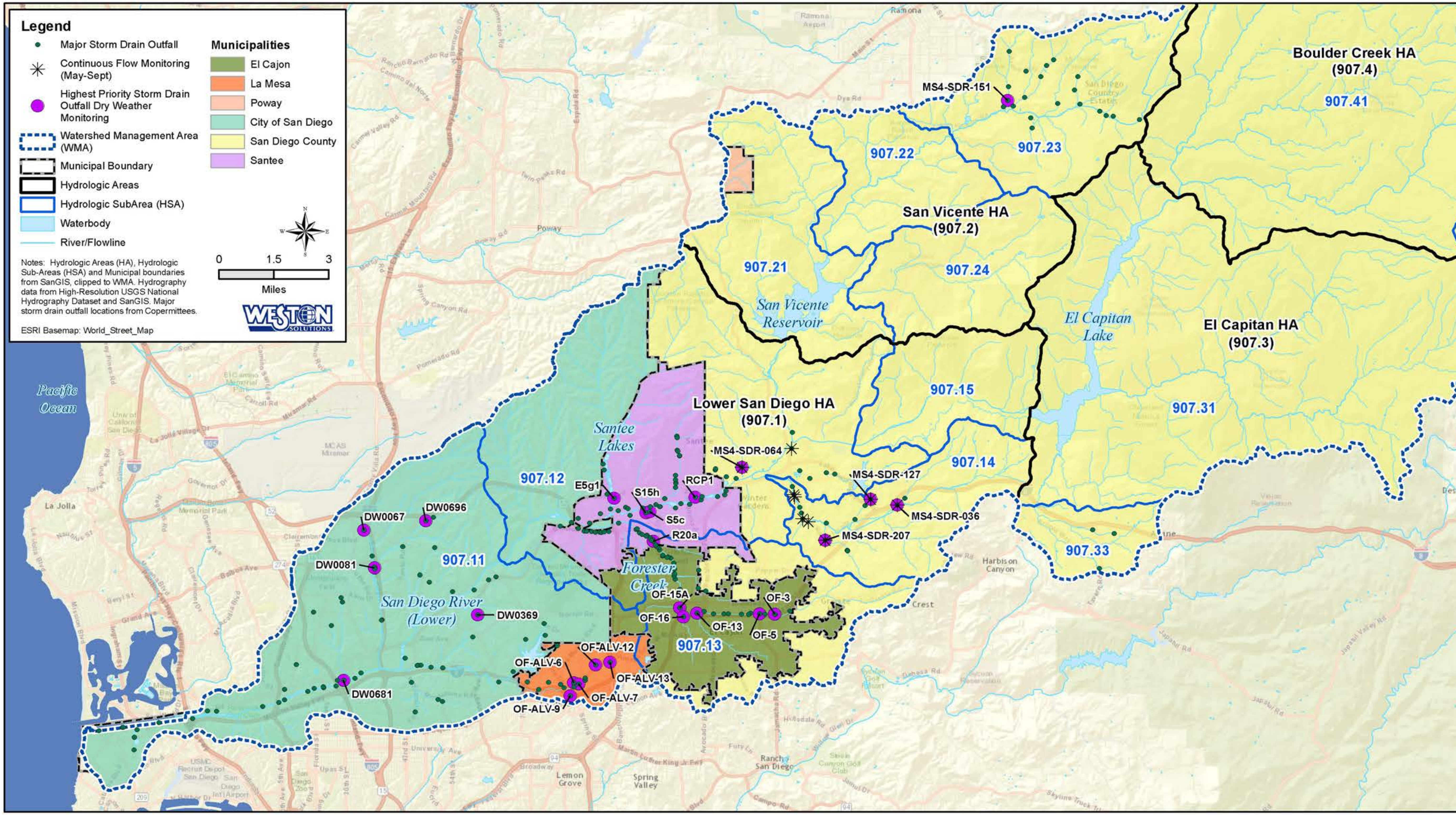

Figure A4-3. Major Storm Drain Outfall Inventory and Highest Priority Storm Drain Outfall Dry Weather Monitoring Station Locations in the San Diego River WMA

4.2.1 *Dry Weather Field Screening and Outfall Prioritization*

Dry weather field screening is visual monitoring of major storm drain outfalls as outlined in Table D-5 of the Permit. Field screening is conducted to identify non-stormwater and illicit discharges, determine which discharges are transient and which are persistent, and prioritize those discharges that will be investigated and eliminated. This program is designed to assess the effectiveness of jurisdictional programs to effectively prohibit non-stormwater discharges. Each Participating Agency performs field screening of a certain number of outfalls on an annual basis to maintain an up-to-date inventory of persistently flowing outfalls and to initiate follow-up investigations that identify and mitigate the source(s). The data collected during field screening are one of the sources of information for the Participating Agencies' Illicit Discharge Detection and Elimination (IDDE) Program (see Section 4.2.4).

The required frequency of field screening varies from once to twice per year depending on the number of major outfalls within the jurisdiction, in accordance with Provision D.2.a.(2)(a) of the Permit. The number of storm drain outfall stations included in dry weather field screening and the total number of visual observations conducted by each Participating Agency during the 2015-2016 monitoring year in the San Diego River WMA are shown in Table A4-11. Dry weather field screening at upstream proxy locations (e.g., manholes) for inaccessible outfalls may result in more than one location representing an outfall, and these upstream locations are included in the station counts and visits. Some source investigations were performed during routine visits and are included in the routine visits column, while others were conducted as separate follow-up visits and are included in the source investigations column.

During the 2015-2016 monitoring year, all County of San Diego major storm drain outfalls were inspected at least twice and up to eight times for dry weather flows. The County also visited 111 smaller storm drain outfalls (outfalls with diameter less than 36 inches) that had been inventoried as part of its Microbial Source Tracking Study, which is provided as Attachment 4C to this appendix. During the 2015-2016 monitoring year, these outfalls, as well as several major storm drain outfalls, were inspected for non-stormwater flows approximately once every two months over the monitoring year. The data were collected to better inform the program about the County's progress toward achieving its dry weather storm drain outfall flow reduction goals.

Table A4-11. Number of Visual Observations Conducted During the 2015-2016 Monitoring Year

Participating Agency	Number of Major Storm Drain Outfalls or Proxy Locations Visited	Number of Routine Visits	Number of Source Investigations	Number of Additional Visits for Other Programs[3]
County of San Diego[1]	53*	106	74 (6 outfalls)	84 (10 stations)
El Cajon[1]	33	54	1	NA
La Mesa[1]	13	22	3 (3 outfalls)	NA
Santee[1]	63	102	3 (3 outfalls)	NA
City of San Diego[2]	69**	80	76 (21 outfalls)	NA

[1] Copermittee with < 125 major outfalls in WMA; 80% of major outfalls must be screened twice/year.
[2] Copermittee in more than one WMA with more than 500 major outfalls total in jurisdiction; 500 outfalls must be screened annually.
[3] Includes flow data but not all visual observations typically conducted during a routine field screening visit.
*Two locations replaced during the monitoring year.
**Three outfalls had more than one proxy location (upstream manhole) visited.

Participating Agencies recorded numerous visual observations regarding outfall and flow characteristics including flow conditions (flowing, ponded, dry, or tidal), whether or not the flow reached the receiving water, whether or not there was a non-stormwater flow source, potential non-stormwater sources, whether the flow source was eliminated, evidence of obvious illicit connections or illicit discharges (IC/ID), whether trash was present and relative amount, and whether there was evidence of illegal dumping. The complete set of visual observations recorded during dry weather field screening visits are provided in Attachment 4D to this appendix, and CEDEN data submittals can be found in Attachment L. The field screening trash assessment results for the San Diego River WMA are summarized in Table A4-12. These trash assessments included some flow source investigation visits to the outfall as well as the routine visits. There was no trash present during 42% of the visits and a low presence of trash (defined as less than 50 pieces) during 53% of the trash assessments at visited outfalls. Approximately 5% of sites had over 50 pieces of trash.

Table A4-12. Dry Weather Field Screening Trash Assessments for the San Diego River WMA

Participating Agency	HSA	No Trash Present	Trash Present		
			Low (<50 pieces)	Medium (50 to 400 pieces)	High (>400 pieces)
County of San Diego	907.12	3	14	5	0
	907.13	0	5	0	0
	907.14	9	22	2	0
	907.23	17	23	0	0
	907.33	1	3	1	1
SUB-TOTAL		**30**	**67**	**8**	**1**
El Cajon	907.13	35	19	1	0
SUB-TOTAL		**35**	**19**	**1**	**0**
La Mesa	907.11	14	11	0	0
SUB-TOTAL		**14**	**11**	**0**	**0**
Santee	907.12	50	40	2	0
	907.13	3	7	1	2
SUB-TOTAL		**53**	**47**	**3**	**2**
City of San Diego	907.11	27	53	4	0
SUB-TOTAL		**27**	**53**	**4**	**0**
GRAND TOTAL		**159**	**197**	**16**	**3**

A summary of the flow conditions (i.e., flowing, ponded, dry, or tidal) at the outfall stations during the 2015-2016 field visits is shown in Figure A4-4, where the stacked bars represent the number of observations in each flow category by Participating Agency. The observations included in this figure are routine visits and follow-up source identification visits to the outfall, but do not include additional visits for other programs. Because some outfalls are visited more than once, the number of observations is greater than the number of actual storm drain outfalls monitored.

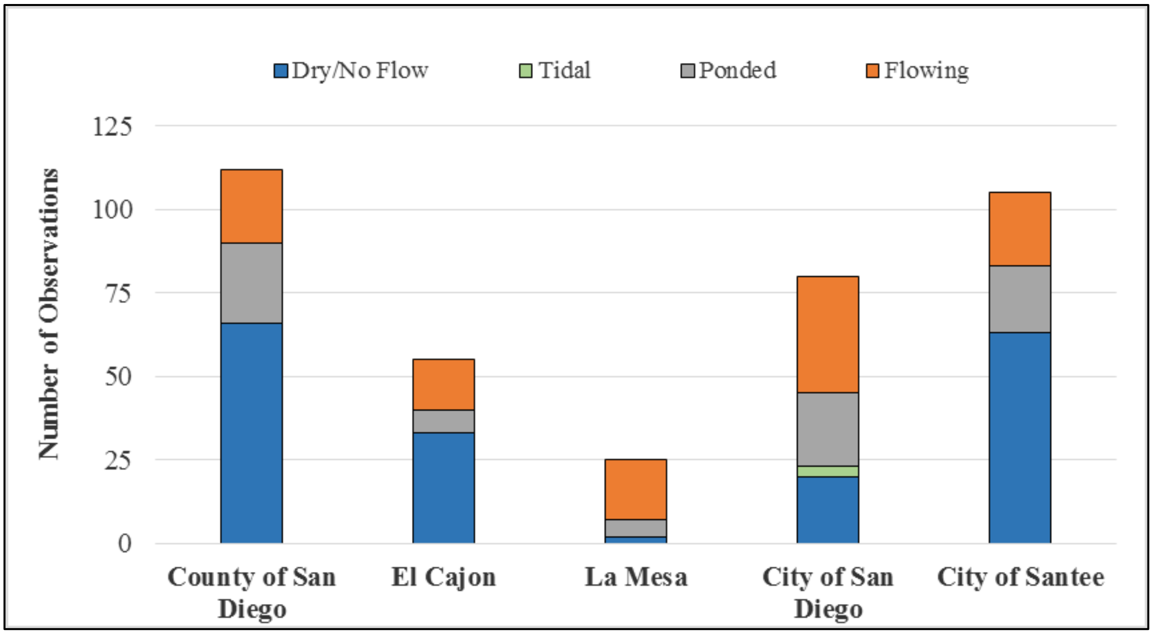

Figure A4-4. Dry Weather Field Screening Flow Observations at Storm Drain Outfall Stations by Participating Agency

During dry weather field screening, Participating Agencies estimated flow rates at stations where flow was present, as required by Table D.5 of the Permit. A compilation of flow estimations recorded by the Participating Agencies in the San Diego River WMA, in gallons per minute (gpm), is presented in Figure A4-5. The majority of flow rates were low, with 75 of 113 estimations categorized as less than five gpm. The observations included in this figure include routine visits and follow-up source identification visits to the outfalls, but do not include additional visits for other programs.

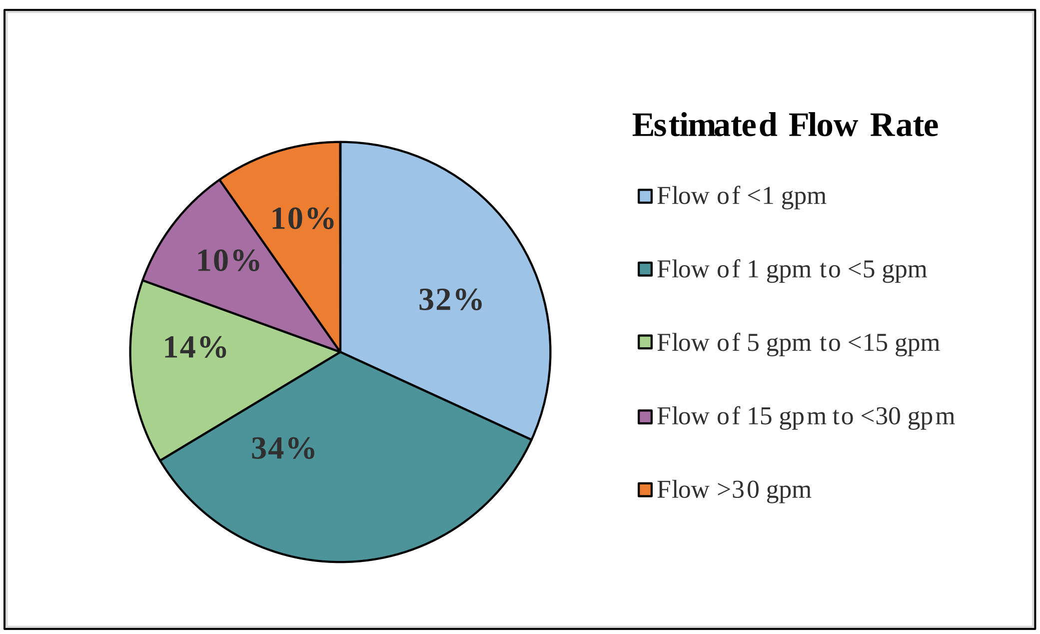

Figure A4-5. Outfall Flow Rate Estimations in the San Diego River WMA

Where an illicit discharge is observed during outfall screening, investigations are performed in an effort to locate the source and eliminate the discharge. In cases where flow sources are known due to historical data, this is listed on the field sheet and the upstream area is briefly checked for additional sources. In cases where discharges are observed, but no obvious illicit discharge was identified as the source, appropriate documentation is recorded, and the locations are prioritized with others for follow-up.

Based on these field screening visits and available historical data, the Participating Agencies determined the flow status of each major storm drain outfall as persistent, transient, dry, tidal, or undetermined. The numbers of storm drain outfalls in each category are shown by Participating Agency and HSA in Table A4-13, and the flow determinations are shown with the locations of the storm drain outfalls in Figure A4-6. As defined in the Permit, flow status for a given outfall is "dry" if no flowing or standing water is observed at the outfall over three most recent visits, and "persistent" flow is defined as presence of flowing or standing water upon three most recent visits. Otherwise, the outfall status is classified as "transient." The undetermined outfall listed for the City of San Diego in Table A4-13 has been tidal on all visits except once when it was dry. Overall, since the prior monitoring year, the number of undetermined outfalls in the San Diego River WMA has been reduced from 7 (WESTON, 2016) to 2, which includes one new site. The number of persistent outfalls has increased by 11 based on the additional dry weather field screening observations made in the 2015-2016 year.

Table A4-13. 2015-2016 Dry Weather Storm Drain Outfall Flow Determinations for the San Diego River WMA

Participating Agency	HSA	Persistent	Transient	Dry/ No Flow	Undetermined	Grand Total
County of San Diego	907.12	2	5	4	0	11
	907.13	0	1	1	1*	3
	907.14	4	6	4	0	14
	907.23	1	5	14	0	20
	907.33	1	0	2	0	3
SUB-TOTAL		**8**	**17**	**25**	**1**	**51**
El Cajon	907.13	8	7	18	0	33
SUB-TOTAL		**8**	**7**	**18**	**0**	**33**
La Mesa	907.11	10	2	1	0	13
SUB-TOTAL		**10**	**2**	**1**	**0**	**13**
City of San Diego	907.11	35	18	11	1**	65
SUB-TOTAL		**35**	**18**	**11**	**1**	**65**
Santee	907.12	14	16	23	0	53
	907.13	2	4	4	0	10
SUB-TOTAL		**16**	**20**	**27**	**0**	**63**
GRAND TOTAL		**77**	**64**	**82**	**2**	**225**

*Undetermined outfall is a new dry weather field screening site.
**Undetermined outfall has been tidal on all visits except one when dry.

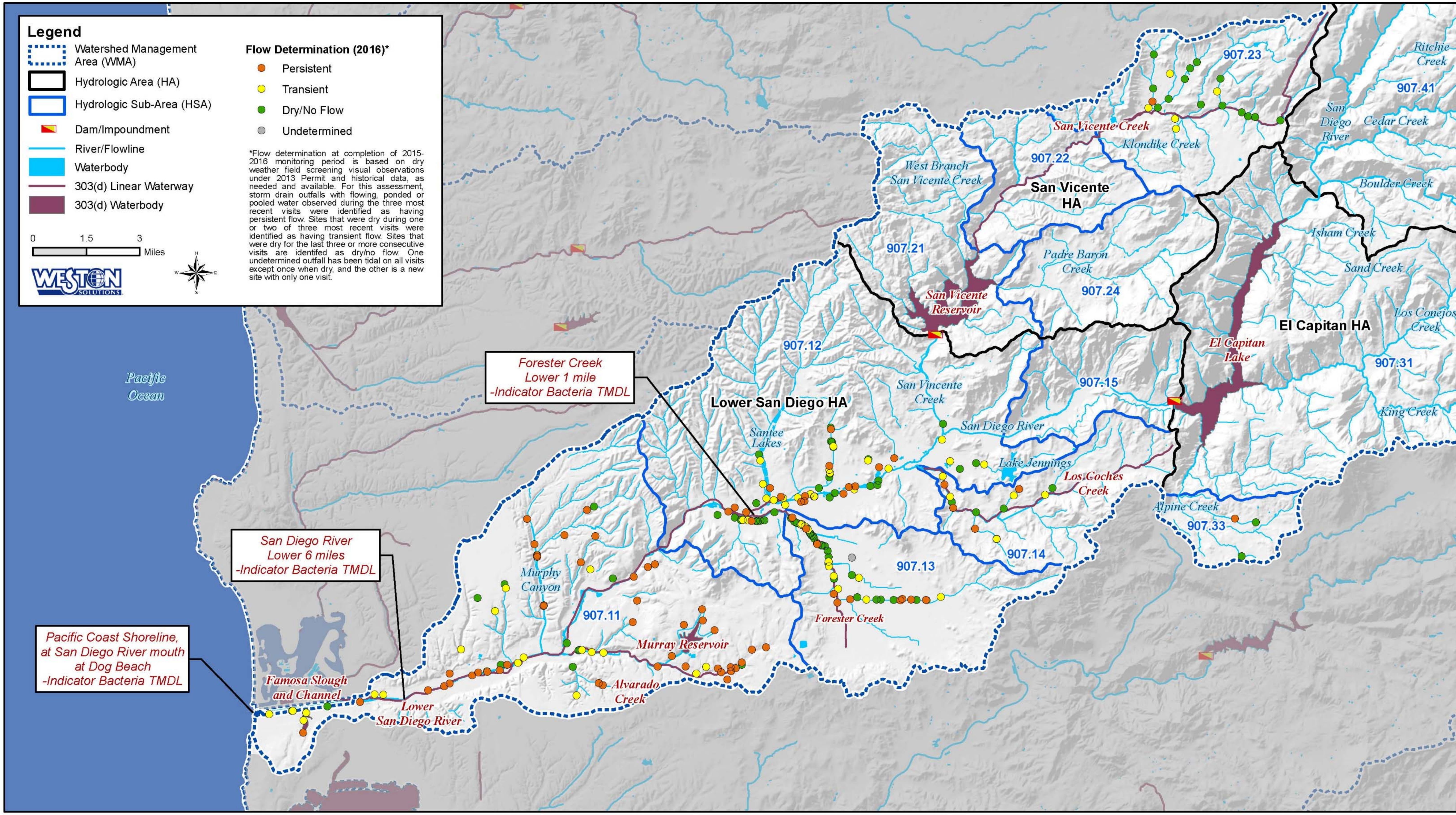

Figure A4-6. 2015-2016 Dry Weather Field Screening Locations with Flow Determinations for the San Diego River WMA

Based on the 2015-2016 field screening monitoring, monitored outfalls that changed to persistent or from persistent status since the 2014-2015 monitoring year are shown below in Table A4-14.

Table A4-14. Dry Weather Storm Drain Outfall Stations that Changed to Persistent or from Persistent Flow Determination since Transitional Monitoring Year 2014-2015

Participating Agency	Station ID	HSA	2015-2016 Persistent Flow Monitored Site	2015-2016 Result	2014-2015 Result
County of San Diego	MS4-SDR-036	907.14	Yes	Transient	Persistent
	MS4-SDR-064	907.12	Yes	Persistent	Transient
	MS4-SDR-097	907.14	Yes	Persistent	Transient
	MS4-SDR-098	907.14	No	Persistent	Transient
	MS4-SDR-139	907.23	No	Transient	Persistent
	MS4-SDR-211	907.12	No	Persistent	Transient
El Cajon	OF-27	907.13	No	Persistent	Transient
City of San Diego	DW0134	907.11	No	Transient	Persistent
	DW0143	907.11	No	Transient	Persistent
	DW0459	907.11	No	Persistent	Transient
	DW0872	907.11	No	Persistent	Undetermined
	DW0873	907.11	No	Persistent	Undetermined
	DW0882	907.11	No	Persistent	Undetermined
	DW0951	907.11	No	Persistent	Undetermined
	DW0953	907.11	No	Transient	Persistent
	DW0954	907.11	No	Persistent	Undetermined
	DW1013	907.11	No	Persistent	Undetermined
	DW1031	907.11	No	Persistent	Undetermined
Santee	396	907.12	No	Persistent	Transient
	1930	907.12	No	Persistent	Transient
	3081	907.12	No	Persistent	Transient
	U5c	907.13	No	Persistent	Transient
	1472	907.12	No	Transient	Persistent

The list of prioritized outfalls based on field screening results is maintained and updated as program implementation develops and monitoring occurs. These prioritized outfalls were originally outlined in the San Diego River Watershed Storm Drain Outfall Monitoring Plan (Storm Drain Outfall Monitoring Plan), Attachment 4A-5 to the WQIP. The Storm Drain Outfall Monitoring Plan, last revised in January 2015, listed three outfalls as the highest priority persistent outfalls for the City of La Mesa (OF-ALV-5, OF-ALV-8, and OF-ALV-11). Since the approval of the WQIP, the City of La Mesa re-prioritized the persistent outfalls under its jurisdiction because groundwater (i.e., springs or rising ground waters) was determined to be the source of flow to all three of these outfalls. Outfalls with groundwater identified as the primary flow source were placed at a lower priority because, in general, groundwater discharges are not considered to pose a high threat to receiving water quality. Outfalls with prohibited discharges identified as the primary flow source, such as irrigation runoff, or discharges with an unknown flow source, were determined to be high priority sites because these categories of discharges have greater potential to threaten receiving water quality and are more likely to contribute sources of bacteria during dry weather. Of these discharges, the sites with the highest average flow rates are placed at a higher priority.

Except for these changes to the City of La Mesa's highest priority outfalls and the selection of the highest priority outfalls for the City of El Cajon, which had not yet been determined when the Storm Drain Outfall Monitoring Plan was developed, the highest priority outfalls in the San Diego River WMA have not changed. The highest priority outfalls for each jurisdiction in the WMA during 2015-2016 are summarized in Table A4-15. Dry weather field screening records are provided as Attachment 4D to this appendix, and CEDEN data submittals can be found in Attachment L.

Table A4-15. Highest Priority Outfalls during 2015-2016 in the San Diego River WMA during the

Copermittee	HSA	Station	Latitude (NAD83)	Longitude (NAD83)	Dates Sampled	
County of San Diego	907.12	MS4-SDR-064	32.86147	-116.94469	Dry	6/28/2016
	907.14	MS4-SDR-036	32.8469	-116.87153	4/19/2016	6/28/2016
		MS4-SDR-127	32.84911	-116.88414	4/19/2016	6/28/2016
		MS4-SDR-207	32.83278	-116.90529	4/19/2016	6/28/2016
	907.23	MS4-SDR-151	33.00782	-116.82069	4/19/2016	6/28/2016
City of El Cajon	907.13	OF-5	32.80362	-116.936	7/5/2016	7/12/2016
		OF-13	32.80363	-116.96548	7/5/2016	7/12/2016
		OF-15A	32.80576	-116.97344	7/6/2016	7/13/2016
		OF-16	32.80216	-116.97167	7/6/2016	7/13/2016
		OF-3	32.80348	-116.92888	7/5/2016	7/12/2016
City of La Mesa	907.11	OF-ALV-12	32.78299	-117.01286	7/7/2016	7/14/2016
		OF-ALV-13	32.78404	-117.00602	7/11/2016	7/14/2016
		OF-ALV-6	32.77578	-117.02305	7/7/2016	7/18/2016
		OF-ALV-7	32.77532	-117.020651	8/4/2016	8/5/2016
		OF-ALV-9	32.77066	-117.02463	7/7/2016	7/18/2016
City of Santee	907.12	E5g1	32.84885	-117.00471	8/15/2016	8/17/2016
		RCP1	32.84949	-116.96659	8/15/2016	8/17/2016
		S15h	32.84326	-116.98969	8/8/2016	8/16/2016
		S5c	32.84363	-116.98795	8/8/2016	8/16/2016
	907.13	R20a	32.8319	-116.98602	8/15/2016	Dry
City of San Diego	907.11	DW0067	32.83539	-117.12212	11/24/2015	3/23/2016
		DW0081	32.8205	-117.11705	11/24/2015	3/23/2016
		DW0369	32.80243	-117.06845	12/7/2015	3/23/2016
		DW0681*	32.775969	-117.131149	12/7/2015	6/7/2016
		DW0696	32.83938	-117.09311	11/24/2015	3/23/2016

*Upstream location sampled.

4.2.2 Highest Priority Storm Drain Outfall Dry Weather Monitoring

The purpose of the highest priority storm drain outfall dry weather monitoring is to evaluate the potential contribution from storm drain outfall discharges to receiving water quality during dry weather conditions and to assess the ability of programs to effectively eliminate non-stormwater discharges to waterbodies or waterways.

The 2015-2016 monitoring year was the first year of storm drain outfall dry weather analytical sampling under the WQIP MAP. Storm drain outfall dry weather monitoring was conducted at the highest priority outfalls identified for each jurisdiction in the San Diego River WMA (Table A4-15, Figure A4-3). Sampling was conducted between November 24, 2015 and August 17, 2016, and two sampling events were conducted at most outfalls. One outfall each under the jurisdiction of the County of San Diego and the City of Santee was sampled once due to lack of flow. In-situ measurements were made for pH, temperature, conductivity, dissolved oxygen, and turbidity. Grab samples were collected and analyzed for constituents contributing to the HPWQC, 303(d) List impairments, TMDLs, non-stormwater action levels (NALs), and those listed in Table D-7 of the Permit. Grab samples were also collected from receiving waters to which the sampled outfalls were discharging and analyzed for total hardness, a measurement needed to compare concentrations of metals to NALs that are hardness-dependent (see footnote *a* in Table A4-16). Visual observations were also recorded.

Analytical results for samples collected during dry weather at the highest priority outfalls are summarized by Participating Agency in Table A4-16 through Table A4-20. Results are compared to NALs as provided in the Permit. In accordance with Table C-4 of the Permit, indicator bacteria concentrations are compared to instantaneous maximum value (IM) NALs, and the remaining constituent concentrations, including general and physical chemical constituents, nutrients, and total and dissolved metals, are compared to maximum daily action level (MDAL) NALs. Additional details regarding NALs used in this assessment are provided in Table A4-34. Laboratory and field data collected for highest priority storm drain outfall dry weather monitoring will be uploaded to CEDEN, and data submittals are provided in Attachment L to this appendix.

4.2.2.1 County of San Diego

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform (i.e., the HPWQC in the WMA) indicated that the highest concentrations were measured at MS4-SDR-127 in the Coches HSA (907.14) for *Enterococcus,* MS4-SDR-127 in the Coches HSA and MS4-SDR-151 in the Gower HSA (907.23) for fecal coliform, and MS4-SDR-127 in the Coches HSA for total coliform. Indicator bacteria concentrations were above the *Enterococcus* IM in all samples and were above the fecal coliform IM in all samples except one each from outfalls MS4-SDR-036 and MS4-SDR-207 (both in the Coches HSA) (Table A4-16).

The only existing MDALs that relate to PWQC in the WMA are for total nitrogen and total phosphorus, and each of these PWQC concentrations was measured above the MDAL except total nitrogen in one of two samples from MS4-SDR-151 in the Gower HSA (907.23).

Other constituents in exceedance of MDALs are listed below. Unless noted, exceedances occurred in both samples collected at the outfall.

- MS4-SDR-036: turbidity, MBAS (one sample), total iron, total manganese, dissolved copper (one sample), dissolved iron, dissolved manganese, and dissolved zinc (one sample).
- MS4-SDR-064: pH and total iron (only one sample was collected at this location).
- MS4-SDR-127: dissolved iron (one sample).
- MS4-SDR-151: dissolved oxygen (below the MDAL indicates impairment), turbidity (one sample), total iron, total manganese, and dissolved manganese (one sample).
- MS4-SDR-207: total iron (one sample), total manganese, dissolved manganese.

The remaining constituents were below MDALs, where available.

4.2.2.2 City of El Cajon

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform indicated that the highest concentrations were measured at OF-3 for *Enterococcus*, at OF-15A for fecal coliform, and at OF-13 for total coliform. All of these outfalls are located in the El Cajon HSA (907.13). Indicator bacteria concentrations were above the *Enterococcus* IM in all samples except one each from outfalls OF-5 and OF-16 and were above the fecal coliform IM in all samples except one from outfall OF-3 (Table A4-17).

The only existing MDALs that relate to PWQC in the WMA are for total nitrogen and total phosphorus, and each of these PWQC concentrations was measured above the MDAL except total phosphorus in both samples from OF-13 and one of two samples from OF-16.

Other constituents in exceedance of MDALs are listed below. Unless noted, exceedances occurred in both samples collected at the outfall.

- OF-3: no additional constituents above MDALs.
- OF-5: total iron, total manganese (one sample).
- OF-13: pH (one sample).
- OF-15A: turbidity (one sample), total iron, total manganese, dissolved manganese (one sample).
- OF-16: pH.

The remaining constituents were below MDALs, where available.

4.2.2.3 City of La Mesa

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform indicated that the highest concentrations were measured at OF-ALV-12 for *Enterococcus* and fecal coliform and OF-ALV-9 for total coliform. Indicator bacteria concentrations were above the *Enterococcus* IM in all samples except one each from outfalls OF-ALV-7 and OF-ALV-9 and were above the fecal coliform IM in all samples except both from outfall OF-ALV-7 (Table A4-18). All outfalls are located in the Mission San Diego HSA (907.11).

The only existing MDALs that relate to PWQC in the WMA are for total nitrogen and total phosphorus, and each of these PWQC concentrations was measured above the MDAL.

Other constituents in exceedance of MDALs are listed below. Unless noted, exceedances occurred in both samples collected at the outfall.

- OF-ALV-6: total iron, total manganese.
- OF-ALV-7: pH (one sample) (below the MDAL range indicates impairment), turbidity, total iron, total manganese, dissolved iron (one sample), dissolved manganese.
- OF-ALV-9: total iron, total manganese, dissolved manganese (one sample).
- OF-ALV-12: turbidity, total iron, total manganese, dissolved manganese.
- OF-ALV-13: turbidity, total iron, total manganese, dissolved manganese.

The remaining constituents were below MDALs, where available.

4.2.2.4 City of Santee

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform indicated that concentrations were greater than 1,600 MPN/100 mL at several outfalls in the WMA. These results are not quantifiable above this value because all dilutions were positive. Indicator bacteria concentrations were above the *Enterococcus* IM in all samples except one sample from RCP1 and were above the fecal coliform IM in all samples (Table A4-19).

The only existing MDALs that relate to PWQC in the WMA are for total nitrogen and total phosphorus, and each of these PWQC concentrations was measured above the MDAL except total phosphorus in one of two samples from RCP1 in the Santee HSA (907.12).

Other constituents in exceedance of MDALs are listed below. Unless noted, exceedances occurred in both samples collected at the outfall.

- E5g1: total iron (one sample).
- R20a: no additional constituents above MDALs (only one sample was collected at this location).
- RCP1: no additional constituents above MDALs.
- S5c: total iron (one sample), total manganese, dissolved manganese.
- S15h: total iron (one sample), total manganese (one sample).

The remaining constituents were below MDALs, where available.

4.2.2.5 City of San Diego

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform indicated that the highest concentrations were measured at DW0681 for all three constituents. Indicator bacteria concentrations were above the *Enterococcus* IM in all samples except both samples from DW0067 and one sample from outfall DW0081. Fecal coliform concentrations were below the IM in all samples except one sample each from outfalls DW0696 and DW0681 (Table A4-20). All outfalls are located in the Mission San Diego HSA (907.11).

The only existing MDALs that relate to PWQC in the WMA are for total nitrogen and total phosphorus, and each of these PWQC concentrations was measured above the MDAL.

Other constituents in exceedance of MDALs are listed below. Unless noted, exceedances occurred in both samples collected at the outfall.

- DW0067: turbidity (one sample), total iron (one sample), total manganese (one sample), dissolved copper (one sample).
- DW0081: pH (one sample).
- DW0369: no additional constituents above MDALs.
- DW0696: dissolved oxygen (below the MDAL indicates impairment), total iron (one sample), total manganese, dissolved manganese.
- DW0681: turbidity, total iron, total manganese, dissolved copper (one sample), dissolved manganese (one sample), dissolved zinc (one sample).

The remaining constituents were below MDALs, where available.

Table A4-16. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – County of San Diego

Analyte	Units	Maximum Daily Action Level (MDAL)	MS4-SDR-036		MS4-SDR-064	MS4-SDR-127		MS4-SDR-151		MS4-SDR-207	
			4/19/2016	6/28/2016	6/28/2016	4/19/2016	6/28/2016	4/19/2016	6/28/2016	4/19/2016	6/28/2016
Physical Chemistry											
Dissolved Oxygen	mg/L	5	5.06	NA	10.75	8.32	6.63	**0**	**0.47**	9.24	9.39
pH	pH units	6.5-8.5	7.52	6.56	**8.58**	8.23	7.83	7.2	7.47	8.17	8.17
Specific Conductivity	µS/cm		1,560	2,390	1,520	3,130	1,830	324	3,840	1,790	1,840
Temperature	Celsius		18.33	23.31	26.28	19.44	24.25	19.8	23.73	20.48	23.35
Turbidity[1]	NTU	20	**62.5**	**325**	13.2	6.18	5.43	6.76	**321**	16.8	0.65
General Chemistry											
Chloride	mg/L		180	150	140	620	240	20	820	220	220
Color	Color units		NA	NA	NA	NA	NA	NA	NA	NA	NA
Hardness as $CaCO_3$	mg/L		523	780	362	561	440	104	1220	509	486
MBAS	mg/L	0.5	**0.6**	0.1	0.1	0.2	0.1	<0.5	<0.5	0.2	<0.5
Sulfate	mg/L		320	NA	NA	380	NA	18	NA	250	NA
Total Dissolved Solids	mg/L		1,040	2,450	867	1,810	1,080	156	2,160	1,030	1,040
Total Suspended Solids	mg/L		31	3510	21.2	2	1.2	7	21	5	<1
Nutrients											
Ammonia as N	mg/L		1.27	8.94	0.58	0.47	0.27	0.18	8.1	0.06	<0.1
Nitrate + Nitrite as N	mg/L		1.06	<0.05	0.38	10.1	2.61	0.06	0.08	3.28	1.95
Nitrate as N	mg/L		0.63	<0.01	0.34	8.78	2.58	0.06	0.02	3.26	1.95
Nitrite as N	mg/L		0.43	<0.05	0.04	1.32	0.03	<0.01	0.06	0.02	<0.01
Total Nitrogen	mg/L	1	**3.9**	**65**	**3.6**	**10.7**	**6.3**	0.6	**12.5**	**3.3**	**2.9**
Total Kjeldahl Nitrogen	mg/L		2.8	65	3.2	0.6	3.7	0.5	12.4	<0.5	0.9
Orthophosphate	mg/L		0.09	4.92	0.22	0.66	0.76	0.25	0.1	0.18	0.18
Dissolved Phosphorus	mg/L		0.83	28.2	0.31	0.7	0.81	0.3	0.15	0.18	0.12
Total Phosphorus	mg/L	0.1	**1.1**	**33.8**	**0.34**	**0.75**	**0.81**	**0.41**	**0.16**	**0.2**	**0.2**
Total Metals											
Cadmium	µg/L		1	22	<1	0.3	0.2	0.4	0.9	0.3	<1
Chromium	µg/L		10	55	1	2	2	1	0.9	1	<1
Chromium III	µg/L		3	55	1	2	2	1	0.9	1	<1
Chromium VI	µg/L	16	5.7	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L		77	564	14	11	9	6	5	4	1
Iron	µg/L	300	**9,360**	**246,000**	**709**	187	122	**666**	**1,010**	**864**	11
Lead	µg/L		7	191	1	0.3	0.5	0.2	0.5	0.4	<1
Manganese	µg/L	50	**1,300**	**3,210**	21	7	15	**135**	**1,400**	**724**	**302**
Nickel	µg/L		24	82	4	6	5	3	4	3	1
Selenium	µg/L		0.9	0.8	2	1	1	0.2	0.5	0.6	0.3
Silver	µg/L		<1	0.4	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L		743	6980	23	21	29	5	16	29	6
Dissolved Metals											
Cadmium	µg/L	(a)(b)	0.5	0.09	0.1	0.2	0.2	<1	<1	0.1	0.3
Chromium	µg/L		6	10	0.4	0.7	2	0.2	<1	0.2	<1
Chromium III	µg/L	(a)(b)	<1	10	0.4	0.7	2	0.2	<1	0.2	<1
Chromium VI	µg/L	16	6.2	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	(a)	**35**	2	8	10	13	3	1	3	1

Table A4-16. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – County of San Diego

Analyte	Units	Maximum Daily Action Level (MDAL)	MS4-SDR-036		MS4-SDR-064	MS4-SDR-127		MS4-SDR-151		MS4-SDR-207	
			4/19/2016	6/28/2016	6/28/2016	4/19/2016	6/28/2016	4/19/2016	6/28/2016	4/19/2016	6/28/2016
Iron	µg/L	300	**3,100**	**89,300**	12	94	**414**	197	21	7	11
Lead	µg/L	(a)	2	2	0.07	5	2	0.3	<1	<1	<1
Manganese	µg/L	50	**1,180**	**2,680**	10	8	16	10	**1,360**	**200**	**281**
Nickel	µg/L	(a)(b)	20	53	2	3	5	0.9	3	1	0.8
Selenium	µg/L		0.6	0.5	2	1	1	<1	0.4	0.5	0.3
Silver	µg/L	(a)	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	(a)	**551**	31	7	64	22	11	4	12	4
Fecal Indicator Bacteria											
Enterococcus	MPN/100 mL	61 (c)	**1,300**	**200**	**1,800**	**50,000**	**5,400**	**500**	**5,000**	**2,300**	**130**
Fecal Coliform	MPN/100 mL	400 (c)	400	<2000#	**8,000**	**50,000**	**3,000**	**28,000**	**50,000**	400	**700**
Total Coliform	MPN/100 mL		30,000	<2000	23,000	170,000	13,000	80,000	50,000	30,000	2,100

< - Results are less than the reporting limit.

NA - Not analyzed.

[1]Laboratory analyzed results were used if analyte was not measured in the field.

J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.

(a) Water Quality Benchmark for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The CCC was applied to dry weather results with the exception of Silver for which the CMC was applied as there is no CCC.

(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.

(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with REC-1 beneficial use (Table C-4 of 2013 Permit).

- Reporting limit greater than Instantaneous Maximum NAL.

Bolded/shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum for the Fecal Indicator Bacteria.

Table A4-17. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – City of El Cajon

Analyte	Units	Maximum Daily Action Level (MDAL)	OF-3		OF-5		OF-13		OF-15A		OF-16	
			7/5/2016	7/12/2016	7/5/2016	7/12/2016	7/5/2016	7/12/2016	7/6/2016	7/13/2016	7/6/2016	7/13/2016
Physical Chemistry												
Dissolved Oxygen	mg/L	5	13.3	9.3	10.9	11.7	11.6	11	10.6	11	7.3	7.1
pH	pH units	6.5-8.5	7.6	7.4	8.1	8.1	8.5	**8.8**	7.1	7.4	**8.7**	**8.7**
Specific Conductivity	µS/cm		2,210	1,577	2180	2,090	1,360	2,940	6,150	5,830	3,770	3,230
Temperature	Celsius		26.8	24.0	26.6	23.6	30.6	28.2	23.9	24.6	32.6	32.8
Turbidity	NTU	20	0.01	0.26	5.81	7.56	2.12	3.03	**25.33**	7.74	4.88	3.03
General Chemistry												
Chloride	mg/L		300	230	260	260	130	530	1,710	1,690	630	490
Color	Color units		35	44	9	3	9	26	41	38	24	18
Hardness as $CaCO_3$	mg/L		688	539	774	689	304	590	1,550	1,490	646	638
MBAS	mg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.1J	0.3J	0.2J	0.2J	<0.5
Sulfate	mg/L		360	347	392	393	222	514	716	622	559	566
Total Dissolved Solids	mg/L		1,470	1,160	1520	1,500	693	1,910	4,030	3,930	2,160	1,920
Total Suspended Solids	mg/L		<20	<20	294	139	3J	10J	242	41	18J	14J
Nutrients												
Ammonia as N	mg/L		<0.1	<0.1	0.05J	0.19	0.52	0.11	0.26	0.06J	0.09J	0.64
Nitrate + Nitrite as N	mg/L		3.6	1.27	7.03	4.48	0.24	0.24	2.07	1.21	0.18	0.16
Total Nitrogen	mg/L	1	**3.9**	**1.3**	**8.3**	**11.1**	**2.2**	**4.2**	**6.4**	**2.2**	**7.8**	**2.8**
Total Kjeldahl Nitrogen	mg/L		0.3J	<0.5	1.3	6.6	2	4	4.3	1	7.6	2.6
Orthophosphate	mg/L		0.27	0.31	0.45	0.56	<0.05	<0.05	0.42	0.31	0.18	0.05
Dissolved Phosphorus	mg/L		0.22	0.33	0.14	0.47	<0.05	0.05	0.55	0.22	0.06	<0.05
Total Phosphorus	mg/L	0.1	**0.28**	**0.35**	**0.5**	**1.09**	0.06	0.07	**0.73**	**0.36**	**0.21**	0.07
Total Metals												
Cadmium	µg/L		<1	<1	<1	0.6J	<1	0.2J	0.8J	0.3J	0.4J	1
Chromium	µg/L		0.6J	0.5J	1J	4J	0.6J	0.5J	7	3J	0.4J	0.4J
Chromium III	µg/L		0.6J	0.5J	1	4	0.6J	0.5J	7	3	0.4J	0.4J
Chromium VI	µg/L	16	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#
Copper	µg/L		5J	5J	6J	31	5J	7J	65	26	5J	5J
Iron	µg/L	300	31J	59	**303**	**3,190**	126	78	**16,400**	**3,430**	76	59
Lead	µg/L		0.1J	0.1J	1J	10	0.4J	0.3J	14	4J	0.5J	0.3J
Manganese	µg/L	50	2J	7	31	**276**	5	5	**152**	**71**	6	4J
Nickel	µg/L		2J	2J	2J	4J	2J	2J	11	9	3J	2J
Selenium	µg/L		2	1	4	4	2	2	4	4	5	4
Silver	µg/L		0.6J	<1	<1	<1	<1	<1	0.8J	0.4J	<1	0.5J
Zinc	µg/L		19J	31	102	520	9J	10J	217	102	11J	7J
Dissolved Metals												
Cadmium	µg/L	(a)(b)	0.2J	<1	0.4J	<1	0.2J	<1	0.4J	0.2J	<1	<1
Chromium	µg/L		0.2J	0.2J	0.4J	0.3J	<5	<5	<5	0.2J	<5	<5
Chromium III	µg/L	(a)(b)	0.2J	0.2J	0.4J	0.3J	<1	0.08J	0.1J	0.2J	0.08J	0.06J
Chromium VI	µg/L	16	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#
Copper	µg/L	(a)	3	4	1J	2	3	6	13	9	4	3
Iron	µg/L	300	11J	19J	6J	5J	4J	4J	40J	54	6J	4J
Lead	µg/L	(a)	<1	<1	<5	0.09J	<1	<1	<1	<1	0.2J	0.09J

Table A4-17. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – City of El Cajon

Analyte	Units	Maximum Daily Action Level (MDAL)	OF-3		OF-5		OF-13		OF-15A		OF-16	
			7/5/2016	7/12/2016	7/5/2016	7/12/2016	7/5/2016	7/12/2016	7/6/2016	7/13/2016	7/6/2016	7/13/2016
Manganese	µg/L	50	2J	2J	8	7	1J	2J	**54**	35	2J	1J
Nickel	µg/L	(a)(b)	1J	1J	1J	0.8J	0.8J	1J	6	5	1J	1J
Selenium	µg/L		2	1	4	4	2	2	5	4	5	4
Silver	µg/L	(a)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	(a)	16J	15J	62	55	2J	4J	57	45	3J	2J
Fecal Indicator Bacteria												
Enterococcus	MPN/100 mL	61 (c)	**>1,600**	**500**	**280**	20	**500**	**1,300**	**300**	**1,300**	30	**230**
Fecal Coliform	MPN/100 mL	400 (c)	**>1,600**	400	**>1,600**	**1,100**	**>1,600**	**2,300**	**>1600**	**3,000**	**>1,600**	**2,300**
Total Coliform	MPN/100 mL		>1,600	7,000	>1,600	17,000	>1,600	23,000	>1,600	8,000	>1,600	8,000

< - Results are less than the reporting limit.

NA - Not analyzed.

J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.

(a) Water Quality Benchmark for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The CCC was applied to dry weather results with the exception of Silver for which the CMC was applied as there is no CCC.

(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.

(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with REC-1 beneficial use (Table C-4 of 2013 Permit).

- Reporting limit greater than Maximum Daily Action Level.

Bolded/shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum for the Fecal Indicator Bacteria.

Table A4-18. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – City of La Mesa

Analyte	Units	Maximum Daily Action Level (MDAL)	OF-ALV-6		OF-ALV-7		OF-ALV-9		OF-ALV-12		OF-ALV-13	
			7/7/2016	7/18/2016	8/4/2016	8/5/2016	7/7/2016	7/18/2016	7/7/2016	7/14/2016	7/11/2016	7/14/2016
Physical Chemistry												
Dissolved Oxygen	mg/L	5	9.5	9.1	NA	NA	10.4	10.8	10.8	10.2	10.2	11.2
pH	pH units	6.5-8.5	6.8	6.9	**5.8**	6.6	8.1	6.5	8.2	8.1	7.9	7.8
Specific Conductivity[1]	µS/cm		3,870	3,550	2,550	3,560	1,164	1,204	2,490	2,570	2,780	2,660
Temperature	Celsius		25.7	26.7	26.7	26.4	23.7	23.0	26.4	24.6	20.5	21.1
Turbidity	NTU	20	13.05	8.01	**967**	**997**	18.61	17.41	**90**	**31.3**	9.72	**24.12**
General Chemistry												
Chloride	mg/L		NA	940	790	1050	NA	130	NA	700	820	690
Color	Color units		8	16	10	8	35	44	18	41	12	17
Hardness as $CaCO_3$	mg/L		916	816	669	802	352	380	564	589	789	660
MBAS	mg/L	0.5	<0.5	<0.5	<0.5	<0.5	0.1J	0.1J	<0.5	<0.5	<0.5	<0.5
Sulfate	mg/L		275	314	62.8	59.4	188	204	292	413	235	216
Total Dissolved Solids	mg/L		2,260	2,100	1,410	1,970	788	834	1,440	2,060	1,840	1,850
Total Suspended Solids	mg/L		785	96	1650	510	75	168	323	201	7J	15J
Nutrients												
Ammonia as N	mg/L		0.45J	<0.1	0.85	0.94	1.58	0.25	1.68	0.09J	0.17	0.08J
Nitrate + Nitrite as N	mg/L		0.94	1.13	2.58	2.18	0.38	0.71	0.82	0.3	0.97	0.87
Total Nitrogen	mg/L	1	**4.7**	**4.8**	**8.6**	**7**	**6.2**	**8.4**	**4.6**	**14.5**	**2.7**	**2.9**
Total Kjeldahl Nitrogen	mg/L		3.8	3.7	6	4.8	5.8	7.7	3.8	14.2	1.7	2
Orthophosphate	mg/L		1.22	0.39	0.02J	<0.05	1.09	1.12	0.39	0.39	0.12	0.12
Dissolved Phosphorus	mg/L		0.64	0.34	0.22	1.15	1.3	1.48	0.28	0.54	0.13	0.13
Total Phosphorus	mg/L	0.1	**1.75**	**0.64**	**2.96**	**2.96**	**1.61**	**1.66**	**0.59**	**0.98**	**0.13**	**0.19**
Total Metals												
Cadmium	µg/L		0.7J	1	0.7J	0.4J	1	6	0.5J	0.4J	1	0.6J
Chromium	µg/L		10	3J	16	5	2J	5	3J	3J	0.3J	0.5J
Chromium III	µg/L		0.3J	0.4J	<1	16	0.4J	0.7J	0.08J	0.1J	<1	0.07J
Chromium VI	µg/L	16	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Copper	µg/L		133	44	314	75	28	49	48	48	3J	6J
Iron	µg/L	300	**8,010**	**1,980**	**280,000**	**119,000**	**2,680**	**3,930**	**25,400**	**31,800**	**1,040**	**1,600**
Lead	µg/L		19	5	14	4J	19	33	8	8	0.2J	0.4J
Manganese	µg/L	50	**315**	**88**	**2,700J**	**1,980J**	**293**	**315**	**1,830**	**301**	**501**	**475**
Nickel	µg/L		10	5	36	15	13	12	7	8	4J	3J
Selenium	µg/L		3	2	2	1	1	2	1	5	2	2
Silver	µg/L		0.3J	0.2J	1	0.3J	<1	0.2J	<1	0.2J	<1	<1
Zinc	µg/L		293	130	426	133	308	428	165	125	8J	16J
Dissolved Metals												
Cadmium	µg/L	(a)(b)	0.2J	0.3J	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	µg/L		0.3J	0.4J	<5	<5	0.4J	0.7J	<5	<5	<5	<5
Chromium III	µg/L	(a)(b)	10	3	16	<1	2	5	3J	3	0.3J	0.5J
Chromium VI	µg/L	16	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Copper	µg/L	(a)	7	6	8	6	4	7	4J	10	2J	3J
Iron	µg/L	300	15J	31J	153	**1,270**	227	288	20J	202	12J	10J
Lead	µg/L	(a)	<1	<1	<1	<1	1	2	<1	0.06J	<1	<1

Table A4-18. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – City of La Mesa

Analyte	Units	Maximum Daily Action Level (MDAL)	OF-ALV-6		OF-ALV-7		OF-ALV-9		OF-ALV-12		OF-ALV-13	
			7/7/2016	7/18/2016	8/4/2016	8/5/2016	7/7/2016	7/18/2016	7/7/2016	7/14/2016	7/11/2016	7/14/2016
Manganese	µg/L	50	25	15	**1,330**	**1,690**	**112**	17	**159**	**196**	**499**	**449**
Nickel	µg/L	(a)(b)	3J	3J	5	5	10	8	1J	4J	2J	2J
Selenium	µg/L		2	2	0.6J	0.8	1	2	1	4	2	1
Silver	µg/L	(a)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	(a)	52	62	22	21	127	112	3J	5J	2J	3J
Fecal Indicator Bacteria												
Enterococcus	MPN/100 mL	61 (c)	**500**	**81**	**500**	<20	**13,000**	<200#	**50,000**	**14,000**	**2,200**	**2,200**
Fecal Coliform	MPN/100 mL	400 (c)	**2,300**	**2,000**	<20	400	**110,000**	**11,000**	**300,000**	**240,000**	**5,000**	**11,000**
Total Coliform	MPN/100 mL		23,000	50,000	110,000	11,000	900,000	50,000	300,000	240,000	30,000	80,000

< - Results are less than the reporting limit.

NA - Not analyzed.

[1] Laboratory analyzed results were used if analyte was not measured in the field.

J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.

(a) Water Quality Benchmark for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The CCC was applied to dry weather results with the exception of Silver for which the CMC was applied as there is no CCC.

(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.

(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with REC-1 beneficial use (Table C-4 of 2013 Permit).

- Reporting limit greater than Maximum Daily Action Level or Instantaneous Maximum NAL.

Bolded/shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum for the Fecal Indicator Bacteria.

Table A4-19. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – City of Santee

Analyte	Units	Maximum Daily Action Level (MDAL)	E5g1		R20a	RCP1		S5c		S15h	
			8/15/2016	8/17/2016	8/15/2016	8/15/2016	8/17/2016	8/8/2016	8/16/2016	8/8/2016	8/16/2016
Physical Chemistry											
Dissolved Oxygen	mg/L	5	5.36	6.29	6.32	5.68	7.8	5.14	5.52	5.85	5.28
pH	pH units	6.5-8.5	7.8	7.8	7.9	8.3	7.4	6.7	8	6.5	8
Specific Conductivity[1]	µS/cm		2,140	1,980	1,510	1,760	1,900	1,770	1,680	1,100	1,000
Temperature	Celsius		28.8	24.7	25.1	28	21	23.6	29.1	25.2	25.0
Turbidity	NTU	20	2.81	5.32	4.26	0.01	0.74	4.58	4.64	3.08	19.58
General Chemistry											
Chloride	mg/L		400	390	220	240	280	240	240	160	130
Color	Color units		39	32	22	5	5	161	191	55	103
Hardness as $CaCO_3$	mg/L		370	414	494	550	515	459	400	245	240
MBAS	mg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.3J	0.1J	0.1J	0.2J
Sulfate	mg/L		271	262	243	244	256	259	238	151	128
Total Dissolved Solids	mg/L		1,270	1,210	903	1,130	1,200	1,170	1,080	664	566
Total Suspended Solids	mg/L		<20	5J	7J	<20	<20	5J	5J	4J	25
Nutrients											
Ammonia as N	mg/L		0.33	0.37	0.24	<0.1	<0.1	1.4	0.87	0.3	0.47
Nitrate + Nitrite as N	mg/L		1.96	1.84	8.12	15.9	14.3	3.17	4.34	1.4	1.42
Total Nitrogen	mg/L	1	**2.7**	**2.3**	**9.3**	**15.9**	**14.7**	**8.7**	**9**	**2.9**	**2.8**
Total Kjeldahl Nitrogen	mg/L		0.7	0.5	1.2	<0.5	0.4J	5.5	4.7	1.5	1.4
Orthophosphate	mg/L		0.29	0.28	0.24	0.1	0.08	0.44	0.55	0.22	0.31
Dissolved Phosphorus	mg/L		0.21	0.23	0.27	0.11	0.08	<0.05	0.76	0.16	<0.05
Total Phosphorus	mg/L	0.1	**0.36**	**0.31**	**0.28**	**0.12**	0.1	**0.73**	**0.92**	**0.28**	**0.45**
Total Metals											
Cadmium	µg/L		<1	<1	0.2J	<1	<1	0.2J	0.2J	0.4J	<1
Chromium	µg/L		0.2J	0.4J	0.6J	0.6J	0.3J	0.4J	0.7J	0.2J	1J
Chromium III	µg/L		<1	0.4J	0.6J	0.6J	0.3J	0.4J	0.7J	<1	1
Chromium VI	µg/L	16	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#
Copper	µg/L		17	17	13	5J	5J	12	14	8J	14
Iron	µg/L	300	191	**306**	146	25J	16J	209	**677**	164	**1,080**
Lead	µg/L		0.2J	0.4J	3J	0.3J	<5	0.9J	2J	0.8J	2J
Manganese	µg/L	50	24	43	5	2J	1J	**103**	**133**	23	**77**
Nickel	µg/L		4J	4J	3J	2J	1J	6	6	2J	4J
Selenium	µg/L		1	1	1	1	1	0.7J	0.7J	1	0.7J
Silver	µg/L		<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L		19J	25	28	12J	12J	95	119	42	100
Dissolved Metals											
Cadmium	µg/L	(a)(b)	<1	<1	0.2J	<1	<1	<1	<1	<1	<1
Chromium	µg/L		<5	<5	<5	<5	<5	<5	<5	<5	<5
Chromium III	µg/L	(a)(b)	<1	<1	<1	<1	<1	<1	0.09J	<1	<1
Chromium VI	µg/L	16	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#	<20#
Copper	µg/L	(a)	13	13	11	3	3	6	8	5	3
Iron	µg/L	300	37J	44J	2J	<50	<50	110	284	29J	48J
Lead	µg/L	(a)	<1	0.07J	1	<1	<1	0.3J	0.6J	0.1J	0.1J

Table A4-19. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – City of Santee

Analyte	Units	Maximum Daily Action Level (MDAL)	E5g1		R20a	RCP1		S5c		S15h	
			8/15/2016	8/17/2016	8/15/2016	8/15/2016	8/17/2016	8/8/2016	8/16/2016	8/8/2016	8/16/2016
Manganese	µg/L	50	8	13	0.8J	<5	0.2J	**65**	**110**	16	34
Nickel	µg/L	(a)(b)	3J	3J	1J	0.5J	0.4J	5	5	2J	2J
Selenium	µg/L		1	1	1	1	1	0.7J	0.8J	0.9J	0.7J
Silver	µg/L	(a)	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	(a)	14J	16J	14J	8J	9J	53	76	26	30
Fecal Indicator Bacteria											
Enterococcus	MPN/100 mL	61 (c)	**280**	**900**	**300**	**500**	50	**>1,600**	**1,600**	**>1,600**	**900**
Fecal Coliform	MPN/100 mL	400 (c)	**900**	**>1,600**	**900**	**1,600**	**900**	**>1,600**	**>1,600**	**>1,600**	**>1,600**
Total Coliform	MPN/100 mL		>1,600	>1,600	>1,600	>1,600	>1,600	>1,600	>1,600	>1,600	1,600

< - Results are less than the reporting limit.

NA - Not analyzed.

[1] Laboratory analyzed results were used if analyte was not measured in the field.

J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.

(a) Water Quality Benchmark for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The CCC was applied to dry weather results with the exception of Silver for which the CMC was applied as there is no CCC.

(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.

(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with REC-1 beneficial use (Table C-4 of 2013 Permit).

- Reporting limit greater than Maximum Daily Action Level.

Bolded/shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum for the Fecal Indicator Bacteria.

Table A4-20. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – City of San Diego

Analyte	Units	Maximum Daily Action Level (MDAL)	DW0067		DW0081		DW0369		DW0696		DW0681UP01	
			11/24/2015	3/23/2016	11/24/2015	3/23/2016	12/7/2015	3/23/2016	11/24/2015	3/23/2016	12/7/2015	6/7/2016
Physical Chemistry												
Dissolved Oxygen	mg/L	5	9.49	9.9	9.32	9.4	9.2	9.77	**4.92**	**1.7**	8.05	6.98
pH	pH units	6.5-8.5	8.5	8	**8.7**	8.5	8.4	8.3	7.8	7.7	7.4	8.3
Specific Conductivity	µS/cm		2,710	1,265	1,120	1,085	4,550	4,590	1,175	1,083	1,360	2,470
Temperature	Celsius		18.0	15.5	18.8	18.5	16.8	16.6	16.1	16.1	19.9	20.8
Turbidity	NTU	20	**42.68**	NA	1.43	NA	0.79	NA	5.56	NA	**35.36**	**29.06**
General Chemistry												
Chloride	mg/L		620	170	120	110	1,100	1,000	130	110	150	460
Color	Color units		100	1.5	<1	1.8	15	23	40	100	18	20
Hardness as $CaCO_3$	mg/L		710	320	330	280	1,300	1,300	350	280	320	340
MBAS	mg/L	0.5	<0.1	0.059	<0.1	<0.1	<0.1	0.084	<0.1	0.23	<0.1	0.1
Sulfate	mg/L		310	160	280	170	500	490	290	160	230	200
Total Dissolved Solids	mg/L		1,700	680	750	630	4,100	2,700	730	600	810	1,400
Total Suspended Solids	mg/L		38	14	1.4	1.4	8.9	3.1	16	9.8	1,500	250
Nutrients												
Ammonia as N	mg/L		<0.5	0.5	<0.5	0.2	<0.5	0.22	<0.5	0.24	<0.5	0.26
Nitrate as N	mg/L		1.4	0.62	0.17	0.36	3.7	3.3	0.21	0.083	0.65	2.7
Nitrite as N	mg/L		<0.3	<0.15	<0.15	<0.15	<0.3	<0.75	<0.15	<0.15	<0.15	<0.15
Total Nitrogen	mg/L	1	**5**	**1.1**	0.17	0.54	**4.1**	**3.7**	**1.3**	0.73	**2.5**	**6.3**
Total Kjeldahl Nitrogen	mg/L		3.6	0.52	<0.2	0.18	0.35	0.38	1.1	0.65	1.8	3.6
Orthophosphate	mg/L		<0.32	0.039	<0.16	<0.05	<0.32	0.051	<0.16	0.19	<0.16	1.4
Dissolved Phosphorus	mg/L		<0.05	0.037	<0.05	<0.05	<0.05	0.029	0.13	0.21	NA	10
Total Phosphorus	mg/L	0.1	**0.14**	0.039	<0.05	<0.05	<0.05	<0.05	**0.28**	**0.33**	**0.29**	**6.4**
Total Metals												
Cadmium	µg/L		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chromium	µg/L		<5	<5	<5	<5	<5	<5	<5	<5	6.5	<5
Copper	µg/L		14	180	<10	17	<10	7.5	11	18	49	60
Iron	µg/L	300	**1,900**	150	<40	38	<40	20	160	**320**	**5,000**	**2,100**
Lead	µg/L		9.3	11	<5	5.1	<5	11	<5	8.4	16	3.7
Manganese	µg/L	50	**67**	33	<20	<20	<20	15	**77**	**120**	**360**	**170**
Nickel	µg/L		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Selenium	µg/L		<10	<10	<10	7	<10	11	<10	<10	<10	<10
Silver	µg/L		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Zinc	µg/L		41	110	<20	<20	<20	<20	<20	22	400	130
Dissolved Metals												
Cadmium	µg/L	(a)(b)	<5	<5	<5	<5#	<5	<5	<5	<5#	<5	<5
Chromium	µg/L		<5	3.3	<5	<5	<5	<5	18	<5	<5	<5
Chromium III	µg/L	(a)(b)	<1	<1	<1	<1	<1	<1	<1	<1	6.5	<1
Chromium VI	µg/L	16	<1	0.4	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	(a)	<10	**150**	<10	16	<10	<10	<10	<10	<10	**140**
Iron	µg/L	300	150	34	63	11	<40	11	130	80	<40	82
Lead	µg/L	(a)	<5	5.9	<5	3.2	<5	4.9	<5	5.3	<5	<5
Manganese	µg/L	50	36	22	<20	<20	<20	14	**67**	**97**	22	**240**

Table A4-20. 2015-2016 Storm Drain Outfall Dry Weather Monitoring Analytical Results for Highest Priority Outfalls – City of San Diego

Analyte	Units	Maximum Daily Action Level (MDAL)	DW0067		DW0081		DW0369		DW0696		DW0681UP01	
			11/24/2015	3/23/2016	11/24/2015	3/23/2016	12/7/2015	3/23/2016	11/24/2015	3/23/2016	12/7/2015	6/7/2016
Nickel	µg/L	(a)(b)	<10	<10	<10	<10	<10	<10	16	<10	<10	6.2
Selenium	µg/L		<10	<10	<10	<10	<10	13	<10	<10	<10	<10
Silver	µg/L	(a)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Zinc	µg/L	(a)	130	81	<20	12	<20	12	94	17	<20	**450**
Fecal Indicator Bacteria												
Enterococcus	CFU/100 mL	61 (c)	<20	<20	20e	**100e**	**200e**	**300e**	**1,600e**	**600e**	**6,600**	**110,000**
Fecal Coliform	CFU/100 mL	400 (c)	20e	<20	<20	<20	80e	40e	**580**	<2,000#	<200	**110,000**
Total Coliform	CFU/100 mL		600e	<20	40e	480	800e	24,000e	18,000e	<2,000	220,000e	110,000

< - Results are less than the reporting limit.

NA - Not analyzed.

J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.

(a) Water Quality Benchmark for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The CCC was applied to dry weather results with the exception of Silver for which the CMC was applied as there is no CCC.

(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.

(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with REC-1 beneficial use (Table C-4 of 2013 Permit).

e - Estimated value, plate count falls outside recommended reporting limits per EPA method guidelines.

- Reporting limit greater than Maximum Daily Action Level or Instantaneous Maximum NAL.

Bolded/shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum for the Fecal Indicator Bacteria.

4.2.3 *Storm Drain Outfall Dry Weather Monitoring Data Assessments*

Provision D.4.b.(1).(c)(i-vi) of the Permit requires the dry weather storm drain outfall monitoring data assessments summarized in Table A4-21. The information necessary to demonstrate compliance with each Provision is outlined in the following discussion. In instances where compliance has been demonstrated in previous sections of this Annual Report, those sections are referenced.

Table A4-21. Storm Drain Outfall Dry Weather Monitoring Assessments

Assessment	Components	Provision(s)
WQIP Annual Report		
Identify known and suspected controllable sources.	Identify known and suspected controllable sources (e.g., facilities, areas, land uses, pollutant generating activities) of transient and persistent flows.	D.4.b.(1)(b)(i)
Identify sources that have been reduced or eliminated.	Identify sources of transient and persistent flows that have been reduced or eliminated.	D.4.b.(1)(b)(ii)
Identify necessary modifications to monitoring locations and frequencies.	Identify necessary modifications to monitoring locations and frequencies necessary to identify and eliminate sources of persistent flows.	D.4.b.(1)(b)(iii)
Rank and prioritize non-stormwater discharges.	Rank persistently flowing outfalls according to potential threat to receiving water quality.	D.4.c.(1)(c)(ii)
	Produce/update prioritized list of outfalls.	
Identify sources contributing to NAL exceedances.	Identify known and suspected sources that may cause or contribute to exceedances.	D.4.b.(1)(c)(iii)
Estimate volumes and loads of non-stormwater discharges.	Analyze data collected as part of the Permit-required dry weather outfall monitoring. Use a model or other method to calculate and estimate collective persistent non-stormwater discharge volumes and pollutant loads. Specific calculations/estimates include: 1) Annual non-stormwater volumes and loads discharged from the Copermittee's major storm drain outfalls to receiving waters within its jurisdiction, with an estimate of the percent contribution from each known source for each storm drain outfall. 2) Annual identification and quantification (by volume and pollutant load) of sources of discharged non-stormwater not subject to the Copermittee's legal authority.	D.4.b.(1)(c)(iv)
Identify data gaps.	Identify data gaps in the monitoring data necessary to fulfill assessment requirements.	D.4.b.(1)(c)(vi)

Table A4-21. Storm Drain Outfall Dry Weather Monitoring Assessments

Assessment	Components	Provision(s)
Once during Permit Term		
Evaluate progress in achieving non-stormwater volume and load reductions.	Identify reductions and progress in achieving reductions.	D.4.c.(1)(c)(v)
	Assess the effectiveness of WQIP improvement strategies, with estimates of volume and load reductions attributed to specific strategies when possible.	
	Identify modifications necessary to increase the effectiveness of WQIP strategies.	

4.2.3.1 Provision D.4.b.(1)(b)

The dry weather field screening monitoring assessments that were first required by Provision D.4.b.(1)(b)(i-iii) during the transitional monitoring period (2013-2014 and 2014-2015 monitoring years) are required to be continued by Provision D.4.b.(1)(c)(i). The assessments related to (i) and (ii) are described in Section 4.2.4 below. To comply with (iii), the data collected under the dry weather field screening monitoring program (Section 4.2.1) were assessed, and no modifications to field screening monitoring locations or frequencies are planned for the 2016-2017 monitoring year in the San Diego River WMA.

4.2.3.2 Provision D.4.b.(1)(c)(ii)

In addition to continuing the assessments required by Provision D.4.b.(1)(b)(i-iii), the 2015-2016 monitoring year is the first requiring analytical monitoring of storm drain outfall dry weather samples, and the first requiring the assessments of Provision D.4.b.(1)(c)(ii-v).

Provision D.4.b.(1)(c)(ii) requires the prioritization of major storm drain outfalls within each Copermittee's jurisdiction based on the storm drain outfall dry weather monitoring data. These data were presented in Section 4.2.1, and the analytical data collected at the highest priority outfalls for each jurisdiction during the 2015-2016 monitoring year are presented in Table A4-16 through Table A4-20 in Section 4.2.2. After assessing these data, no re-prioritizations are planned for the 2016-2017 monitoring year in the San Diego River WMA. Although the flow determination changed for some outfalls from persistent to transient, high priority outfalls selected for analytical monitoring in 2015-2016 will continue to be monitored until one of the conditions of Provision D.2.b.(2)(b)(ii) have been met (i.e., three consecutive dry visits, no exceedance of NALs, or identified as a discharge authorized under a separate National Pollutant Discharge Elimination System [NPDES] permit). When an outfall fulfills one of these criteria or the threat to water quality has been reduced (per Provision D.2.b.(2)(b)(iii)), it will be replaced with the next highest priority outfall on the Copermittee's list for the WMA. Monitored outfalls that changed from persistent to transient flow determination are shown in Table A4-14. There was one high priority persistent flow monitored outfall that is now identified as having transient flow.

4.2.3.3 Provision D.4.b.(2)(c)(iii)

This Provision requires further investigation into sources at the highest priority outfalls with persistent flows exceeding NALs. The highest priority outfalls are listed for each jurisdiction in Table A4-15, and the analytical results collected at these outfalls are presented in Table A4-16 through Table A4-20.

These highest priority outfalls were a specific focus for IDDE investigations during the 2015-2016 monitoring year. The results from these investigations are presented in Section 4.2.4.2. The most common identified or suspected source of non-stormwater flows was runoff from over-irrigation, which has been acknowledged as a source associated with several types of pollutants including nutrients, bacteria, pesticides, and sediment (Regional Board, 2013). The 2015-2016 highest priority storm drain outfall dry weather monitoring results showed exceedances of NALs for the HPWQC and PWQCs *Enterococcus*, fecal coliform, total nitrogen, and total phosphorus. Concentrations of iron and manganese were also above NALs, and groundwater seepage in addition to over-irrigation were identified or suspected as sources of flows at many of the outfalls. Groundwater can be a natural source of these minerals, and over-irrigation can contribute to rising groundwater and groundwater seepage. There were three exceedances of dissolved copper and two of dissolved zinc NALs at monitored outfalls in the watershed. Investigations identified residential vehicle washing and impervious surface washing as a source of flows at one of these outfalls, and power washing as well as other sources associated with flows at another of these outfalls. Details regarding source investigations are provided in 4.2.4, including a table of sources identified for highest priority outfalls (Table A4-26).

4.2.3.4 Provision D.4.b.(2)(c)(iv)

Persistent dry weather flow was identified by each of the Participating Agencies in the San Diego River WMA. Since persistent flow was observed, the Participating Agencies were required to calculate or estimate the non-stormwater volumes and pollutant loads collectively discharged from these persistently flowing outfalls to receiving waters, and estimate percent contributions from each known source for each outfall. The Participating Agencies are also required to identify and quantify (i.e., volume and pollutant loads) sources of non-stormwater discharge not subject to the Participating Agency's legal authority that are discharged from the major storm drain outfalls, with persistent flow, to downstream receiving waters. Assessment methodology and results are summarized below and are described in greater detail in Attachment 4E. Suspected sources were included in this assessment.

4.2.3.4.1 Discharge Volumes from Persistently Flowing Major Storm Drain Outfalls

For each major storm drain outfall with persistent flow during the 2015-2016 monitoring year, the non-stormwater discharge was modeled by multiplying the total number of dry weather days for the month by a unique instantaneous flow rate for the outfall for that month. The number of dry weather days (i.e., less than 72 hours since rain event of 0.1 inches or more) for each calendar month was determined using rainfall data from the County of San Diego Alert Station 27-La Mesa. For months with field visits, the instantaneous flow measurement recorded for that visit was applied to the month, and if there were multiple field visits within a given month these were averaged and applied to the month (averages included instantaneous flow measurements and zero flow for dry/tidal/ponded conditions). For months where no outfall-specific data was available, the average of all instantaneous flow measurements for the outfall was applied to that month. The annual non-stormwater discharge for each major storm drain outfall represents the sum of cumulative monthly flows. These non-stormwater discharge volumes should considered rough estimates that are based on limited field observations and measurements. When feasible, instantaneous flow measurements are based on the area-velocity method, which applies measured flow depth, width, and velocity. Velocity is often measured using a float. Although multiple velocity measurements may be collected to overcome inherent variability and a roughness factor may be applied to address friction, the float method represents a rough estimation tool for velocity. Where site conditions limit accurate collection of area-velocity field measurements, non-stormwater discharge may be estimated either using a volumetric flow rate method (e.g., filling a container of known volume in a measured interval of time), or best professional judgement based on field observations.

The County of San Diego collected continuous flow monitoring data at seven major storm drain outfalls, and for these outfalls, the continuous flow data was used rather than the instantaneous flow measurements provided by field visits. The continuous flow datasets were adjusted to exclude wet weather days and the subsequent 72-hour wet period and then used to calculate the cumulative monthly discharge for the period when flow was monitored. For months with no continuous flow data, but available visual observation flow data, the monthly discharge was calculated using the approach described above. For months with no outfall-specific flow data, an average of the daily discharge values using the continuous flow dataset was applied to the days of that month.

Table A4-22 presents the estimated annual non-stormwater volume and the average annual discharge calculated for major storm drain outfalls with persistent flow in the San Diego River WMA, by Participating Agency.

Table A4-22. 2015-2016 Non-stormwater Flow Estimates for Major Storm Drain Outfalls with Persistent Flow

Participating Agency	No. Persistently Flowing Major Storm Drain Outfalls	Annual Non-Storm Water Discharge (cf)	Annual Average Discharge by Outfall (cf/outfall)
County of San Diego	8	1,904,441	238,055
City of El Cajon	8	2,172,555	271,569
City of La Mesa	10	782,160	78,216
City of Santee	16	886,596	55,412
City of San Diego	35	45,570,744	1,302,021

cf – cubic feet

4.2.3.4.2 Pollutant Loads for Persistent Flow Outfalls

Pollutant loads were calculated based on whether analytical monitoring data was available for a major storm drain outfall. Loads were calculated as follows:

- <u>Major Storm Drain Outfalls with Parameter-Specific Monitoring Data (High Priority Outfalls):</u> The annual load represents the product of the outfall-specific annual discharge volume and the mean of the measured pollutant concentrations for the major storm drain outfall if two samples were collected.

- Other Persistent Flow Outfalls: Where site-specific monitoring data were not available for a persistently flowing outfall, the pollutant load was calculated by taking the product of the outfall-specific annual discharge volume and the mean pollutant concentration from all the dry weather monitoring events for the jurisdiction for the parameter.

For each persistently flowing outfall, annual non-stormwater pollutant loads were estimated for each monitored constituent. The pollutant load estimates are presented in tables by Participating Agency in Attachment 4E to this appendix.

Dry weather visual observation and field investigation data regarding known and/or suspected sources of non-stormwater discharge were used to estimate percent contributions from each known or suspected source for each persistent flow outfall in accordance with Provision D.4.b.(1)(c)(iv)(a). These percentages are provided by outfall in Table A4-23, and the stormwater volume and pollutant loads based on this source are provided in Attachment 4E to this appendix.

Table A4-23. 2015-2016 Dry Weather Storm Drain Outfall Assessment of Discharge by Known or Suspected Flow Source for Persistently Flowing Major Storm Drain Outfalls

Participating Agency	Major Storm Drain Outfall	Annual Dry Weather Discharge (cf)	Estimated Percent (%) of Non-Stormwater Discharge from Known or Suspected Flow Sources**					
			Irrigation Source	Groundwater/ Seepage Source*	Leaky Water Pipe	Other ICID Source	Washing Source	Unknown or No Source Data
County of San Diego	MS4-SDR-064	10,769	100%					
	MS4-SDR-097	10,469						X
	MS4-SDR-098	17,336						X
	MS4-SDR-127	20,081	100%					
	MS4-SDR-151	0	100%					
	MS4-SDR-207	1,261,687	49%	49%			2%	
	MS4-SDR-211	12,614						X
	MS4-SDR-240	571,484						X
City of El Cajon	OF-13	835,931	98%				2%	
	OF-15A	57,750		100%				
	OF-16	624,278						X
	OF-27	0						X
	OF-3	105,971						X
	OF-5	0						X
	OF-6A	57,750						X
	OF-7	490,875		100%				
City of La Mesa	OF-ALV-1	57,750		100%				
	OF-ALV-11	115,500		100%				
	OF-ALV-12	115,500		100%				
	OF-ALV-13	0	100%					
	OF-ALV-4	0						X
	OF-ALV-5	251,790		100%				
	OF-ALV-6	57,750	50%	50%				
	OF-ALV-7	57,750		100%				
	OF-ALV-8	86,625		100%				
	OF-ALV-9	39,495						X
City of Santee	1463	28,875						X
	1662	144,375	100%					

Table A4-23. 2015-2016 Dry Weather Storm Drain Outfall Assessment of Discharge by Known or Suspected Flow Source for Persistently Flowing Major Storm Drain Outfalls

Participating Agency	Major Storm Drain Outfall	Annual Dry Weather Discharge (cf)	Estimated Percent (%) of Non-Stormwater Discharge from Known or Suspected Flow Sources**					
			Irrigation Source	Groundwater/ Seepage Source*	Leaky Water Pipe	Other ICID Source	Washing Source	Unknown or No Source Data
	1930	0	100%					
	3081	0						X
	3306	0	100%					
	396	0	100%					
	722	14,438	98%				2%	
	A5c	14,438						X
	E5g1	28,875	100%					
City of Santee	J25c	28,875						X
	P20f	304,819		100%				
	RCP1	69,984		100%				
	RCP3	213,754	100%					
	S15h	9,288						X
	S5c	28,875	98%			2%		
	U5c	0	100%					
City of San Diego	DW0067	11,539,390	100%					
	DW0072	0	100%					
	DW0074	15,256	100%					
	DW0078	0	50%	50%				
	DW0081	707,541		98%		2%		
	DW0096	0						X
	DW0097	0	100%					
	DW0099	7,776,000	100%					
	DW0100	516,326		100%				
	DW0130	0					100%	
	DW0133	1,075,680	100%					
	DW0136	0	100%					
	DW0357	10,368						X
	DW0369	1,860,572		100%				

Table A4-23. 2015-2016 Dry Weather Storm Drain Outfall Assessment of Discharge by Known or Suspected Flow Source for Persistently Flowing Major Storm Drain Outfalls

Participating Agency	Major Storm Drain Outfall	Annual Dry Weather Discharge (cf)	Estimated Percent (%) of Non-Stormwater Discharge from Known or Suspected Flow Sources**					
			Irrigation Source	Groundwater/ Seepage Source*	Leaky Water Pipe	Other ICID Source	Washing Source	Unknown or No Source Data
	DW0459	0	100%					
	DW0673	0						X
	DW0681	698,658	98%				2%	
	DW0696	0	100%					
	DW0784	519,750			100%			
	DW0785	12,908,160						X
	DW0791	28,875	100%					
	DW0849	9,154	100%					
	DW0850	0						X
	DW0858	5,449					100%	
	DW0872	0						X
	DW0873	0						X
	DW0882	0						X
	DW0907	1,376,870						X
	DW0925	1,296,000						X
	DW0951	518,400				100%		
	DW0954*	1,814,400	100%					
	DW0955**	3,814	100%					
	DW1013	777,600	100%					
	DW1031	1,075,680						
	DW1132	1,036,800		100%				

*Groundwater is considered an uncontrollable source
**Additional information can be found in Attachment 4E (Runoff Sources tab).

4.2.3.5 Provision D.4.b.(2)(c)(v)

This Provision requires the Participating Agencies to review the data collected under the storm drain outfall dry weather monitoring program in order to identify pollutant reduction progress, assess water quality improvement strategy effectiveness, and identify modifications necessary to increase effectiveness. This assessment is required once during the Permit term and will be provided in the San Diego River WMA chapter of the RMAR, which is scheduled for submittal to the Regional Board in December 2017.

4.2.3.6 Provision D.4.b.(2)(c)(vi)

No gaps have been identified in the monitoring data. Because the 2015-2016 monitoring year was the first year of monitoring under the WQIP MAP and the first year requiring the assessments outlined in Provision D.4.b.(1)(c)(ii-iv), the collection of additional data may be necessary before the Participating Agencies are able to identify data gaps.

4.2.4 Illicit Discharge Detection and Elimination Program Data and Assessment

Based on the results of the dry weather major storm drain outfall monitoring described above, the Participating Agencies conducted investigations to identify sources of flow or NAL exceedances. Where IC/ID are identified, additional action to address the source(s) is taken. These investigations and source elimination activities related to outfall monitoring are one part of the larger IDDE programs that each Participating Agency has established. The goals of these IDDE programs are as follows:

- Control the contribution of pollutants to and the discharges from the storm drain system within the Participating Agencies' jurisdictions.
- Effectively prohibit non-stormwater discharges to the storm drain system.
- Reduce the discharge of pollutants in stormwater to the maximum extent practicable.

In addition to outfall monitoring and associated source investigations, the IDDE programs also include the following components to prevent, identify, and eliminate IC/IDs:

- Educating the local community about prohibited discharges and how to prevent them. During the 2015-2016 fiscal year, this outreach program included working closely with water utilities to educate communities about outdoor water conservation, including preventing irrigation runoff.
- Operating a public complaint phone hotline and website and investigating the complaints received.
- Inspecting industrial/commercial and municipal facilities, construction sites, and residential areas. In addition to identifying and eliminating IC/IDs where applicable, inspectors also proactively educate responsible parties about how to avoid IC/IDs, such as cleaning outdoor areas by sweeping instead of hosing them off.
- Maintaining the storm drain system and sewer system, which provide opportunities to identify unpermitted connections to the storm drain system, cross connections, and other potential sources of IC/IDs.

The IDDE components listed above are described in more detail in Section 4 of the Annual Report and in the jurisdictional strategy tables in Appendix 2. The Participating Agencies' Jurisdictional Runoff Management Program (JRMP) Annual Report forms, also included in Appendix 2, list the total numbers of IC/IDs identified and eliminated through all IDDE program activities during the fiscal year. More detail about source investigation and elimination specifically related to the storm drain outfall dry weather monitoring component of the IDDE program are presented below.

4.2.4.1 Dry Weather Storm Drain Outfall Source Identification Results

Source investigations associated with storm drain outfall monitoring broadly categorize identified sources as "controllable" and "uncontrollable." Uncontrollable sources include natural sources like groundwater and springs. Controllable and uncontrollable sources are further classified as known and suspected.

Controllable sources, along with information about whether they were eliminated, are presented in Table A4-24. In cases where flow was observed at the outfall, but the source was not directly observed or otherwise definitively identified, Participating Agencies may have identified the sources as "suspected" rather than "known." Suspected sources may require additional investigation to identify them more specifically before they can be reduced or eliminated.

Irrigation runoff was the most commonly identified known or suspected controllable source within the San Diego River WMA. Participating Agencies worked with water districts to address irrigation runoff through water conservation programs, consisting of outreach and enforcement, typically through drought ordinances or other prohibitions of wasting water, where necessary. With the adoption of the new JRMPs toward the end of the 2014-2015 fiscal year, the Participating Agencies also established legal authority to prohibit irrigation runoff as an illicit discharge. Due to these programs and substantial effort from water agencies due to the statewide drought and mandatory conservation requirements, a large number of irrigation runoff incidents were reported to hotlines and investigated. For example, citywide, the City of San Diego stormwater hotline went from receiving about 1,200 calls per year to over 2,800 calls per year; additional reports of irrigation runoff were the main driver of the increase.

The Participating Agencies also identified known or suspected uncontrollable sources of discharge, which are summarized in Table A4-25. As with controllable sources, "known" indicates a higher level of source identification certainty than "suspected." Groundwater infiltration into the storm drain system was the most common uncontrollable source identified.

Table A4-24. Known and Suspected Controllable Sources of Persistent and Transient Flows in the San Diego River WMA

Participating Agency	Known Controllable Sources				Suspected Controllable Sources				
	Commercial Washing Activities	Irrigation Runoff	Vehicle Washing	Other	Irrigation Runoff	Commercial Washing Activities	Residential Vehicle Washing	Residential Impervious Surface Washing	Other
County of San Diego	-	-	-	-	48	-	-	-	1 – Power Washing
City of El Cajon	-	2	1	-	3	1	-	-	-
City of La Mesa	-	7	-	-	-	-	-	-	-
City of Santee	-	17 (4 Eliminated, 1 Reduced)	-	1 – Automotive Activities	-	-	-	-	-
City of San Diego	1 (Eliminated)	8	-	1 – Illicit Connection (Eliminated) 1 – Permit discharge (Eliminated)	21	7 (1 Eliminated)	2	2	1 – Construction related discharges

Table A4-25. Known or Suspected Uncontrollable Sources of Persistent and Transient Flows in the San Diego River WMA

Participating Agency	Known Uncontrollable Source			Suspected Uncontrollable Source		
	Groundwater	Springs	Tidal	Groundwater	Rain Event >72 hours prior	Springs
County of San Diego	-	-	-	13	-	-
City of El Cajon	2[2]	-	-	2	-	-
City of La Mesa	10[2]	-	-	11	-	-
City of Santee	3[2]	-	-	2	-	-
City of San Diego	3	1	5	27[1]	3	1

Notes:

[1] The City of San Diego tested 17 of these locations during the monitoring year and found the water to be uncontaminated (i.e., not exceeding NALs).

[2] Identified as groundwater through additional analytical testing comparing the chemical profile of water in the storm drain system to groundwater, potable water, and, where applicable, recycled water. Depth to groundwater was also investigated and determined to be shallow enough to influence the storm drain system.

4.2.4.2 Source Identification for Highest Priority Outfalls

Each of the Participating Agencies prioritized their outfalls that had persistent flows and identified the five highest priority major outfalls (Section 4.2.1, Table A4-15). In addition to the field screening completed at all outfalls, samples were also taken for analysis at the five highest priority outfalls, as described in Section 4.2.2. The highest priority outfalls were a focus for IDDE investigations during the 2015-2016 monitoring year. Figure A4-7 shows the known or suspected flow source types identified at the highest priority outfalls.

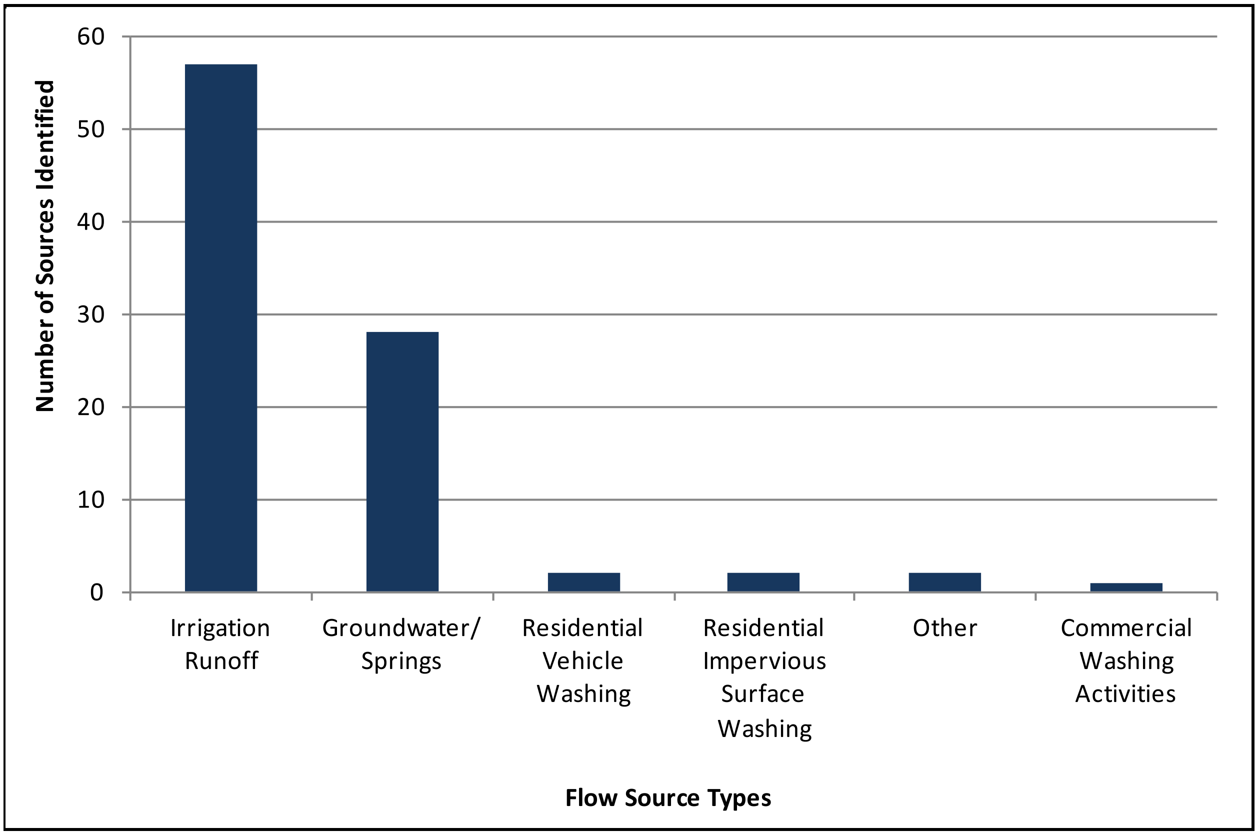

Figure A4-7. Known or Suspected Flow Sources Identified for Highest Priority Storm Drain Outfalls

More details about source investigations and associated source elimination activities at the highest priority outfalls is provided in Table A4-26.

4.2.4.3 Additional Source Investigation Activities

The City of San Diego and County of San Diego are utilizing flow meters at selected outfalls in the San Diego River WMA to assist in source identification. The County has installed flow meters at nine outfalls, and the City plans to install flow meters at four outfalls. The flow meters measure continuous flow at these outfalls, which may allow the Copermittees to target source investigation and elimination activities at particular times when flow rates tend to be higher. For example, irrigation systems are typically turned on at night or in the early morning and can be identified by recurring higher flow rates during this time.

The Copermittees are also investigating potential sources of bacteria from wastewater systems since human sources of bacteria are the highest priority source from a public health perspective. The City of San Diego has formed an interdepartmental team of staff from the Storm Water Division and the Public Utilities Department Wastewater Division to follow up on locations where bacterial source tracking data have indicated potential human sources, which could originate from the sanitary sewer system. To date, efforts have been focused on the San Diego River Watershed. For example, through this team's efforts, a broken private sewer lateral in the Sports Arena area that had been contributing wastewater to the storm drain system was identified and repaired. Similarly, the City of Santee has been working with Padre Dam Municipal Water District (Padre Dam), which is also the owner and operator of the public wastewater conveyance system in Santee, on an investigation of potential exfiltration from the wastewater system to the storm drain system. This investigation focuses in the area around a Bacteria TMDL monitoring site in Forester Creek.

Table A4-26. Highest Priority Persistent Outfall Source Elimination

Jurisdiction	Highest Priority Site ID	Source Investigation Performed?	Type	Runoff Source(s)	Actions Taken or Planned	Status of Elimination/ Identification
City of San Diego	DW0081	Yes	Unpermitted Discharge	Ground water, Other Illicit Discharges or Connections	Codes is working with Navy housing, and Caltrans to get the ultimate flow source found and stopped if possible. Still pending	In Progress
City of San Diego	DW0067	Yes	Unpermitted Discharge	Irrigation Runoff	Sent whole drainage area of DW0067 to residential patrol program RPP-029. Reported to Get it Done website	In Progress
City of San Diego	DW0369	Yes	NPDES Allowable Discharge, Other Permit Discharge, NPDES Allowable Discharge	Uncontaminated infiltration into storm drain system, Rising Groundwater, Springs		In Progress
City of San Diego	DW0681	Yes	Unpermitted Discharge, Other Permit Discharge	Irrigation Runoff, Residential Vehicle Washing, Residential Impervious Surface Washing	Reported to the Water Department and repair was confirmed visually	Eliminated
City of San Diego	DW0696	Yes	Unpermitted Discharge	Irrigation Runoff, Unidentified	Reported to Get it Done website	In Progress
City of La Mesa	OF-ALV-6	Yes	NPDES Allowable Discharge, Unpermitted Discharge	Rising Groundwater, Irrigation Runoff	Additional sampling performed	Identified as groundwater
City of La Mesa	OF-ALV-7	Yes	NPDES Allowable Discharge	Rising Groundwater	Additional sampling performed	Identified as groundwater
City of La Mesa	OF-ALV-9	Yes	Unknown	Unidentified	Continue monitoring and source identification	In Progress
City of La Mesa	OF-ALV-12	Yes	NPDES Allowable Discharge	Rising Groundwater	Analysis of water profile	Identified as groundwater
City of La Mesa	OF-ALV-13	Yes	Unpermitted Discharge, Unknown	Irrigation Runoff, Unidentified	Continue monitoring and source identification	In Progress
City of El Cajon	OF-3	Yes	Unknown	Unidentified		In Progress
City of El Cajon	OF-5	Yes	Unknown	Unidentified	Continue monitoring and source identification	In Progress
City of El Cajon	OF-13	Yes	Unpermitted Discharge	Non-Residential Vehicle Washing, Irrigation Runoff		In Progress
City of El Cajon	OF-15A	Yes	Permitted Discharge	Groundwater	Additional sampling performed	Identified as groundwater
City of El Cajon	OF-16	Yes	Unknown	Unidentified		In Progress
City of Santee	S5c	Yes	Unpermitted Discharge	Irrigation Runoff, Other Illicit Discharges or Connections		In Progress
City of Santee	E5g1	Yes	Unpermitted Discharge	Irrigation Runoff	Educational materials given to apartment complex managers	In Progress
City of Santee	S15h	Yes	Permitted Discharge, Unpermitted Discharge	Rising Groundwater, Other Illicit Discharges or Connections	Additional sampling performed	In Progress
City of Santee	RCP1	Yes	Unpermitted Discharge	Unidentified	Contacted Grossmont Union School District on multiple occasions.	In Progress
City of Santee	R20a	Yes	Unknown	Unidentified	Continue monitoring and source identification	In Progress
County of San Diego	MS4-SDR-064	Yes	Unpermitted Discharge	Over-irrigation		In Progress
County of San Diego	MS4-SDR-127	Yes	Unpermitted Discharge	Irrigation Runoff, Over-irrigation		In Progress
County of San Diego	MS4-SDR-151	Yes	Unpermitted Discharge	Irrigation Runoff, Over-irrigation		In Progress
County of San Diego	MS4-SDR-207	Yes	Unpermitted Discharge	Irrigation Runoff, Over-irrigation, Ground water		In Progress
County of San Diego	MS4-SDR-036	Yes	Unpermitted Discharge	Power Washing, Irrigation Runoff, Over-irrigation		In Progress

4.2.5 Storm Drain Outfall Wet Weather Monitoring

Storm drain outfall wet weather monitoring was conducted at five outfalls in the San Diego River WMA. Five stations representative of storm water discharges from Residential, Commercial, Industrial, and typical Mixed-use land uses were selected from the inventory of major storm drain outfalls, and at least one station was selected for each Participating Agency within the WMA. Two outfalls were located in the Mission San Diego HSA, two in the Santee HSA, and one in the El Cajon HSA. The storm drain outfall wet weather monitoring stations for the San Diego River WMA are presented in Table A4-27 and are shown with corresponding land uses in Figure A4-8. The outfall names for the wet weather monitoring stations differed from the jurisdictional station names in the Participating Agencies' inventories; therefore, both station identifiers are given in Table A4-27. This is the first year of storm drain outfall wet weather monitoring in accordance with the WQIP MAP. The prior two years of wet weather monitoring were under the transitional monitoring program with a different list of analytical parameters. The locations of these outfalls have not been adjusted since transitional monitoring began. Therefore, three years of data have now been collected at all five storm drain outfall wet weather monitoring locations in the San Diego River WMA.

Table A4-27. Storm Drain Outfall Wet Weather Monitoring Stations in the San Diego River WMA

Storm Drain Outfall Name	Jurisdictional Identifier	Jurisdiction	HSA Name/No.	Latitude	Longitude
MS4-SDR-1	OF-11	City of El Cajon	El Cajon/907.13	32.80256	-116.95808
MS4-SDR-2	OF-ALV-11	City of La Mesa	Mission San Diego/ 907.11	32.77776	-117.01751
MS4-SDR-3	DW0136	City of San Diego	Mission San Diego/ 907.11	32.74773	-117.22927
MS4-SDR-4	G30c	City of Santee	Santee/907.12	32.84501	-116.99122
MS4-SDR-5	MS4-SDR-064	County of San Diego	Santee/907.12	32.86165	-116.94474

Sampling at the storm drain outfall wet weather monitoring locations was conducted between December 11, 2015 and January 31, 2016. The rainfall statistics for the monitored event at each outfall, based on nearby Alert station gauges, are presented in Table A4-28. The highest event volumes and peak flow rates were observed during the monitored event at MS4-SDR-2 in the Mission San Diego HSA, and the lowest volumes and flows were observed during the event at MS4-SDR-5 in the Santee HSA. Storm drain outfall wet weather flow data are presented in Attachment 4F to this appendix, and a QA/QC report is provided as Attachment 4G.

Table A4-28. 2015-2016 Rainfall Statistics for Storm Drain Outfall Wet Weather Monitoring Events in the San Diego River WMA

Date	Station Name/ Jurisdictional Identifier	Total Rain (in)	Duration (hours)	Intensity (in/hour)	Antecedent Dry Days	Event Volume (cf)	Peak Flow (cfs)
01/31/2016	MS4-SDR-1/ OF-11	0.51	7.82	0.07	22	42,350	4.61
01/31/2016	MS4-SDR-2/ OF-ALV-11	0.51	7.82	0.07	22	105,153	28.0
01/04/2016	MS4-SDR-3/ DW0136	0.11	7.00	0.02	6	7,866	2.04
12/11/2015	MS4-SDR-4/ G30c	0.36	9.97	0.04	13	32,495	5.33
01/04/2016	MS4-SDR-5/ MS4-SDR-064	0.12	20.4	0.01	6	4,466	0.89

in – inches cf – cubic feet cfs – cubic feet per second

Monitoring was conducted in accordance with the WQIP MAP. Grab samples were collected and analyzed for pH, temperature, conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria, and composite samples were collected and analyzed for constituents contributing to the HPWQC, 303(d) List impairments, and constituents with stormwater action levels (SALs). A receiving water sample was also collected and analyzed for hardness, where feasible. Observational and hydrologic data were also recorded.

Analytical results for samples collected at the five storm drain outfall wet weather monitoring locations are summarized in Table A4-29. Bacteria concentrations are compared to single sample maximum (SSM) effluent limitations from the Bacteria TMDL, and results for the remaining required constituents, including general and physical chemical constituents, nutrients, and total and dissolved metals, are compared to SALs as provided in the Permit and listed in Table A4-34 of this appendix.

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform (i.e., the HPWQC within the WMA) indicated that the highest concentrations were measured at MS4-SDR-3 in the Mission San Diego HSA (907.11) for *Enterococcus* and total coliform and at MS4-SDR-5 in the Santee HSA (907.12) for fecal coliform. Concentrations of *Enterococcus* and fecal coliform in wet weather discharges from all five outfalls were above the SSMs (WQBELs discharging to freshwater creeks with REC-1 beneficial use). The only existing SALs that relate to PWQC in the WMA are for nitrate/nitrite as N and total phosphorus, and each of these PWQC concentrations was measured below the SALs. No other constituent concentrations were above the corresponding SALs.

Laboratory and field data collected for storm drain outfall wet weather monitoring will be uploaded to CEDEN, and data submittals are provided in Attachment L to this appendix.

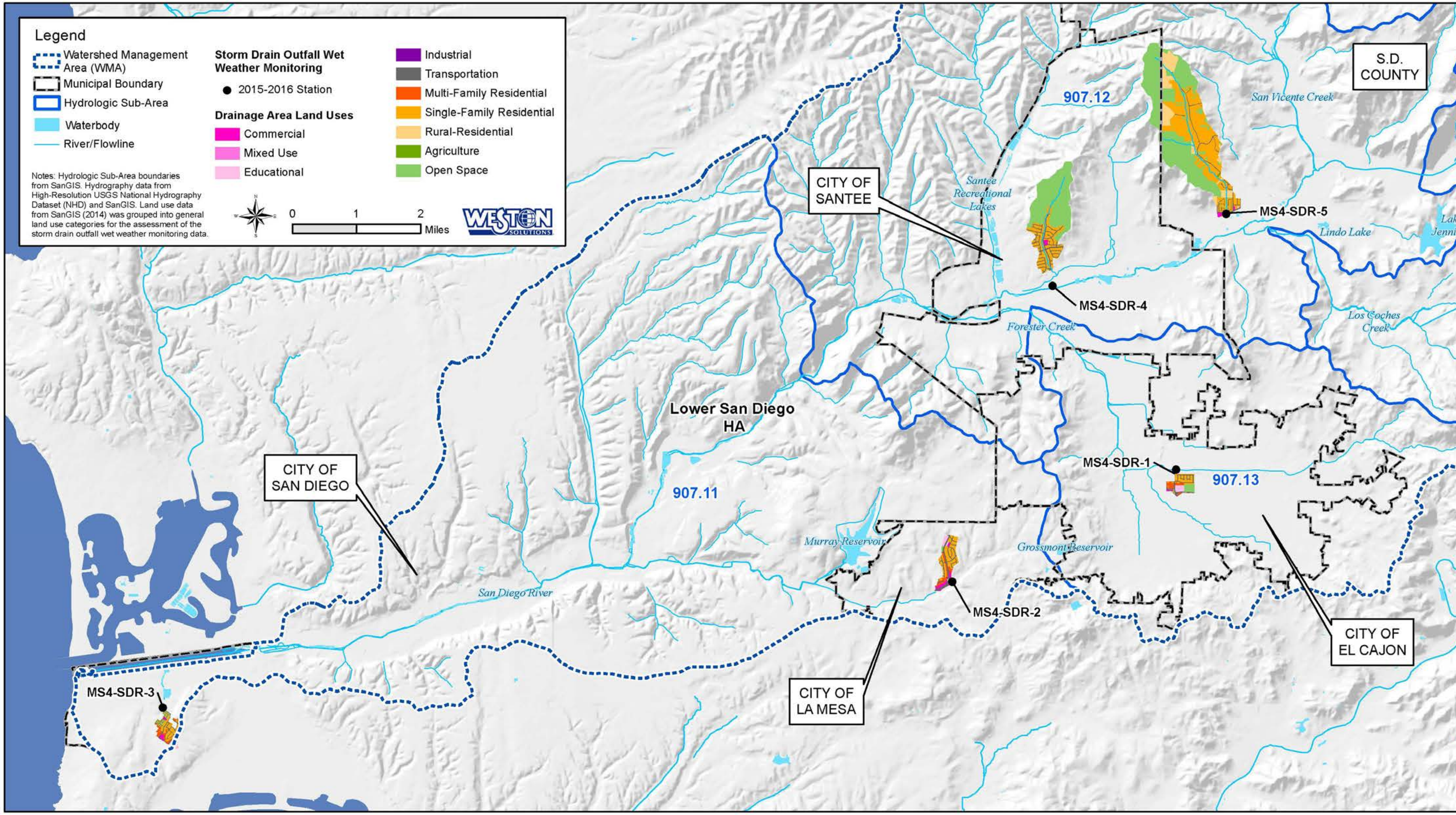

Figure A4-8. 2015-2016 Storm Drain Outfall Wet Weather Monitoring Locations and Drainage Areas in the San Diego River WMA

Table A4-29. 2015-2016 Storm Drain Outfall Wet Weather Monitoring Analytical Results in the San Diego River WMA

Analyte	Units	Single Sample Maximum[1]	Stormwater Action Level (SAL)[2]	MS4-SDR-1/ OF-11 (907.13)	MS4-SDR-2/ OF-ALV-11 (907.11)	MS4-SDR-3/ DW0136 (907.11)	MS4-SDR-4/ G30c (907.12)	MS4-SDR-5/ MS4-SDR-064 (907.12)
				1/31/2016	1/31/2016	1/4/2016	12/11/2015	1/4/2016
Bacteriological								
Enterococcus	MPN/100 mL	61		**11,000**	**2,800**	**500,000**	**1,600**	**170,000**
Fecal Coliform	MPN/100 mL	400		**2,400**	**2,000**	**3,500**	**2,400**	**5,000**
Total Coliform	MPN/100 mL			16,000	13,000	500,000	2,400	35,000
Physical Chemistry								
Color	Color units			25	75	50	60	80
Dissolved Oxygen	mg/L			9.91	10.14	7.49	9.21	9.97
pH	pH units			7.88	8.95	8.17	7.91	8.06
Salinity	PPT			0.03	0.05	0.08	0.13	0.09
Specific Conductivity	µS/cm			64	102	174	269	187
Temperature	Celsius			15.26	14.85	14.34	15.56	15.2
Turbidity	NTU		126	20.1	18.2	5.8	16.8	41.1
General Chemistry								
Ammonia as N	mg/L			<0.10	0.097J	0.092J	0.14	0.43
Chloride	mg/L			5.6	48	10	30	24
Dissolved Phosphorus	mg/L			0.098	0.13	0.14	0.24	0.29
Nitrate/Nitrite as N	mg/L		2.6	0.315	0.948	0.499	0.908	2.182
Nitrate as N	mg/L			0.27	0.91	0.45	0.86	2.1
Nitrite as N	mg/L			0.045J	0.038J	0.049J	0.048J	0.082J
Orthophosphate as P	mg/L			0.11	0.15	0.15	0.28	0.3
Sulfate	mg/L			5.7	30	7.2	14	33
Total Dissolved Solids	mg/L			63	180	79	150	170
Total Hardness	mg/L			30.7	76.5	33.4	59.9	77.8
Total Kjeldahl Nitrogen	mg/L			0.81	1.2	0.79	1.3	2.5
Total Nitrogen (calc)	mg/L			1.13	2.15	1.29	2.21	4.68
Total Phosphorus	mg/L		1.46	0.17	0.23	0.17	0.32	0.38
Total Suspended Solids	mg/L			24	26	8	29	23
Total Metals								
Cadmium	µg/L		3	0.06J	0.084J	<0.1	0.089J	0.079J
Copper	µg/L		127	9.8	16	15	12	15
Lead	µg/L		250	1.6	3.1	0.95	3.5	1.7
Manganese	µg/L			19	110	13	25	28
Selenium	µg/L			0.15J	0.38J	<0.4	0.36J	0.22J
Zinc	µg/L		976	73	93	50	39	40
Dissolved Metals								
Manganese	µg/L			<5	40	7.4	3.4	5.2
Selenium	µg/L			<0.4	0.32J	<0.4	0.28J	0.18J

[1] Single Sample Maximum Final Effluent Limitations from Table 6.2c. Regional Water Quality Control Board Order No. R9-2013-0001, Attachment E.

[2] Storm Water Action Levels for Discharges from Storm Drain Outfalls to Receiving Waters, Table C-5. Regional Water Quality Control Board Order No. R9-2013-0001.

< - Results are less than the reporting limit.

J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Bold/shaded values do not meet Single Sample Maximum Final Effluent Limitations.

4.2.6 Storm Drain Outfall Wet Weather Monitoring Data Assessments

Provision D.4.b.(2).(c) of the Permit requires the storm drain outfall wet weather monitoring data assessments summarized in Table A4-30. The information necessary to demonstrate compliance with each Provision is outlined below. In instances where compliance has been demonstrated in previous sections of this Annual Report, those sections are referenced.

Table A4-30. Storm Drain Outfall Wet Weather Monitoring Assessments

Assessment	Components	Provision(s)
WQIP Annual Report		
Estimate loads and volumes.	Calculate or estimate the average stormwater runoff coefficient for each land use type.	D.4.b.(2).(b)(i)(a)
	Calculate or estimate the volume of stormwater and pollutant loads discharged from each monitored storm drain outfall for each qualifying storm event.	D.4.b.(2).(b)(i)(b)
	Calculate or estimate the total volume and pollutant load discharged from the Copermittee's jurisdiction over the course of the wet season.	D.4.b.(2).(b)(i)(c)
	Calculate or estimate the percent contribution of stormwater volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major storm drain outfall or each major storm drain outfall for each qualifying storm event.	D.4.b.(2).(b)(i)(d)
	Identify necessary modifications to monitoring locations and frequencies necessary to identify pollutants in stormwater discharges.	D.4.b.(2).(b)(ii)
Evaluate WQIP analysis.	Using data and applicable SALs, evaluate and compare data collected to the analyses and assumptions used to develop the WQIP.	D.4.b.(2).(c)(ii)
	Evaluate whether analyses and assumptions should be updated as a component of the adaptive management efforts.	D.4.b.(2).(c)(ii)
Identify data gaps.	Identify data gaps in the monitoring data necessary to fulfill assessment requirements.	D.4.b.(2).(c)(iv)
Evaluate trends.	Evaluate data collected pursuant to D.2.c, incorporate new data into time-series plots for each long-term monitoring constituent and perform statistical trends analysis on cumulative long-term wet weather data set.	D.4.b.(2)(d)
Once during Permit Term		
Evaluate progress in achieving stormwater pollutant reductions.	Identify reductions and progress in achieving reductions from different land uses and/or drainage areas.	D.4.b.(2).(c)(iii)
	Assess the effectiveness of WQIP improvement strategies, with estimates of volume and load reductions attributed to specific strategies when possible.	
	Identify modifications necessary to increase the effectiveness of WQIP strategies.	

4.2.6.1 Provision D.4.b.(2)(b)

Provision D.4.b.(2)(c)(i) requires that Copermittees continue to conduct the land-use based storm drain outfall wet weather monitoring assessment previously required by the transitional monitoring requirements of Provision D.4.b.(2)(b).

Because the storm drain outfall wet weather monitoring station locations have not been modified, the general approach and land use data and groupings presented in the 2014-2015 monitoring and assessment report (WESTON, 2016) are applicable to the 2015-2016 monitoring year. The technical approach and applicable equations can be found in the Transitional Wet Weather MS4 Monitoring Workplan (WESTON, 2015c). Assessment results are presented in detail by jurisdiction in Attachment 4H to this appendix. As more data are collected and incorporated into the assessment, the results are becoming increasingly representative of the variation in runoff coefficients and constituent concentrations associated with different land uses and wet weather conditions to generate a more robust prediction of jurisdictional loads based on land use.

Data specific to the 2015-2016 monitoring year that were incorporated into this assessment include pollutant volumes and loads at each outfall for the monitored event (Table A4-31) and for the monitoring year (Table A4-32). Updated land use event mean concentration (EMC) summary tables based on three monitoring years of data are included in the detailed assessment results provided as Attachment 4H to this appendix.

In compliance with Provision D.4.b.(2)(b)(ii), the storm drain outfall wet weather monitoring locations and frequencies were evaluated in order to identify modifications that may be considered for implementation in the future. A review of the collective land use data associated with monitored storm drain outfall drainage areas was conducted to determine whether the WMA contains any categories of land use types not represented within the monitored storm drain outfall drainage areas. The results and recommendations were presented in the 2012-2014 transitional monitoring and assessment report (WESTON, 2015a) and remain unchanged for the 2015-2016 monitoring year. The distribution of land use types within the monitored outfall drainage areas closely resembles that of the WMA.

The evaluation of monitoring frequency included a review of the monitoring data to determine how well the data from each monitored storm event represented the wet weather conditions on an annual basis. The total qualifying rainfall characterizing storms greater than 0.1 inch for 2015-2016 was 11.17 inches and 12.13 inches at the La Mesa and Fashion Valley Alert precipitation stations, respectively. These rainfall values are slightly greater than the official regional rainfall average of 10.82 inches (Lindbergh Field). Rainfall patterns varied significantly across the San Diego River WMA, with larger, higher intensity events in the coastal areas. At the Fashion Valley Alert station, three rainfall days had 24-hour totals of greater than one inch (July, September, and November 2015); and in January 2016, over two inches of rainfall was recorded for a 24 hour period. At the La Mesa Alert station, 2015 daily rainfall totals were less than 0.9-inch; and in January 2016, two rainfall days had 24-hour totals of greater than one inch. The storm events monitored in the San Diego River WMA were small to average in size, with rainfall totals of approximately 0.5 inch or less. Moving forward, rainfall intensity as well as storm size will be considered when evaluating forecasted storm events for monitoring, if possible. It has been found that a target of a rainfall intensity of at least 0.05 inch/hour shows a good precipitation response and higher measured Runoff "C" compared to lower intensity storm events. In general, capturing larger events has been less feasible in recent years due to the patterns of rainfall in the region.

Table A4-31. 2015-2016 Wet Weather Storm Drain Outfall Discharge Pollutant Loads by Station for Monitored Event – San Diego River WMA

Analyte	Units	OF-11 MS4-SDR-1 (907.13)	OF-ALV-11 MS4-SDR-2 (907.11)	DW0136 MS4-SDR-3 (907.11)	G30c MS4-SDR-4 (907.12)	MS4-064 MS4-SDR-5 (907.12)
Area	ac	76.1	114.0	91.4	479.7	1,190.57
Qualifying Measured Rainfall	in	0.51	0.51	0.11	0.36	0.12
Measured Outfall Runoff "C"		0.301	0.498	0.216	0.052	0.009
Event Volume	cf	42,350	105,153	7,866	32,495	4,466
Bacteriological						
Enterococcus	MPN	1.319E+11	8.34E+10	1.11E+12	1.47E+10	2.15E+11
Fecal Coliform	MPN	2.878E+10	5.96E+10	7.80E+09	2.21E+10	6.32E+09
Total Coliform	MPN	1.919E+11	3.87E+11	1.11E+12	2.21E+10	4.43E+10
General Chemistry						
Ammonia as N[1]	lbs	0.1322	0.6367	0.0452	0.2840	0.1199
Chloride	lbs	14.81	315.1	4.9107	60.86	6.691
Dissolved Phosphorus	lbs	0.2591	0.8534	0.0687	0.4869	0.0809
Nitrate as N	lbs	0.7138	5.974	0.2210	1.745	0.5855
Nitrite as N	lbs	0.1190	0.2494	0.0241	0.0974	0.0229
Nitrate/Nitrite as N	lbs	0.8328	6.2231	0.2450	1.842	0.6083
Orthophosphate	lbs	0.2908	0.9847	0.0737	0.5680	0.0836
Sulfate	lbs	15.07	196.9	3.5357	28.40	9.200
Total Dissolved Solids	lbs	166.6	1182	38.79	304.3	47.40
Total Hardness	lbs	81.16	502.2	16.40	121.5	21.69
Total Kjeldahl Nitrogen	lbs	2.141	7.877	0.3879	2.637	0.6970
Total Nitrogen (calculated)	lbs	2.974	14.10	0.6330	4.4791	1.3054
Total Phosphorus	lbs	0.4494	1.510	0.0835	0.6491	0.1059
Total Suspended Solids	lbs	63.45	170.7	3.929	58.83	6.412
Total Metals						
Cadmium[1]	lbs	0.0002	0.0006	0.0002	0.0002	0.00002
Copper	lbs	0.0259	0.1050	0.0074	0.0243	0.0042
Lead	lbs	0.0042	0.0203	0.0005	0.0071	0.0005
Manganese	lbs	0.0502	0.7221	0.0064	0.0507	0.0078
Selenium[1]	lbs	0.0004	0.0025	0.0001	0.0007	0.0001
Zinc	lbs	0.1930	0.6105	0.0246	0.0791	0.0112
Dissolved Metals						
Manganese[1]	lbs	0.0066	0.2626	0.0036	0.0069	0.0014
Selenium[1]	lbs	0.0053	0.0021	0.0001	0.0006	0.0001

ac – acres in – inches cf – cubic feet MPN – most probable number lbs – pounds ND – not detected
Note 1: Where chemistry results were less than the RL, for load calculations purposes half the RL value was used for this constituent.
2015-2016 storm drain outfall wet weather monitoring results are found in Table A4-29.

Table A4-32. 2015-2016 Wet Weather Storm Drain Outfall Discharge Annual Pollutant Loads by Station for the San Diego River WMA

Analyte	Units	OF-11	OF-ALV-11	DW0136	G30c	MS4-064
		MS4-SDR-1	MS4-SDR-2	MS4-SDR-3	MS4-SDR-4	MS4-SDR-5
		(907.13)	(907.11)	(907.11)	(907.12)	(907.12)
Area	ac	76.1	114.0	91.4	479.7	1,190.6
Qualifying Measured Rainfall	in	11.17	11.17	11.56	11.17	11.17
Measured Outfall Runoff "C"		0.154	0.446	0.267	0.117	0.013
Annual Volume	cf	475,188	2,061,577	1,024,052	2,275,702	627,580
Bacteriological						
Enterococcus	MPN	1.480E+12	1.635E+12	1.450E+14	1.031E+12	3.021E+13
Fecal Coliform	MPN	3.229E+11	1.168E+12	1.015E+12	1.547E+12	8.886E+11
Total Coliform	MPN	2.153E+12	7.589E+12	1.450E+14	1.547E+12	6.220E+12
General Chemistry						
Ammonia as N[1]	lbs	1.483	12.48	5.881	19.89	16.85
Chloride	lbs	166.1	6178	639.3	4262	940.3
Dissolved Phosphorus	lbs	2.907	16.73	8.950	34.10	11.36
Nitrate as N	lbs	8.009	117.1157	28.7679	122.2	82.27
Nitrite as N	lbs	1.335	4.891	3.133	6.819	3.213
Nitrate/Nitrite as N	lbs	9.344	122.0	31.90	129.0	85.49
Orthophosphate	lbs	3.263	19.30	9.589	39.78	11.75
Sulfate	lbs	169.1	3861	460.3	1989	1293
Total Dissolved Solids	lbs	1869	23166	5050	21310	6660
Total Hardness	lbs	910.7	9845	2135	8510	3048
Total Kjeldahl Nitrogen	lbs	24.03	154.4	50.50	184.7	97.95
Total Nitrogen (calculated)	lbs	33.37	276.4	82.40	313.7	183.4
Total Phosphorus	lbs	5.043	29.60	10.87	45.46	14.89
Total Suspended Solids	lbs	712.0	3346	511.43	4120	901.1
Total Metals						
Cadmium[1]	lbs	0.0018	0.0108	0.0320	0.0126	0.0031
Copper	lbs	0.2907	2.059	0.9589	1.705	0.5877
Lead	lbs	0.0475	0.3990	0.0607	0.4972	0.0666
Manganese	lbs	0.5636	14.16	0.8311	3.552	1.097
Selenium[1]	lbs	0.0044	0.0489	0.0128	0.0511	0.0086
Zinc	lbs	2.166	11.97	3.196	5.541	1.567
Dissolved Metals						
Manganese[1]	lbs	0.0742	5.1479	0.4731	0.4830	0.2037
Selenium[1]	lbs	0.0593	0.0412	0.0128	0.0398	0.0071

ac – acres   in – inches   cf – cubic feet   MPN – most probable number   lbs – pounds   ND – not detected

Note 1: Where chemistry results were less than the RL, for load calculations purposes half the RL value was used for this constituent.
2015-2016 storm drain outfall wet weather monitoring results are found in Table A4-29.

4.2.6.2 Provision D.4.b.(2)(c)[ii]

In addition to the land-based assessment presented in Section 4.2.6.1, the 2015-2016 monitoring year is the first requiring the additional assessments of Provision D.4.b.(2)(c)(ii-iv).

Provision D.4.b.(2)(c)(ii) requires the Copermittees to evaluate and compare data collected during the monitoring year to the analyses and assumptions used to develop the WQIP and evaluate whether adaptive management is necessary for updates. The analytical results for samples collected at the five storm drain outfall wet weather monitoring locations in the San Diego River WMA are summarized in Table A4-29 in Section 4.2.5. Results indicated that indicator bacteria concentrations in wet weather discharges from all five monitored outfalls were above the SSMs specified in the Bacteria TMDL. The analyses and assumptions used to develop the WQIP resulted in the selection of bacteria as the HPWQC and in the selection of the five outfalls monitored during wet weather. Because concentrations of indicator bacteria in wet weather discharges from each of these outfalls were above Bacteria TMDL numeric targets, continued monitoring of these outfalls is consistent with the intentions of the WQIP. The Participating Agencies have been officially implementing their strategies to address bacteria under the WQIP for less than one year, and updates through adaptive management are not necessary at this time.

4.2.6.3 Provision D.4.b.(2)(c)[iii]

This Provision requires the Copermittees to review the data collected under the storm drain outfall wet weather monitoring program in order to identify pollutant reduction progress, assess water quality improvement strategy effectiveness, and identify modifications necessary to increase effectiveness. This assessment is required once during the Permit term and will be provided in the RMAR, which is scheduled for submittal to the Regional Board in December 2017.

4.2.6.4 Provision D.4.b.(2)(c)[iv]

No gaps have been identified in the monitoring data. Since the 2015-2016 monitoring year was the first year of monitoring under the WQIP MAP and the first year requiring the assessments outlined in Provision D.4.b.(2)(c)(ii-iii), the collection of additional data will be necessary before the Copermittees are able to identify data gaps.

4.2.6.5 Provision D.4.b.(2)(d)

This provision requires creation of time-series plots for long-term monitoring data collected under Provision D.2.c and a trend analysis on this cumulative long-term storm drain outfall wet weather monitoring data set. This assessment will be addressed when sufficient data (i.e., at least three monitoring years are required for a statistical test) have been collected.

4.3 Special Studies

4.3.1 San Diego Regional Reference Streams and Beaches Studies

The Participating Agencies participated in the San Diego Regional Reference Streams and Beaches Studies from 2014 to 2016, which measured levels of indicator bacteria that account for natural sources to establish the background concentrations, or “reference conditions”, for streams or beaches minimally disturbed by anthropogenic activities. This reference system approach results in allocation of allowable exceedance days based on frequencies of exceedance at reference sites with natural sources of bacteria. The results of these studies support the forthcoming re-evaluation of the Bacteria TMDL and numeric target development for future TMDLs. These studies were intended to provide data to support discussions of reasonable, accurate targets for indicator bacteria at Southern California streams and beaches.

4.3.1.1 Reference Streams Study

This study investigated concentrations of indicator bacteria, nutrients, metals, and conventional constituents occurring naturally at reference streams in minimally disturbed watersheds in Southern California during wet weather (during a storm and the three days following a storm) and dry weather conditions. Although additional constituents were analyzed, the main focus of the study was indicator bacteria. The study also sought to categorize exceedance frequencies for indicator bacteria by hydrologic, geomorphologic, biotic and abiotic factors. Study questions included the following:

- How does the water quality objective exceedance frequency for indicator bacteria vary between wet weather, summer dry weather and winter dry weather?
- How does indicator bacteria vary by stream landscape and site-specific factors, including:
    - Catchment size and geology?
    - Wet weather parameters such as size, timing of storm, and number of antecedent dry days?
    - Dry weather factors such as flow, stream physiochemical parameters (temperature, conductivity, and turbidity), chemical parameters (nutrients, organic carbon, metals, and conventional constituents) and trophic status, as measured by algal abundance?

The sampling locations selected for this study were chosen to meet reference screening criteria and represent varying watershed size and geology. Samples were collected during eight storm events at five locations, and dry weather samples were collected weekly at 10 intermittent stream locations in 10 watersheds in Southern California. Five locations were in San Diego County, three were in Orange County, and two were in Ventura County. In addition to indicator bacteria analysis, samples were collected biweekly and analyzed for nutrients, metals, and conventional constituents. Samples were also analyzed for the presence of human genetic marker in order to eliminate locations with potential human sources of fecal bacteria. The chosen “reference” streams had drainage areas that were at least 95% undeveloped, were relatively homogenous geologically, had year round flow or at least prolonged dry weather flow, did not include drainage areas affected by wildfires, were not included on the 303(d) list, and had no evidence of anthropogenic effects. Findings from the study included the following:

- Indicator bacteria concentrations measured during the study were generally below water quality objectives except for *Enterococcus*, and exceedance frequencies were highest during summer dry weather.
- Wet weather EMC exceedance frequencies were low except for *Enterococcus*. The number of events sampled was not sufficient to determine whether relationships exist between exceedance frequencies and watershed size and/or geology.

- Temperature was the major factor associated with elevated summer dry weather concentrations of indicator bacteria, although total suspended solids (TSS), nutrients, and organic carbon were also positively correlated. No significant relationships between indicator bacteria concentrations and watershed size or geology were observed during dry weather.
- EMC fluxes (flux was calculated as the ratio of mass loading and watershed area) during wet weather were two to three times greater than during dry weather and were comparable to those described in previous studies.

Results are presented in greater detail in the Technical Report (Tiefenthaler et al., 2015, which is provided as Attachment 4I to this appendix.

4.3.1.2 Reference Beaches Study

The reference beaches study investigated concentrations of indicator bacteria occurring naturally at reference beaches during a period of prolonged drought. The goals of this study included the following:

- Quantify concentrations and exceedance frequencies for indicator bacteria at reference beaches during wet and dry weather (natural, background conditions), while evaluating the presence of human genetic marker to determine whether samples were contaminated by human sources.
- Quantify concentrations and exceedance frequencies for indicator bacteria at the associated, minimally-impacted estuary.

The chosen "reference" beaches had minimal human impact with open beaches and breaking waves, received freshwater runoff from a beach or estuary, and received runoff originating from undeveloped watersheds with over 93% open space. The two sites meeting these criteria were San Onofre Creek in San Diego County, which has an associated bar-built estuary, and Deer Creek in Los Angeles County, which has an associated mixing zone. Weekly dry weather sampling was conducted at both locations, and wet weather sampling was conducted over four days for one event at San Onofre Creek (only one storm event breached the creek mouth). Samples during each event were collected at the beach, creek, and the respective estuary or mixing zone. Findings from the study included the following:

- Indicator bacteria concentrations and exceedance frequencies during both winter and summer dry weather were low at both monitored beaches. This is consistent with results from previous studies of beaches with blocked estuary inlets or beaches with flowing creeks and no estuary.
- Indicator bacteria concentrations in the estuary or mixing zone associated with both beaches were one to three orders of magnitude greater than those at the corresponding beach, and were higher at San Onofre Creek than Deer Creek. Exceedance frequencies were also higher in the estuary associated with San Onofre Creek compared to the mixing zone associated with Deer Creek. This suggests that dry weather exceedance frequencies may have been greater if the estuary had been open to tidal exchange.

- At both study locations, no significant relationships between indicator bacteria and water temperature, salinity, or antecedent dry days were observed, but indicator bacteria concentrations decreased with the number of antecedent dry days at the San Onofre Creek beach and increased with the number of antecedent dry days in the associated estuary. Significant positive correlations were found between total coliform concentrations and water temperature, salinity, and antecedent dry days and between *E. coli* and fecal coliform and salinity in the estuary associated with San Onofre Creek. This indicates that freshwater input from the creek dilutes bacteria concentrations. Regrowth of bacteria may have been a factor at this estuary.
- During the single monitored storm event, indicator bacteria exceedances were common in the San Onofre Beach creek and estuary samples, but exceedances were only observed at the beach on the day of the storm. Because all samples associated with this storm event were positive for human genetic marker, results could not be used to determine natural background exceedance frequencies. However, positive human marker results were rare throughout the study overall, indicating that the study locations may be suitable reference sites.

Results are presented in greater detail in the Technical Report (Tiefenthaler et al., 2016), which is provided as Attachment 4J to this appendix.

4.3.2 Wet Weather Epidemiology Study and Quantitative Microbial Risk Assessment

This special study examined the correlation between bacteria levels in stormwater discharges from the San Diego River and the health effects experienced by surfers at Ocean Beach, located near the mouth of the San Diego River. The first phase of the study was performed from January 2014 through March of 2015 and included 654 surfers and 10,081 logged surfing sessions.

The overall goal of the study was to answer four questions:

- Is surfing associated with an increased rate of illness?
- Are illness rates higher when surfing following wet weather compared to dry weather?
- What is the association between water quality and illness following wet weather events?
- What level of water quality corresponds to the same risk of illness as current water quality objectives?

Results indicated that there is an increased risk of illness associated with water contact, and that risk was greater when surfing after a wet weather event compared to during dry weather. The excess risk of illness when entering the ocean in wet weather compared to not entering the ocean was quantified to be 12 surfers per 1,000. An association was established between *Enterococcus* and illness after a wet weather event; however, the risk of illness was found to be lower than that which would be predicted by *Enterococcus* water quality objectives. An extra 12 illnesses per 1,000 surfers after wet weather ocean exposure was below the most recent water quality guidelines for recreational beaches from the USEPA (2012), which recommends no more than 32 to 36 illnesses per 1,000 swimmers.

In addition, a quantitative microbial risk assessment (QMRA) was performed to estimate the risks of gastrointestinal illness from recreational exposure to beaches impacted by wet weather storm drain outfall discharges. Source tracking work and analysis of pathogen concentrations were conducted, and modeling results were comparable to epidemiological study results. The study demonstrated the applicability of QMRA for recreational water risk estimates during wet weather and may facilitate consideration of site-specific water quality criteria.

Additional details can be found in the technical report (Schiff et al., 2016), which is provided as Attachment 4K to this appendix.

4.3.3 Special Studies Assessments

Provision D.4.c of the Permit requires an annual evaluation of special studies results to assess their relevance to the Participating Agencies' characterization of receiving water conditions, understand sources of pollutants and/or stressors, and control and reduce the discharges of pollutants from the storm drain outfalls to receiving waters. This Provision also requires the Participating Agencies to identify modifications and/or updates to the WQIP that are necessary based on special study results.

Results from the special studies outlined above supplement the bacteria data collected under Provisions D.1 (receiving water) and D.2 (storm drain outfalls). Results from these studies may be used in conjunction with data from other studies in re-assessing numeric targets related to bacteria. The Regional Reference Streams and Beaches Study provides a scientific basis for updating the "reference" conditions to be considered in evaluating compliance levels for bacteria, and will be useful in the re-evaluation of the Bacteria TMDL. The Wet Weather Epidemiology Study may facilitate consideration of site-specific water quality criteria for bacteria. Once these re-evaluations occur, adaptive management may be utilized to modify the WQIP.

4.4 Action Levels

The action levels for storm drain outfall samples utilized to evaluate the data collected in the San Diego River WMA are presented in Table A4-34. Suggested analytical methods and reporting limits are presented in Attachment 4A-5d to the WQIP MAP.

Table A4-33. Action Levels for the San Diego River WMA – Storm Drain Outfalls

Analyte	Benchmark Reference	Units	Action Level(s)				Notes
Non-Stormwater Action Levels for Discharges from Storm Drain Outfalls to Ocean Surf Zone							
			AMAL	IM			
Total coliform	Ocean Plan	MPN/100 mL	1000	10,000/1,000			For IM, total coliform density NAL is 1,000 MPN/100 mL when the fecal/total coliform ratio exceeds 0.1.
Fecal coliform	Ocean Plan	MPN/100 mL	200	400			For AMAL, fecal coliform density NAL is 200 MPN/100 mL during any 30 day period.
Enterococcus	Ocean Plan	MPN/100 mL	35	104			IM value has been set to the Basin Plan water quality objective (WQO) for saltwater "designated beach areas".
Non-Stormwater Action Levels for Discharges from Storm Drain Outfalls to Bays, Harbors, and Lagoons/Estuaries							
			AMAL	IM			
Turbidity	Ocean Plan	NTU	75	225			
pH	Ocean Plan	Units	Within limit of 6.0-9.0 at all times				
Fecal coliform	Basin Plan	MPN/100 mL	200	400			AMAL is based on a minimum of not less than five samples for any 30-day period. For IM, the NAL is reached if more than 10 percent of the total samples exceed 400 MPN/100 ml during any 30 day period.
Enterococcus	Basin Plan	MPN/100 mL	35	104			IM value has been set to the Basin Plan WQO for saltwater "designated beach areas" and is not applicable to water bodies that are not designated with water contact recreation (REC-1) beneficial use.
Non-Stormwater Action Levels for Discharges from Storm Drain Outfalls to Inland Surface Waters							
			AMAL	MDAL	IM		
Dissolved Oxygen	Basin Plan	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters				
Turbidity	Basin Plan	NTU	-	20	See MDAL		
pH	Basin Plan	Units	Within limit of 6.5-8.5 at all times				
Fecal Coliform	Basin Plan	MPN/100 mL	200	-	400		AMAL is based on a minimum of not less than five samples for any 30-day period. For IM, the NAL is reached if more than 10 percent of total samples exceed 400 MPN/100 mL during any 20 day period.
Enterococcus	Basin Plan	MPN/100 mL	33	-	61		IM value has been set to the Basin Plan WQO for saltwater "designated beach areas" and is not applicable to water bodies that are not designated with water contact recreation (REC-1) beneficial use.
Total Nitrogen	Basin Plan	mg/L	-	1	See MDAL		
Total Phosphorus	Basin Plan	mg/L	-	0.1	See MDAL		
MBAS	Basin Plan	mg/L	-	0.5	See MDAL		
Iron	Basin Plan	mg/L	-	0.3	See MDAL		
Manganese	Basin Plan	mg/L	-	0.05	See MDAL		
Non-Stormwater Action Levels for Priority Pollutants							
			Freshwater		Saltwater		
			AMAL	MDAL	AMAL	MDAL	
Cadmium	CTR	µg/L	**	**	8	16	
Copper	CTR	µg/L	*	*	2.9	5.8	See footnote.
Chromium III	CTR	µg/L	**	**	-	-	
Chromium VI	CTR	µg/L	8.1	16	41	83	
Lead	CTR	µg/L	*	*	2.9	14	See footnote.
Nickel	CTR	µg/L	**	**	6.8	14	See footnote.
Silver	CTR	µg/L	*	*	1.1	2.2	See footnote.
Zinc	CTR	µg/L	*	*	47	95	See footnote.

Table A4-33. Action Levels for the San Diego River WMA – Storm Drain Outfalls

Analyte	Benchmark Reference	Units	Action Level(s)	Notes
Stormwater Action Levels				
Turbidity	Order No. R9-2013-0001	NTU	126	
Nitrate & Nitrite (Total)	Order No. R9-2013-0001	mg/L	2.6	
Phosphorus (Total P)	Order No. R9-2013-0001	mg/L	1.46	
Cadmium (Total Cd) †	CTR	µg/L	3	See footnote.
Copper (Total Cu) †	CTR	µg/L	127	See footnote.
Lead (Total Pb) †	CTR	µg/L	250	See footnote.
Zinc (Total Zn) †	CTR	µg/L	976	See footnote.

* Action levels designated on a case by case basis.

** Action levels designated on a case by case basis, but calculated criteria are not to exceed MCLs under the CCR, Title 22, Division 4, Chapter 15, Article 4 Section 64431.

The cadmium, Copper, Chromium (III), Lead, Nickel, Silver, and Zinc NALs for storm drain outfall discharges to freshwater receiving waters will be developed on a case-by-case basis on site-specific water quality data (receiving water hardness). For these priority pollutants, refer to 40 CFR 131.38(b)(2).

† Sampling must include a measure of receiving water hardness at each storm drain outfall. If a total metal concentration exceeds the corresponding metals SAL in the table, that concentration must be compared to the CTR and the USEPA 1-hour maximum concentration for the detected level of RW hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific metal exceeds that SAL, but does not exceed the applicable USEPA 1-hr maximum concentration criterion for the measured level of hardness, then the sample result will not be considered above the SAL for that measurement.

4.5 California Environmental Data Exchange Network Data Upload and Retrieval

Provision F.4.a.(6) of the Permit requires that monitoring data collected pursuant to Provision D (Monitoring and Assessment Program Requirements) must be uploaded to the CEDEN, a central location for finding and sharing information about California's waterbodies. CEDEN aggregates water quality, aquatic habitat, and wildlife health data and makes them accessible in downloadable forms at www.ceden.org.

Data in the CEDEN are searchable by date and by location, project, station, or parameter using the "Find Data" functionality of the CEDEN website. The data from the San Diego Region Copermittee Program can be retrieved by identifying the Program as "National Pollutant Discharge Elimination System (NPDES) Program" and Project as "San Diego Region NPDES", which is the parent Project name. Within this overall retrieval, the specific datasets described in this Annual Report can be identified using the project names listed in Table A4-35. Data are limited to those parameters that are currently storable in CEDEN. SMC data are submitted to the SMC Program.

In accordance with the Permit, data collected during the 2015-2016 monitoring year has been submitted to CEDEN and will become available from CEDEN once loaded by the Regional Data Center into the system during 2017. CEDEN data submittals and receipts are provided as Attachment L to this appendix.

Table A4-34. Project Names for CEDEN Data Retrieval

Project Code	Project Name
AB_LM	Ambient Bay and Lagoon Monitoring
BacteriaTMDL_SDR	San Diego River Bacteria TMDL Monitoring Program
MS4_WW_OFM	Wet Weather MS4 Outfall Monitoring
MS4_DW_OFSM	Dry Weather MS4 Outfall Field Screening and Discharge Monitoring
NPDES_RWM	NPDES Receiving Water Monitoring

Appendix 4 Monitoring and Assessment Results

Attachments: Provided Separately

Attachment A – SMC Regional Monitoring Program Data

Attachment B – Bacteria TMDL Monitoring Report

Attachment C – Microbial Source Tracking

Attachment D – Dry Weather Field Screening Data

Attachment E – Dry Weather Storm Drain Outfall Assessment

Attachment F – Wet Weather Storm Drain Outfall Flow Data

Attachment G – Wet Weather Storm Drain Outfall QA/QC Report

Attachment H – Wet Weather Storm Drain Outfall Assessment

Attachment I – Reference Streams Study

Attachment J – Reference Beaches Study

Attachment K – Wet Weather Epidemiology Study

Attachment L – CEDEN Data Submittals and Receipts

APPENDIX 5

Adaptive Management/Modifications

Appendix 5 Adaptive Management/Modifications

5.1 TRIGGERS FOR ADAPTIVE MANAGEMENT

The adaptive management process may include modifications to the priority water quality conditions, numeric goals, strategies, and schedules, and/or to the monitoring and assessment program outlined in the Water Quality Improvement Plan (WQIP). This appendix contains analyses and information in support of the adaptive management process. With the acceptance of the WQIP in February 2016, the Copermittees have been officially implementing the WQIP for less than a year. Therefore, it is too early in the implementation process to have significant feedback necessary to drive the adaptive management process. Only one year of monitoring data have been collected under the WQIP Monitoring and Assessment Plan (MAP), and additional monitoring years under the Permit term are necessary for feasible evaluation of the effectiveness of jurisdictional strategies. Minor administrative changes, including clarifications, correction of typos and errors, and edits to WQIP strategies, are proposed, primarily by the City of San Diego. These modifications are documented as markup in the Participating Agencies' strategy tables of Appendix 2. No significant modifications to the MAP are warranted based on data collected during the 2015-2016 monitoring year. The results of the Permit-required assessments of these data are presented in Appendix 4.

5.1.1 Routine Monitoring Results

Results from routine monitoring programs may trigger updates to the WQIP, potentially prompting additions or changes to the strategies that are implemented. The evaluation of monitoring results occurs at two levels:

(1) comparison to receiving water limitations and determination of the influence of municipal separate storm sewer system (MS4) (storm drain system) discharges to any persistent exceedances, and
(2) comparison of dry and wet weather storm drain system discharge data to non-stormwater action levels (NALs) and stormwater action levels (SALs).

5.1.1.1 Receiving Water Limitations

The primary focus of this assessment is on conditions within receiving waters and their relationship to storm drain system discharges. An assessment methodology to determine whether discharges from the storm drain system are potentially sources of pollutants "causing or contributing" to "persistent" receiving water exceedances is currently being developed, and the results of the assessment will be presented in the San Diego River Watershed Management Area (WMA) chapter of the Regional Monitoring and Assessment Report (RMAR) to be submitted with the Report of Waste Discharge (ROWD) in December 2017. Therefore, this trigger for adaptive management pertaining to receiving water exceedances that may not be addressed by the WQIP will be addressed in the next report deliverable, prior to the 2016-2017 WQIP Annual Report.

5.1.1.2 Exceedances of NALs and/or SALs

The primary focus of this assessment is on exceedances of NALs or SALs in storm drain outfall discharges during dry and wet weather, respectively. NALs and SALs are incorporated into the WQIP in order to:

(1) support the development and prioritization of water quality improvement strategies,
(2) assess the effectiveness of the water quality improvement strategies, and
(3) support the detection and elimination of non-stormwater and illicit discharges to the storm drain system (NALs only).

Appendix 4 includes the results of the dry and wet weather storm drain outfall discharge monitoring programs and compares the data to applicable NALs or SALs included in Provision C of the Permit. A summary of these results is presented in Table A5-1, and the locations of the storm drain outfall dry weather monitoring locations (highest priority outfalls) and storm drain outfall wet weather monitoring locations are shown in Appendix 4 in Figures A4-3 and A4-8, respectively. Repeated exceedances for constituents that are not currently addressed by the WQIP may indicate that these constituents warrant further consideration. During the 2015-2016 monitoring year, the NALs most often exceeded in the San Diego River WMA were consistent with those identified by the WQIP as priority water quality conditions, with the exception of iron and manganese.

The comparison of the storm drain outfall monitoring results to NALs and SALs may also be used to guide the adaptation of strategies. If the jurisdictional strategies outlined in Section 4 result in reductions in pollutant loads from outfalls with discharges in exceedance of NALs or SALs, an assessment of the effectiveness of these strategies could be made. To date, only one year of monitoring data have been collected in accordance with the MAP, and the Participating Agencies in the San Diego River WMA have just begun to implement their jurisdictional strategies under the accepted WQIP intended to result in achievement of dry and wet weather interim goals for the term of the current Permit (see Section 4). Additional data will be necessary before an assessment of the effectiveness of these strategies can be made.

Table A5-1. Exceedances of NALs and SALs during the 2015-2016 Monitoring Year in the San Diego River WMA

Constituent	Outfalls with NAL Exceedances	Outfalls with SAL Exceedances[3]
Fecal Coliform[1]	MS4-SDR-064, MS4-SDR-127, MS4-SDR-151, MS4-SDR-207, OF-3, OF-5, OF-13, OF-15A, OF-16, OF-ALV-6, OF-ALV-9, OF-ALV-12, OF-ALV-13, E5g1, R20a, RCP1, S5c, S15h, DW0696, DW0681	OF-11, OF-ALV-11, DW0136, G30c, MS4-SDR-064
Enterococcus[1]	MS4-SDR-036, MS4-SDR-064, MS4-SDR-127, MS4-SDR-151, MS4-SDR-207, OF-3, OF-5, OF-13, OF-15A, OF-16, OF-ALV-6, OF-ALV-7, OF-ALV-9, OF-ALV-12, OF-ALV-13, E5g1, R20a, RCP1, S5c, S15h, DW0081, DW0369, DW0696, DW0681	OF-11, OF-ALV-11, DW0136, G30c, MS4-SDR-064
Turbidity[1,2]	MS4-SDR-036, MS4-SDR-151, OF-15A, OF-ALV-7, OF-ALV-12, OF-ALV-13, DW0067, DW0681	None
pH[1]	MS4-SDR-064, OF-13, OF-16, OF-ALV-7, DW0081	N/A
Cadmium[2]	N/A	None
Copper[1,2]	MS4-SDR-036, DW0067, DW0681	None
Chromium VI[1]	None	N/A
Lead[1,2]	None	None
Zinc[1,2]	MS4-SDR-036, DW0681	None
Dissolved Oxygen[1]	MS4-SDR-151, DW0696	N/A
Total Nitrogen[1]	MS4-SDR-036, MS4-SDR-064, MS4-SDR-127, MS4-SDR-151, MS4-SDR-207, OF-3, OF-5, OF-13, OF-15A, OF-16, OF-ALV-6, OF-ALV-7, OF-ALV-9, OF-ALV-12, OF-ALV-13, E5g1, R20a, RCP1, S5c, S15h, DW0067, DW0369, DW0696, DW0681	N/A
Total Phosphorus[1]	MS4-SDR-036, MS4-SDR-064, MS4-SDR-127, MS4-SDR-151, MS4-SDR-207, OF-3, OF-5, OF-15A, OF-16, OF-ALV-6, OF-ALV-7, OF-ALV-9, OF-ALV-12, OF-ALV-13, E5g1, R20a, RCP1, S5c, S15h, DW0067, DW0696, DW0681	N/A
MBAS[1]	MS4-SDR-036	N/A
Iron[1]	MS4-SDR-036, MS4-SDR-064, MS4-SDR-127, MS4-SDR-151, MS4-SDR-207, OF-5, OF-15A, OF-ALV-6, OF-ALV-7, OF-ALV-9, OF-ALV-12, OF-ALV-13, E5g1, S5c, S15h, DW0067, DW0696, DW0681	N/A
Manganese[1]	MS4-SDR-036, MS4-SDR-151, MS4-SDR-207, OF-5, OF-15A, OF-ALV-6, OF-ALV-7, OF-ALV-9, OF-ALV-12, OF-ALV-13, S5c, S15h, DW0067, DW0696, DW0681	N/A
Nitrate + Nitrite (total)[2]	N/A	None
Phosphorus (Total P)[2]	N/A	None

1. Applicable to non-stormwater discharges from MS4s to inland surface waters.
2. Applicable for discharges of stormwater from MS4s to receiving waters.
3. Exceeds Single Sample Maximum Final Effluent Limitations (Attachment E.6 of Permit for Bacteria TMDL).

5.1.1.3 Special Studies Results

As part of the MAP, the Participating Agencies are engaged in special studies related to bacteria, the highest priority water quality condition (HPWQC) for the watershed. Results from the special studies outlined in Section 3.3 and Appendix 4 Section 4.3 supplement the bacteria data collected under Provisions D.1 (receiving water) and D.2 (storm drain outfalls). As relevant data, conclusions, and lessons learned become available from these studies, the numeric goals, strategies, schedules, and the MAP may be impacted and may require modification. Additionally, lessons learned and study results from outside the watershed, especially those related to the bacteria impairments, may also be incorporated into the WQIP.

The Regional Reference Streams and Beaches Study provides a scientific basis for updating the “reference” conditions to be considered in evaluating compliance levels for bacteria, and will be useful in the re-evaluation of the Bacteria Total Maximum Daily Load (TMDL). The Wet Weather Epidemiology Study may facilitate consideration of site-specific water quality criteria for bacteria. Once these re-evaluations occur, adaptive management may be utilized to modify the WQIP.

5.1.2 Regulatory Considerations

The purpose of this section is to summarize changes in the regulatory landscape including:

(1) new regulatory actions at the State or local level, and

(2) Regional Board recommendations that must be considered as part of the adaptive management process.

5.1.2.1 New Regulatory Actions

When new regulations or policies are adopted that impact watershed planning and implementation processes, modifications to the WQIP numeric goals, strategies, schedules, and/or MAP may be warranted, and, in some cases, required. For example, an update to the WQIP must be initiated no later than six months following approval of a TMDL Basin Plan Amendment by the Office of Administrative Law and the United States Environmental Protection Agency (USEPA). The trigger applies to TMDLs containing wasteload allocations assigned to Participating Agencies within the watershed during the term of the Order (see Provision F.2.c.(2)). Other examples of regulatory drivers that may trigger modifications to the WQIP include new state policies or plans (e.g., trash, toxicity, biological objectives, bacteria standards updates) and changes resulting from modifications to existing Permit requirements (e.g., as a result of revising a TMDL).

5.1.2.2 Regional Board Recommendations

In cases where the Regional Board makes recommendations for modifications to the WQIP or Jurisdiction Runoff Management Program (JRMP), these recommendations must be considered as part of the adaptive management process. No such recommendations were made during the 2015-2016 monitoring year.

5.1.3 Program Effectiveness Assessments/Progress Toward Numeric Goals

Strategies developed within the WQIP have been incorporated into Participating Agencies' monitoring programs through implementation of their JRMPs. Each Participating Agency is implementing programs that are focused on addressing bacteria in the watershed. As strategy implementation progresses, periodic refinements to the programs may provide additional focus on the specific water quality issues identified in the WQIP. Participating Agencies utilize various assessment methods to determine which program refinements are effective and which are not. In some cases, the program effectiveness assessment results may provide useful information leading to adaption of elements of the WQIP. Where new information is applicable and available, it may be used to modify numeric goals, strategies, schedules, and the MAP.

At this time, only one year of data have been collected in accordance with the MAP and the Participating Agencies have been implementing their jurisdictional strategies under the WQIP, accepted in February 2016, for less than a year. Initial results related to program effectiveness (Section 4.2) indicate that the Participating Agencies have made progress towards meeting their dry and wet weather interim goals for the current Permit term. In most cases they are on track to meet the identified goals during the Permit term and, in some cases, these goals have already been met. Additional data from subsequent monitoring years will be necessary to supplement this data before evaluations leading to adaptive management actions are feasible and modifications to strategies considered.

5.2 ADAPTIVE MANAGEMENT - CHANGES TO WATER QUALITY IMPROVEMENT PLAN ELEMENTS

The potential triggers that may result in adaptive management of the San Diego River WMA WQIP's numeric goals, strategies, schedules, and/or MAP are outlined in Section 5.1. In general, priority and highest priority water quality conditions and numeric goals are established based on longer periods of record compared to a monitoring year and their assessment would most appropriately be conducted following the collection of sufficient data to make scientifically-based decisions. At earliest, such consideration may be given during the preparation of the ROWD, which is due to the Regional Board in December 2017.

The 2015-2016 monitoring year was the first under the accepted WQIP and MAP. Receiving water and storm drain outfall discharge monitoring results indicated that no modifications to the priority and highest priority water quality conditions identified by the WQIP are necessary at this time.

On an annual schedule, it is more likely that modifications may be made to strategies and implementation schedules. These are elements that may require updates on a more frequent basis to ensure effective implementation and assessment as the WQIP progresses. The information that may be used to modify these elements of the WQIP through adaptive management is summarized in Table A5-2. While one year of monitoring data have been collected in accordance with the MAP of the WQIP, only a few months of this time period have been under the accepted WQIP and implementation. The Participating Agencies in the San Diego River WMA began planning and implementing their jurisdictional strategies intended to result in achievement of dry and wet weather interim goals for the term of the current Permit. Sufficient information is not yet available to warrant adaptive management of the water quality strategies and schedules.

Collection of additional data will be necessary to supplement this data before the combined data set can be evaluated and adaptive management considered. Minor administrative changes, including clarifications, correction of typos and errors, and edits to WQIP strategies, are proposed, primarily by the City of San Diego. These modifications are identified as markup to the Participating Agencies' tables in Appendix 2, and the rationale for the each change is also provided in the tables.

Table A5-2. Information Used to Modify Strategies and Schedules

Evidence	WQIP AR Sections	2015-2016 Status	Adaptive Management Required after 2015-2016? (Y/N)
Receiving water monitoring results.	Section 3, Appendix 4	No new information pertaining to receiving water exceedances not addressed by the WQIP.	N
Storm drain outfall monitoring results.	Section 3, Appendix 4	NAL and SAL exceedances are consistent with WMA priority constituents.	N
Special studies results.	Section 3, Appendix 4	Data from these studies will be useful for the re-evaluation of the Bacteria TMDL and to facilitate consideration of site-specific water quality criteria for bacteria.	N
New or updated regulations.	Section 5	No new regulatory drivers; adaptive management will be required as new TMDLs are approved and as the Trash Amendments are incorporated into the Permit.	N
Program effectiveness assessments.	Section 5	Additional data will be necessary to supplement 2015-2016 data before program effectiveness can be evaluated.	N
Progress towards achieving numeric goals.	Section 4	Initial results related to program effectiveness indicate that the Participating Agencies have made progress towards meeting each of their dry and wet weather interim goals for the current Permit term.	N

In addition to the strategies and schedules, it is also feasible that updates to the MAP may be necessary more often than priority water quality conditions and numeric goals and schedules. Changes to the MAP may be triggered by several factors including:

- Modifications to other elements of the WQIP, including priority water quality conditions, numeric goals and schedules, and/or strategies and schedules.
- Identification of data gap through the required assessments under Provision D.4.
- Results of special studies.
- Requests/requirements from the Regional Board.

None of these triggers are applicable to the 2015-2016 monitoring year, and adaptive management of the MAP is not required at this time. Additional assessments are planned for the ROWD, including evaluation monitoring data and receiving water limitations.

San Dieguito River Watershed Management Area Water Quality Improvement Plan Annual Report

Submitted to the San Diego Regional Water Quality Control Board by:

January 2017

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.

amec foster wheeler

With:

TETRA TECH

DMAX

MOE

Executive Summary

The Water Quality Improvement Plan (WQIP) provides a comprehensive watershed-based program to improve surface water quality in the San Dieguito River Watershed Management Area (WMA), in receiving waters in the San Dieguito River, and at nearby beaches. The Responsible Agencies tasked with implementing the WQIP in the San Dieguito River WMA are the City of Del Mar, the City of Escondido, the City of Poway, the City of San Diego, the City of Solana Beach, and the County of San Diego.

The San Dieguito River WMA encompasses almost 346 square miles of urban land and undeveloped open space extending from the San Dieguito Lagoon in the west to the Volcan Mountains in the east. The WMA includes Del Mar, Solana Beach, Fairbanks Ranch, Rancho Peñasquitos, Rancho Bernardo, Del Dios, Poway, San Pasqual, Ramona, and Santa Ysabel. Small creeks drain downstream into the San Dieguito River, then into the San Dieguito Lagoon, and finally into the Pacific Ocean.

This Annual Report provides an update on monitoring and assessment completed during the previous reporting period and highlights the strategies implemented and progress toward meeting goals set for the highest priorities. Significant progress has been made in obtaining WQIP goals. The permit term performance based goals have been achieved for dry weather flow reduction by the City of Del Mar and City of San Diego. The County of San Diego has establised a baseline flow for persistently flowing major outfalls. Best management practices (BMPs) have been installed and maintained in the City of Escondido, City of San Diego, City of Solana Beach, and County of San Diego, reducing or preventing pollutants from entering receiving waters.

Water Quality Improvement Plan Process

The WQIP identifies goals and strategies to improve in the quality of urban runoff waters. These improvements to water quality are achieved through the consistent process of evaluation, goal setting, and monitoring and reporting, according to the following process:

1. Priority and Highest Water Quality Conditions → 2. Sources → 3. Goals, Strategies, & Schedules → 4. Monitoring & Assessment → 5. Adaptive Management Process → 6. Annual Reporting

With these distinct steps, the WQIP provides a long-term program to measurably improve overall water quality within the San Dieguito River WMA. This Annual Report implements Step (6) of the WQIP Process.

Highest Priority Water Quality Conditions

The WQIP identifies the following conditions/pollutants as highest priorities within the San Dieguito River WMA:

- Indicator bacteria along the Pacific Ocean at the San Dieguito Lagoon Mouth from areas above Lake Hodges when rainfall causes the Lake Hodges dam to overflow.
- Indicator bacteria along the Pacific Ocean at the San Dieguito Lagoon Mouth as measured during both wet and dry weather.

Monitoring and Assessment

The WQIP Monitoring and Assessment Program plays a key role in the Municipal Separate Storm Sewer System (MS4) Permit's new focus on the outcomes of WQIP program implementation to achieve water quality improvement. The long-term receiving water monitoring and MS4 monitoring program provides information on a wide variety of water quality conditions, including the highest priority water quality condition (HPWQC) and the other WMA priority water quality conditions (PWQCs).

Receiving waters were last monitored at the long-term monitoring stations during the October 1, 2014, through September 30, 2015, monitoring year. These historical mass loading stations have been monitored since 2001. This data was present in previous monitoring reports. The Responsible Agencies implemented receiving water monitoring in support of the Bacteria Total Maximum Daily Load (TMDL) at the Pacific Shoreline. Details are provided in Appendix C and highlights are summarized below.

- During wet weather, the receiving waters at the San Dieguito Lagoon Mouth achieved 0 percent (%) single-sample maximum exceedance frequencies for total coliform and fecal coliform. The single-sample maximum for *Enterococcus* was 13.6%. EH-380 is in compliance with interim and final wet weather single-sample maximum receiving water limitations (RWLs) for all three compliance constituents.
- During the wet season, which evaluates a combination of both wet and dry weather samples, EH-380 achieved a 0% geometric mean exceedance frequency for all compliance constituents and is in compliance with interim and final dry weather geometric mean RWLs.
- During the dry season, when recreational activities occur with more regularity, EH-380 achieved a 0% exceedance frequency for all three compliance constituents, and is in compliance with interim and final dry weather geometric mean RWLs.

The MS4 outfall monitoring program provides information on the estimated amount of pollutants coming from monitored MS4 outfalls. Details of this monitoring program are in Appendix C. The results for samples collected during the October 1, 2015, through September 30, 2016, monitoring year were compared with non-storm water action levels and storm water action levels. In dry weather, the non-storm water action levels were met over 75% of the time for multiple consituents. In wet weather, the storm water action levels were met over 90% of the time for all consituents except total copper, nitrate + nitrite, and bacteria indicators. The Responsbile Agencies plan to continue implementing the WQIP strategies without modification to realize the rewards of these pollutant reduction benefits and will work toward meeting the goals related to the HPWQC.

The Illicit Discharge Dectection and Elmination (IDDE) Program found non-storm water discharges and worked to eliminate them throughout the WMA. This program helps with dry weather runoff reductions and is one mechanism to achieve some of the fiscal year (FY) 18 performance-based goals. Table ES-1 provides more information about the implementation of the IDDE program throughout the WMA.

Table ES-1
IDDE Program Summary in the San Dieguito River WMA

IDDE Program Action	Total Number in WMA
Non-storm water discharges or illicit discharges investigated	341
Sources of non-storm water identified	273
Non-storm water discharges eliminated	261
Sources of illicit discharges or connection identified	231
Illicit discharges or connections eliminated	220
Number of enforcement actions	195[1]

1. The number of enforcement actions issued does not equal the number of identified illicit discharges or connections because some discharge complaints in the last quarter of FY 16 were still under investigation at the end of FY 16.
IDDE = illicit discharge detection and elimination; WMA = Watershed Management Area

In addition to monitoring in the receiving waters and the MS4, the Responsible Agencies conducted special studies. The San Diego Regional Reference Streams and Beaches Study is complete and provided valuable information for the Bacteria TMDL[1] Reopener. The San Dieguito River WMA Bacteria Source Identification and Prioritization Special Study assessed sources of bacteria in selected focus areas using the San Diego Bacteria Source Identification and Prioritization Process developed in 2012 as part of the MS4 Permit Report of Waste Discharge process. It provides a framework for the Responsible Agencies to review bacteria sources at MS4 outfalls where water quality-based effluent limit (WQBEL) exceedances occur without implementing costly source identification studies. The study has provided the Responsible Agency a detailed list of sources to investigate if further exceedances are found at the focus area outfalls. Details on the special study assessments are provided in Appendix C.

Strategies

Strategies implemented throughout the WMA deliver proven benefits for addressing multiple pollutants by eliminating sources or treating pollutants already found in urban

[1] *Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001.

runoff. Responsible Agencies sponsor stream and beach cleanups, provide turf conversion rebates, and work with the public to educate them on the impacts of their actions on the environment. Many of these actions are above and beyond the requirements of the Jurisdictional Runoff Management Program (JRMP) strategies. Figure ES-1 provides a snapshot of the actions that the Responsible Agencies have taken during the previous monitoring year.

Public Outreach and Source Control

- Provide turf conversion rebates
- Engage in enforcement actions for over-irrigation
- Sponsor beach and river cleanup events

Municipal Control Activities

- Sweep streets using new technologies and on a more frequent basis
- Clean debris out of catch basins
- Build and maintain structural best management practices (BMPs)

Figure ES-1
San Dieguito River WMA Strategy Overview

Hodges Reservoir Nutrient Source Study

In FY 16, the Responsible Agencies completed the Hodges Reservoir Nutrients Evaluation Technical Memorandum, which analyzed available receiving water and MS4 data collected. In addition, the San Dieguito River WMA Responsible Agencies are currently coordinating with the City of San Diego's Public Utilities Department to develop a study plan and associated monitoring plans for the Hodges Reservoir Nutrient Source Study. The goal of this study is to characterize all the sources of nutrients in the Hodges Reservoir and watershed draining to the Hodges Reservoir, including development of a comprehensive conceptual model to guide any future monitoring efforts to fill known data gaps.

Progress Toward Meeting Goals

To measure progress toward achieving their goals and addressing the HPWQC, the San Dieguito River WMA Responsible Agencies developed numeric goals and schedules. Numeric goals may take a variety of forms, but all forms can quantify a benefit to water quality so that progress toward and achievement of the goals are measurable. During this MS4 Permit term, the Responsible Agencies have defined goals based on actions they are taking to improve water quality in the WMA. Many of the goals are on track or have been met. Table ES-2 summarizes the progress of Responsible Agencies toward meeting their goals during the previous year.

Table ES-2
San Dieguito River WMA Progress Toward Performance-Based Goals (FY 16)

Responsible Agency	Weather (Dry/Wet)	FY 18 Goal	Progress
City of Del Mar	Dry	10% reduction of anthropogenic surface dry weather flows that originate within Del Mar's jurisdictional boundaries	Achieved to Date
City of Escondido	Wet	4 acres of drainage area treated through restoration of 1 sediment detention basin in a multiuse treatment area at Eagle Scout (formerly Sand) Lake, Kit Carson Park	Achieved
	Dry	10% anthropogenic dry weather flow reduction at one priority outfall (HDG_102)	In Progress
City of Poway	Dry	5% increase from the baseline through turf conversion	In Progress
City of San Diego	Dry and Wet	10.6 acres of drainage area treated through construction of 2 green infrastructure BMPs	In Progress
	Dry	10% reduction in prohibited dry weather flow from baseline measured at persistently flowing outfalls in the WMA	Achieved to Date
City of Solana Beach	Dry and Wet	40.5 acres of low flows directed to the sanitary sewer through construction of one diverter at high priority outfall Seascape Sur	Achieved
	Dry and Wet	8 acres of drainage area treated through curb cuts along Highway 101	Achieved
County of San Diego	Wet	1% bacteria load reduction from the MS4	In Progress
	Dry	20% reduction anthropogenic dry weather flows	In progress

% = percent; BMP = best management practice; FY = fiscal year; MS4 = municipal separate storm sewer system; WMA = Watershed Management Area

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APPENDIX E	Adaptive Management/Modifications

Acronyms and Abbreviations

Acronym or Abbreviation	Definition
%	percent
AB 411	California Assembly Bill 411, the Beach Safety Act
AEP	California Association of Environmental Professionals
Bacteria TMDL	*Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001
BMP	best management practice
Caltrans	California Department of Transportation
CCTV	closed-circuit television
CEQA	California Environmental Quality Act
Copermittee	Operator of a municipal separate storm sewer system in San Diego County that is party to the MS4 Permit
DPW	Department of Public Works
FY	fiscal year
HMP	Hydromodification Management Plan
HPWQC	highest priority water quality condition
IDDE	illicit discharge detection and elimination
IPM	integrated pest management
IRWM	Integrated Regional Water Management
JRMP	Jurisdictional Runoff Management Program
LID	low-impact development
MPN	most probable number
MS4	Municipal Separate Storm Sewer System
MS4 Permit	San Diego Regional Water Quality Control Board Order No. R9-2013-0001 (amended by Order No. R9-2015-0001 and by Order No. R9-2015-0100), National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems Draining the Watersheds Within the San Diego Region
MWD	Metropolitan Water District

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
NA	not applicable
NPDES	National Pollutant Discharge Elimination System
PDP	priority development project
PGA	pollutant-generating activity
PWQC	priority water quality condition
QAPP	Quality Assurance Project Plan
REC-1	water contact recreation beneficial use
Regional Board	San Diego Regional Water Quality Control Board
Responsible Agency	Responsible Agencies include parties subject to the Bacteria TMDL and participating in the Water Quality Improvement Plan, specifically the Copermittees in the San Dieguito River WMA
RWL	receiving water limitation
SCCWRP	Southern California Coastal Water Research Project
SOP	standard operating procedure
SUSMP	Standard Urban Storm Water Mitigation Plan
TCBMP	treatment control best management practices
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
WDR	Waste Discharge Requirement
WMA	Watershed Management Area
WMAA	Watershed Management Area Analysis
WQBEL	water quality-based effluent limit
WQIP	Water Quality Improvement Plan
WQO	water quality objective

1 Introduction

The San Diego Regional Water Quality Control Board (Regional Board) regulates discharges from municipal separate storm sewer systems (MS4s) in the San Diego Region *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region* (MS4 Permit) under Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100. The MS4 Permit covers portions of San Diego County, southern Orange County, and southwestern Riverside County and regulates Phase I municipalities that own and operate MS4s (i.e., storm drain systems) that discharge storm water (wet weather) runoff and non-storm water (dry weather) runoff to surface waters throughout the San Diego region.

Under the MS4 Permit, the San Diego region is subdivided into 10 watershed management areas (WMAs), which cover the major, natural drainages in the region. The MS4 Permit requires a Water Quality Improvement Plan (WQIP) to be developed for each WMA (San Dieguito River WMA Responsible Agencies, 2015). The San Diego County Copermittees are listed in Table 1a of the MS4 Permit and the Copermittees with jurisdictional areas within the San Dieguito River WMA are as follows:

- City of Del Mar
- City of Escondido
- City of Poway
- City of San Diego
- City of Solana Beach
- County of San Diego

Each Copermittee, referred to as a Responsible Agency in the WQIP, must comply with the MS4 discharge prohibitions and receiving water limitations outlined in the MS4 Permit through timely implementation of control measures, other actions specified in the MS4 Permit, and adherence to the WQIP.

The goal of the WQIP is to guide the Responsible Agencies to implement their individual jurisdictional programs, known as Jurisdictional Runoff Management Programs (JRMPs), toward an outcome-based approach and to improve water quality. To accomplish this goal, an adaptive planning and management process is used to identify the highest priority water quality condition(s) (HPWQC) within the WMA. Responsible Agencies will also implement strategies through the WQIP and JRMPs to achieve improvements in the quality of discharges from storm drain systems to the receiving waters such as creeks, rivers, and beaches. The final WQIP for the San Dieguito River WMA can be found on the Project Clean Water website (www.projectcleanwater.org).

The MS4 Permit also requires the Responsible Agencies within each WMA to submit an Annual Report to demonstrate progress toward implementing the WQIPs and corresponding JRMPs. The Annual Report covers two different reporting periods. The first reporting period is from July 1, 2015, through June 30, 2016, for the JRMPs and WQIP strategy implementation. The second reporting period is from October 1, 2015, through September 30, 2016, for monitoring and assessment programs. Progress toward goals may be assessed in either reporting period, depending on the goal metric. This Annual Report addresses the requirements in Provision F.3.b.(3) and other provisions of the MS4 Permit.

Table 1-1 provides an overview of the MS4 Permit requirements that must be addressed and where they are addressed within the Annual Report. Appendix A provides additional details regarding the specific MS4 Permit requirements and where they are addressed within the Annual Report.

Table 1-1
MS4 Permit WQIP Annual Reporting Provisions and Corresponding Annual Report Sections[1]

MS4 Permit Provision[2]	WQIP Annual Report Section						WQIP Appendix			
	Section 1: Introduction	Section 2: WMA Priorities & Goals	Section 3: Monitoring	Section 4 : Achieving Goals	Section 5: Adaptive Management	Section 6: Conclusions	Appendix B – Goals	Appendix C – Monitoring	Appendix D – Jurisdictional Specific Information	Appendix E – Adaptive Management
Provision A – Prohibitions and Limitations										
A.4.a.(2)			X		X			X	X	X
Provision B – Water Quality Improvement Plans										
B.5.a.					X			X		X
B.5.b.			X	X	X		X	X	X	X
B.5.c.					X					X
Provision D – Monitoring and Assessment Program Requirements										
D.1.e.(2)(c)			X					X		
D.2.b.(iv)			X					X		
D.4.b.(1)(a)(ii)			X					X		
D.4.b.(1)(b)			X		X			X		X
D.4.b.(1)(c)			X		X			X		X
D.4.b.(2)(a)					X			X		X
D.4.b.(2)(b)			X		X			X		X

Table 1-1 (continued)
MS4 Permit WQIP Annual Reporting Provisions and Corresponding Annual Report Sections[1]

MS4 Permit Provision[2]	WQIP Annual Report Section						WQIP Appendix			
	Section 1: Introduction	Section 2: WMA Priorities & Goals	Section 3: Monitoring	Section 4 : Achieving Goals	Section 5: Adaptive Management	Section 6: Conclusions	Appendix B – Goals	Appendix C – Monitoring	Appendix D – Jurisdictional Specific Information	Appendix E – Adaptive Management
D.4.b.(2)(c)			X		X			X		X
D.4.c.			X					X		
D.4.d.					X					X
D.4.d.(1)					X					X
D.4.d.(2)					X					X
D.4.d.(3)					X					X
Provision E – Jurisdictional Runoff Management Programs										
E.1.b.									X	
E.2.d.(4)			X					X		
E.8.c.	X								X	
Provision F – Reporting										
F.1.b.(6)					X					X
F.2.a.(2)					X					X
F.2.a.(3)					X					X
F.2.b.(1)					X				X	
F.2.b.(2)					X				X	
F.2.c.(1)(c)					X					X
F.3.b.(3)(a-f)	X		X	X	X			X	X	X
F.6						X		X		
Attachment E – Specific Provisions for Total Maximum Daily Loads Applicable to Order No. R9-2013-0001										
Attachment E			X	X				X		

1. Appendix A provides additional details regarding the specific MS4 Permit requirements and where they are addressed within the Annual Report.
2. Some MS4 Permit Provisions are addressed in JRMPs.

WQIP = Water Quality Improvement Plan; WMA = watershed management area; MS4 = municipal separate storm sewer system

The San Dieguito River WMA WQIP Annual Report for 2015–2016 is structured as follows:

Section 1, Introduction – This section provides an overview of the MS4 Permit, the WQIP, and the Annual Reporting requirements. Includes references to Appendix A:

Appendix A. Crosswalk of Permit Requirements and Annual Report References

Section 2, Overview of San Dieguito River Watershed Management Area – This section introduces the watershed management area, the priority water quality conditions (PWQCs) and the HPWQCs of the watershed. The numeric goals and schedules developed to measure progress toward addressing the HPWQCs are presented. Includes references to Appendix B:

Appendix B. Water Quality Improvement Plan Numeric Goals

Section 3, Monitoring and Assessment – This section summarizes the monitoring programs and provides an assessment of the data collected relative to this HPWQC. Includes references to Appendix C:

Appendix C. Monitoring Results and Assessments

Section 4, Implementation and Progress Toward Achieving Numeric Goals – The section discusses the assessment of the progress toward meeting the numeric goals, with a focus on those numeric goals occurring during the MS4 Permit term. The section also provides an overview of the strategies implemented to meet the numeric goals, the status of implementation, and plans for the coming year. Includes references to Appendix D:

Appendix D. Jurisdictional Runoff Management Program Annual Report Forms, Fiscal Analysis, Updated BMP Manuals, and Jurisdictional Strategies

Section 5, Adaptive Management – This section summarizes the elements of the WQIP's process, which can be changed during the course of MS4 Permit implementation based on monitoring results and new information gathered during the reporting period. Includes references to Appendix E:

Appendix E. Adaptive Management/Modifications

Section 6, Conclusions and Recommendations – This section provides the conclusions and recommendations that are based on the data collected and assessments conducted during implementation of the WQIP in fiscal year (FY) 2015–2016 (FY 16).

Section 7, References – This section lists the sources used to prepare this Annual Report.

2 Overview of San Dieguito River Watershed Management Area

The San Dieguito River WMA drains a 346-square-mile area in central San Diego County. The headwaters of the San Dieguito River WMA are located at the easternmost extent of the WMA, in the Volcan Mountains, and drain to the Pacific Ocean near Del Mar at its western end. Six jurisdictions and Caltrans are located in the San Dieguito River WMA. The amount of land within each jurisdiction is described in Table 2-1 and shown in Figure 2-1. The California Department of Transportation (Caltrans), along with other non-Phase 1 MS4s dischargers, is regulated under separate permits. However, the Responsible Agencies are responsible for discharges originating from these lands outside of their regulatory control if these discharges enter the MS4 of the particular Responsible Agency. The Responsible Agencies look to collaborate and improve communication with non-municipal sources and the appropriate regulatory agencies to ensure that these discharges are regulated before they enter the Responsible Agencies' MS4s.

Table 2-1
Land Area for the San Dieguito River WMA

Responsible Agency	Land Area (Acres)	Percent (%) of Total
San Diego County	176,644	80.3%
City of San Diego	27,345	12.4%
City of Poway	9,011	4.1%
City of Escondido	4,362	2.0%
City of Solana Beach	1,597	0.7%
City of Del Mar	990	0.5%

For the WQIP, the San Dieguito River WMA was divided into three subwatersheds to focus on different (or several) receiving waters when identifying PWQCs and developing the JRMPs. These subwatersheds include the area below Lake Hodges, the area between Lake Hodges and Sutherland Reservoir, and the area above Sutherland Reservoir.

The subwatershed below Lake Hodges is located southwest of Lake Hodges and drains into the San Dieguito Lagoon, which ultimately discharges into the Pacific Ocean. The subwatershed above Lake Hodges contains Lake Hodges, and extends eastward to Sutherland Reservoir. The subwatershed above Sutherland Reservoir is drained by Santa Ysabel Creek, which feeds into the Sutherland Reservoir.

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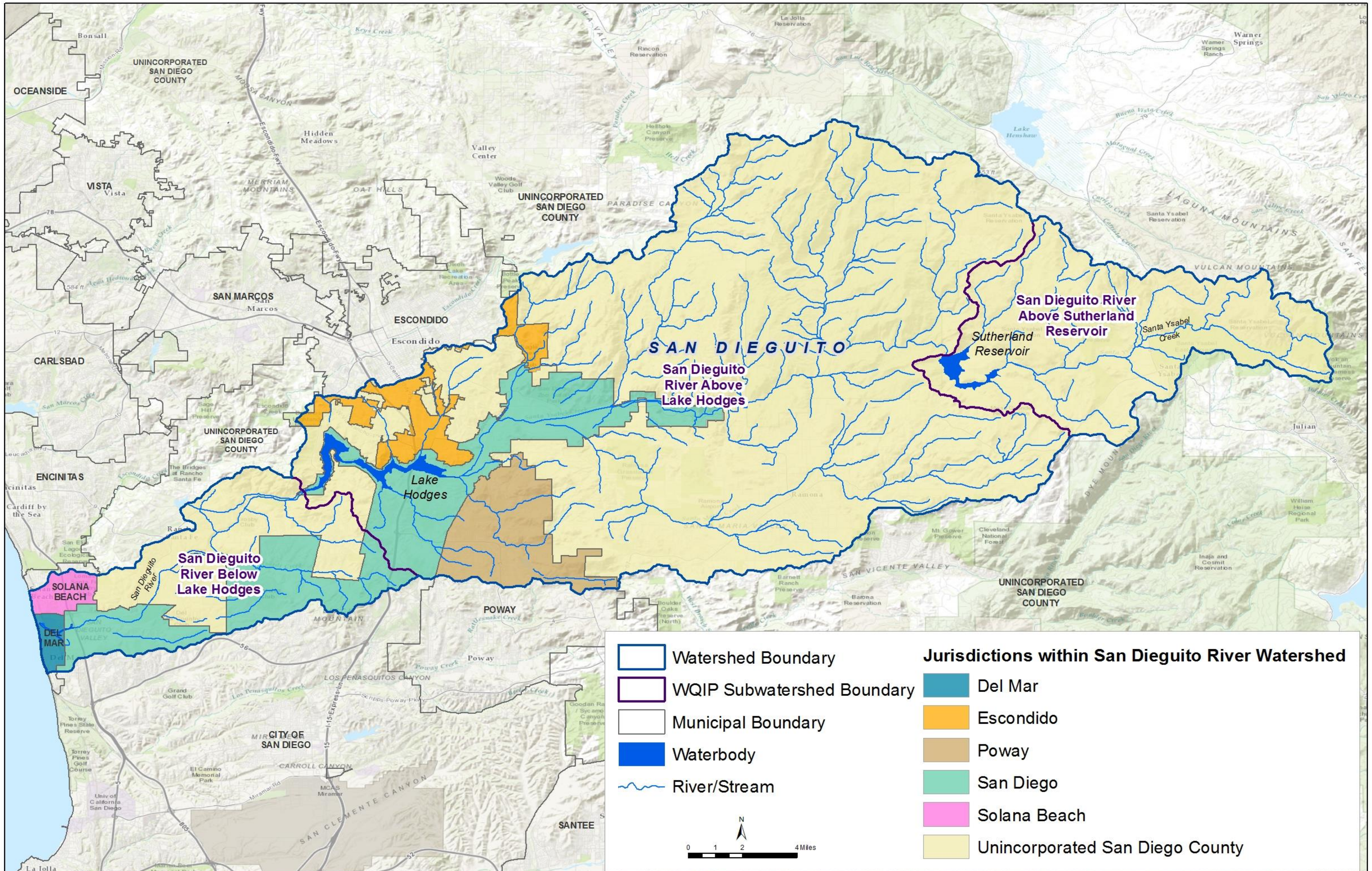

Figure 2-1
San Dieguito River WMA
Subwatersheds

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2.1 San Dieguito River WMA WQIP

The overarching goal of the San Dieguito River WMA WQIP is to further the Clean Water Act's objective to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the state. This goal will be accomplished through a planning and adaptive management process that identifies the PWQCs and HPWQCs. The San Dieguito River WMA WQIP identifies strategies (implemented through JRMPs to address priority water quality conditions in the WMA with a particular focus on the HPWQC to achieve measurable numeric goals and to improve the quality of MS4 discharges and, in turn, the receiving waters. The San Dieguito River WMA WQIP outlines how the Responsible Agencies are evaluating water quality conditions, prioritizing those water quality conditions, and using these common priorities to guide jurisdictional and watershed-scale programs to address the HPWQC.

2.2 Priority and Highest Priority Water Quality Conditions

The WQIP identifies the PWQCs on the basis of an assessment of receiving water conditions, MS4 discharges and their potential impacts, and the sources of pollutants in the watershed. The PWQCs for the San Dieguito River WMA are detailed in Appendices A and F of the WQIP, and are summarized by the beneficial use and pollutant category in Figure 2-2.

The HPWQC is the foundation for establishing the WQIP numeric goals and schedules and selecting water quality improvement strategies to achieve the necessary improvements in the quality of MS4 discharges and/or receiving waters. Table 2-2 details the following conditions/pollutants as highest priorities within the San Dieguito River WMA. The HPWQC is highlighted in bold in Figure 2-2.

Table 2-2
Highest Priority Water Quality Condition in the San Dieguito River WMA

Highest Priority Water Quality Condition	Potential Stressor	Temporal Extent		Subwatershed
		Dry	Wet	
Potential impairment of water contact recreation beneficial use (REC-1) at Pacific Ocean Shoreline	Indicator bacteria	–	✓	San Dieguito River Above Lake Hodges
Potential impairment of REC-1 at Pacific Ocean Shoreline	Indicator bacteria	✓	✓	San Dieguito River Below Lake Hodges

REC-1 = water contact recreation beneficial use

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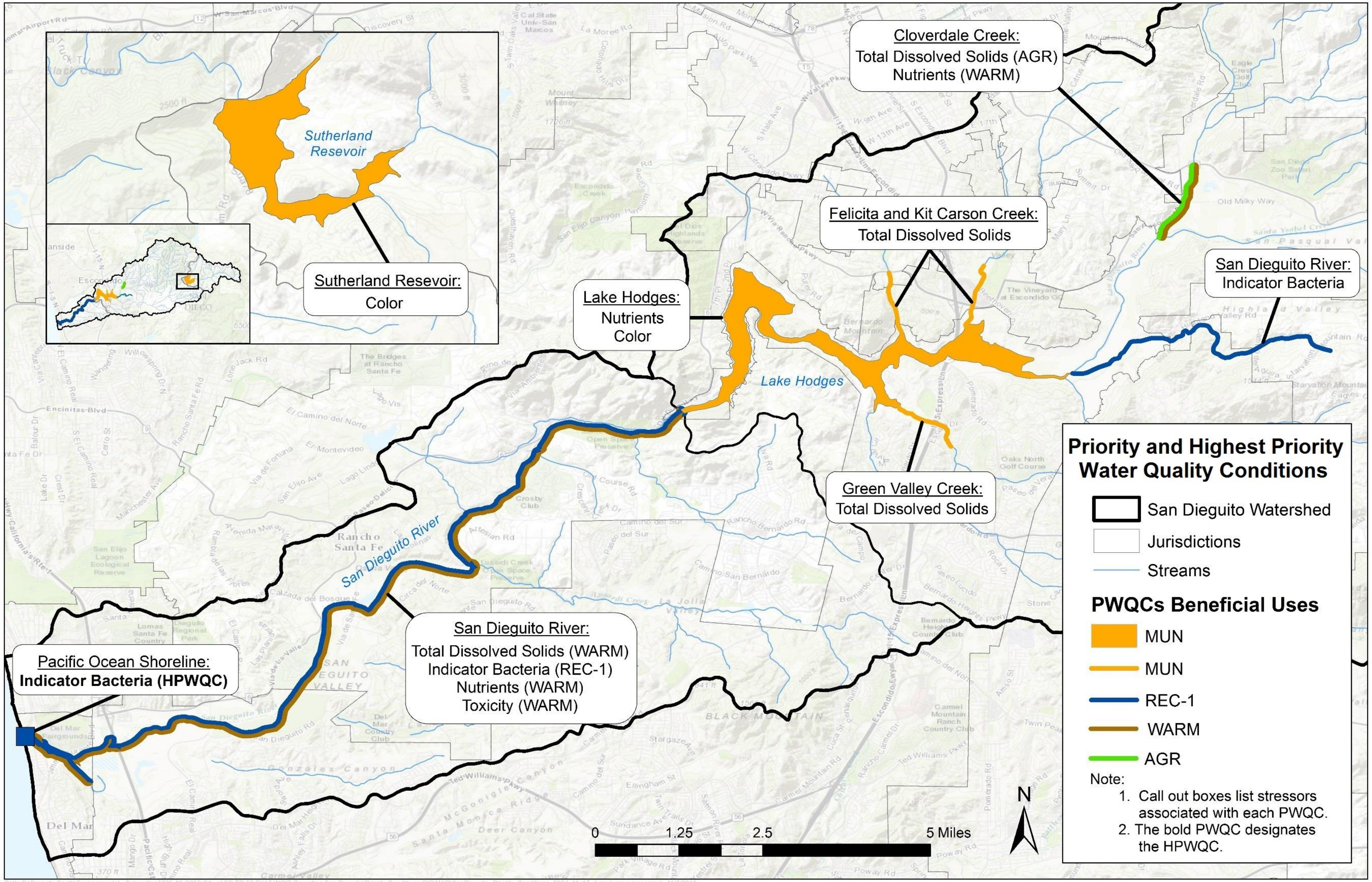

Figure 2-2
San Dieguito River WMA
Priority and Highest Priority Water Quality Conditions

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2.3 WQIP Numeric Goals

In the WQIP, the Responsible Agencies identified and developed specific water quality improvement numeric goals and strategies to address the HPWQC identified within the WMA. The numeric goals (interim and final) and corresponding schedules support implementation of the WQIP and measure reasonable progress toward addressing the HPWQC. In addition, the Responsible Agencies' monitoring and assessment programs measure progress toward attaining these goals. The numeric goals for the San Dieguito River WMA are presented in detail by jurisdiction in Appendix B.

The numeric goals for the San Dieguito River WMA are presented in detail by jurisdiction in Appendix B.

The goals extend beyond the timeframe of the current MS4 Permit. For this reason, the numeric goals within the WQIP are categorized into three distinct time periods:

1. Interim goals within the five-year MS4 Permit term. These goals are typically specific to each Responsible Agency's jurisdiction.
2. Interim goals based on the interim Bacteria TMDL compliance pathways.
3. Final goals based on final Bacteria TMDL compliance options.

The timeline for the San Dieguito River WMA bacteria numeric goals is illustrated in Figure 2-3.

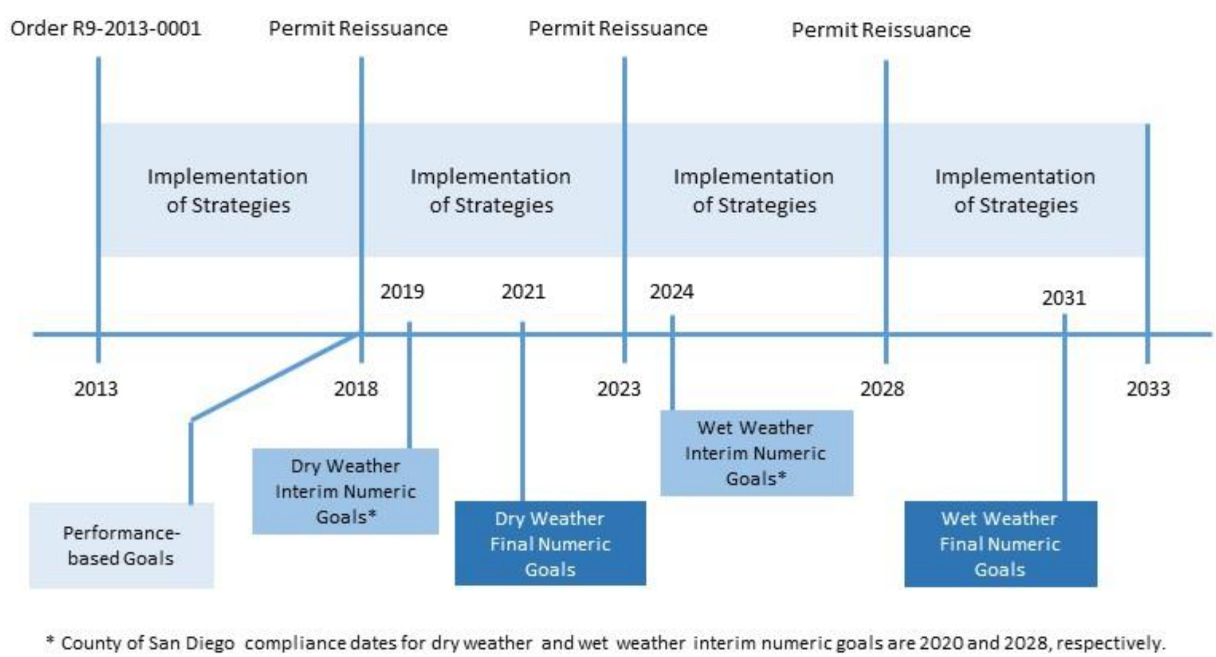

Figure 2-3
Timelines and Relationships for Bacteria TMDL Numeric Goals

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3 Monitoring and Assessment

The Pacific Shoreline near the San Dieguito Lagoon mouth is a stretch of beach in San Diego County that is a popular recreation destination for residents. The HPWQC at this beach is water contact recreation beneficial use (REC-1) related to the bacteria indicators measured during both dry and wet weather. This section discusses the monitoring related to maintaining contact recreation uses at Pacific Ocean Shoreline near the San Dieguito Lagoon mouth. Monitoring related to the 2013–2018 MS4 Permit term and interim/final goals is detailed.

3.1 Monitoring Related to Performance Based Goals

The Responsible Agencies have established dry and wet weather interim goals for the 2013–2018 MS4 Permit term. Tables 3-1 and 3-2 summarize the data collected during the monitoring year, October 1, 2015, through September 31, 2016, to assess progress toward meeting FY 18 goals.

Table 3-1
Dry Weather Monitoring Related to Performance-Based Goals

Jurisdiction	Performance-Based Goal	Monitoring Element
City of Del Mar	Reduce by 10% anthropogenic surface dry weather flows[1] that originate within Del Mar's jurisdictional boundaries.	Collect flow measurements at selected MS4 outfalls. Sampling Days: 2 Field site visits: 15
City of Escondido	Reduce by 10% dry weather[1] flow in priority drainage area with persistent flow.	Collect flow measurements at a priority MS4 outfall (HDG_102). Sampling Days: 2 Implement month-long dry weather flow from 7/6/16 to 8/8/16 to establish baseline flow information.
City of Poway	Achieve a 5% increase in turf conversion from baseline.	Track the implementation of turf conversion, including turf conversion increase.
City of San Diego	Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality from 10.6 acres of drainage area.	Track the acres of drainage area treated by green infrastructure BMPs.
	Reduce by 10% the prohibited[2] dry weather flow from baseline measured at persistently flowing outfalls during dry weather.	Collect flow measurements at persistently flowing outfalls. Sampling Days:18

Table 3-1 (continued)
Dry Weather Monitoring Related to Performance-Based Goals

Jurisdiction	Performance-Based Goal	Monitoring Element
City of Solana Beach	Direct 40.5 acres of low flows to the sanitary sewer through construction of 1 diverter at high priority outfall Seascape Sur.	Detail the completion of the diverter, including acres treated.
	Design and construct curb cuts to treat 8 acres of drainage area along Highway 101.	Detail the completion of curb cuts, including acres treated.
County of San Diego	Reduce by 20% the aggregate dry weather flow[1] volume or the number of persistently flowing outfalls during dry weather.	Establish baseline: 1) Collect continuous flow data at 6 persistently flowing major outfall to determine baseline aggregate flow; 2) Identified total number of persistently flowing major outfalls.

1. The term "dry weather flows" excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.
2. Does not include allowable discharges as defined in Provision A and Provision E.2.a of the MS4 Permit.

% = percent; BMP = best management practice; MS4 = municipal separate storm sewer system

Table 3-2
Wet Weather Monitoring Related to Performance Based Goals

Jurisdiction[1]	Performance-Based Goal	Monitoring Element
City of Del Mar	Reduce by 10% anthropogenic surface dry weather flows[2] that originate within Del Mar's jurisdictional boundaries to address bacteria regrowth contributing during wet weather.	Collect flow measurements at selected MS4 outfalls during dry weather. Sampling Days: 2 Field site visits: 15
City of Escondido	Implement and maintain water quality improvement BMPs to target fecal coliform, *Enterococcus*, total coliform, sediment, and nutrients from 4 acres of drainage area.	Confirm the restoration of the BMP, including acres treated by multiuse treatment area.
City of San Diego	Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure 9 BMPs to improve water quality from 10.6 acres of drainage area.	Track the acres of drainage area treated by green infrastructure BMPs.
City of Solana Beach	Direct 40.5 acres of low flows to the sanitary sewer through construction of 1 diverter at high priority outfall Seascape Sur.	Detail the completion of the diverter, including acres treated.
	Design and construct curb cuts to treat 8 acres of drainage area along Highway 101.	Detail the completion of curb cuts, including acres treated.
County of San Diego	Reduce baseline bacteria loads from storm drain outfalls to receiving water by 1%.	Collect bacteria and flow data at MS4 outfalls as part of the wet weather MS4 outfall monitoring program.

1. City of Poway does not have a wet weather performance-based goal.
2. The term "dry weather flows" excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.

% = percent; BMP = best management practice; MS4 = municipal separate storm sewer system

3.2 Monitoring Related to Interm and Final Goals

The Responsible Agencies have initiated a Monitoring and Assessment Program, as outlined in Section 5 of the San Dieguito River WMA WQIP. The purpose of the program is to track progress toward meeting long-term WQIP goals. The program includes monitoring of receiving water and at MS4 outfalls. In addition, two designated special studies are to be completed. This section provides an overview of the monitoring conducted to track progress through this reporting period. The full details of the monitoring results are in Appendix C.

Bacteria Total Maximum Daily Load (TMDL) Compliance Monitoring Program

The Bacteria TMDL (Regional Board, 2010) Compliance Monitoring Program monitors bacteria indicators at the historical San Diego County AB 411 (California Assembly Bill [AB] 411) monitoring location at the mouth of San Dieguito Lagoon. The historical AB411 site is located 25 yards down-current of where ocean currents meet river discharge in ankle-to-knee-deep water. The current AB411 site is at the point where ocean currents meet river discharge in ankle-to-knee-deep water. Monitoring occurred as required during both dry and wet weather.

Wet weather monitoring was conducted at the monitoring location during three storm events during the wet season (October 1 through April 30). However, during the recreation season (April 1 through October 31), samples are collected at the monitoring location five times per month, as consistent with AB 411 requirements, and during dry periods of the wet season (November 1 through March 31) on a monthly basis per the Bacteria TMDL requirements. Dry weather samples were collected after an antecedent dry period of 72 hours with less than 0.1 inch of rainfall. Grab samples were collected in a manner consistent with requirements of the AB 411 program. All samples were analyzed for total coliform, fecal coliform, and *Enterococcus*.

Section 2.6 of Appendix C provides more information on the sampling performed in the 2015–2016 monitoring year and Attachment B of Appendix C provides the BacteriaTMDL Compliance Monitoring Report. The data collected as part of this program will be used to assess the receiving water compliance pathway in future years. A summary of the results from the 2015-2016 monitoring year includes the following:

- ❖ During wet weather, the receiving waters at the San Dieguito Lagoon Mouth achieved 0 percent (%) single-sample maximum exceedance frequencies for total coliform and fecal coliform. The single-sample maximum for *Enterococcus* was 13.6%. EH-380 is in compliance with interim and final wet weather single-sample maximum receiving water limitations (RWLs) for all three compliance constituents.
- ❖ During the wet season, which evaluates a combination of both wet and dry weather samples, EH-380 achieved a 0% geometric mean exceedance frequency for all compliance constituents and is in compliance with interim and final dry weather geometric mean RWLs.

- During the dry season, when recreational activities occur with more regularity, EH-380 achieved a 0% exceedance frequency for all three compliance constituents, and is in compliance with interim and final dry weather geometric mean RWLs.

San Dieguito River WMA MS4 Outfall Monitoring

The Responsible Agencies implemented the dry and wet weather MS4 outfall monitoring program, as detailed in Section 5 of the WQIP. The dry weather MS4 monitoring program is a combination of field screening and collection of samples at persistently flowing major outfalls. Field screening includes visual monitoring of all major MS4 outfalls to identify and eliminate sources of persistently flowing non-storm water discharges. This information is also used to track the progress of some of the 2018 MS4 Permit term goals.

Water quality sample collection provides information on the impact of MS4 outfalls on receiving water quality during dry weather. The goal of the wet weather MS4 monitoring program is to identify pollutants in storm water discharges from the MS4s and to guide pollutant source identification efforts by collecting paired water quality samples and flow data. Annually, the data from the dry weather program is compared with the non-storm water action levels, and data from the wet weather program is compared with the storm water action levels. In dry weather durign the monitoring year, the non-storm water action levels were met over 75% of the time for multiple consituents. In wet weather during the monitoring year, the storm water action levels were met over 90% of the time for all consituents except total copper, nitrate + nitrite, and bacteria indicators.The data collected as part of this program will be used to assess the MS4 outfall compliance pathway toward reaching interim and long-term goals in future years**.** Bacteria indicators are measured during both dry and wet weather MS4 analytical sampling events, and will be used to assess bacteria concentration loads discharging from the MS4 to receiving waters.

Table 3-3 summarizes the number of major outfalls for each Responsible Agency that were sampled during the 2015–2016 monitoring year along with the dates of the analytical monitoring. Sections 3 and 4 of Appendix C provide more information on dry and wet weather MS4 monitoring programs, respectively. Attachments C and D (Dry and Wet Weather Assessments) of Appendix C provide detailed calculations with regard to these monitoring programs. The data collected as part of this program will be used to assess MS4 compliance pathways in future years.

Table 3-3
Number of Major MS4 Outfalls Monitored During the 2015–2016 Monitoring Year

Jurisdiction	Number of Major Outfalls Visited Per Year				
	Field Screening[1]	Dry Weather Monitoring		Wet Weather Monitoring	
		Number of Sites[2]	Dates	Number of Sites[2]	Dates
City of Del Mar	6 (5)[3,4]	3	6/30/16 8/12/16	1	3/5/2016
City of Escondido	3 (3)[3]	1	4/20/2016 8/30/2016	1	3/5/2016
City of Poway	12 (15)[3]	1[5]	7/29//2016 8/2/2016	1	3/6/2016
City of San Diego	42 (42)[6]	5	2/16/2016 2/22/2016 4/5/2016 4/26/2016 6/10/2016	1	1/30/2016
City of Solana Beach	3 (3)[3]	1[7]	6/30/16 8/12/16	1	3/5/2016
County of San Diego	20 (20)[2]	5[8]	3/28/2016 – 4/21/2016 6/30/2016 - 7/7/2016	1	1/31/2016

1. Field screening represents the number of major MS4 outfalls visited in the 2015–2016 monitoring year. Total number of major outfalls within each jurisdiction in the WMA is provided in parentheses.
2. Number of sites represents the number of outfalls with priority persistent flows selected for dry weather water quality sampling.
3. For Responsible Agencies with fewer than 125 major outfalls in the WMA, 80% of major outfalls must be screened twice per year.
4. The City of Del Mar has identified five major outfalls and will also screen an additional non-major outfall.
5. The number of sites has been updated from two sites initially listed in the San Dieguito River WMA WQIP.
6. For Responsible Agencies with portions of their jurisdictions in more than one WMA and more than 500 major MS4 outfalls in their jurisdictions, at least 500 major outfalls must be inspected once per year.
7. City of Solana Beach has a low flow diverter at Fletcher Cove and Seascape Sur. Dry weather sampling is being carried out at Seascape Sur because there is discharge occurring between the diverter at the street and the outfall.
8. The number of sites has been updated from three sites initially listed in the San Dieguito River WMA WQIP.

In addition to the dry weather MS4 field screening and monitoring, the County of San Diego has also installed continuous flow monitoring equipment at four of the five of its highest priority major MS4 outfalls with persistent non-storm water flows and two additional major outfalls with persistent non-storm water flows. The equipment was installed during the dry season (May through September) to more closely monitor dry weather discharge rates from these outfalls for non-storm water flow rates and volumes and to potentially identify cyclical trends or increases in non-storm water flows. This information can be used to help San Diego County reduce or eliminate non-storm water flows to address its 2018 MS4 Permit term goal.

San Diego Regional Reference Streams and Beaches Study

The San Diego Regional Reference Streams and Beach Study (Southern California Coastal Water Research Project [SCCWRP], 2015 and SCCWRP, 2016) characterizes the natural background concentrations of bacteria from natural streams and beaches in a condition minimally disturbed by anthropogenic activities, referred to as a “reference” condition. These data are being used during the Bacteria TMDL Reopener to revisit the Bacteria TMDL numeric targets based on current data and United States Environmental Protection Agency (USEPA) policy, which may lead to revised terms of compliance. The Bacteria TMDL Reopener is in progress and is expected to be completed in 2017. Section 5.1 of Appendix C provides more information on these special studies.

San Dieguito River WMA Bacteria Source Identification and Prioritization Process Special Study

The San Dieguito River Responsible Agencies conducted a Bacteria Source Identification and Prioritization Special Study. This study assessed sources of bacteria in selected focus areas using the San Diego Bacteria Source Identification and Prioritization Process developed in 2012 as part of the MS4 Permit Report of Waste Discharge process. The focus area drainages were selected because of elevated *Enterococcus* concentrations and known dry weather flows. The focus areas also allowed participating Responsible Agencies to identify bacteria sources to target in their jurisdictions.

The study used geospatial data, water quality data, and the prioritization process to determine potential bacteria sources in selected focus areas. This process can serve as a framework for the Responsible Agencies to review bacteria sources at MS4 outfalls where water quality-based effluent limit (WQBEL) exceedances occur without implementing costly source identification studies. It may also lead potentially to modification or enhancement of WQIP strategies in these focus areas.

Each Responsible Agency now has a detailed list of sources to investigate if further exceedances are found at the focus area outfalls. Specific actions include continued frequent city-wide patrols within the City of Del Mar and assessment of data, including determination in whether specific focus areas will need to be established in the future. The City of Escondido will be filling an identified data gap and evaluating the top potential source in the jurisdiction’s focus area (septic tanks) to determine the number of registered septic tanks within city limits. The Responsible Agencies will continue to implement planned WQIP strategies in the focus area. Section 5.2 of Appendix C provides more information on this special study.

4 Implementation and Progress Toward Achieving Numeric Goals

The MS4 Permit requires the Responsible Agencies to develop specific water quality improvement numeric goals and strategies to address the HPWQC identified for the San Dieguito River WMA. Each year, the Responsible Agencies assess specific water quality data and programmatic information to gauge progress toward achieving the numeric goals. These assessments provide information to determine whether intended outcomes are being realized or whether adaptations of the programs are necessary. This section discusses the strategies that have been implemented during the reporting period and the progress toward achieving specific permit term goals for the watershed. Many of the selected strategies necessarily target the WMA HPWQC, but many address other pollutants as well, providing a multi-benefit approach to implementation.

4.1 Strategies and Schedules

The strategies being implemented by the Responsible Agencies are the activities that enable improvements in water quality to achieve the numeric goals outlined in Section 2. The success of the strategies will ultimately be measured against the WQIP interim and final numeric goals.

In general, all Responsible Agencies are collectively implementing both JRMP-required and optional nonstructural best management practices (BMPs) throughout the San Dieguito River WMA to achieve dry and wet weather load reduction goals. As implementation continues and progress is evaluated, distributed and regional structural BMPs will be implemented to meet interim and final goals as needed and as funding becomes available. Figure 4-1 shows the different types of strategies implemented by Responsible Agencies to meet WQIP goals.

JRMP strategies implemented by all Responsible Agencies during the reporting period throughout the San Dieguito River WMA are summarized by program element in Table 4-1. Detailed jurisdictional strategies are included in Appendix D. Within the detailed strategies tables, information is presented to indicate whether the strategy was implemented during this reporting period, whether it will continue to be implemented during the next reporting period, or whether the strategy will be modified or eliminated for the coming year(s).

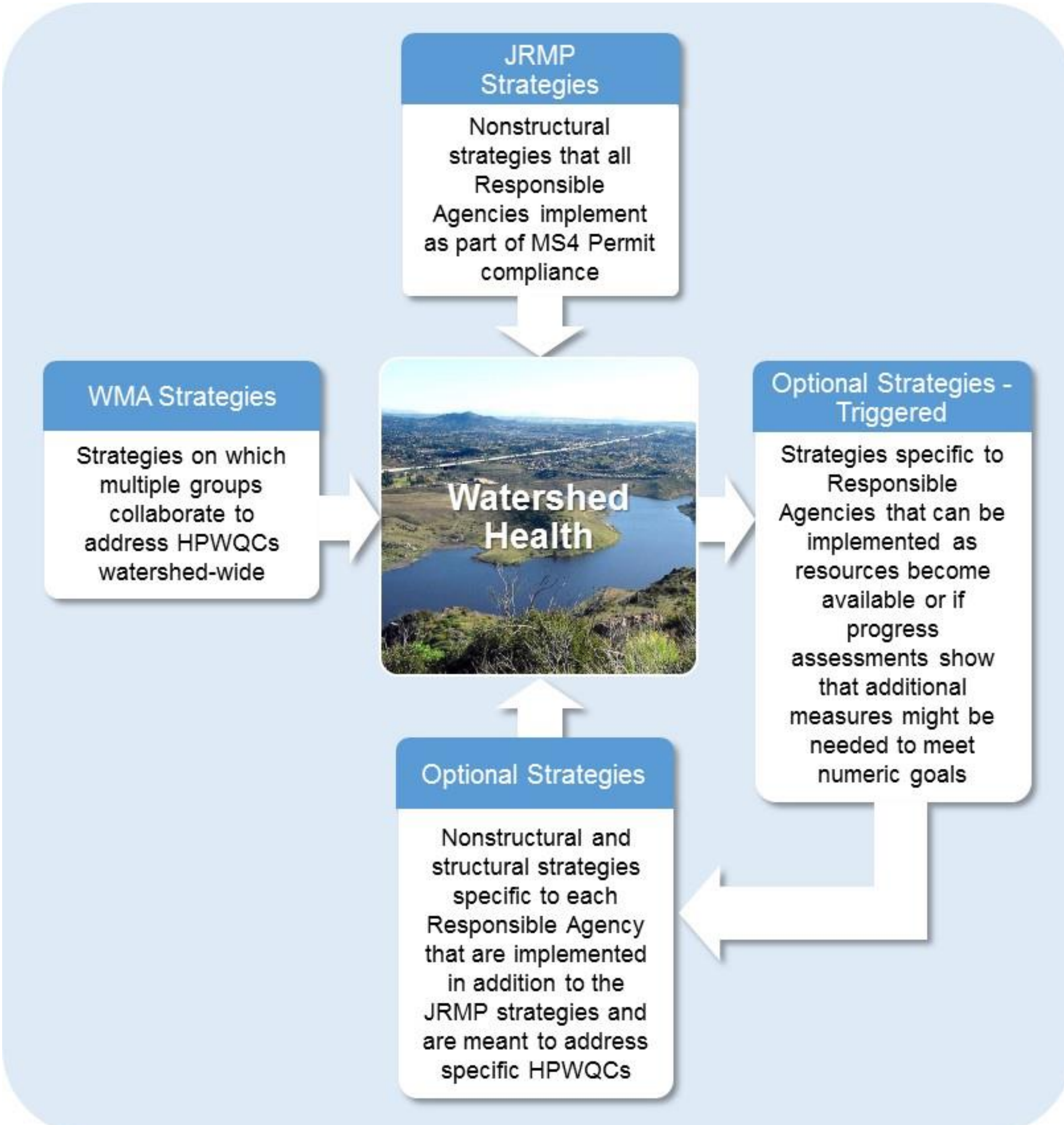

Figure 4-1
Strategies Implemented by Responsible Agencies to Meet WQIP Goals

Table 4-1
Jurisdictional Runoff Management Program Strategies Implemented in 2015–2016 by All Responsible Agencies

Strategy	Pollutants Addressed						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
Jurisdictional Runoff Management Program (JRMP) (E.2-E.7) Strategies							
E.3 Development Planning							
All Development Projects							
Establish guidelines and standards for all development projects and public low-impact development (LID) best management practices (BMPs); provide technical support related to implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area or implement easements to protect water quality, where applicable and feasible. Provide education and outreach to the development community regarding requirements of the Municipal Separate Storm Sewer System (MS4) Permit, Water Quality Improvement Plan (WQIP), and BMP updates.	X	X	X	X	X	X	X
Priority Development Projects (PDPs)							
For PDPs, administer a program and provide technical support to other internal departments to ensure implementation of onsite structural BMPs to control pollutants and manage hydromodification by developing storm water development standards and design guidelines. Includes confirmation of design, construction, and maintenance of PDP structural BMPs. Update the BMP Design Manual to determine the nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	X	X	X	X	X	X	X

Table 4-1 (continued)
Jurisdictional Runoff Management Program Strategies Implemented in 2015–2016 by All Responsible Agencies

Strategy	Pollutants Addressed						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
E.4 Construction Management							
Administer a program to oversee implementation of temporary BMPs that control sediment and other pollutants during the construction phase of projects. Includes requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other internal departments.			X	X	X	X	
E.5 Existing Development							
Commercial, Industrial, Municipal, and Residential Facilities and Areas							
Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and pollutant-generating activities (PGAs), as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods. Require minimum BMPs for existing residential, commercial, and industrial development. Implement policies and procedures to ensure discharges from swimming pools meet permit requirements.	X	X	X	X	X	X	X

Table 4-1 (continued)
Jurisdictional Runoff Management Program Strategies Implemented in 2015–2016 by All Responsible Agencies

Strategy	Pollutants Addressed						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
MS4 Infrastructure							
Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels as allowed by resource agencies, detention basins, pump stations, etc.) for water quality improvement and for flood control risk management. Includes inspecting and cleaning catch basins, implementing controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers, and repairing and replacing MS4 components.	X	X	X	X	X		
Roads, Streets, and Parking Lots							
Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways. Implement street sweeping.	X	X	X	X	X		
Pesticides, Herbicides, and Fertilizer BMP Program							
Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education.		X					X
Retrofit and Rehabilitation in Areas of Existing Development							
Develop a strategy and identification of candidate areas of existing development necessary for implementing retrofit projects and facilitate the implementation of such projects.	X	X	X	X	X	X	X
Develop a strategy and identify candidate areas necessary to implement stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	X	X	X	X	X	X	X

Table 4-1 (continued)
Jurisdictional Runoff Management Program Strategies Implemented in 2015–2016 by All Responsible Agencies

Strategy	Pollutants Addressed						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program							
Implement the Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	X	X	X	X	X	X	X
E.7 Public Education and Participation (B.3.b(1)(a)(iii))							
Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences. Enhanced school and recreation-based education and outreach, of which may include irrigation reduction issues, integrated pest management (IPM) for residents and businesses, and implementation and education of pet waste program. Promote and encourage implementation of designated BMPs in commercial and industrial areas.	X	X	X	X	X	X	X

Table 4-1 (continued)
Jurisdictional Runoff Management Program Strategies Implemented in 2015–2016 by All Responsible Agencies

Strategy	Pollutants Addressed						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
E.6 Enforcement Response Plan							
Continue to implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Storm Water Code Enforcement Unit's Standard Operating Procedures (SOPs) – Enforcement Response Plan.	X	X	X				

1. Highest priority water quality condition is highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

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Nonstructural strategies reduce pollutant loading to the MS4 by reducing pollutant generation at the source and/or by reducing mobilization of pollutants to the MS4, and either directly or ultimately to receiving waters. Programs designed to diminish the impacts of irrigation runoff, landscaping practices, and pet waste on receiving water quality are primary examples of nonstructural approaches that Responsible Agencies in the San Dieguito River WMA have employed during this permit term. The key strategies for each Responsible Agency are presented in Sections 4.1.1 through 4.1.6, and WMA strategies are presented in Section 4.1.7.

4.1.1 City of Del Mar

During FY 16, Del Mar implemented the strategies described in the WQIP. Highlights of strategies implemented by Del Mar to address bacteria are shown in Figure 4-2. The full list of strategies implemented is in Appendix D. Additional strategies being implemented are listed in Table 4-2.

Septic System Maintenance

Septic systems have the potential to be a source of bacteria if not properly operated and maintained. During FY 16, the City of Del Mar reviewed data to determine which properties have septic systems (onsite wastewater treatment system). In June 2016, letters were sent to the identified properties along with an educational information sheet explaining how to protect and maintain septic systems.

Storm Runoff

The City of Del Mar operates two storm runoff pumps in the northern coastal portion of the City: 27th Street and 29th Street. The 27th and 29th Street pumps collect and pump storm water to the sanitary sewer for the first 30 minutes of a wet weather event reducing the amount of potential pollutants reaching the receiving water.

Patrols to Eliminate Potential Pollutant Sources

The City of Del Mar implements a proactive patrol of the entire city at least six times per year. City staff patrol municipal, commercial, residential, and construction areas and locations to identify any potential illicit discharges and improper BMP implementation. In addition, treatment control best management practices (TCBMPs) and all minor and major MS4 outfalls are inspected during patrols. For FY 16, Del Mar conducted 11 city-wide patrols (~monthly) and were able to enforce proper BMP implementation throughout the city.

Figure 4-2
Highlights of Del Mar Strategies

Table 4-2
Summary of Strategies for the San Dieguito River Watershed Management Area—City of Del Mar

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
Promoted and collaborated with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	X	X	X	X	X	X	X
Continued participating in source reduction initiatives.	X	X	X	X	X	X	X
Implemented a program to require septic system maintenance practices.	X	X		X			X
Participated in the San Diego Regional Reference Streams and Beaches Study (see Section 3.2 for study details).		X					
Participated in the San Dieguito River WMA Bacteria Source Identification and Prioritization Process Special Study (see Section 3.2 for study details).		X					
Visually inspected all major and minor MS4 outfalls.	X	X	X	X	X	X	X
Operated and maintained infiltration pits and low-flow diverters in the northern coastal portion of Del Mar.	X	X	X	X	X		

1. Highest priority water quality condition is highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

MS4 = municipal separate storm sewer system; WMA = watershed management area

4.1.2 City of Escondido

During FY 16, Escondido implemented the strategies described in the WQIP. Highlights of strategies implemented by Escondido to address bacteria are shown in Figure 4-3. The full list of strategies implemented is in Appendix D. Additional strategies being implemented are listed in Table 4-3.

- ❖ Implemented the mitigation plan for the Regional General Permit 94 for channel maintenance throughout Escondido. The 4.44-acre project in Kit Carson Park resulted in removing 67 exotic trees and other invasive vegetation, and planting 742 native riparian container trees and applying 22 pounds of cottonwood-willow woodland seed mix.
- ❖ Conducted a comprehensive review of inventoried structural BMPs associated with Priority Development Projects.
- ❖ Transitioned storm water program existing developments inspections, to the City's asset management program (Cityworks) for improved scheduling, tracking, and reporting.

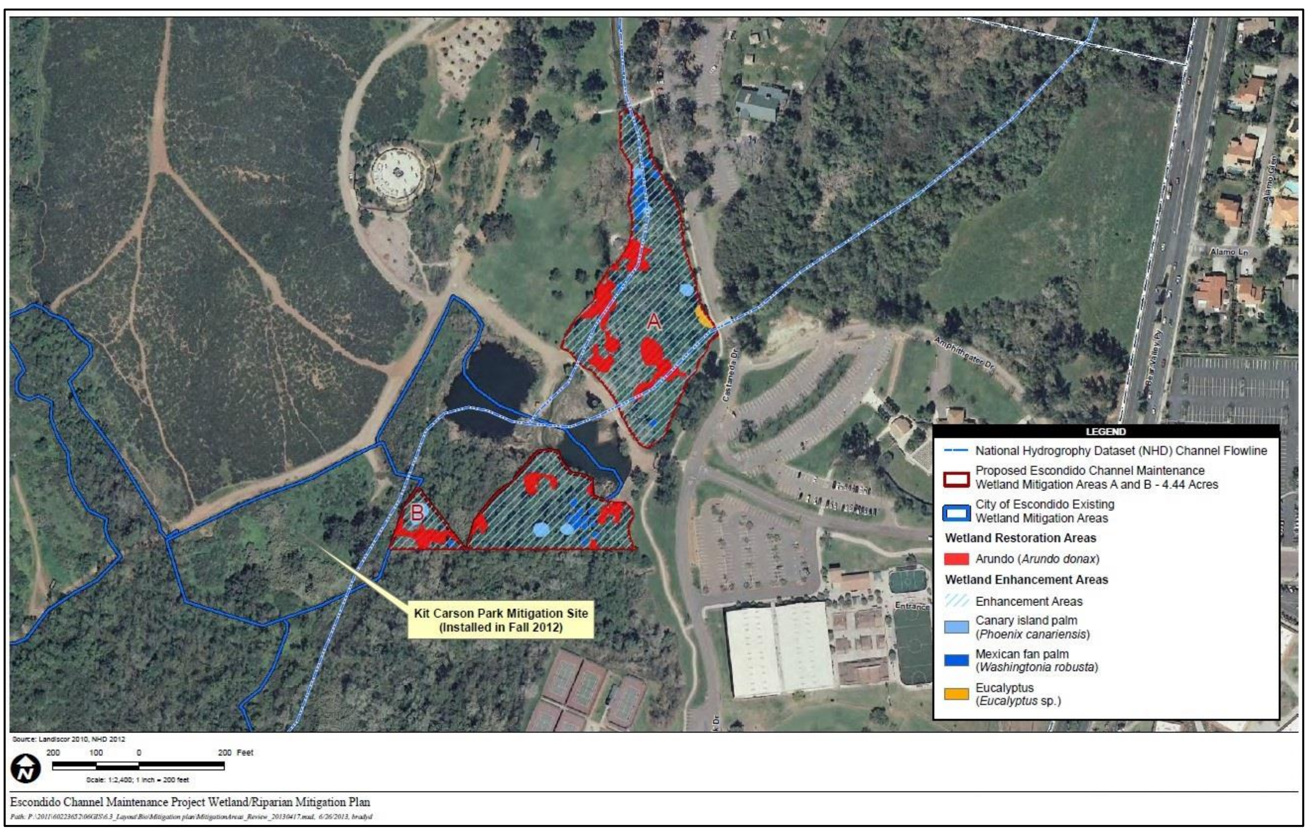

Figure 4-3
Highlights of Escondido Strategies

Table 4-3
Summary of Strategies for the San Dieguito River Watershed Management Area—City of Escondido

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
Participated in the San Diego Regional Reference Streams and Beaches Study (see Section 3.2 for study details).	X	X	X	X	X	X	X
Participated in the San Dieguito River WMA Bacteria Source Identification and Prioritization Process Special Study (see Section 3.2 for study details).	X	X	X	X	X	X	X
The City conducted a City-wide hydraulic study to identify potential retrofit projects that could be used in an alternative compliance program.	X	X	X	X	X	X	X

1. Highest priority water quality condition is highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

WMA = watershed management area

4.1.3 City of Poway

During FY 16, Poway implemented the strategies described in the WQIP. Highlights of strategies implemented by Poway to address bacteria are shown in Table 4-4. The full list of strategies implemented is in Appendix D.

Table 4-4
Summary of Strategies for the San Dieguito River Watershed Management Area—City of Poway

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
Required implementation of low-impact development (LID) best management practices (BMPs) with all new construction.	X	X	X	X	X	X	X
Promoted Metropolitan Water District of Southern California (MWD) and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	X	X	X	X	X	X	X
Proactively repaired and replaced corrugated metal pipe municipal separate storm sewer system (MS4) components to provide source control from MS4 infrastructure.	X	X	X		X		
Targeted human behavior in parks and other public areas, including trash reduction or other high-impact behaviors that affect habitat, wildlife, and water quality.	X	X		X			X
Participated in the San Diego Regional Reference Streams and Beaches Study (see Section 3.2 for study details).	X	X			X		
Reconfigured the Department of Public Works (DPW) waste yard to reduce pollutants/runoff.	X		X	X			X

1. Highest priority water quality condition is highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

4.1.4 City of San Diego

During FY 16, City of San Diego implemented the strategies described in the WQIP. Highlights of strategies implemented by City of San Diego are described below. The full list of strategies implemented is in Appendix D. Additional strategies being implemented are listed in Table 4-5.

- **Special Study (New in FY16):** The City of San Diego and other Responsible Agencies in the WMA completed the San Dieguito River WMA Bacteria Source Identification and Prioritization Special Study to assess sources of bacteria in the watershed. The study allowed the Responsible Agencies to prioritize potential sources of bacteria in unique focus areas using existing monitoring and geospatial data. In addition, the study may be used by the Responsible Agencies to tailor and modify strategies in these focus areas.

- **Hodges Reservoir Efforts (New in FY16):** The City of San Diego's Public Utilities Department secured $2.9 million in Proposition 84 funding for the Lake Hodges Natural Treatment System Project. This project is designed to create a biofiltration wetland at Hodges Reservoir to improve water quality. The wetland will also provide habitat and species conservation benefits, in addition to recreational opportunities.

  Also, the City of San Diego's Public Utilities Department and other Responsible Agencies completed the Lake Hodges Nutrients Evaluation Tech Memo, which summarizes the results of an analysis of receiving water and MS4 data collected. Because the analysis was inconclusive, the Responsible Agencies have begun developing a conceptual model of nutrient sources in the subwatershed surrounding Hodges Reservoir, and a Study Plan, Monitoring Plan, and Quality Assurance and Project Plan (QAPP) for the Hodges Reservoir Nutrient Source Study. When implemented, the study will be able to quantify the Responsible Agencies' nutrients load in the Above Lake Hodges subwatershed to better inform their water quality strategies.

- **Structural Strategies:** 0.8 acre of drainage area was treated by green infrastructure features, and approximately 9.86 additional acres are expected to be treated by FY 18 in the WMA.

Table 4-5
Summary of Strategies for the San Dieguito River Watershed Management Area—City of San Diego

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
Storm Drain Structure Cleaning: 2,438 storm drain structure inspections were conducted, resulting in the cleaning of 286 structures and removal of 125.2 tons of debris in the WMA.	X		X	X	X		
New in FY 16: Catch Basin Cleaning Optimization: In an effort to further optimize its drain cleaning program, the City of San Diego (City) analyzed eight years of catch basin cleaning data and assigned priorities to individual basins based on historical debris removal. This enhancement will allow the City to target high priority drains to maximize pollutant removal while maintaining cost efficiencies.	X		X	X	X		
Street Sweeping: Approximately 2,878 curb miles of roads, streets, highways, medians, parking lots, and operations yards were swept in the WMA.	X	X	X	X	X		
New in FY 16: Median Sweeping: 4,315 median miles were swept citywide.	X	X	X	X	X		
New in FY 16: Targeted Aggressive Street Sweeping Pilot: The City completed a pilot study that quantified the effectiveness of posting limited-hour "no parking" signs on typically nonposted routes. The study found that posting routes resulted in an approximate 50% increase in pollutant removal because the sweeper had more access to curbs and gutters. Based on this finding, the City will consider posting additional routes if supported by the community.	X	X	X	X	X		
New in FY 16: MS4 Maintenance: In addition to routine maintenance of the MS4, the City repaired or replaced 12 pump stations and modernized another 14 pump stations, CCTV surveyed 28,000 linear feet of pipe in 62 locations citywide, and began the development of the Waterways Maintenance Plan and Channel **Maintenance Prioritization Plan**. To help minimize the risk of flooding in a flood-prone drainage area, the City also installed a 2,400-volt automatic transfer switch and generator to a 130,000 gallon-per-minute pump station, allowing for sustained function in the event of a power outage.	X		X	X	X		

Table 4-5 (continued)
Summary of Strategies for the San Dieguito River Watershed Management Area—City of San Diego

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
IDDE Program: 119 discharges were reported by the public, 171 cases were investigated, 140 discharges or illicit connections were eliminated, 141 enforcement actions were issued, and 69 escalated enforcement actions were issued in the WMA. **New in FY 16: Launch of the Get It Done App**: This app allows illicit discharges to be reported quickly via any smartphone. Lastly, the Tiger Team (a proactive escalated monitoring and enforcement team that involves multiple City departments and divisions) was developed to identify, locate, and eliminate sources of human specific bacteria in the MS4. Over several months during the reporting year, one problem area within the City was investigated extensively and a source of human-specific bacteria in the MS4 was identified and abated.	X	X	X	X	X	X	X
Commercial and Industrial Business Inspections: 314 inspections were completed, 14 follow-up inspections were completed, 49 violations were issued, 58 enforcement actions were issued, and 23 escalated enforcement actions were issued in the WMA. In addition, the City conducted property-based inspections that focus on common areas/activities shared among multiple businesses or tenants that generate pollution. A previously conducted pilot study on inspection practices found property-based inspections to be more effective in identifying and resolving water quality issues (e.g., improper trash disposal practices and irrigation runoff, etc.) associated with commercial and industrial businesses.	X	X	X	X	X	X	X
Trash Clean Ups: 4 cleanup events were sponsored through community-based organizations and 24,674 pounds of trash and debris were collected in the WMA (see Appendix D for a list of specific projects).				X			
Rebates to Reduce Irrigation Runoff: Rebates were issued to convert 61,032 square feet of turf in the WMA and rebates for rain barrels were issued to capture 772,740 gallons of rainwater citywide.	X	X	X	X	X	X	X

Table 4-5 (continued)
Summary of Strategies for the San Dieguito River Watershed Management Area—City of San Diego

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
New in FY 16: Offsite Alternative Compliance Program: The City implemented Phase I of the Alternative Compliance Program to give development projects that would require onsite structural BMPs the ability to propose offsite alternative compliance projects. The development of Phase II was also initiated and will include the establishment of an in-lieu fee structure and credit system.	X	X	X	X	X	X	X
New in FY 16: Bacteria Regrowth Study: The City completed a study to characterize the magnitude and extent of potential *Enterococcus* loading because of regrowth within the City's storm drain system. This study quantifies the amount of bacteria in receiving water samples that are harmless to humans and could potentially be used to refine bacteria water quality standards of the Bacteria TMDL as a part of the Reopener process.	X						

1. Highest priority water quality condition is highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

% = percent; BMP = best management practice; CCTV = closed-circuit television; FY = fiscal year;
IDDE = illicit discharge detection and elimination; MS4 = municipal separate storm sewer system;
TMDL = total maximum daily load; WMA = watershed management area

4.1.5 City of Solana Beach

During FY 16, Solana Beach implemented the strategies described in the WQIP. The full list of strategies implemented is in Appendix D.

The City of Solana Beach worked diligently during the reporting period to implement planned strategies to address the San Dieguito River WMA's HPWQC of indicator bacteria along with other associated pollutants. Many of these strategies were effective in identifying and managing potential sources of pollutants and will continue to be carried out during the next reporting period, as described in Figure 4-4. Additional strategies being implemented are listed in Table 4-6.

Progress Toward Numeric Goals

During FY 16, the City of Solana Beach completed both jurisdictional water quality improvement numeric goals ahead of schedule. Solana Beach installed a low-flow diverter at Seascape Sur (an identified persistently flowing outfall), diverting 2.5 million gallons of discharge since October 2014. Solana Beach also completed installation of curb cuts along Highway 101, which treats 8.62 acres of the drainage area.

Patrols to Eliminate Pollutant Sources

Solana Beach conducted patrols of the entire City, including all residential areas, commercial and industrial facilities, and treatment control BMPs. Solana Beach actively managed potential sources of pollutants, working directly with property owners to effectively address 18 issues of discharge. Solana Beach has deemed this approach to be effective in eliminating pollutant sources and will continue implementation during the next reporting period on a bimonthly basis.

Outfall Inspections

Solana Beach inspected all outfalls throughout the City, both minor and major, to identify any persistently flowing outfalls. Solana Beach has only one persistently flowing outfall, and will continue to inspect all outfalls on a bimonthly basis to identity any new sources of discharge that could contribute to bacteria pollution in receiving waters.

Prioritizing Sewer Line Replacement Projects

Solana Beach continued implementation of an aggressive sewer infrastructure replacement program and CCTV surveyed 20% of the sewer infrastructure during the reporting period. The results led to a prioritized list of sewer line replacement projects. Solana Beach invests approximately $500,000 in sewer replacement projects per year in an effort to reduce any seepage of bacteria from leaky sewer lines into groundwater or potentially the MS4.

Figure 4-4
Highlights of City of Solana Beach Strategies

Table 4-6
Summary of Strategies for the San Dieguito River Watershed Management Area—City of Solana Beach

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
Promoted and encouraged implementation of designated best management practices (BMPs) at residential areas.	X	X	X	X	X	X	X
Promoted and encouraged implementation of designated BMPs in commercial areas.	X	X	X	X	X	X	X
Continued participating in source reduction initiatives.	X			X			
Began program development and analysis for capturing trash and debris, to minimize its impact on receiving waters.	X			X	X		
Participated in the San Diego Regional Reference Streams and Beaches Study (see Section 3.2 for study details).	X						
Participated in the San Dieguito River Watershed Management Area (WMA) Bacteria Source Identification and Prioritization Process Special Study (see Section 3.2 for study details).	X						
Implemented other projects, including several green infrastructure, water quality improvement BMP, and dry weather flow separation and treatment projects (see Appendix D for a list of specific projects).	X	X	X	X	X	X	X

1. Highest priority water quality condition is highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

4.1.6 County of San Diego

During FY 16, County of San Diego (County) implemented the strategies described in the WQIP. Highlights of strategies implemented by the County of San Diego to address sediment, bacteria, and freshwater input are shown below. The full list of strategies implemented is in Appendix D.

- **Residential Area BMPs:** The County encourages BMPs in residential areas. All residential management areas were inspected in FY 16.
- **Water Conservation:** The County collaborates with and promotes the efforts of partner agencies for incentive programs such as rain barrels, water smart irrigation controllers, soil sensors, turf replacement programs, and residential landscape evaluation programs.
- **Green Streets:** The County developed green street retrofit design standards and specifications. Green streets are now being used to meet compliance for all retrofit and redeveloped road projects in the Capital Improvement Projects plan.
- **Public Education:** The County collaborates with the Regional Education Workgroup and Think Blue San Diego Region to develop and distribute educational materials.
- **Trash Generation Studies:** The County is collaborating with the Responsible Agencies to develop baseline trash generation rates.
- **Offsite Alternative Compliance:** The County supports applicant-implemented offsite alternative compliance. The Water Quality Equivalency provides the currency for structural BMPs and some natural system management practices.
- **Irrigation Runoff Prevention Study:** The County undertook a community-based social marketing pilot study on the effectiveness of irrigation runoff prevention materials.
- **Sustainable Landscapes:** The County is implementing a program to encourage landscape retrofits that replace water-intensive turf grass with landscaping that provides several environmental benefits.
- **Rain Barrel Incentives:** The County offers incentives for rain barrel installation by offering discounts on rain barrel purchases as well as rebates for rain barrel installation.

Additionally, the County recently undertook efforts to update its 2007 Low-Impact Development (LID) Handbook[2] to better align with the County's Standard Urban Storm Water Mitigation Plan (SUSMP) and Hydromodification Management Plan (HMP), and to reflect the most current data on LID approaches and their efficacy. For its distinguished efforts, the County was named the recipient of the 2015 Outstanding Innovation in Green Planning and Design Award by the San Diego Chapter of the California Association of Environmental Professionals (AEP), a non-profit organization established in 1974, and dedicated to enforcing and supporting the California Environmental Quality Act (CEQA). Additionally, the County of San Diego received a similar award in October 2016 for work done during the fiscal year on development of its Guidance on Green Infrastructure, a document outlining tools to uniformly design, install, and maintain LID features in the public right-of-way (Figure 4-5). Additional strategies being implemented are listed in Table 4-7.

Figure 4-5
LID Incorporated into a Roadway Median

Table 4-7
Summary of Strategies for the San Dieguito River Watershed Management Area—County of San Diego

Strategy	Multiple Benefits						
	Bacteria[1]	Nutrients	Metals	Trash	Sediment	Flow[2]	Habitat/Wildlife
Began implementing the Sustainable Landscapes Program to encourage landscape retrofits.	X	X	X		X	X	X
Began implementing an incentive program for best management practice (BMP) retrofits (Public-Private Partnerships – a County-sponsored program to offer incentives for rain barrel installation, downspout disconnects from the storm water system, etc.).	X	X	X	X	X	X	

1. Highest priority water quality condition is highlighted in orange.
2. Flow is defined as storm water and non-storm water discharges to receiving waters.

[2] http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

4.1.7 Optional WMA Strategies

In addition to implementing strategies on a jurisdictional basis, Responsible Agencies are collaboratively implementing projects within the WMA that improve water quality, as described in Table 4-8.

Table 4-8
Optional WMA Strategies

WMA Strategy	Implementation Status Update
WMA-4: Collaborative Approach to Irrigation Reduction	Responsible Agencies collaborated with water agencies to continue to implementing turf replacement and rain barrel rebate programs. Additionally, various Responsible Agencies implemented reduction programs to help achieve the State-mandated reduction in water consumption.
WMA-6: Offsite Alternative Compliance Option (Watershed Management Area Analysis [WMAA])	Responsible Agencies implemented Phase I of the Alternative Compliance Program to give development projects that would require onsite structural best management practices (BMPs) the ability to propose offsite alternative compliance projects.
WMA-7: Collaboration with the Regional Board	Collaborated with the Regional Board to include non-Phase I municipal separate storm sewer systems (MS4s) in general permits, waivers, and Waste Discharge Requirements (WDRs).
WMA-14: Participation as a Stakeholder in the San Diego Integrated Regional Water Management (IRWM) Program as Appropriate	Hodges Reservoir Natural Treatment System was awarded $2.9 million in grant funding. This project will create a biofiltration wetland at Hodges Reservoir to improve water quality. The wetland also will provide habitat and species conservation benefits, in addition to recreational opportunities. – More information on IRWM efforts is available at http://www.sdcwa.org/more-31-million-awarded-water-projects-san-diego-region#sthash.5sYifWjP.dpuf.

4.2 Calculating Baseline Values for Assessment of Progress Toward Achieving Numeric Goals

Section 4 of the San Dieguito River WMA WQIP included several placeholders for baseline values to help Responsible Agencies determine progress in achieving numeric goals. These baseline values were calculated for this annual report and are summarized in Table 4-9.

Table 4-9
Baseline Values for Numeric Goals for Pacific Ocean Shoreline Recreation (Bacteria)

Compliance Pathway	Metric	Agency	Baseline
Wet Weather Bacteria			
MS4 Discharges % Days Exceeding WQO	Fecal coliform	All Responsible Agencies	98%[1]
	Enterococcus		100%[1]
	Total coliform		100%[1]
# of Direct or Indirect MS4 Discharges[2] to Receiving Water	Discharges[2]	City of Del Mar	6 discharges[2]
		City of Escondido	3 discharges[2]
		City of Poway	15 discharges[2]
		City of San Diego	42 discharges[2]
		City of Solana Beach	3 discharges[2]
		County of San Diego	20 discharges[2]
Reduce anthropogenic surface dry weather flows to address bacteria regrowth contributing during wet weather		City of Del Mar	<u>Average Annual Flow:</u> 0.81 gallons per minute <u>Maximum Flow:</u> 1.5 gallons per minute
Design and install diverters at high priority outfalls to treat first flush and low flows		City of Solana Beach	0 acres of low flow diverted to the sanitary sewer
Design and construct curb cuts to redirect water from traditional drainage areas to permeable surfaces		City of Solana Beach	0 acres of drainage area treated

Table 4-9 (continued)
Baseline Values for Numeric Goals for Pacific Ocean Shoreline Recreation (Bacteria)

Compliance Pathway	Metric	Agency	Baseline
Dry Weather Bacteria			
MS4 Discharges % Days Exceeding WQO	Fecal coliform	City of Del Mar	82%[3]
	Enterococcus	City of San Diego	100%[3]
	Total coliform	City of Solana Beach	100%[3]
# of Direct or Indirect MS4 Discharges[4] to Receiving Water	Discharges[4]	City of Del Mar	6 discharges[4]
		City of San Diego	42 discharges[4]
		City of Solana Beach	3 discharges[4]
Reduce anthropogenic surface dry weather flows		City of Del Mar	Average Annual Flow: 0.81 gallons per minute Maximum Flow: 1.5 gallons per minute
Reduce anthropogenic dry weather flow in priority drainage area with persistent flow by performing special strategies, including property-based inspections for residents and commercial areas		City of Escondido	Average Flow: 6.2 gallons per minute Maximum Flow: 37 gallons per minute
Turf conversion		City of Poway	0 square feet of turf converted
Implement runoff reduction programs such as education and outreach, enhanced inspections, rebates, and increased enforcement		City of San Diego	Average Annual Flow[5]: 38.6 gallons per minute Maximum Flow[5]: 224.4 gallons per minute
Design and install diverters at high priority outfalls to treat first flush and low flows		City of Solana Beach	0 acres of low flow diverted to the sanitary sewer
Design and construct curb cuts to redirect water from traditional drainage areas to permeable surfaces		City of Solana Beach	0 acres of drainage area treated

Table 4-9 (continued)
Baseline Values for Numeric Goals for Pacific Ocean Shoreline Recreation (Bacteria)

Compliance Pathway	Metric	Agency	Baseline
Dry Weather Bacteria			
MS4 Discharges % Days Exceeding WQO	Fecal coliform	County of San Diego	82%[2]
	Enterococcus	County of San Diego	100%[2]
	Total coliform	County of San Diego	100%[2]
# Direct or Indirect MS4 Discharges[2] to Receiving Water	Discharges[2]	County of San Diego	20 discharges[5]
Eliminate anthropogenic dry weather flows from storm drain outfalls either by aggregate flow volume or the number of persistently flowing outfalls during dry weather		County of San Diego	10 of 20 major MS4 outfalls have persistent dry weather flows; average flow rate as measured with continuous flow monitoring equipment = 8.614 gallons per minute

1. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008, through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period.
2. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008, through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the fifth sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Discharges are defined as observed dry weather flows from persistently flowing MS4 outfalls.
5. Calculated using historical dry weather MS4 outfall data from 2009–2012.

% = percent; MS4 = municipal separate storm sewer system; WQO = water quality objective; # = number

4.3 Progress Toward Achieving Goals for the San Dieguito River WMA

As discussed in Section 2, interim and final numeric goals were established for the watershed as a means of measuring reasonable progress toward addressing the HPWQC; the goals are included in Appendix B. Performance-based goals are included to measure short-term jurisdictional progress toward achieving these goals, given that sustained water quality improvement is typically demonstrated over a longer timeframe. Performance-based goals are intended to measure an outcome from a strategy or suite of strategies, and to provide an interim link to demonstrate reasonable incremental progress in the quality of MS4 discharges and receiving waters by FY 18. The strategies or suite of strategies presented have been selected as goals because they are measurable and provide a direct water quality benefit in the near term. Table 4-10 summarizes progress in FY 16 toward meeting these performance-based goals.

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Table 4-10
Progress Toward Performance-Based Goals to Address Pacific Ocean Shoreline Recreation (Bacteria)

Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY18 Goal	Progress
City of Del Mar	Reduce anthropogenic surface dry weather water flows	Dry	Average Annual Flow: 0.81 gallon per minute Maximum Flow: 1.5 gallons per minute	Reduce anthropogenic surface dry weather flows[5] that originate within Del Mar's jurisdictional boundaries by 10%	Achieved to date. Average dry weather flow in FY 16 was 0.3 gallon per minute, representing an 80% reduction from the baseline average flow.
City of Escondido	Implement and maintain water quality improvement BMPs to target fecal coliform, *Enterococcus*, total coliform, sediment, and nutrients	Wet	N/A	Treat 4 acres of drainage area through restoration of 1 sediment detention basin in a multiuse treatment area at Eagle Scout (formerly Sand) Lake, Kit Carson Park	Achieved. Project implemented in January 2014. Observational monitoring and minor maintenance conducted in FY 16.
	Reduce anthropogenic dry weather flow in priority drainage area with persistent flow by performing special strategies, including property-based inspections for residents and commercial areas	Dry	Average Flow: 6.2 gallons per minute Maximum Flow: 37 gallons per minute	Reduce anthropogenic dry weather flow at one priority outfall (HDG_102)by 10%	In progress. Performed study to determine baseline flow.

Table 4-10 (continued)
Progress Toward Performance-Based Goals to Address Pacific Ocean Shoreline Recreation (Bacteria)

Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY18 Goal	Progress
City of Poway	Implement turf conversion	Dry	0 square feet of turf converted	Increase the baseline through turf conversion rate by 5%	In progress. There were no turf conversion projects in the WMA in FY 16.
City of San Diego	Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	Wet and Dry	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	Treat 10.6 acres of drainage area through construction of 2 green infrastructure BMPs[2]	In progress. The City has begun the process for developing a green infrastructure policy. The City implemented green infrastructure that treats 0.8 acre of drainage area (Del Mar Heights Rd Median) and is expected to exceed the performance-based goal by implementing additional projects that treat 9.86 acres of drainage area (Callado Road Green Street) for a total of 10.66 acres treated by 2018.

Table 4-10 (continued)
Progress Toward Performance-Based Goals to Address Pacific Ocean Shoreline Recreation (Bacteria)

Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY18 Goal	Progress
City of San Diego (continued)	Implement runoff reduction programs, including targeted education and outreach, enhanced inspections, rebates, and increased enforcement	Dry	Average Dry Weather Flow[1]: 38.6 gallons per minute Maximum Dry Weather Flow[1]: 224.4 gallons per minute	Reduce prohibited dry weather flow from baseline measured at persistently flowing outfalls in the WMA by 10%	Achieved to date: Average dry weather flow in FY 16 was 13.8 gallons per minute, representing a 64.2% reduction from the baseline average flow.
City of Solana Beach	Design and install diverters at high priority outfalls to treat first flush and low flows	Wet and Dry	0 acres of low flow diverted to the sanitary sewer	Direct 40.5 acres of low flows to the sanitary sewer through construction of one diverter at high priority outfall Seascape Sur	Achieved. Since installation in October 2014, 2.5 million gallons of water have been diverted to the sanitary sewer. Diverter diverts low flows as well as first flushes.
	Design and construct curb cuts to redirect water from traditional drainage areas to permeable surfaces	Wet and Dry	0 acres of drainage area treated	Treat 8 acres of drainage area through curb cuts along Highway 101	Achieved. 8.627 acres of drainage area treated through Highway 101 project.

Table 4-10 (continued)
Progress Toward Performance-Based Goals to Address Pacific Ocean Shoreline Recreation (Bacteria)

Agency	Performance-Based Goal	Weather (Wet/Dry)	Baseline	FY18 Goal	Progress
County of San Diego	Reduce baseline bacteria loads from storm drain outfalls to receiving water	Wet	*Enterococcus* Load for MS4-SDC-6 = 1.25E+10^{13} MPN/year	Reduce bacteria load from the MS4 by 1%	In progress. Currently 3.38E+10^{14}(3)
	Eliminate anthropogenic dry weather flows from storm drain outfalls either by aggregate flow volume or the number of persistently flowing outfalls during dry weather	Dry	50% of major outfalls have persistent dry weather flows; average flow rate as measured at outfalls with continuous flow monitoring equipment is 8.614 gallons per minute	Reduce by 20%	In progress. Baseline was established during 2015–2016 monitoring year.

1. Calculated using historical dry weather MS4 outfall data from 2009-2012. Calculations are described in Appendix D.
2. Taken from Table 5-29 of the Transitional Monitoring and Assessment Program Report for the San Dieguito River Watershed Management Area (2012-2014) (San Dieguito River WMA Copermittees, 2015)
3. The total flow volume during the 2015-2016 monitoring year was approximately 2 times larger than total flow during the baseline year. This may contribute to an increased annual load at MS4-SDC-6.

% = percent; BMP = best management practice; FY = fiscal year; MPN = most probable number; MS4 = municipal separate storm sewer system; N/A = not applicable; TMDL = total maximum daily load; WMA = Watershed Management Area

5 Adaptive Management

This section summarizes the potential triggers for adaptation of the WQIP and the results of the MS4 Permit adaptive management process for the San Dieguito River WMA during the first year of implementation. The adaptive management approach uses an iterative approach to re-evaluate major components of the WQIP, based on the requirements of the MS4 Permit. It details how the Responsible Agencies use new data and information to improve the WQIP through updates to priorities, assessments of and adjustments to goals, updates to strategies to meet the latest goals, and updates to the monitoring and assessment program to provide the necessary data to support the process. Responsible Agencies are continually evaluating and assessing the implementation of the WQIP and making minimal modifications to streamline and optimize execution outside the MS4 Permit adaptive management process.

The MS4 Permit describes various triggers that may warrant program adaptation, including exceedances of water quality standards in receiving waters, new information, Regional Board recommendations, and input from the public. Effectiveness assessments of JRMP programs and strategies may also trigger adaptations to the WQIP.

The adaptive management process is used in conjunction with water quality and program data to evaluate whether modifications to numeric goals, schedules, and/or strategies are necessary to achieve compliance with the interim and final compliance numeric goals. MS4 Permit adaptive management triggers are typically implemented either annually or at the end of the MS4 Permit term.

5.1 Potential Triggers for Adaptation

The adaptive management process may be triggered when new information becomes available. New information to be considered includes results of routine monitoring and special studies, new regulatory drivers, results of program effectiveness assessments and progress toward numeric goals, and recommendations from the public and/or Regional Board. Modifications may be made to the PWQCs, goals, strategies, schedules, and/or the Monitoring and Assessment Program (Appendix E). The potential triggers for adaptation to be considered annually in the Annual Report are summarized in Table 5-1.

Table 5-1
Triggers for Adaptive Management Within the WQIP

Trigger[1]	Frequency for Assessment	Potential Area(s) for Adaptation			
		Priority Water Quality Conditions	Goals and Schedules	Strategies and Schedules	Monitoring and Assessment
Exceedances of Non-Storm Water Action Levels or Storm Water Action Levels	Annual			X	X
Special Studies Results	Annual, as results are available		X	X	X
New Regulatory Actions	Annual, as applicable	X	X	X	X
Regional Board Recommendations	Annual, as applicable	X	X	X	X
Program Effectiveness Assessments/ Progress Toward Goals	Annual			X	X

1. The trigger related to the review of receiving water limitations exceedances will now be assessed on a permit term basis in the Regional Monitoring and Assessment Report. Section 6.2 and Appendix E provide more detail.

5.2 WQIP Elements for Adaptation

The San Dieguito River WMA WQIP was approved by the Regional Board in February 2016. The Responsible Agencies have just begun to implement the WQIP strategies. Therefore, there have been no adaptations made to the PWQCs, goals, strategies, or schedules, as summarized in Table 5-2. There have been changes to timing of the receiving water limitation exceedance assessment put forth by Provision A.4 and administrative changes to the City of San Diego's strategies. These changes are summarized in Table 5-2 and additional information is provided in Appendix E.

Table 5-2
2015–2016 WQIP Annual Report Adaptations

Elements for Adaptation	2015–2016 Annual Report Adaptation
Priority Water Quality Conditions	There are no adaptations at to the priority water quality conditions at this time. No new regulations, policies, or recommendations from the Regional Board have triggered adaption of this WQIP Element.
Goals and Schedules	The Responsible Agencies are on track to meet their 2018 WQIP goals and do not plan any adaptations to their goals or the related schedules at this time.
Strategies and Schedules	The Responsible Agencies have just begun implementation of their WQIP strategies that have pollutant reduction benefits. They plan to continue implementing the strategies without modification to realize the rewards of these pollutant reduction benefits. Escondido's JRMP is being updated and re-submitted concurrent with this WQIP Annual Report. The changes to the JRMP are mostly related to changes in the final approved WQIP for the Carlsbad Watershed Management Area. In the process of reviewing the JRMP for resubmittal, several clarifications, corrections, and updates were made, but no notable changes were made to strategies presented in this WQIP. A summary table of the changes is included in Appendix D. The City of San Diego has identified some administrative changes that are reflected in Appendix D and some operational adaptive management efforts in it JRMP included in Appendix D.
Monitoring and Assessment	The adaptive management process was to review receiving water limitation exceedances once per permit term, as allowed by the MS4 Permit, and not annually, as outlined in the WQIP.

JRMP = Jurisdictional Runoff Management Program; WQIP = Water Quality Improvement Plan

5.3 Summary of Previous Adaptation and Implementation

The 2015–2016 San Dieguito River WMA WQIP Annual Report is the first annual report submitted by the Responsible Agencies. No prior adaptations or updates to either the WQIP or each Responsible Agency's JRMP exist.

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6 Conclusions and Recommendations

The Responsbile Agencies have successfully implemented the 2015–2016 program set forth in the WQIP. Progress toward performance-based goals has been achieved. Wet and dry weather water quality monitoring provided an initial data set for assessing and adapting goals and strategies. The conclusions described below highlight the success of the WQIP.

Monitoring and Assessment: The Responsible Agencies successfully completed wet and dry weather MS4 outfall monitoring in 2015–2016 in accordance with Provision D of the MS4 Permit. Monitoring was also conducted for the HPWQC. The monitoring program and results for 2015–2016 are described in Section 3 and Appendix C. Monitoring and assessment highlights include:

- ❖ Monitoring for the HPWQC: The first year of Bacteria TMDL monitoring at the at the historical San Diego County AB 411 monitoring location at the mouth of the San Dieguito Lagoon (EH-380) was completed for wet and dry weather. Results are as follows:
  - ➢ During wet weather, the receiving waters at the San Dieguito Lagoon Mouth achieved 0% single-sample maximum exceedance frequencies for total coliform and fecal coliform. The single-sample maximum for *Enterococcus* was 13.6%. EH-380 is in compliance with interim and final wet weather single-sample maximum RWLs for all three compliance constituents.
  - ➢ During the wet season, which evaluates a combination of both wet and dry weather samples, EH-380 achieved a 0% geometric mean exceedance frequency for all compliance constituents and is in compliance with interim and final dry weather geometric mean RWLs.
  - ➢ During the dry season, when recreational activities occur with more regularity, EH-380 achieved a 0% exceedance frequency for all three compliance constituents, and is in compliance with interim and final dry weather geometric mean RWLs.
- ❖ MS4 Monitoring: Data collected as part of the MS4 monitoring program were compared to the permit action levels as detailed below:
  - ➢ In dry weather, the non-storm water action levels were met over 75% of the time for multiple consituents.
  - ➢ In wet weather, the storm water action levels were met over 90% of the time for all consituents except total copper, nitrate + nitrite, and bacteria indicators.
- ❖ Special Studies: The San Diego Regional Reference Streams and Beaches Study provided valuable information for the Bacteria TMDL Reopener. The San Dieguito River WMA Bacteria Identification and Prioritization Process Special Study provides a framework for the Responsible Agencies to review bacteria sources at MS4 outfalls where WQBEL exceedances occur without implementing costly source

identification studies. Each Responsible Agency now has a detailed list of sources to investigate if further exceedances are found at the focus area outfalls.

- ❖ Hodges Reservoir: The Responsible Agencies are coordinating with the City of San Diego's Public Utilities Department to develop a study plan and associated monitoring plans for the Hodges Reservoir Nutrient Source Study. The goal of this study is to characterize all the sources of nutrients in the Hodges Reservoir and watershed draining to the Hodges Reservoir. The study will include development of a comprehensive conceptual model to guide any future monitoring efforts to fill known data gaps.

Strategy Implementation: Strategies have been implemented as planned in the WQIP during 2015–2016. Strategies for the HPWQC are described in Section 4. The following examples highlight efforts by the Responsbile Agencies to improve water quality:

- ❖ City of Del Mar: The City of Del Mar proactively implemented its City-wide patrol approach to identify issues or potential issues and ensure proper BMP implementation. The City of Del Mar also operated two pumps to divert storm runoff to the sanitary sewer during the first 30 minutes of a wet weather event.
- ❖ City of Escondido: The City of Escondido implemented the mitigation plan for the Regional General Permit 94 for channel maintenance throughout the city. The 4.44-acre project in Kit Carson Park removed 67 exotic trees and invasive vegetation, planted 742 native riparian container trees, and applied 22 pounds of cottonwood-willow woodland seed mix.
- ❖ City of Poway: The City of Poway now requires the implementation of LID BMPs with all new construction within the City. They also have proactively repaired and replaced corrugated metal pipe MS4 components to provide source control from MS4 infrastructure.
- ❖ City of San Diego: The City of San Diego has substantially increased its enforcement activities to reduce irrigation runoff. It launched the Get It Done App which allows illicit discharges to be reported quickly and accurately via any smartphone. In addition, the Tiger Team (a proactive escalated monitoring and enforcement team that involves multiple City departments and divisions) was developed to identify, locate, and eliminate sources of human specific bacteria in the MS4. To help address nutrients in the Hodges Reservoir, the City of San Diego's Public Utilities Department secured $2.9 million in Proposition 84 funding for the Lake Hodges Natural Treatment System Project. This project is designed to create a biofiltration wetland at the Hodges Reservoir to improve water quality. The wetland will also provide habitat and species conservation benefits, in addition to recreational opportunities.
- ❖ City of Solana Beach: The City of Solana Beach implemented an aggressive sewer infrastructure replacement program. As part of this program, approximately 20% of the City's sewer infrastructure is surveyed during the reporting period using CCTV technology. The results led to a prioritized list of sewer line replacement projects.

Solana Beach invests approximately $500,000 in sewer replacement projects per year in an effort to reduce any seepage of bacteria from leaky sewer lines into groundwater or potentially the MS4.

- County of San Diego: The County of San Diego collaborates with and promotes the partner agencies' incentive programs such as rain barrels, water smart irrigation controllers, soil sensors, turf replacement programs, and residential landscape evaluation programs. The County also undertook a community-based social marketing pilot study on the effectiveness of irrigation runoff prevention materials.

Progress Toward Goals

The Responsible Agencies have either met, surpassed, demonstrated progress toward achieving, or have plans to achieve the performance-based goals for the current MS4 Permit term. Performance-based goals achieved include the following:

- BMPs have been installed and maintained in the City of Escondido, City of San Diego, City of Solana Beach, and County of San Diego, reducing or preventing pollutants from entering receiving waters.
- Dry weather flow reduction goals have been surpassed in the City of Del Mar and the City of San Diego.
- The County of San Diego established the baseline number of persistently flowing major outfalls and has established the baseline flow of these outfalls.

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7 References

San Diego Regional Water Quality Control Board. 2010. *Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001.

San Dieguito River WMA Copermittees. 2015. *Transitional Monitoring and Assessment Program Report for the San Dieguito River Watershed Management Area (2012-2014)*. Developed by Weston Solutions. January.

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San Dieguito River WMA Responsible Agencies. 2015. *San Dieguito River WMA Water Quality Improvement Plan.* Developed by Amec Foster Wheeler Environment and Infrastructure, Inc. September.

Southern California Coastal Water Research Project (SCCWRP), 2015. *Wet and Dry Weather Natural Background Concentrations of Fecal Indicator Bacteria in San Diego, Orange, and Ventura County, California Streams.* SCCWRP Technical Report 862. June 2015.

Southern California Coastal Water Research Project (SCCWRP), 2016. *Microbiological Water Quality at Reference Beaches and an Adjoining Estuary in Southern California during a Prolonged Drought.* SCCWRP Technical Report 936. July 2016.

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Appendix A: Crosswalk of MS4 Permit Requirements and Annual Report References

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Table A-1
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP Annual Report Section	WQIP Appendix			
			Appendix B Numeric Goals	Appendix C Monitoring	Appendix D Jurisdictional Information	Appendix E Adaptive Management
Provision A						
A.4.a.(2)	If ***exceedance(s) of water quality standards persist in receiving waters*** notwithstanding implementation of this Order, the Copermittees must comply with the following procedures: (2) Upon a **determination** by either the Copermittees or the San Diego Water Board that discharges from the MS4 are **causing or contributing to a new exceedance** of an applicable water quality standard **not addressed** by the Water Quality Improvement Plan, the Copermittees must submit the following updates to the Water Quality Improvement Plan pursuant to Provision F.2.c ***or as part of the Water Quality Improvement Plan Annual Report*** required under Provision F.3.b, unless the San Diego Water Board directs an earlier submittal:	Section 5		X		X
	(a) The water quality improvement ***strategies being implemented that are effective and will continue to be implemented***,	Section 5.2			X	
	(b) ***Water quality improvement strategies (i.e. BMPs, retrofitting projects, stream and/or habitat rehabilitation projects, adjustments to jurisdictional runoff management programs, etc.) that will be implemented*** to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards,	Section 5.2				X
	(c) ***Updates to the schedule for implementation*** of the existing and additional water quality improvement strategies, and	Section 5.2				X
	(d) ***Updates to the monitoring and assessment program*** to track progress toward achieving compliance with Provisions A.1.a, A.1.c and A.2.a of this Order;	Section 5.2				X
Provision B						
B.5.a.	a. The **priority water quality conditions** and potential **water quality improvement strategie**s included in the Water Quality Improvement Plan pursuant to Provisions B.2.c and B.2.e ***may be re-evaluated by the Copermittees as needed during the term of this Order as part of the Water Quality Improvement Plan Annual Report***. Re-evaluation and recommendations for modifications to the priority water quality conditions and potential water quality improvement strategies **must be provided in the Report of Waste Discharge**, and must consider the following: (1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan; (2) New information developed when the requirements of Provisions B.2.a-c have been re-evaluated; (3) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality conditions and implementation strategies to address the highest priority water quality conditions; (4) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees; (5) San Diego Water Board recommendations; and (6) Recommendations for modifications solicited through a public participation process.	Section 5		X		X
B.5.b.	b. The water quality improvement goals, strategies and schedules, included in the Water Quality Improvement Plan pursuant to Provisions B.3, ***must be reevaluated and adapted as new information becomes available*** to result in more effective and efficient measures to address the highest priority water quality conditions identified pursuant to Provision B.2.c. ***Re-evaluation of and modifications to the water quality improvement goals, strategies and schedules must be provided in the Water Quality Improvement Plan Annual Report***, and must consider the following:	Section 5	X			X
	(1) Modifications to the **priority water quality conditions** based on Provision B.5.a;	Section 5				X
	(2) Progress toward **achieving interim and final numeric goals** in receiving waters and MS4 discharges for the highest priority water quality conditions in the Watershed Management Area,	Section 4.3				
	(3) Progress toward achieving outcomes according to established schedules;	Section 4.3				
	(4) New policies or regulations that may affect identified numeric goals;					X
	(5) Measurable or demonstrable reductions of non-storm water discharges to and from each Copermittee's MS4;			X		

Table A-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP Annual Report Section	WQIP Appendix: Appendix B Numeric Goals	WQIP Appendix: Appendix C Monitoring	WQIP Appendix: Appendix D Jurisdictional Information	WQIP Appendix: Appendix E Adaptive Management
	(6) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;			X		
B.5.b. (continued)	(7) New information developed when the requirements of Provisions B.2.b and B.2.d have been re-evaluated;	Section 5		X		X
	(8) Efficiency in implementing the Water Quality Improvement Plan;	Section 5			X	X
	(9) San Diego Water Board recommendations; and	Section 5				X
	(10) Recommendations for modifications solicited through a public participation process.	Section 5				X
B.5.c.	c. The water quality improvement monitoring and assessment program, included in the Water Quality Improvement Plan pursuant to Provision B.4, ***must be reevaluated and adapted when new information becomes available***. Re-evaluation and recommendations for modifications to the monitoring and assessment program, pursuant to the requirements of Provision D, ***may be provided in the Water Quality Improvement Plan Annual Report***, but must be provided in the Report of Waste Discharge.	Section 5		X		X
Provision D						
D.1.e.(2)(c)	**Sediment Quality Monitoring** (c) The Copermittees must incorporate a ***Sediment Monitoring Report as part of the Water Quality Improvement Plan Annual Report*** in accordance with the schedule contained in the Sediment Monitoring Plan, unless otherwise directed in writing by the San Diego Water Board Executive Officer. The Sediment Monitoring Report must contain the following information: (i) Analysis: An evaluation, interpretation and tabulation of the water and sediment monitoring data, including interpretations and conclusions as to whether applicable Receiving Water Limitations in this Order have been attained at each sample station; (ii) Sample Location Map: The locations, type, and number of samples must be identified and shown on a site map; and (iii) California Environmental Data Exchange Network: A statement certifying that the monitoring data and results have been uploaded into the California Environmental Data Exchange Network (CEDEN).			X		
D.2.b.(iv)	**Dry Weather MS4 Outfall Discharge Monitoring** (iv) Each Copermittee must document ***removal or re-prioritization of the highest priority persistent flow MS4 outfall monitoring stations identified under Provision D.2.b.(2)(a) in the Water Quality Improvement Plan Annual Report***. Persistent flow MS4 outfall monitoring stations that have been removed must be replaced with the next highest prioritized major MS4 outfall in the Watershed Management Area within its jurisdiction, unless there are no remaining qualifying major MS4 outfalls within the Copermittee's jurisdiction in the Watershed Management Area.			X		
D.4.b.(1)(a)(ii)	**Non-Storm Water Dischargers Reduction Assessments** (a) Each Copermittee must assess and report the ***progress of its illicit discharge detection and elimination program***, required to be implemented pursuant to Provision E.2, toward effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction as follows: (ii) Based on the data collected pursuant to Provisions D.2.b, the ***assessments required under <u>Provision D.4.b.(1)(c)</u> must be included in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3).***			X		
D.4.b.(1)(b)	(b) Based on the transitional dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.a.(2), each Copermittee must assess and report the following: (i) Identify the known and suspected controllable sources (e.g. facilities, areas, land uses, pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area; (ii) Identify sources of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area that have been reduced or eliminated; and (iii) Identify modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.			X		X

Table A-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP Annual Report Section	WQIP Appendix: Appendix B Numeric Goals	WQIP Appendix: Appendix C Monitoring	WQIP Appendix: Appendix D Jurisdictional Information	WQIP Appendix: Appendix E Adaptive Management
D.4.b.(1)(c)	(c) Based on the **dry weather MS4 outfall discharge field screening monitoring** required pursuant to Provision D.2.b.(1), each Copermittee must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(1)(b); (ii) Based on the data collected and applicable NALs in the Water Quality Improvement Plan, rank the MS4 outfalls in the Copermittee's jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan, with the goal of eliminating persistent flow non-storm water discharges and/or pollutant loads in order of the ranked priority list through targeted programmatic actions and source investigations; (iii) For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identify the known and suspected sources within the Copermittee's jurisdiction in the Watershed Management Area that may cause or contribute to the NAL exceedances; (iv) Each Copermittee must analyze the data collected pursuant to Provision D.2.b, and utilize a model or other method, to calculate or estimate the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually. [a] Each Copermittee must calculate or estimate the annual non-storm water volumes and pollutant loads collectively discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall; [b] Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters.			X		
	(v) Each Copermittee must review the data collected pursuant to Provision D.2.b and findings from the assessments required pursuant to Provision D.4.b.(1)(c)(i)-(iv) at least once during the term of this Order to: [a] Identify reductions and progress in achieving reductions in non-storm water and illicit discharges to the Copermittee's MS4 in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction, with an estimate, if possible, of the non-storm water volume and/or pollutant load reductions attributable to specific water quality strategies implemented by the Copermittee; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittee in the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction. (vi) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(1)(c)(i)-(v).			X		
D.4.b.(2)(a)	**Storm Water Pollutant Discharge Reduction Assessments** (a) The Copermittees must assess and report the ***progress of the water quality improvement strategies, required to be implemented pursuant to Provisions B and E, toward reducing pollutants in storm water discharges*** from the MS4s within the Watershed Management Area as follows: (ii) Based on the data collected pursuant to Provisions D.2.c, the ***assessments required under <u>Provision D.4.b.(2)(c)</u> must be included in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).			X		

Table A-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP Annual Report Section	WQIP Appendix			
			Appendix B Numeric Goals	Appendix C Monitoring	Appendix D Jurisdictional Information	Appendix E Adaptive Management
D.4.b.(2)(b)	(b) Based on the transitional wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.a.(3) the Copermittees must assess and report the following: (i) The Copermittees must analyze the monitoring data collected pursuant to Provision D.2.a.(3), and utilize a watershed model or other method, to calculate or estimate the following for each monitoring year: [a] The average storm water runoff coefficient for each land use type within the Watershed Management Area; [b] The volume of storm water and pollutant loads discharged from each of the Copermittee's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch; [c] The total flow volume and pollutant loadings discharged from the Copermittee's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and [d] The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch.(ii) Identify modifications to the wet weather MS4 outfall discharge monitoring locations and frequencies necessary to identify pollutants in storm water discharges from the MS4s in the Watershed Management Area pursuant to Provision D.2.c.(1).			X		
D.4.b.(2)(c)	(c) Based on the wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.c the Copermittees must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(2)(b); (ii) Based on the data collected and applicable SALs in the Water Quality Improvement Plan, analyze and compare the monitoring data to the analyses and assumptions used to develop the Water Quality Improvement Plans, including strategies developed pursuant to Provision B.3, and evaluate whether those analyses and assumptions should be updated as a component of the adaptive management efforts pursuant to Provision B.5 for follow-up action to update the Water Quality Improvement Plan; (iii) The Copermittees must review the data collected pursuant to Provision D.2.c and findings from the assessments required pursuant to Provisions D.4.b.(2)(c)(i)-(ii) at least once during the term of this Order to: [a] Identify reductions or progress in achieving reductions in pollutant concentrations and/or pollutant loads from different land uses and/or drainage areas discharging from the Copermittees' MS4s in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters within the Watershed Management Area to the MEP, with an estimate, if possible, of the pollutant load reductions attributable to specific water quality strategies implemented by the Copermittees; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittees in the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters in the Watershed Management Area to the MEP. (iv) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(2)(c)(i)-(iii).			X		
D.4.c.	**Special Studies Assessments** c. The Copermittees must ***annually evaluate the results and findings from the special studies developed and implemented pursuant to Provision D.3***, and assess their relevance to the Copermittees' efforts to characterize receiving water conditions, understand sources of pollutants and/or stressors, and control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters in the Watershed Management Area. The Copermittees must ***report the results of the special studies assessments applicable to the Watershed Management Area, and identify any necessary modifications or updates to the Water Quality Improvement Plan based on the results in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).	Section 3.2		X		X
D.4.d.	Integrated Assessment of Water Quality Improvement Plan d. As part of the ***iterative approach and adaptive management process*** required for the Water Quality Improvement Plan pursuant to Provision B.5, the Copermittees in each Watershed Management Area must integrate the data collected pursuant to Provisions D.1-D.3, the findings from the assessments required pursuant to Provisions D.4.a-c, and information collected during the implementation of the jurisdictional runoff management programs required pursuant to Provision E to assess the effectiveness of, and identify necessary modifications to, the Water Quality Improvement Plan as follows:	Section 5.2		X		X

Table A-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP Annual Report Section	WQIP Appendix			
			Appendix B Numeric Goals	Appendix C Monitoring	Appendix D Jurisdictional Information	Appendix E Adaptive Management
D.4.d.(1)	(1) The Copermittees ***must re-evaluate the priority water quality conditions and numeric goals for the Watershed Management Area, as needed, during the term of this Order pursuant to Provision B.5.a.*** The re-evaluation and recommendations for modifications to the priority water quality conditions, and/or numeric goals and corresponding schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The priority water quality conditions and numeric goals for the Watershed Management Area must be reevaluated as follows: (a) Re-evaluate the receiving water conditions in the Watershed Management Area in accordance with Provision B.2.a; (b) Re-evaluate the impacts on receiving waters in the Watershed Management Area from MS4 discharges in accordance with Provision B.2.b; (c) Re-evaluate the identification of MS4 sources of pollutants and/or stressors in accordance with Provision B.2.d; (d) Identify beneficial uses of the receiving waters that are protected in accordance with Provision D.4.a; (e) Evaluate the progress toward achieving the interim and final numeric goals for protecting impacted beneficial uses in the receiving waters.	Section 5.2		X		X
D.4.d.(2)	(2) The Copermittees ***must re-evaluate the water quality improvement strategies for the Watershed Management Area during the term of this Order pursuant to Provision B.5.b.*** The re-evaluation and recommendations for modifications to the water quality improvement strategies and schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The water quality improvement strategies for the Watershed Management Area must be re-evaluated as follows: (a) Identify the non-storm water and storm water pollutant loads from the Copermittees' MS4 outfalls in the Watershed Management Area, calculated or estimated pursuant to Provisions D.4.b; (b) Identify the non-storm water and storm water pollutant load reductions, or other improvements to receiving water or water quality conditions, that are necessary to attain the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters; (c) Identify the non-storm water and storm water pollutant load reductions, or other improvements to the quality of MS4 discharges, that are necessary for the Copermittees to demonstrate that non-storm water and storm water discharges from their MS4s are not causing or contributing to exceedances of receiving water limitations; (d) Evaluate the progress of the water quality improvement strategies toward achieving the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters.	Section 5.2			X	X
D.4.d.(3)	(3) The Copermittees ***must re-evaluate and adapt the water quality monitoring and assessment program for the Watershed Management Area when new information becomes available to improve the monitoring and assessment program pursuant to Provision B.5.c.*** The re-evaluation and recommendations for modifications to the monitoring and assessment program ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. Modifications to the water quality monitoring and assessment program must be consistent with the requirements of Provision D.1-D.3. The re-evaluation of the water quality monitoring and assessment program for the Watershed Management Area must consider the data gaps identified by the assessments required pursuant to Provisions D.4.a-b, and results of the special studies implemented pursuant to Provision D.4.c	Section 5.2		X		X
Provision E						
E.1.b.	**b.** With the first ***Water Quality Improvement Plan Annual Report*** *required pursuant to Provision F.3.b.(3),* ***each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority*** within its jurisdiction to implement and enforce each of the requirements contained in this Order.	Cert Statement			X	
E.2.d.(4)	(4) Each Copermittee must submit a ***summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its jurisdiction with each Water Quality Improvement Plan Annual Report required under Provision F.3.b.(3)*** of this Order.			X		

Table A-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP Annual Report Section	WQIP Appendix			
			Appendix B Numeric Goals	Appendix C Monitoring	Appendix D Jurisdictional Information	Appendix E Adaptive Management
E.8.c.	**c.** Each Copermittee must submit a ***summary of the annual fiscal analysis with each Water Quality Improvement Plan Annual Report required pursuant to Provision F.3.b.(3)***.				X	
Provision F						
F.1.b.(6)	(6) During implementation of the Water Quality Improvement Plan the Copermittees must ***correct any deficiencies in the Plan identified by the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report*** following a request by the Board to do so.	Section 5.2				X
F.2.a.(2)	(2) Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the jurisdictional runoff management program document based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;***				X	X
F.2.a.(3)	(3) Each Copermittee must submit ***updates to its jurisdictional runoff management program, with the supporting rationale for the modifications, either in the Water Quality Improvement Plan Annual Report*** required pursuant to Provision F.3.b.(3), or as part of the Report of Waste Discharge required pursuant to Provision F.5.b	Section 5			X	X
F.2.b.(1)	(1) Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provisions E.3.a-d concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the BMP Design Manual based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;***	Section 5.2			X	
F.2.b.(2)	(2) Any ***future updates to the BMP Design Manual*** made after it update pursuant to Provision F.2.b.(1) is completed must be consistent with the requirements of Provisions E.3.a-d and ***must be submitted as part of the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b; and				X	
F.2.c.(1)(c)	(c) The Copermittees for each Watershed Management Area ***must submit 1) proposed updates to the Water Quality Improvement Plan and supporting rationale, and 2) recommendations received from the public and the Water Quality Improvement Consultation Panel and the rationale for the requested updates, either in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b.	Section 5.2				X
F.3.b.(3)(a-f)	(3) Water Quality Improvement Plan Annual Reports - The Copermittees for each Watershed Management Area must ***submit a Water Quality Improvement Plan Annual Report for each reporting period no later than January 31*** of the following year. The annual reporting period consists of two different periods: 1) July 1 to June 30 of the following year for the jurisdictional runoff management programs, 2) October 1 to September 30 of the following year for the monitoring and assessment programs. The Water Quality Improvement Plan Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each ***Annual Report must include the following***:	See below				
	(a) The receiving water and MS4 outfall discharge monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;	Section 3.2		X		
	(b) The progress of the special studies required pursuant to Provision D.3, and the findings, interpretations and conclusions of a special study, or each phase of a special study, upon its completion;	Section 3.2		X		
	(c) The findings, interpretations and conclusions from the assessments required pursuant to Provision D.4;			X		
	(d) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following: (i) The **progress toward achieving the interim and final numeric goals** for the highest water quality priorities for the Watershed Management Area;	Section 4.3				

Table A-1 (continued)
Crosswalk of MS4 Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP Annual Report Section	WQIP Appendix			
			Appendix B Numeric Goals	Appendix C Monitoring	Appendix D Jurisdictional Information	Appendix E Adaptive Management
	(ii) The water quality improvement **strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods**;				X	X
	(iii) The water quality improvement strategies planned for implementation during the next reporting period;				X	X
F.3.b.(3)(a-f) (continued)	(iv) Proposed modifications to the water quality improvement strategies, the public comments received and the supporting rationale for the proposed modifications;	Section 5			X	X
	(v) Previous modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area; and	Section 5.3			X	X
	(vi) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;	Section 5.2			X	X
	(e) A completed Jurisdictional Runoff Management Program Annual Report Form (contained in Attachment D to this Order or a revised form accepted by the San Diego Water Board) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative; and				X	
	(f) Each Copermittee must provide any data or documentation utilized in developing the Water Quality Improvement Plan Annual Report upon request by the San Diego Water Board. Any Copermittee monitoring data utilized in developing the Water Quality Improvement Plan Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN). Any Copermittee monitoring and assessment data utilized in developing the Water Quality Improvement Plan Annual Report must be available for access on the Regional Clearinghouse required pursuant to Provision F.4.			X		
F.6	Each Copermittee must comply with all the reporting and recordkeeping provisions of the Standard Permit Provisions and General Provisions contained in Attachment B to this Order.	Section 6		X		
Attachment E						
Attachment E	Specific Monitoring and Assessment Requirements for each TMDL.TMDL monitoring and assessment results must be submitted as part of Water Quality Improvement Plan Annual Reports required under Provision F.3.b	Section 3.2		X		

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Appendix B: Water Quality Improvement Plan Numeric Goals

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The following sections present final and interim numeric goals by jurisdiction.

B.1 City of Del Mar Goals

Del Mar's Water Quality Improvement Plan interim and final goals for wet and dry weather are presented in Tables B-1 and B-2, respectively.

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Table B-1
Wet Weather Numeric Goals for the City of Del Mar

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY18	FY19	FY24[1]	FY29	FY31[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	43% Days Exceeding WQO (2002 TMDL Model)	See performance measures.	43%[2]	33%	25%	22%
	Enterococcus	49% Days Exceeding WQO (2002 TMDL Model)		49%[2]	36%	26%	22%
	Total coliform	43% Days Exceeding WQO (2002 TMDL Model)		43%[2]	33%	25%	22%
Or							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 98%[3]	See performance measures.	22%	22%	22%	22%
	Enterococcus	**New:** 100%[3]		22%	22%	22%	22%
	Total coliform	**New:** 100%[3]		22%	22%	22%	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	0.5%	0.7%	1.0%	1.5%
	Enterococcus			2.5%	3.9%	6.0%	7.7%
	Total coliform			1.2%	2.2%	3.2%	4.3%

Table B-1 (continued)
Wet Weather Numeric Goals for the City of Del Mar

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year: Current Permit Term (FY14—FY18) FY18	FY 16–20 FY19	FY 21–25 FY24[1]	FY 26–30 FY29	FY 31–36 FY31[1]
Or							
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 1 discharge[4]	See performance measures.	0	0	0	0
Or							
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
	Total coliform		100%	100%	100%	100%	100%
Or							
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge % load reduction (above). Interim compliance is implementation of strategies and schedule (presented in WQIP Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See WQIP Section 4.3.2 for compliance analysis results.					

Table B-1 (continued)
Wet Weather Numeric Goals for the City of Del Mar

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year Current Permit Term (FY14—FY18)
Performance Measures		
Suite of Strategies To Measure Performance During First Permit Term	**Baseline**	**FY18**
Reduce anthropogenic surface dry weather flows[6] to address bacteria regrowth contributing during wet weather	**New:** Average Dry Weather Flow: 0.81 gallons per minute Maximum Dry Weather Flow: 1.5 gallons per minute	10% reduction in anthropogenic surface dry weather flows[6] that originate within the City's jurisdictional boundaries

1. Denotes TMDL interim and final target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceedance frequency.
3. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period.
4. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The term "dry weather flows" excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.

% = percent; FY = fiscal year; WQO = water quality objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-2
Dry Weather Numeric Goals for the City of Del Mar

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14–FY18)	FY 16–20	FY 21–25
			FY18	FY19[1]	FY21[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	11% Days Exceeding WQO (2002[2])	See performance measures.	5.5%	0%
	Enterococcus	17% Days Exceeding WQO (2002[2])		8.5%	0%
	Total coliform	6% Days Exceeding WQO (2002[2])		3%	0%
Or					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 82%[3]	See performance measures.	0%	0%
	Enterococcus	**New:** 100%[3]		0%	0%
	Total coliform	**New:** 100%[3]		0%	0%
Or					
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	10.4%	20.7%
	Enterococcus			41.7%	83.5%
	Total coliform			7.2%	14.4%
Or					
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 1 discharge[4]	See performance measures.	0	0

Table B-2 (continued)
Dry Weather Numeric Goals for the City of Del Mar

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14–FY18)	FY 16–20	FY 21–25
			FY18	FY19[1]	FY21[1]
Or					
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%
	Enterococcus		100%	100%	100%
	Total coliform		100%	100%	100%
Or					
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge % load reduction (above). Interim compliance is implementation of strategies and schedule (presented in WQIP Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See WQIP Section 4.3.2 for compliance analysis results.			

Table B-2 (continued)
Dry Weather Numeric Goals for the City of Del Mar

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		Current Permit Term (FY14–FY18)
Performance Measures		
Suite of Strategies To Measure Performance During First Permit Term	**Baseline**	**FY18**
Reduce anthropogenic surface dry weather flows[6]	**New:** Average Dry Weather Flow: 0.81 gallons per minute Maximum Dry Weather Flow: 1.5 gallons per minute	Reduce anthropogenic surface dry weather water flows[6] that originate within the City's jurisdictional boundaries by 10%

1. Denotes TMDL interim and final target.
2. The existing exceedance frequency was calculated on the basis of available monitoring data between 1996 and 2002 per MS4 Permit requirements and presented in more detail in Appendix H.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Discharges are defined as observed dry weather flows from persistently flowing MS4 outfalls.
5. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The term "dry weather flows" excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.

% = percent; FY = fiscal year; WQO = water quality objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

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B.2 City of Escondido Goals

The City of Escondido's Water Quality Improvement Plan interim and final goals for wet and dry weather are presented in Tables B-3 and B-4, respectively.

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Table B-3
Wet Weather Numeric Goals for the City of Escondido

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY18	FY19	FY24[1]	FY29	FY31[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	43% Days Exceeding WQO (2002 TMDL Model)	See performance measures.	43%[2]	33%	25%	22%
	Enterococcus	49% Days Exceeding WQO (2002 TMDL Model)		49%[2]	36%	26%	22%
	Total coliform	43% Days Exceeding WQO (2002 TMDL Model)		43%[2]	33%	25%	22%
Or							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 98%[3]	See performance measures.	22%	22%	22%	22%
	Enterococcus	**New:** 100%[3]		22%	22%	22%	22%
	Total coliform	**New:** 100%[3]		22%	22%	22%	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	0.5%	0.7%	1.0%	1.5%
	Enterococcus			2.5%	3.9%	6.0%	7.7%
	Total coliform			1.2%	2.2%	3.2%	4.3%

Table B-3 (continued)
Wet Weather Numeric Goals for the City of Escondido

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY18	FY19	FY24[1]	FY29	FY31[1]
Or							
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 1 discharge[4]	See performance measures.	0	0	0	0
Or							
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
	Total coliform		100%	100%	100%	100%	100%
Or							
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge % load reduction (above). Interim compliance is implementation of strategies and schedule (presented in WQIP Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See WQIP Section 4.3.2 for compliance analysis results.					

Table B-3 (continued)
Wet Weather Numeric Goals for the City of Escondido

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		Current Permit Term (FY14–FY18)
Performance Measures		
Suite of Strategies To Measure Performance During First Permit Term	Baseline	FY18
Implement and maintain water quality improvement BMPs to target fecal coliform, *Enterococcus*, total coliform, sediment, and nutrients	0 acres of drainage area treated	4 acres of drainage area treated through restoration of 1 sediment detention basin in a multiuse treatment area at Eagle Scout (formerly Sand) Lake, Kit Carson Park

1. Denotes TMDL interim and final target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceedance frequency.
3. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period.
4. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
5. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WQO = water quality objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-4
Dry Weather Numeric Goals for the City of Escondido

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year Current Permit Term (FY14–FY18)
Performance Measures		
Suite of Strategies To Measure Performance During First Permit Term	**Baseline**	**FY18**
Reduce anthropogenic dry weather flow[1] in priority drainage area with persistent flow by performing special strategies, including property-based inspections for residents and commercial areas	**New:** Average Flow: 6.2 gallons per minute Maximum Flow: 37 gallons per minute	10% anthropogenic dry weather flow[1] reduction at priority outfall (HDG_102)

1. Here and throughout this table, the term "dry weather flows" excludes groundwater and other exempt or permitted non-storm water flows.

% = percent; FY = fiscal year

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B.3 City of Poway Goals

The City of Poway's Water Quality Improvement Plan interim and final goals for wet and dry weather are presented in Tables B-5 and B-6, respectively.

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Table B-5
Wet Weather Numeric Goals for the City of Poway

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY18	FY19	FY24[1]	FY29	FY31[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	43% Days Exceeding WQO (2002 TMDL Model)	See performance measures.	43%[2]	33%	25%	22%
	Enterococcus	49% Days Exceeding WQO (2002 TMDL Model)		49%[2]	36%	26%	22%
	Total coliform	43% Days Exceeding WQO (2002 TMDL Model)		43%[2]	33%	25%	22%
Or							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 98%[3]	See performance measures.	22%	22%	22%	22%
	Enterococcus	**New:** 100%[3]		22%	22%	22%	22%
	Total coliform	**New:** 100%[3]		22%	22%	22%	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	0.5%	0.7%	1.0%	1.5%
	Enterococcus			2.5%	3.9%	6.0%	7.7%
	Total coliform			1.2%	2.2%	3.2%	4.3%
Or							
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 1 discharge[4]	See performance measures.	0	0	0	0

Table B-5 (continued)
Wet Weather Numeric Goals for the City of Poway

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY18	FY19	FY24[1]	FY29	FY31[1]
Or							
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
	Total coliform		100%	100%	100%	100%	100%
Or							
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge % load reduction (above). Interim compliance is implementation of strategies and schedule (presented in WQIP Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See WQIP Section 4.3.2 for compliance analysis results.					

1. Denotes TMDL interim and final target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceedance frequency.
3. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period
4. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
5. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WQO = water quality objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

Table B-6
Dry Weather Numeric Goals for the City of Poway

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year Current Permit Term (FY14–FY18)
Performance Measures		
Suite of Strategies To Measure Performance During First Permit Term	**Baseline**	**FY18**
Turf conversion	**New:** 0 square feet of turf converted	5% increase from the baseline through turf conversion

% = percent; FY = fiscal year

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B.4 City of San Diego Goals

The City of San Diego Water Quality Improvement Plan interim and final goals for wet and dry weather are presented in Tables B-7 and B-8, respectively.

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Table B-7
Wet Weather Numeric Goals for the City of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY18	FY19	FY24[1]	FY29	FY31[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	43% Days Exceeding WQO (2002 TMDL Model)	See performance measures.	43%[2]	33%	25%	22%
	Enterococcus	49% Days Exceeding WQO (2002 TMDL Model)		49%[2]	36%	26%	22%
	Total coliform	43% Days Exceeding WQO (2002 TMDL Model)		43%[2]	33%	25%	22%
Or							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 98%[3]	See performance measures.	22%	22%	22%	22%
	Enterococcus	**New:** 100%[3]		22%	22%	22%	22%
	Total coliform	**New:** 100%[3]		22%	22%	22%	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	0.5%	0.7%	1.0%	1.5%
	Enterococcus			2.5%	3.9%	6.0%	7.7%
	Total coliform			1.2%	2.2%	3.2%	4.3%
Or							
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge % load reduction (above). Interim compliance is implementation of strategies and schedule (presented in WQIP Appendix I) based on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See WQIP Section 4.3.2 for compliance analysis results.					

Table B-7 (continued)
Wet Weather Numeric Goals for the City of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY18	FY19	FY24[1]	FY29	FY31[1]
Or							
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 1 discharge[4]	See performance measures.	0	0	0	0
Or							
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
	Total coliform		100%	100%	100%	100%	100%

Table B-7 (continued)
Wet Weather Numeric Goals for the City of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year Current Permit Term (FY14–FY18)
Performance Measures		
Suite of Strategies To Measure Performance During First Permit Term	**Baseline**	**FY18**
Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	10.6 acres of drainage area treated through construction of 2 green infrastructure BMPs[6]

1. Denotes TMDL interim and final target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceedance frequency.
3. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period
4. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
5. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The 10.6 acres of drainage area treated are associated with 2 green infrastructure projects that will be completed by FY18.

% = percent; FY = fiscal year; WQO = water quality objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-8
Dry Weather Numeric Goals for the City of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25
			FY18	FY19[1]	FY21[1]
Bacteria TMDL Goals (Applicable Below Lake Hodges)					
Receiving Water % Days Exceeding WQO	Fecal coliform	11% Days Exceeding WQO (2002[2])	See performance measures.	5.5%	0%
	Enterococcus	17% Days Exceeding WQO (2002[2])		8.5%	0%
	Total coliform	6% Days Exceeding WQO (2002[2])		3%	0%
Or					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 82%[3]	See performance measures.	0%	0%
	Enterococcus	**New:** 100%[3]		0%	0%
	Total coliform	**New:** 100%[3]		0%	0%
Or					
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	10.4%	20.7%
	Enterococcus			41.7%	83.5%
	Total coliform			7.2%	14.4%

Table B-8 (continued)
Wet Weather Numeric Goals for the City of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25
			FY18	FY19[1]	FY21[1]
Bacteria TMDL Goals (Applicable Below Lake Hodges)					
Or					
MS4 Discharges Implement Accepted Water Quality Improvement Plan		Metric for compliance analysis is MS4 discharge % load reduction (above). Compliance is based on implementation of strategies listed in WQIP Appendix I. See WQIP Section 4.3.2 for analysis results.			
Or					
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 10 discharges[4]	See performance measures.	0	0
Or					
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%
	Enterococcus		100%	100%	100%
	Total coliform		100%	100%	100%

Table B-8 (continued)
Wet Weather Numeric Goals for the City of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year Current Permit Term (FY14–FY18)
Performance Measures (Applicable Below and Above Lake Hodges)		
Suite of Strategies To Measure Performance During First Permit Term	**Baseline**	**FY18**
Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	10.6 acres of drainage area treated through construction of 2 green infrastructure BMPs[6]
Implement runoff reduction programs such as education and outreach, enhanced inspections, rebates[7], and increased enforcement	**New:** Average Dry Weather Flow[8]: 38.6 gallons per minute Maximum Dry Weather Flow[8]: 224.4 gallons per minute	10% reduction in prohibited[9] dry weather flow from baseline measured at persistently flowing outfalls in the WMA

Table B-8 (continued)
Wet Weather Numeric Goals for the City of San Diego

1. Denotes TMDL interim and target.
2. The existing exceedance frequency was calculated on the basis of available monitoring data between 1996 and 2002 per MS4 Permit requirements and presented in more detail in Appendix H.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Discharges are defined as observed dry weather flows from persistently flowing MS4 outfalls.
5. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The 10.6 acres of drainage area treated are associated with 2 green infrastructure projects that will be completed by FY18.
7. City of San Diego rebates include grass replacement, rainwater harvesting, downspout disconnect, and micro-irrigation.
8. Dry weather flow baseline calculations were based on Targeted Dry Weather Flow Outfall Monitoring data from 2009 to 2012. Data are only from outfalls with "persistent flow," defined as: “the presence of flowing, pooled, or ponded water more than 72 hours after a measureable rainfall event of 0.1 inch or greater during three consecutive monitoring and/or inspection events. All other flowing, pooled, or ponded water is considered transient.” Persistently flowing annual averages were computed, and an overall average was computed using all data points in this time period and used for comparison. Note, reported flow values of 0 were present and included in the calculations.
9. Does not include allowable discharges as defined in Provision A and Provision E.2.a of the MS4 Permit.

% = percent; FY = fiscal year; WQO = water quality objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

B.5 City of Solana Beach Goals

City of Solana Beach's Water Quality Improvement Plan interim and final goals for wet and dry weather are presented in Tables B-9 and B-10, respectively.

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Table B-9
Wet Weather Numeric Goals for the City of Solana Beach

<table>
<tr><th colspan="2" rowspan="3">Compliance Pathways</th><th rowspan="3">Baseline</th><th colspan="5">Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term (FY14—FY18)</th><th>FY 16–20</th><th>FY 21–25</th><th>FY 26–30</th><th>FY 31–36</th></tr>
<tr><th>FY18</th><th>FY19</th><th>FY24[1]</th><th>FY29</th><th>FY31[1]</th></tr>
<tr><td rowspan="3">Receiving Water
% Days Exceeding WQO</td><td>Fecal coliform</td><td>43% Days Exceeding WQO (2002 TMDL Model)</td><td rowspan="3">See performance measures.</td><td>43%[2]</td><td>33%</td><td>25%</td><td>22%</td></tr>
<tr><td>Enterococcus</td><td>49% Days Exceeding WQO (2002 TMDL Model)</td><td>49%[2]</td><td>36%</td><td>26%</td><td>22%</td></tr>
<tr><td>Total coliform</td><td>43% Days Exceeding WQO (2002 TMDL Model)</td><td>43%[2]</td><td>33%</td><td>25%</td><td>22%</td></tr>
<tr><td colspan="8">Or</td></tr>
<tr><td rowspan="3">MS4 Discharges
% Days Exceeding WQO</td><td>Fecal coliform</td><td>New: 98%[3]</td><td rowspan="3">See performance measures.</td><td>22%</td><td>22%</td><td>22%</td><td>22%</td></tr>
<tr><td>Enterococcus</td><td>New: 100%[3]</td><td>22%</td><td>22%</td><td>22%</td><td>22%</td></tr>
<tr><td>Total coliform</td><td>New: 100%[3]</td><td>22%</td><td>22%</td><td>22%</td><td>22%</td></tr>
<tr><td colspan="8">Or</td></tr>
<tr><td rowspan="3">MS4 Discharges
% Load Reduction</td><td>Fecal coliform</td><td rowspan="3">0% Load Reduction (2002 TMDL Model)</td><td rowspan="3">See performance measures.</td><td>0.5%</td><td>0.7%</td><td>1.0%</td><td>1.5%</td></tr>
<tr><td>Enterococcus</td><td>2.5%</td><td>3.9%</td><td>6.0%</td><td>7.7%</td></tr>
<tr><td>Total coliform</td><td>1.2%</td><td>2.2%</td><td>3.2%</td><td>4.3%</td></tr>
<tr><td colspan="8">Or</td></tr>
<tr><td># of Direct or Indirect MS4 Discharges to Receiving Water</td><td>Discharges</td><td>New: 1 discharge[4]</td><td>See performance measures.</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Table B-9 (continued)
Wet Weather Numeric Goals for the City of Solana Beach

<table>
<tr><th colspan="2" rowspan="3">Compliance Pathways</th><th rowspan="3">Baseline</th><th colspan="5">Goals by Assessment Period and Fiscal Year</th></tr>
<tr><th>Current Permit Term (FY14—FY18)</th><th>FY 16–20</th><th>FY 21–25</th><th>FY 26–30</th><th>FY 31–36</th></tr>
<tr><th>FY18</th><th>FY19</th><th>FY24[1]</th><th>FY29</th><th>FY31[1]</th></tr>
<tr><td colspan="8">Or</td></tr>
<tr><td rowspan="3">% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]</td><td>Fecal coliform</td><td rowspan="3">Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td></tr>
<tr><td>Enterococcus</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td></tr>
<tr><td>Total coliform</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td></tr>
<tr><td colspan="8">Or</td></tr>
<tr><td colspan="2">MS4 Discharges
Implement Accepted Water Quality Improvement Plan</td><td colspan="6">Metric for compliance analysis is MS4 discharge % load reduction (above). Interim compliance is implementation of strategies and schedule based (presented in WQIP Appendix I) on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.
See WQIP Section 4.3.2 for compliance analysis results.</td></tr>
</table>

Table B-9 (continued)
Wet Weather Numeric Goals for the City of Solana Beach

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year Current Permit Term (FY14–FY18)
Performance Measures		
Suite of Strategies To Measure Performance During First Permit Term	**Baseline**	**FY18**
Design and install diverters at high priority outfalls to treat first flush and low flows	**New:** 0 acres of low flow diverted to the sanitary sewer	40.5 acres of low flows directed to sanitary sewer through construction of 1 diverter at high priority outfall Seascape Sur
Design and construct curb cuts to redirect water from traditional drainage areas to permeable surfaces	**New:** 0 acres of drainage area treated	8 acres of drainage area treated through curb cuts along Highway 101

1. Denotes TMDL interim and final target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceedance frequency.
3. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period
4. Discharges are defined as the number of flowing major MS4 outfalls during wet weather monitoring.
5. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WQO = water quality objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

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Table B-10
Dry Weather Numeric Goals for the City of Solana Beach

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25
			FY18	FY19[1]	FY21[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	11% Days Exceeding WQO (2002[2])	See performance measures.	5.5%	0%
	Enterococcus	17% Days Exceeding WQO (2002[2])		8.5%	0%
	Total coliform	6% Days Exceeding WQO (2002[2])		3%	0%
Or					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 82%[3]	See performance measures.	0%	0%
	Enterococcus	**New:** 100%[3]		0%	0%
	Total coliform	**New:** 100%[3]		0%	0%
Or					
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	10.4%	20.7%
	Enterococcus			41.7%	83.5%
	Total coliform			7.2%	14.4%

Table B-10 (continued)
Dry Weather Numeric Goals for the City of Solana Beach

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25
			FY18	FY19[1]	FY21[1]
Or					
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 0 discharges[4]	See performance measures.	0	0
Or					
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%
	Enterococcus		100%	100%	100%
	Total coliform		100%	100%	100%

Table B-10 (continued)
Dry Weather Numeric Goals for the City of Solana Beach

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		Current Permit Term (FY14–FY18)
Performance Measures		
Suite of Strategies to Measure Performance During First Permit Term	Baseline	FY18
Design and install diverters at high priority outfalls to treat first flush and low flows	**New:** 0 acres of low flow diverted to the sanitary sewer	40.5 acres of low flows directed to sanitary sewer through construction of 1 diverter at high priority outfall Seascape Sur
Design and construct curb cuts to redirect water from traditional drainage areas to permeable surfaces	**New:** 0 acres of drainage area treated	8 acres of drainage area treated through curb cuts along Highway 101

1. Denotes TMDL interim and final target.
2. The existing exceedance frequency was calculated on the basis of available monitoring data between 1996 and 2002 per MS4 Permit requirements and presented in more detail in Appendix H.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Discharges are defined as observed dry weather flows from persistently flowing MS4 outfalls.
5. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WQO = water quality objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

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B.6 County of San Diego WMA Goals

The County of San Diego's Water Quality Improvement Plan interim and final goals for wet and dry weather are presented in Tables B-11 and B-12, respectively.

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Table B-11
Wet Weather Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY18	FY19	FY24	FY28[1]	FY31[1]
Receiving Water % Days Exceeding WQO	Fecal coliform	43% Days Exceeding WQO (2002 TMDL Model)	See performance measures.	43%[2]	40%	33%	22%
	Enterococcus	49% Days Exceeding WQO (2002 TMDL Model)		49%[2]	45%	36%	22%
	Total coliform	43% Days Exceeding WQO (2002 TMDL Model)		43%[2]	40%	33%	22%
Or							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 98%[3]	See performance measures.	22%	22%	22%	22%
	Enterococcus	**New:** 100%[3]		22%	22%	22%	22%
	Total coliform	**New:** 100%[3]		22%	22%	22%	22%
Or							
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	0.5%	0.6%	0.7%	1.5%
	Enterococcus			2.5%	3.0%	3.9%	7.7%
	Total coliform			1.2%	1.5%	2.2%	4.3%
Or							

Table B-11 (continued)
Wet Weather Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year				
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25	FY 26–30	FY 31–36
			FY18	FY19	FY24	FY28[1]	FY31[1]
~~# of Direct or Indirect MS4 Discharges to Receiving Water~~	~~Discharges~~	~~Number of flowing major MS4 outfalls during wet weather monitoring (Section 5.1 of this Water Quality Improvement Plan)~~	~~See performance measures.~~	~~0~~	~~0~~	~~0~~	~~0~~
Or							
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[4]	Fecal coliform	Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%	100%	100%
	Enterococcus		100%	100%	100%	100%	100%
	Total coliform		100%	100%	100%	100%	100%
Or							
MS4 Discharges Implement Accepted Water Quality Improvement Plan.		Metric for compliance analysis is MS4 discharge % load reduction (above). Interim compliance is implementation of strategies and schedule based (presented in WQIP Appendix I) on analysis results. Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment. See WQIP Section 4.3.2 for compliance analysis results.					

Table B-11 (continued)
Wet Weather Numeric Goals for the County of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year
		Current Permit Term (FY14–FY18)
Performance Measures		
Suite of Strategies To Measure Performance During First Permit Term	Baseline	FY18
Reduce baseline bacteria loads from storm drain outfalls to receiving water	Enterococcus Load for MS4-SDC-6 = 1.25E+13 MPN/year (Transitional Monitoring Program FY14)	1% bacteria load reduction from the MS4

1. Denotes TMDL interim and final target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the Responsible Agencies by maintaining the existing wet weather exceedance frequency.
3. Wet weather baseline exceedance rate calculated using targeted and random MS4 wet weather monitoring data from October 1, 2008 through September 30, 2013. Monitoring data were assessed similar to the method outlined in Attachment E.6 of the 2013 MS4 Permit for each monitoring year. The observed wet weather days in exceedance were summed and divided by the total wet weather days in exceedance for the historical 5-year period
4. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WQO = water quality objective

All numeric goals are cumulative from the baseline assessment for each fiscal year.

Table B-12
Dry Weather Numeric Goals for the County of San Diego

Compliance Pathways		**Baseline**	**Goals by Assessment Period and Fiscal Year**		
			Current Permit Term (FY14—FY18)	**FY 16–20**	**FY 21–25**
			FY18	**FY19[1]**	**FY21[1]**
Receiving Water % Days Exceeding WQO	Fecal coliform	11% Days Exceeding WQO (2002[2])	See performance measures.	5.5%	0%
	Enterococcus	17% Days Exceeding WQO (2002[2])		8.5%	0%
	Total coliform	6% Days Exceeding WQO (2002[2])		3%	0%
Or					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	**New:** 82%[3]	See performance measures.	0%	0%
	Enterococcus	**New:** 100%[3]		0%	0%
	Total coliform	**New:** 100%[3]		0%	0%
Or					
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See performance measures.	10.4%	20.7%
	Enterococcus			41.7%	83.5%
	Total coliform			7.2%	14.4%

Table B-12 (continued)
Dry Weather Numeric Goals for the County of San Diego

Compliance Pathways		Baseline	Goals by Assessment Period and Fiscal Year		
			Current Permit Term (FY14—FY18)	FY 16–20	FY 21–25
			FY18	FY19[1]	FY21[1]
Or					
# of Direct or Indirect MS4 Discharges to Receiving Water	Discharges	**New:** 3 discharges[4]	See performance measures.	0	0
Or					
% of Exceedances of Final Receiving Water WQOs Due to Natural Sources[5]	Fecal coliform	**New:** Unknown at this time. A detailed source study that differentiates between human and non-human sources would be needed to establish the baseline.	100%	100%	100%
	Enterococcus		100%	100%	100%
	Total coliform		100%	100%	100%

Table B-12 (continued)
Dry Weather Numeric Goals for the County of San Diego

Compliance Pathways	Baseline	Goals by Assessment Period and Fiscal Year		
		Current Permit Term (FY14–FY18)	FY 16–20	FY 21–25
Performance Measures				
Suite of Strategies To Measure Performance During First Permit Term	Baseline	FY18	FY20	FY21
Eliminate anthropogenic dry weather flows[6] from storm drain outfalls either by aggregate flow volume or the number of persistently flowing outfalls during dry weather	10 of 20 major MS4 outfalls have persistent dry weather flows; average flow rate as measured with continuous flow monitoring equipment = 8.614 gallons per minute	Reduce by 20%	Reduce by 75%	Reduce by 100% anthropogenic dry weather discharges from storm drain outfalls to the receiving water or meet the WQOs in the storm drain discharge.

1. Denotes TMDL interim and final target. Request moving Interim TMDL Compliance Date from April 4, 2016 (per MS4 Permit Attachment E, 6.c(1)) to April 4, 2020, to allow adequate time to investigate and mitigate dry weather flows through the adaptive management process of the Water Quality Improvement Plan.
2. The existing exceedance frequency was calculated on the basis of available monitoring data between 1996 and 2002 per MS4 Permit requirements and presented in more detail in Appendix H.
3. Dry weather baseline exceedance rate calculated using targeted and random MS4 dry weather monitoring data from October 1, 2008 through September 30, 2013. Rolling 5-sample-date geometric means were calculated, beginning with the 5th sample date of each monitoring year. Geometric mean WQOs were applied and the exceedance frequency extrapolated to determine baseline percent of dry weather days in exceedance for the historical 5-year period.
4. Discharges are defined as observed dry weather flows from persistently flowing MS4 outfalls.
5. Demonstration of exceedances of final receiving water limitations due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. Here and throughout this table, the term "dry weather flows" excludes groundwater, other exempt or permitted non-storm water flows, and sanitary sewer overflows.

% = percent; FY = fiscal year; WQO = water quality objective
All numeric goals are cumulative from the baseline assessment for each fiscal year.

Appendix C: Monitoring Results and Assessments

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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
°C	degrees Celsius
≥	greater than or equal to
<	less than
≤	less than or equal to
µg/L	micrograms per liter
µS/cm	micro-Siemens per centimeter
%	percent
303(d) List	Clean Water Act Section 303(d) List of Water Quality Limited Segments
AB 411	California Assembly Bill 411, the Beach Safety Act
Bight ’13	Southern California Bight 2013 Regional Monitoring Survey
BMI	benthic macroinvertebrates
BMP	best management practice
$CaCO_3$	calcium carbonate
CEDEN	California Environmental Data Exchange Network
cf	cubic feet
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeters
Copermittee	Operator of a municipal separate storm sewer system in San Diego County that is party to the MS4 Permit
County	County of San Diego
CPOM	coarse particulate organic matter
CRAM	California Rapid Assessment Method
CSCI	California Stream Condition Index
CTR	California Toxics Rule
CWA	Clean Water Act
DEH	San Diego County Department of Environmental Health
DO	dissolved oxygen
Dup	duplicate
E. coli	*Escherichia coli*

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
EMC	event mean concentration
EPA	United States Environmental Protection Agency Method
EPT	Ephemeroptera, Plecoptera, and Trichoptera taxa
FIB	fecal indicator bacteria
ft^3/sec	cubic feet per second
FY	fiscal year
GIS	geographic information system
HMP	Hydromodification Monitoring Program
HPWQC	highest priority water quality condition
HSA	hydrologic subarea
HU	hydrologic unit
IBI	Index of Biotic Integrity
IC/ID	illicit connection and/or illicit discharge
ID	identification
IDDE	illicit discharge detection and elimination
in	inches
J	Analytical flag for 'Analyte detected above the method detection limit but below the reporting limit'
JRMP	Jurisdictional Runoff Management Program
lb	pounds
LTMS	long-term monitoring station
m	meters
MAP	Monitoring and Assessment Program
MBAS	methylene blue active substance
MDL	method detection limit
mg/L	milligrams per liter
MMI	multi-metric index of biological integrity
MPN	most probable number
MPN/100mL	most probable number per 100 milliliters

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
MS4	Municipal Separate Storm Sewer System
MS4 Permit	San Diego Regional Water Quality Control Board Order No. R9-2013-0001 (amended by Order No. R9-2015-0001 and R9-2015-0100), National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems Draining the Watersheds Within the San Diego Region
N	nitrogen
NA	not analyzed
NA	not applicable
NAL	non-storm water action level
ND	not detected
NPDES	National Pollutant Discharge Elimination System
NSWD	non-storm water discharge
NTU	nephelometric turbidity unit
NWS	National Weather Service
O/E	ratio of observed taxa to expected taxa
P	phosphorus
pMMI	predictive multi-metric index of biotic integrity
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RL	reporting limit
Regional Board	San Diego Regional Water Quality Control Board
Responsible Agency	Responsible Agencies include parties subject to the Bacteria TMDL and participating in this Water Quality Improvement Plan, specifically the Copermittees in the San Dieguito River WMA
RWL	receiving water limitations
SAFIT	Southwest Association of Freshwater Invertebrate Taxonomists

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
SAL	storm water action level
SCCWRP	Southern California Coastal Water Research Project
SM	Standard Method
SMC	Southern California Storm Water Monitoring Coalition
sub-AV	sub area-velocity
SWAMP	Surface Water Ambient Monitoring Program
SWMP	Storm Water Management Plan
SWRCB	California State Water Resources Control Board
TBD	to be determined
TDS	total dissolved solids
TIE	toxicity identification evaluation
TKN	total Kjeldahl nitrogen
TMAR	Transitional Monitoring and Assessment Report
TMDL	Total Maximum Daily Load
TRE	toxicity reduction evaluation
TSS	total suspended solids
TV	tolerance value
USEPA	United States Environmental Protection Agency
WMA	Watershed Management Area
WQBEL	water quality-based effluent limitation
WQIP	Water Quality Improvement Plan
WQO	water quality objective

1 Monitoring and Assessment Program

The Monitoring and Assessment Program (MAP) for the San Dieguito River Watershed Management Area (WMA) is Section 5 of the Water Quality Improvement Plan (WQIP). The MAP incorporates requirements of Provision B and Provision D of the Municipal Separate Storm Sewer System (MS4) Permit (San Diego Regional Water Quality Control Board, 2013) along with the specific monitoring and assessment requirements for the Bacteria Total Maximum Daily Load (TMDL) in Attachment E of the MS4 Permit.

The Monitoring Program includes three major components: (1) the receiving water monitoring program that measures the long-term health of the watershed; (2) the MS4 outfall monitoring program that documents non-storm water flows and measures outfall water quality at selected sites during dry and wet conditions; and (3) special studies that further investigate the highest priority water quality conditions (HPWQCs). Table 1-1 provides an overview of the monitoring that is planned as part of the San Dieguito River WMA MAP and Figure 1-1 shows the locations for the 2015–2016 monitoring year.

This appendix summarizes monitoring data collected during the 2015–2016 monitoring year (October 1, 2015, and September 30, 2016), and data that were not summarized in the 2013–2014 and 2014–2015 Transitional Monitoring and Assessment Program Reports for the San Dieguito River WMA. Data include both receiving water and MS4 outfall monitoring data. Monitoring methodologies were summarized in Section 5 of the San Dieguito River WMA WQIP and were specified in the associated component Monitoring Plans (Project Clean Water, 2016). These documents provide detailed information regarding monitoring locations, monitoring techniques, constituents sampled, and quality assurance/quality control (QA/QC) requirements.

The Assessment Program for the 2015–2016 monitoring year includes only an annual analysis of the monitoring data collected for the 2015–2016 monitoring year. This appendix describes the MS4 Outfall Discharge Assessments (Provision D.4.b), which evaluate both the dry weather data associated with the illicit discharge detection and elimination (IDDE) program collected as part of the Jurisdictional Runoff Management Program (JRMP) program, along with the dry and wet weather MS4 monitoring data collected by the Responsible Agencies. The results of the special studies are also assessed in this appendix. The Receiving Water Assessment (Provision D.4.a) and the Integrated Assessments (D.4.b), as well as assessments of wet weather MS4 outfall discharge temporal trends, will be summarized in the Regional Monitoring and Assessment Report to be submitted with the Report of Waste Discharge in December 2017.

Table 1-1
Water Quality Improvement Plan Monitoring Overview

Monitoring Program			Monitoring Element	Program Schedule[1]				
				2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
Monitoring to Assess Goals and Schedules		Dry/Wet	Varies by goal and jurisdiction	–	–	●	●	●
Receiving Water Monitoring	Long-Term Receiving Water Monitoring	Dry	Conventionals[2], FIB, nutrients, metals, pesticides, toxicity (chronic), possible TIE/TREs, visual observations, field measurements	–	●[3]	–	–	–
Receiving Water Monitoring	Long-Term Receiving Water Monitoring	Dry	Hydromodification (channel conditions, discharge points, habitat integrity, evidence and estimate of erosion and habitat impacts)	–	●[3]	–	–	–
Receiving Water Monitoring	Long-Term Receiving Water Monitoring	Dry	Bioassessment (BMI taxonomy, algae taxonomy, physical habitat characteristics)	–	●[3]	–	–	–
Receiving Water Monitoring	Long-Term Receiving Water Monitoring	Wet	Conventionals[2], FIB, nutrients, metals, pesticides, toxicity (chronic), field measurements	–	●[3]	–	–	–

Table 1-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Program				Monitoring Element	Program Schedule[1]				
					2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
Receiving Water Monitoring (continued)	Regional Monitoring Participation	Bight	Dry	Chemistry, toxicity, benthic infauna	●	–	–	–	●[4]
		SMC	Dry	Bioassessment	●	●	●	●	●
		2011 HMP	Wet	Channel assessments; flow monitoring; sediment transport monitoring	●	●	●	–	–
		AB 411[5]	Dry	FIB	●	●	●	●	●
	Sediment Quality Monitoring	Sediment Quality Monitoring	Dry	Chemistry, toxicity, benthic infauna	●[6]	●	–	–	–
	Bacteria TMDL Monitoring	Bacteria Monitoring Pacific Ocean Shoreline at San Dieguito Lagoon Mouth	Dry	FIB, visual observations, optional field measurements	–	–	●	●	●
			Wet	FIB, visual observations, optional field measurements	–	–	●	●	●

Table 1-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Program			Monitoring Element	Program Schedule[1]				
				2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
MS4 Monitoring	MS4 Field Screening	Dry	Visual: flow condition, presence and assessment of trash in and around the station, IC/IDs, descriptions	●[7]	●[7]	●	●	●
MS4 Monitoring	MS4 Outfall	Dry	Field parameters, conventionals[2], nutrients, metals, FIB	–	–	●	●	●
MS4 Monitoring	MS4 Outfall	Wet	Field parameters, conventionals[2], nutrients, metals, FIB	●[7]	●[7]	●	●	●
Special Studies	San Diego Regional Reference Streams and Beaches	Dry	Field parameters, conventionals[1], FIB, instantaneous flow	2012–2014	●[8]	–	–	–
Special Studies	San Diego Regional Reference Streams and Beaches	Dry	Streams only: nutrients, metals, bioassessment (including physical habitat and chlorophyll a)	2012–2014	–	–	–	–
Special Studies	San Diego Regional Reference Streams and Beaches	Wet	Field parameters, conventionals[1], FIB	2012–2014	●	–	–	–
Special Studies	San Diego Regional Reference Streams and Beaches	Wet	Streams only: nutrients, metals, toxicity, flow, and precipitation (duration of storm)	2012–2014	●	–	–	–

Table 1-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Program			Monitoring Element	Program Schedule[1]				
				2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
Special Studies (continued)	San Dieguito River WMA Bacteria Source Identification and Prioritization Process Special Study	NA	GIS analysis, literature review, data gap analysis	–	–	●	–	–
Special Studies (continued)	Proposed Nutrient Load Characterization for Lake Hodges led by the City of San Diego's Public Utilities Department	TBD	The schedule and program elements of this study are currently under development and elements are described in Section 5.3.	–	–	–	–	●

AB 411 = California Assembly Bill 411; BMI = benthic macroinvertebrates; FIB = fecal indicator bacteria; GIS = geographic information system; HMP = Hydromodification Monitoring Program; IC/ID = illicit connection and/or illicit discharge; ID = identification; MS4 = Municipal Separate Storm Sewer System; NA = not applicable; SMC = Southern California Storm water Monitoring Coalition; TBD = to be determined; TIE = toxicity identification evaluation; TMDL = Total Maximum Daily Load; TRE = toxicity reduction evaluation; WMA = Watershed Management Area

The highlighted cells represent the monitoring that occurred during the October 2015 to September 2016 monitoring year.

1. The MS4 Permit was adopted on May 8, 2013; the MS4 Permit became effective on June 27, 2013. Note that implementation of the programs began when the WQIP was approved in September 2015.
2. Definition of conventionals (conventional parameters) is based on Storm Water Management Plan (SWMP) guidelines.
3. Completed under the Transitional Monitoring Program in accordance with MS4 Permit Provisions D.1.a and D.2.a.
4. The 2018 Southern California Bight Regional Monitoring will occur during the summer of 2018 or 2019.
5. The AB 411 program is not required by the MS4 Permit. Responsible Agencies are using the data to track beach water quality conditions related to the highest priority water quality condition for the WMA.
6. Sediment Quality Monitoring was completed under the 2013 Southern California Bight Regional Monitoring Program.
7. Completed under the Transitional Monitoring Program according to MS4 Permit Provisions D.1.a and D.2.a.
8. Dry weather monitoring at reference streams was completed in spring 2014. Dry weather monitoring at reference beaches began in fall 2014.

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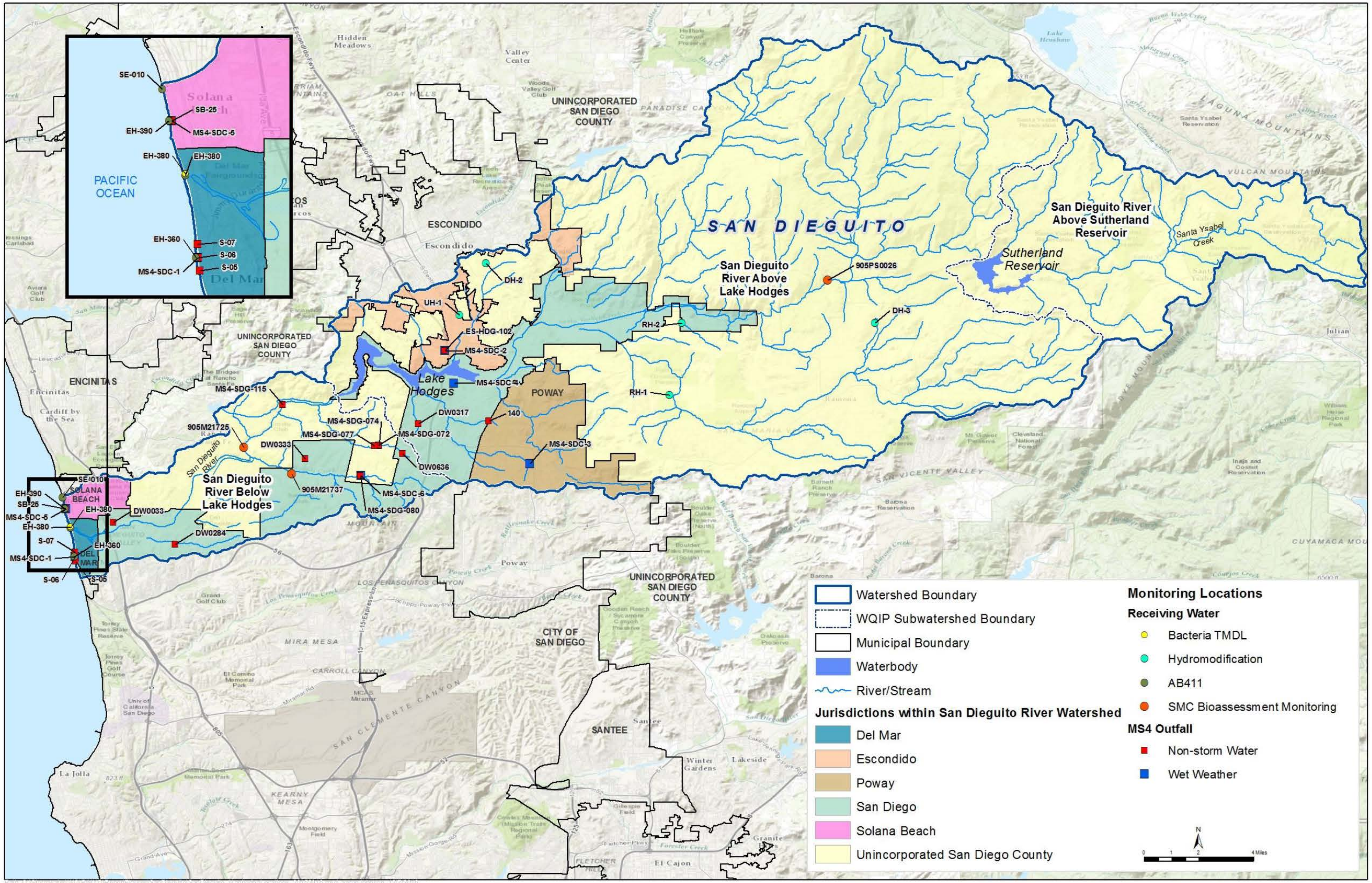

Figure 1-1
2015- 2016 MAP Monitoring Locations for the San Dieguito River WMA

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1.1 2015–2016 Regional Rainfall Summary

Precipitation during the 2015–2016 monitoring year measured at the National Weather Service Lindbergh Field station (GHCND:USW00023188) was compared with average precipitation from 1939–2015. The 2015–2016 observed total of 8.18 inches was slightly less than the average annual total of 9.90 inches. Greater than average rainfall amounts were observed in November 2015, January 2016, May 2016, and September 2016. All other months saw less than average rainfall amounts, including February 2016, which saw much less than the average February (0.05 inch vs. 1.8 inches). Figure 1-2 shows the October 2015 through September 2016 monthly rainfall measured at Lindbergh Field, compared with the average monthly and annual rainfall.

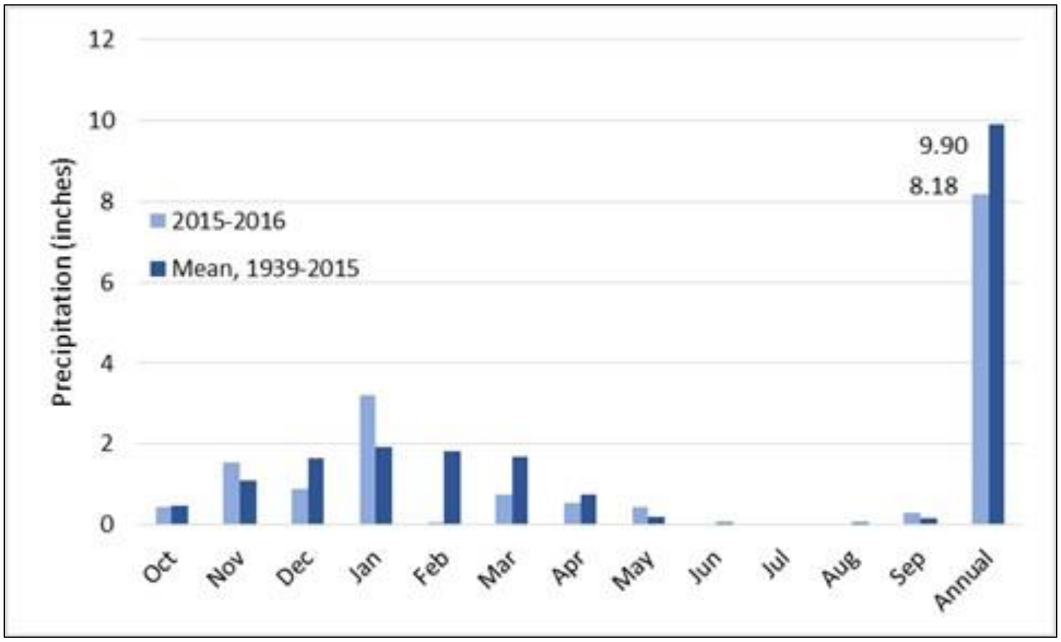

Figure 1-2
2015–2016 Monthly Rainfall vs. Average Monthly Rainfall (Lindbergh Field)

Eighty-four County of San Diego (County) ALERT rain gauges were used to measure rainfall throughout the region during the monitoring year (October 2015 through September 2016). Because the Transitional Monitoring Annual Reports presented rainfall data based on a July through June monitoring year, the July 2015 through September 2015 measured rainfall is also presented to fill the gap between the end of reporting under the transitional program and the beginning of reporting under the WQIP. Going forward, WQIP Annual Reports will present data based on the October through September monitoring year.

July 2015 through September 2015 regional rainfall totals ranged from less than 0.25 inch in the inland deserts to over 5 inches in the mountains. Totals at the coast ranged from approximately 1 inch near the international border with Mexico to over 3 inches in the Mission Bay area. Rainfall in the San Dieguito River WMA ranged from 1.73 inches at the Sutherland Reservoir ALERT station to 5.10 inches at the Ramona ALERT station. Figure 1-3 presents regional rainfall totals from July 2015 through September 2015.

October 2015 through September 2016 regional rainfall totals ranged from less than 1 inch in the inland deserts to over 30 inches in the mountains. Totals at the coast ranged from approximately 7 inches near the international border with Mexico to approximately 12 inches in the northern section of the county. Rainfall in the San Dieguito River WMA ranged from 12.05 inches at the Rancho Bernardo ALERT station to 18.17 inches at the Witch Creek ALERT station. Figure 1-4 presents regional rainfall totals from October 2015 through September 2016.

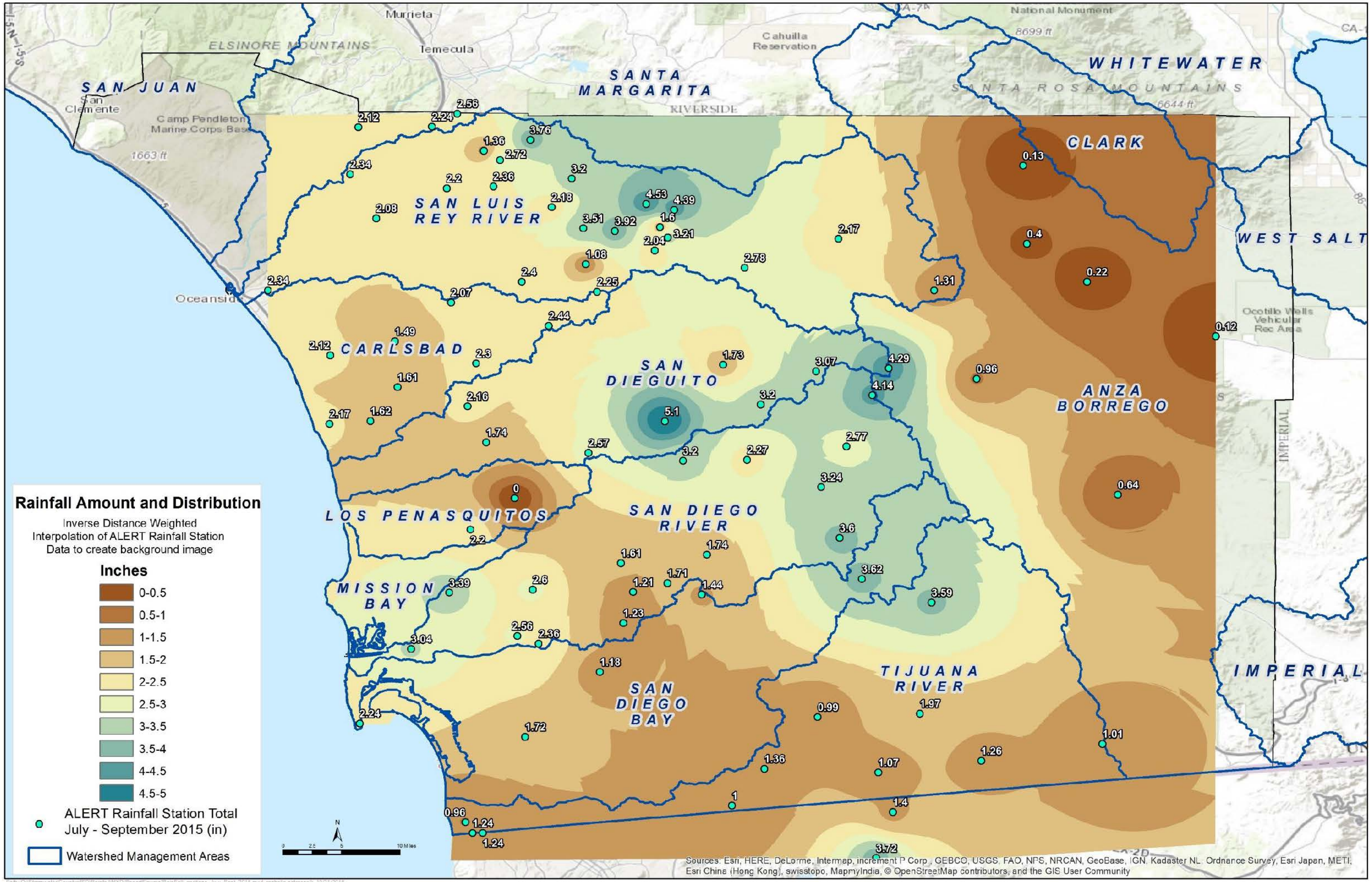

Figure 1-3
July 2015 through September 2015 ALERT Station Rainfall Totals

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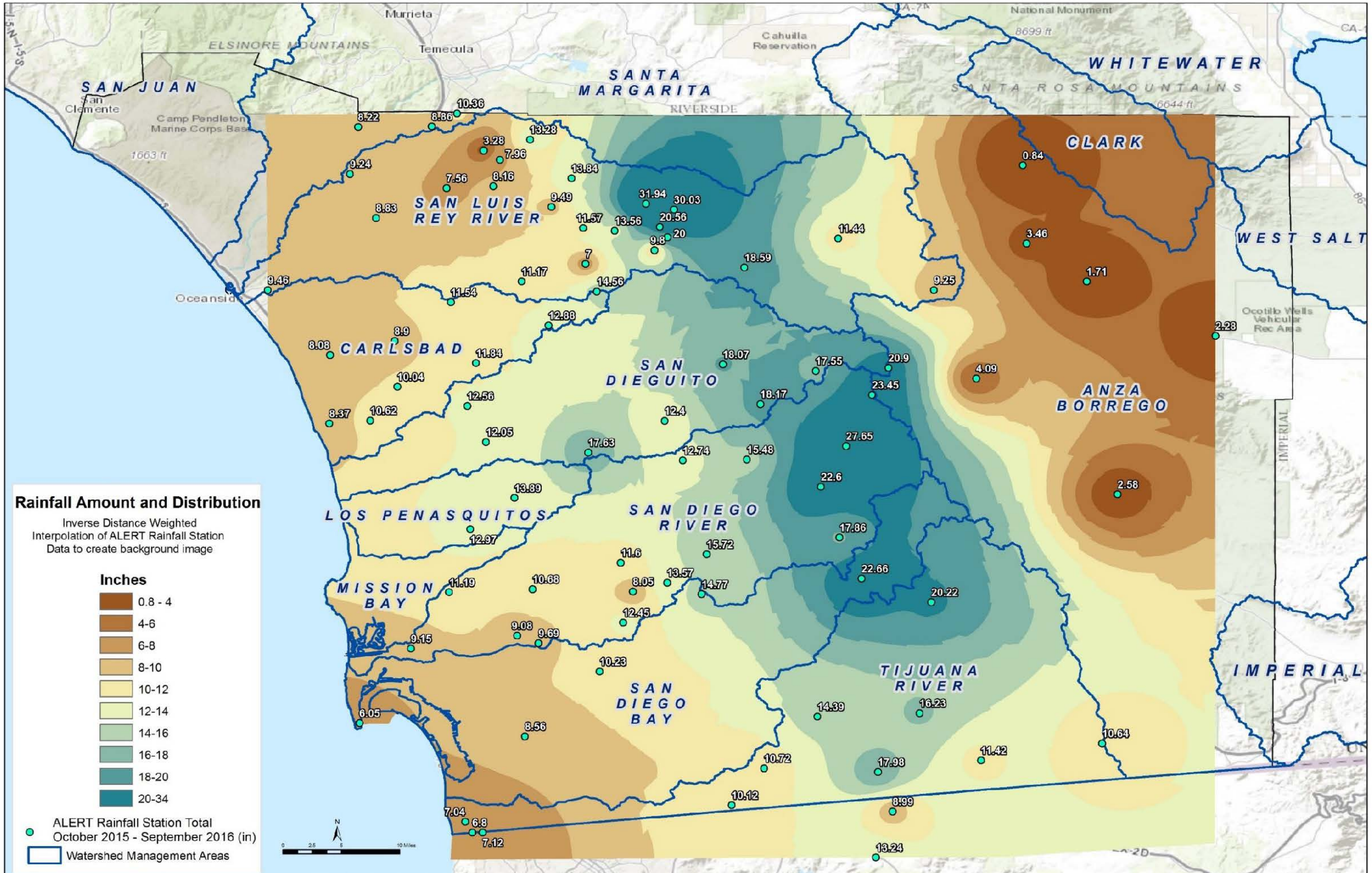

Figure 1-4
October 2015 through September 2016
ALERT Station Rainfall Totals

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1.2 Monitoring Results and Assessments Appendix Organization

This appendix includes the monitoring results and assessments for the San Dieguito River WMA WQIP Annual Report and is organized as follows:

Section 1, Monitoring and Assessment Program—This section provides an overview of the MAP, the monitoring performed during the October 2015 through September 2016 monitoring year, annual rainfall summary, and the assessments included in this appendix.

Section 2, Receiving Water Data Summary—This section describes the monitoring data collected as part of the Receiving Water Monitoring program. Data from various sources were compiled and summarized. Some data were collected during the October 2015 through September 2016 monitoring year, while other data were collected previously but not included in the San Dieguito River WMA Transitional Monitoring Assessment Report submitted in January 2016.

Section 3, Dry Weather Outfall Assessments and Illicit Discharges—This section summarizes the dry weather MS4 Outfall Discharge Assessments (MS4 Permit Provision B.4.b). It includes a comparison with non-storm water action levels (NALs) and assessments required by the MS4 Permit.

Section 4, Wet Weather Outfall Assessments—This section summarizes the wet weather MS4 Outfall Discharge Assessments (MS4 Permit Provision B.4.b). It includes a comparison with storm water action levels (SALs) and assessments required by the MS4 Permit.

Section 5, Special Study Assessments—This section provides an overview of the three special studies completed or in progress in the San Dieguito River WMA, including the San Diego Regional Reference Streams and Beaches Studies, the San Dieguito River WMA Bacteria Source Identification and Prioritization Process Special Study, and the Proposed Nutrient Load Characterization for Lake Hodges Study.

Section 6, California Environmental Data Exchange Network (***CEDEN) Certification Statement Summary***—This section provides a summary of the CEDEN data submittal certifications for the October 2015 through September 2016 monitoring year.

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2 Receiving Water Monitoring Data Summary

Section 2 of the Monitoring Results and Assessments Appendix highlights receiving water data collected as part of the San Dieguito River WMA MAP. Because this is the first Annual Report to be submitted under the San Dieguito River WMA WQIP, data collected since the acceptance of the MS4 Permit in 2013 will be (1) referenced if they have been previously submitted to the Regional Board, (2) summarized if sampling was conducted prior to the October 2015 through September 2016 monitoring year and the data have not been previously submitted to the Regional Board, or (3) summarized in graphical and tabular form as part of this Monitoring Results and Assessments Appendix. As discussed in Section 1, the MS4 Permit Provision D.4.a.(b) requires Receiving Water Assessments to be completed as part of the Report of Waste Discharge in December 2017. The data presented in this appendix will be used to complete those assessments as well as the Integrated Assessment detailed in the MAP.

2.1 Long-Term Receiving Water and Sediment Quality Monitoring Data

The Transitional Receiving Water Monitoring Program completed during the October 2014 through September 2015 monitoring year fulfilled a number of the requirements for long-term monitoring outlined in the MAP. The results of this monitoring were presented in the Transitional Monitoring and Assessment Program Report for the San Dieguito River WMA (2014–2015) (San Diego County Municipal Copermittees, 2016). Results presented included water quality monitoring during dry and wet weather, trash assessments, hydromodification monitoring, and bioassessment at the long-term monitoring stations (LTMS).

As stated in the San Dieguito River WMA WQIP, the Southern California Bight 2013 Regional Monitoring Survey (Bight ’13) Monitoring Program satisfied the initial monitoring requirements of the state's Sediment Control Plan. Up to three sites were monitored in the San Dieguito Lagoon in 2013 for the initial screening of sediment quality. Follow-up monitoring was conducted in summer 2014 to further characterize one site that was possibly impacted. Based on the monitoring and assessment completed, sediment conditions in San Dieguito Lagoon are generally protective of the beneficial uses and are typical of a tidally influenced shallow lagoon (San Diego County Municipal Copermittees, 2014). The Sediment Monitoring Report was provided in the 2015 Transitional Monitoring and Assessment Report in accordance with the MS4 Permit reporting requirements.

2.2 Bight ’13 Regional Monitoring Data

Sediment quality monitoring was conducted during summer 2013 at 22 sites in nine estuaries and lagoons in the San Diego region under Bight ’13 (San Dieguito Responsible Agencies, 2015a). The sediment quality monitoring included sediment chemistry and toxicity. Bight ’13 was used to fulfill the initial monitoring requirements for the Sediment Quality Monitoring requirement of the MS4 Permit that is summarized in Section 2.1.

2.3 Southern California Storm Water Monitoring Coalition (SMC) Monitoring Data

The SMC was formed in 2001 by cooperative agreement of the Phase I municipal storm water National Pollutant Discharge Elimination System (NPDES) lead permittees, the NPDES regulatory agencies in southern California, and the Southern California Coastal Water Research Project (SCCWRP). The purpose of the SMC was to develop the technical information necessary to better understand storm water mechanisms and impacts, and then develop the tools that will effectively and efficiently improve storm water decision making. One area of interest for the SMC was in developing a regional coordinated bioassessment monitoring program for wadeable streams that brought together the various disparate bioassessment programs being performed in southern California. Up until this point, efforts were minimally coordinated and provided only limited information about the health of streams in the region as a result of an emphasis on end-of-watershed monitoring.

To attain a more holistic understanding of the biological health region's watersheds, the SMC initiated a regional bioassessment monitoring program in 2009 using multiple indicators of ecological health, including benthic macroinvertebrates, benthic algae, riparian wetland condition, water chemistry, water column toxicity, and physical habitat.

The SMC bioassessment monitoring program was designed to address three main questions:

1. What is the biological condition of perennial streams in the region?
2. What stressors are associated with poor condition?
3. Are conditions changing over time?

Participation in regional monitoring programs as required under Provision D.1.e.(1) of the MS4 Permit was accomplished through reallocation of permit-required monitoring efforts, and allowed the SMC to develop a cooperative sampling program that was efficient and cost-effective for participants.

Many participants are currently involved in the SMC program:

- County of Los Angeles Department of Public Works
- County of Orange Public Works
- County of San Diego Copermittees
- Riverside County Flood Control and Water Conservation District
- San Bernardino County Flood Control District
- Ventura County Watershed Protection District
- San Gabriel River Regional Monitoring Program
- California Department of Fish and Wildlife
- California Regional Water Quality Control Board, Santa Ana Region

- California Regional Water Quality Control Board, Los Angeles Region
- California Regional Water Quality Control Board, San Diego Region
- State Water Resources Control Board

2.3.1 Stream Bioassessment Methods

Three monitoring reaches were assessed for the SMC Regional Monitoring Program in the San Dieguito River WMA in the 2015–2016 monitoring year (Table 2-1). They include two SMC "Condition" sites identified as 905M21725 in the main stem of the San Dieguito River and 905M21737 in Lusardi Creek, a tributary to the San Dieguito River. Condition sites are those that are randomly selected from the SMC sample draw list each year and are sampled only once during the current five year cycle (2015–2019) to discern an overall condition estimate of the health of streams in the region. The third SMC site, identified as 905PS0026 in upper Santa Ysabel Creek, was considered a "Trend" site and had been previously sampled during the preceding five-year SMC cycle (2009–2013), as well as in 2015. Trend sites are those that have been randomly selected from the preceding five-year SMC cycle (2009–2013) list, and are being sampled each year of the current five year cycle (2015–2019) to evaluate any overall trends in the health of streams in the region. Data from these sites will also be submitted to the SMC program and will be analyzed within the context of the South Coast Region of California.

Table 2-1
San Dieguito River WMA Storm water Monitoring Coalition Regional Monitoring Program Bioassessment Sites for 2015–2016

SMC Region (WMA)	Stream: Location	Site Type	Station Code[1]	Date Sampled	Latitude/ Longitude
Central San Diego (San Dieguito)	Santa Ysabel Creek: In Pamo Valley	Trend (Open)	905PS0026	May 5, 2016	33.10706/ -116.86739
	San Dieguito River: Near the end of Artesian Road	Condition	905M21725	May 17, 2016	33.01796/ -117.17811
	Lusardi Creek: Downstream of Camino del Sur	Condition	905M21737	May 17, 2016	33.00405/ -117.15264

1. Locations can also be found on Figure 1-1.
SMC = Southern California Storm Water Monitoring Coalition; WMA = Watershed Management Area

All bioassessments were performed between May 5 and May 17, 2016, during the appropriate index period for the SMC (May 1 through July 30). Biological condition and physical habitat quality were assessed in the field using the bioassessment protocol adopted by the Surface Water Ambient Monitoring Program (SWAMP) of the California State Water Resources Control Board (SWRCB): *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (Ode, et al., 2016) and the SMC 2015–2019 Work Plan (Mazor, 2015a). The California Rapid Assessment Method (CRAM) scoring followed procedures outlined in *California Rapid Assessment Method for Wetlands, Riverine Wetlands Field Book* (CRAM, 2013).

2.3.1.1 Benthic Community Sampling and Analysis

The sampling team delineated a 150-meter stream “reach” from which samples were collected. The sampling reach was divided into 11 main transects (A, B, C…K) spaced at 15-meter intervals. Transects were established perpendicular to the direction of stream flow (labeled A through K from downstream to upstream), and marked with flags along the stream bank. Inter-transects were established between the 11 main transects (AB, BC, CD…JK), equidistant from the adjacent down and upstream transects and also flagged along the stream bank. Beginning at the downstream end of the sampling reach and progressing upstream, macroinvertebrate and algae samples were collected at each main transect.

Benthic biological community data analysis followed standardized assessment tools adopted by SWAMP. Benthic macroinvertebrates (BMI) were identified according to Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) Level 2 requirements. These data were then analyzed to produce various biological metrics and two different multi-metric indices (MMI) of overall BMI health: (1) Southern California Index of Biotic Integrity (IBI) (Ode et al., 2005), and (2) the California Stream Condition Index (CSCI) (Mazor et al., 2015c).

The recently developed CSCI is included in this appendix to provide a comparative assessment of the BMI communities of the monitoring stations. The CSCI combines two indices of biological condition: (1) a predictive multi-metric index of biotic integrity (pMMI), and (2) a ratio of observed taxa at a site to the expected taxa at a site (O/E); it is calculated as a mean of individual pMMI and O/E scores. This combination improves the accuracy over using the two individually, because both have limitations when assessing unusual BMI assemblages or sites with unique natural conditions.

2.3.1.2 Physical Habitat Data Collection

Measurements of physical habitat characteristics were performed to document local conditions that may affect the stream environment. At each main transect, three measurements of stream size are collected, including wetted width, bankfull width, and bankfull height (each to the nearest centimeter). Wetted width is defined as the width of streambed that is inundated with water at the time of sampling, while bankfull width is defined as the distance between the apparent limits of the stream banks under normal 1- to 2-year storm-flow conditions. Bankfull height is measured from the water level to the height of the bank at bankfull dimensions.

Once these stream size measurements were collected, particle size was recorded at five points along each transect and inter-transect. A measure of overhead canopy cover was taken from the center of each main transect with a handheld densiometer. Riparian vegetation on each bank, human influence, and instream habitat complexity were all recorded using a categorical scoring system.

Following physical habitat observations at each transect, a series of reach-wide characteristics were recorded, including stream sinuosity, gradient, and flow. Sinuosity is a measure of how much a stream meanders, and is expressed as the ratio of actual channel length to straight line reach length. Stream gradient (i.e., slope) was determined across the sampling reach with a hand level and stadia rod using standard surveying practices.

The final habitat characterization task included scoring each station for three parameters: epifaunal cover, sediment deposition, and channel alteration. Stations were scored from 0 to 20 for each of these parameters, with 0 indicating poor conditions and 20 indicating optimal conditions.

2.3.1.3 Water Quality Sample Collection

Prior to entering the stream, the field team collected both water quality (i.e., pH, dissolved oxygen, specific conductivity, temperature, and turbidity) and analytical chemistry samples at the downstream end of the sampling reach. Water quality was assessed using YSI® handheld field meters that had been precalibrated prior to use in the field.

Analytical samples were collected in precleaned bottles provided by the analytical laboratory. When the analytical methods did not require a chemical preservative, the sample bottle was used directly to collect the sample. If the analytical method required preservation, a precleaned bottle was used as a secondary container to collect the sample, which was then transferred to the laboratory-provided analytical container.

Manual grab samples were collected by inserting the precleaned bottle upsidedown into the channel and then inverting at the approximate midway point in the water column with the container opening facing upstream.

2.3.1.4 CRAM Wetland Condition Data Collection

CRAM analysis requires evaluation of the assessment reach in terms of four attributes: buffer and landscape context, hydrology, physical structure, and biotic structure. Each of these attributes is further described as follows:

- Buffer and landscape context – Assesses a riverine system in terms of the continuity of the buffer within 500 meters upstream and downstream and the quality of the buffer immediately surrounding the assessment reach. This attribute measures the ability of wildlife to enter the riparian corridor buffer and easily move within it along the wetland area within 500 meters of the assessment reach. Buffer is defined as an area in a natural or seminatural state that is not currently dedicated to anthropogenic uses that would detract from its ability to protect the assessment reach from stress or disturbance.

- ❖ Hydrology – Assesses the water source and quality, as well as the channel stability and its connection to the surrounding flood plain.
- ❖ Physical structure – Assesses the availability of various habitat patch types and topographical complexity of the channel that indicate the capacity of the riverine system to support characteristic flora and fauna.
- ❖ Biotic structure – Assesses horizontal and vertical plant structure, which measures the number of distinct plant zones in plan-view and the amount of vertical overlap of plant canopy layers. In addition, the species dominance and composition of the plant community within the assessment reach are assessed.

While an overall CRAM numerical score is produced, there is no official threshold or categorical condition rating system for wetland health (i.e., high, medium, low wetland health) based on the overall CRAM score. However, the overall CRAM score can be compared with the distribution of scores from the regional or statewide dataset of ambient surveys for the specific type of wetland being assessed (i.e., riverine nonconfined in this case). The overall condition of a specific wetland can therefore be assessed within the context of a regional distribution as a percentile of such scores collected during similar ambient surveys.

2.3.2 Stream Bioassessment Results

Table 2-2 summarizes IBI and CSCI index scores for the benthic community health and riverine wetland condition scores (i.e., CRAM). More detailed results and additional information on the IBI, CSCI, and CRAM are presented in Attachment A. Tables 2-3 and 2-4 summarize physical habitat and analytical chemistry results, respectively.

Table 2-2
Summary of San Dieguito River WMA Bioassessment Monitoring Site Index Scores, 2016

Stream Name	Station Code	IBI Score	IBI Condition Category	CSCI Score	CSCI Condition Category	Overall CRAM Score	CRAM Score Percentile[1]
Santa Ysabel Creek	905PS0026	44	Fair	0.75	Likely Altered	86	85.2
San Dieguito River	905M21725	13	Very Poor	0.62	Very Likely Altered	75	30.0
Lusardi Creek	905M21737	24	Poor	0.59	Very Likely Altered	82	67.2
	905M21737 Dup	21	Poor	0.67	Likely Altered		

1. Expressed as the percent of all currently available San Diego County ambient survey nonconfined riverine CRAM sites (n=62) with a lower overall CRAM score (Data Source: www.cramwetlands.org)

CRAM = California Rapid Assessment Method; CSCI = California Stream Condition Index; Dup = duplicate; IBI = Index of Biological Integrity

Table 2-3
Summary of San Dieguito River WMA Physical Habitat Measures of SMC Monitoring, 2016

Physical Habitat Measure	Santa Ysabel Creek 905PS0026	San Dieguito River 905M21725	Lusardi Creek 905M21737
Elevation (feet above sea level)	860	48	180
Gradient (% of slope)	0.8%	0.4%	1.7%
Sinuosity Index[1]	1.01	1.03	1.33
Flow Volume (cfs, ft^3/sec)	<0.01	0.3	0.3
Mean Depth (cm)	11.4	11.9	26.7
Mean Wetted Width (m)	1.6	4.5	2.1
Mean Bankfull Width (m)	2.8	24.5	8.0
Epifaunal substrate cover (0–20 scale)[2]	10	7	16
Sediment deposition (0–20 scale)[2]	17	10	18
Channel alteration (0–20 scale)[2]	20	20	20
Bank stability-left bank	Vulnerable/Stable	Vulnerable	Vulnerable/Stable
Bank stability-right bank	Vulnerable/Stable	Vulnerable	Vulnerable/Stable
Average canopy cover (% of reach)	62%	60%	17%
Macroalgal cover (% of reach)	31%	0%	27%
Aquatic macrophyte cover (% of reach)	46%	62%	43%
CPOM presence (% of reach)	51%	95%	64%
Flow Habitats (% of Reach)			
Riffle habitat	1%	3%	23%
Glide habitat	69%	97%	75%
Pool habitat	14%	0%	2%
Dry substrate	17%	0%	0%
Substrate Composition (% of Reach)			
Roots	0%	33%	25%
Fines	10%	41%	18%
Sand	66%	0%	16%
Gravel	5%	5%	10%
Cobble	18%	20%	6%
Boulder	1%	1%	5%
Bedrock	0%	0%	20%

1. 1.0 = strait path, >1.0 to 1.1 = low sinuosity, >1.1 to 1.2 = moderate sinuosity, >1.2 to 1.5 = high sinuosity.
2. 0-20 scale, where 0 represents poor conditions and 20 represents optimal conditions.

< = less than; % = percent; cfs = cubic feet per second; cm = centimeters; CPOM = coarse particulate organic matter; ft^3/sec = cubic feet per second; m = meters

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Table 2-4
Summary of San Dieguito River WMA Analytical Chemistry Results for SMC Monitoring, 2016

Constituent	Method	Units	WQO[1]	MDL	RL	Sample Type	San Dieguito River 905M21725	Lusardi Creek 905M21737	Lusardi Creek 905M21737 Dup	Santa Ysabel Creek 905PS0026
Water Temperature	NA	°C	NA	–	–	Point	17.3	16.9	NA	16.7
pH	NA	units	6.5-9.0	–	–	Point	7.61	8.03	NA	8.98
Dissolved Oxygen	NA	mg/L	<6.0	–	–	Point	2.7	6.8	NA	3.6
Specific Conductance	NA	µS/cm	NA	–	–	Point	1,059	3,668	NA	1,370
Turbidity	NA	NTU	20	–	–	Point	5.8	2.2	NA	2.4
Alkalinity as CaCO3	SM 2320 B	mg/L	NA	0.56	10	Grab	270	280	280	330
Ammonia as N	EPA 350.1	mg/L	NA	0.048	0.10	Grab	ND	ND	ND	ND
Calcium	EPA 200.7	mg/L		0.0160	0.100	Grab	202	213	212	85.2
Chloride	EPA 300.0	mg/L	250	1.0-2.5	10-12	Grab	780	810	810	270
Hardness as CaCO3	EPA 200.7	mg/L	250	0.0894	0.662	Grab	932	952	945	398
Magnesium	EPA 200.7	mg/L	0.05	0.0120	0.100	Grab	104	102	101	45.1
Nitrate + Nitrite as N	EPA 353.2	µg/L	NA	10	100	Grab	23J	40J	ND	ND
Nitrate as N	EPA 353.2	mg/L	10	0.041	0.10	Grab	ND	ND	ND	ND
Nitrite as N	EPA 353.2	µg/L	1	10	100	Grab	ND	ND	ND	ND
Nitrogen, Total	Calculation	mg/L	1	0.060	0.20	Grab	1.1	0.96	0.85	0.65
Nitrogen, Total Kjeldahl	EPA 351.2	mg/L	NA	0.050	0.10	Grab	1.1	0.92	0.85	0.65
Orthophosphate as P	EPA 365.3	mg/L	NA	0.00083	0.010	Grab	0.090	0.15	0.14	0.021
Phosphorus as P	EPA 365.3	mg/L	0.1	0.00083	0.010	Grab	0.085	0.086	0.12	0.079

Table 2-4 (continued)
Summary of San Dieguito River WMA Analytical Chemistry Results for SMC Monitoring, 2016

Constituent	Method	Units	WQO[1]	MDL	RL	Sample Type	San Dieguito River 905M21725	Lusardi Creek 905M21737	Lusardi Creek 905M21737 Dup	Santa Ysabel Creek 905PS0026
Sulfate	EPA 300.0	mg/L	250	1.0-2.5	5.0-12	Grab	380	400	390	63
Total Suspended Solids	SM 2540 D	mg/L	58	0.5	5	Grab	20	1J	1J	23

1. San Diego Region Basin Plan (Regional Board, 1994)

°C = degrees Celsius; µS/cm = micro-Siemens per centimeter; $CaCO_3$ = calcium carbonate; Dup = duplicate; EPA = United States Environmental Protection Agency Method; J = estimate; MDL = method detection limit; mg/L = milligrams per liter; N = nitrogen; NA = not applicable field measurement; ND = not detected; NTU = nephelometric turbidity unit; P = phosphorus; RL = reporting limit; SM = Standard Method

Santa Ysabel Creek in Pamo Valley (905PS0026)

Santa Ysabel Creek (905PS0026) had an IBI score of 44 (Fair) and a CSCI score of 0.75 (Likely Altered). The IBI rating indicated an unimpaired BMI community (an IBI score of less than or equal to [≤] 39 is considered impaired), while the CSCI score indicated slightly lower quality biotic conditions (a CSCI score of less than [<] 0.79 is considered impaired). Individual metrics of the BMI community were variable, with some aspects of the community indicating high quality conditions (e.g., a high diversity of beetles) while others did not (e.g., a high percent of tolerant taxa and a low number of Ephemeroptera, Plecoptera, and Trichoptera EPT) taxa). The site did support some sensitive BMI, albeit in low abundance.

Figure 2-1
Santa Ysabel Creek (905PS0026) Transect F Looking Downstream

The riverine wetland condition of Santa Ysabel Creek, shown in Figure 2-1, was of good quality according to the CRAM analysis, with an overall CRAM score of 86 of a possible 100 points. Every CRAM attribute metric scored an A or B, the two highest rating categories. The CRAM score at Santa Ysabel Creek fell into the 85th percentile of the ambient survey distribution within the County, indicating that this site scored better than 85 percent of all nonconfined riverine sites that have been assessed within the County during ambient monitoring surveys.

Stream flow at the time of sampling was low and some short segments of the monitoring reach were dry. The streambed and riparian corridor were mostly undisturbed, with some evidence of cattle grazing upstream of the monitoring reach and an unpaved forest service road approximately 50 meters south of the streambed. The banks were predicted to be stable under normal stormflows, but some areas would be vulnerable to erosion under high flows. The vegetation was dominated by native species, with good coverage in all vegetative layers, and a reach-wide overhead canopy cover of 62 percent (%).

Macroalgal and aquatic macrophyte coverage were moderate, with a substantial amount of coarse particulate organic matter (CPOM) (a food source for BMI) in the streambed. The substrate was dominated by sand (66%) and cobble (18%). Flow habitats primarily consisted of glides (shallow, slow) and pools (deep, slow).

The results of the physical water quality and analytical chemistry are presented in Table 2-8. None of the measured parameters were at levels that would limit BMI colonization, with the possible exception of dissolved oxygen (DO), which had a value of 3.6 milligrams per liter (mg/L). Specific conductance was slightly elevated relative to most reference streams, with a value of 1,370 micro-Siemens per centimeter (µS/cm).

San Dieguito River at Artesian Road (905M21725)

The San Dieguito River site had IBI and CSCI scores that indicated a degraded BMI community. The site had an IBI score of 13 (Very Poor) and a CSCI score of 0.62 (Very Likely Altered). All metrics of the BMI community consistently indicated poor biotic integrity. The community was dominated by Dipteran taxa (true flies), which composed 67% of the taxa; a single EPT taxon was collected (*Baetis adonis*) and no beetles. There were no sensitive BMI collected, although many taxa had moderate tolerance values (TV = 4-6) which indicated that the site was likely not exposed to severe chemical pollutants.

The riverine wetland condition of the San Dieguito River monitoring reach was moderate, as shown in Figure 2-2, with a CRAM score of 75 of 100 possible points. The site was rated high for buffer and most vegetation characteristics (slightly elevated percent invasive species), but was rated lower for water source and diversity of habitat types (i.e., structural patch richness and topographic complexity). The CRAM score at the San Dieguito River site fell into the 30th percentile of the ambient survey distribution within the County, indicating that this site scored better than 30 percent of all non-confined riverine sites that have been assessed within the County during ambient monitoring surveys.

The reach was in a low gradient segment of the river, and flow was dominated by glide habitat (97%) with a flow volume of 0.3 cubic feet per second (cfs). The banks were predicted to be stable under normal 1- to 2-year storm events, but many areas would be vulnerable to erosion under high flows, and it is possible that in a year with heavy rainfall, some of the aquatic macrophyte growth could be scoured from the streambed to expose more cobble substrate. Overhead canopy exhibited 60% coverage across the reach and macrolagal cover was nearly absent. Aquatic macrophytes were very abundant within the streambed, sometimes forming dense stands with a mix of cattails, sedges, and watercress. CPOM was detected at 95% of the transect points assessed. Substrate was composed primarily of fine sediments and roots of the aquatic macrophytes, with some small sections of cobble.

Figure 2-2
San Dieguito River (905M21725) Transect K Looking Upstream

The results of the physical water quality and analytical chemistry indicated that chloride and sulfate concentrations were slightly elevated above that typically observed in reference streams of southern California, at 780 mg/L and 380 mg/L, respectively. These two analytes were identified in the SMC Regional Monitoring Program report to be high priority regional stressors to BMI (Mazor, 2015b), with the potential to limit BMI colonization. The concentration of dissolved oxygen was also relatively low, with a value of 2.7 mg/L.

Lusardi Creek Downstream of Camino del Sur (905M21737)

The Lusardi Creek site was sampled in duplicate for BMI, as required under the SMC Regional Monitoring Program. The site exhibited IBI and CSCI scores that indicated a moderately degraded BMI community for both duplicate samples. The site had IBI scores of 24 and 21 (Poor) and CSCI scores of 0.59 and 0.67 (Very Likely Altered and Likely Altered, respectively). BMI metrics indicated that some aspects of the community were in moderate condition, with a total of four EPT taxa that included the sensitive caddisfly, *Tinodes* sp. The community also had relatively high IBI metric scores for the percent of non-insect taxa, plus an overall low abundance of non-insect individuals, further indicating relatively good biotic conditions relative to typical urban influenced streams.

The riverine wetland condition of the Lusardi Creek monitoring reach was good, shown in Figure 2-3, with an overall CRAM score of 82 of 100 possible points. The site was in an undeveloped open space preserve with a natural streambed and bank and a limited-access, unpaved road just south of the stream. The reach was rated low for three CRAM attributes, including water source (typical in an urbanized setting), a low hydrologic connectivity to the active floodplain, and limited vertical biotic structure (overlap of plant canopy layers). The CRAM score at the Lusardi Creek site fell into the 67th percentile of the ambient survey distribution within the County, indicating that this site scored better than 67% of all nonconfined riverine sites that have been assessed within the County during ambient monitoring surveys.

Figure 2-3
Lusardi Creek (905M21737) Transect F Looking Upstream

The banks showed evidence of a relatively recent fire, but were otherwise dominated by native vegetation. Flow volume was 0.3 cfs, and the 1.7% stream gradient made riffle habitat abundant (23% of the flow habitat within the reach). The rocky geology of the reach created mostly stable banks, but likely inhibited the establishment of tall riparian vegetation, with canopy cover directly over the stream comprising only 17% of the reach. Macroalgal and aquatic macrophyte reach-wide coverage was 27% and 43%, respectively, and CPOM was observed at 64% of the transect points. With five of the seven general substrate types exceeding 10% coverage, substrate types were diverse; however, the dominant types were roots (25%) and bedrock (20%).

The results of the physical water quality and chemistry analysis indicated that chloride and sulfate concentrations were slightly elevated above those typically observed in reference streams of southern California, at 810 mg/L and 400 mg/L, respectively, and could potentially limit BMI colonization. A specific conductance of 3,668 µS/cm was also measured, which is above the known tolerance of many sensitive BMI. The DO concentration was higher at this stream (6.8 mg/L) than at the other two streams monitored, likely a result of the increased riffle flow habitat.

2.4 California Assembly Bill 411 (AB 411) Data

San Diego County Department of Environmental Health (DEH) implements the Beach and Bay Water Quality Monitoring Program to support the statewide program funded by the Beach Safety Act (AB 411). This program is commonly referred to as AB 411 monitoring. There are three AB 411 beach monitoring stations in the San Dieguito River WMA. The AB 411 monitoring program is not required by the MS4 Permit. Responsible Agencies are using the AB 411 data to track dry weather beach water quality conditions related to the HPWQC for the watershed (San Dieguito Responsible Agencies, 2015a).

The number of samples for the period between October 1, 2015, and July 31, 2015, collected for each fecal indicator bacteria (FIB) indicator (E*nterococcus*, fecal coliform, and total coliform) is presented in Table 2-5.

Table 2-5
San Dieguito River WMA AB411 Data Summary

Site ID	Location[1]	Total Number of Samples		
		Enterococcus	Fecal Coliform	Total Coliform
EH-360	15th Street near outlet	48	47	47
EH-380	San Dieguito River outlet	116	115	115
EH-390	Seascape near outlet	28	28	28

1. Figure 1-1 shows the locations of the AB 411 Monitoring Locations.

ID = identification

The concentrations for the FIB indicators are shown in Figures 2-4 through 2-12. These data will be reviewed during the Receiving Water Assessment completed in the Regional Monitoring and Assessment Report.

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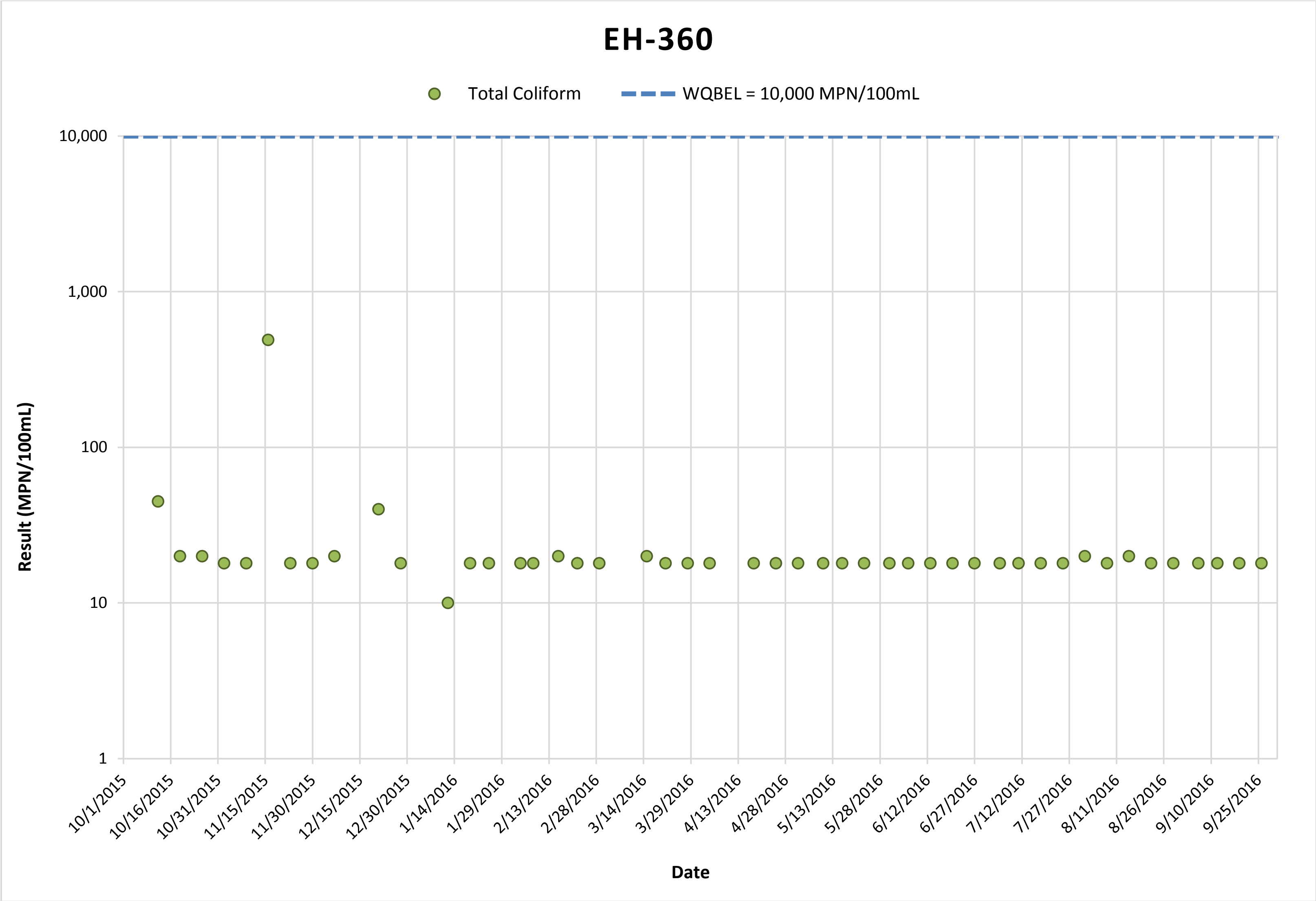

Figure 2-4
Total Coliform Concentrations at AB 411 Site EH-360

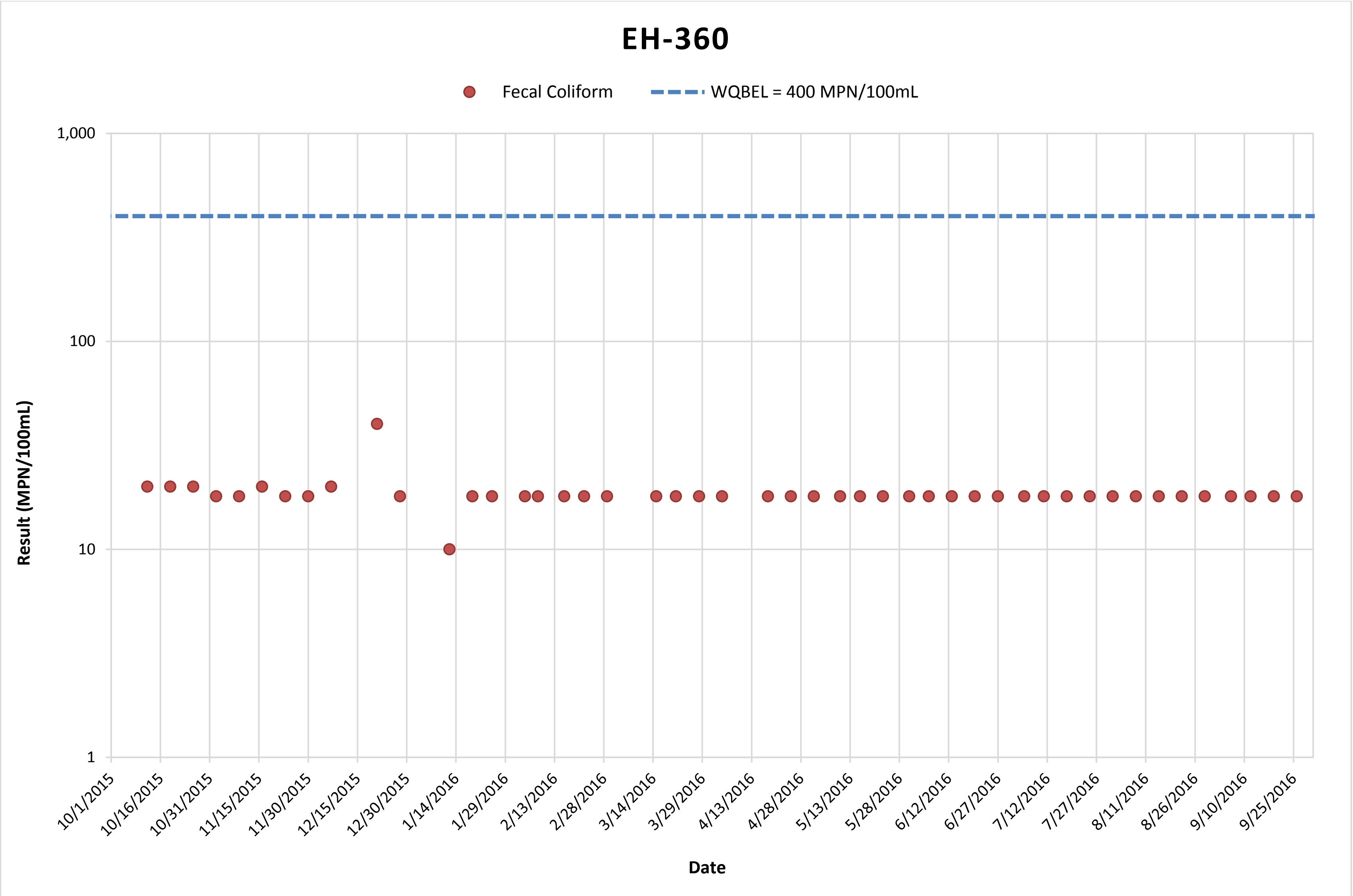

Figure 2-5
Fecal Coliform Concentrations at AB 411 Site EH-360

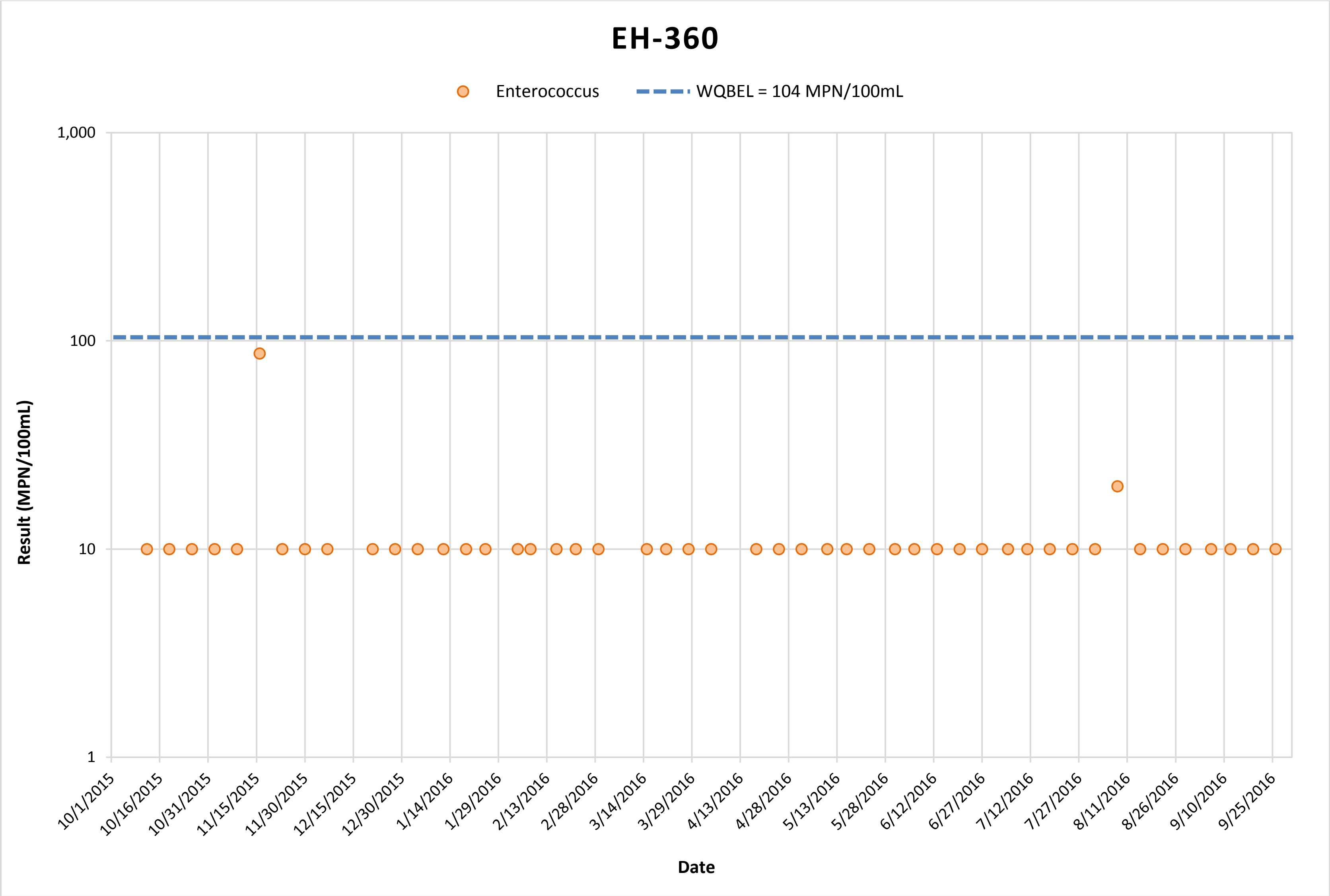

Figure 2-6
***Enterococcus* Concentrations at AB 411 Site EH-360**

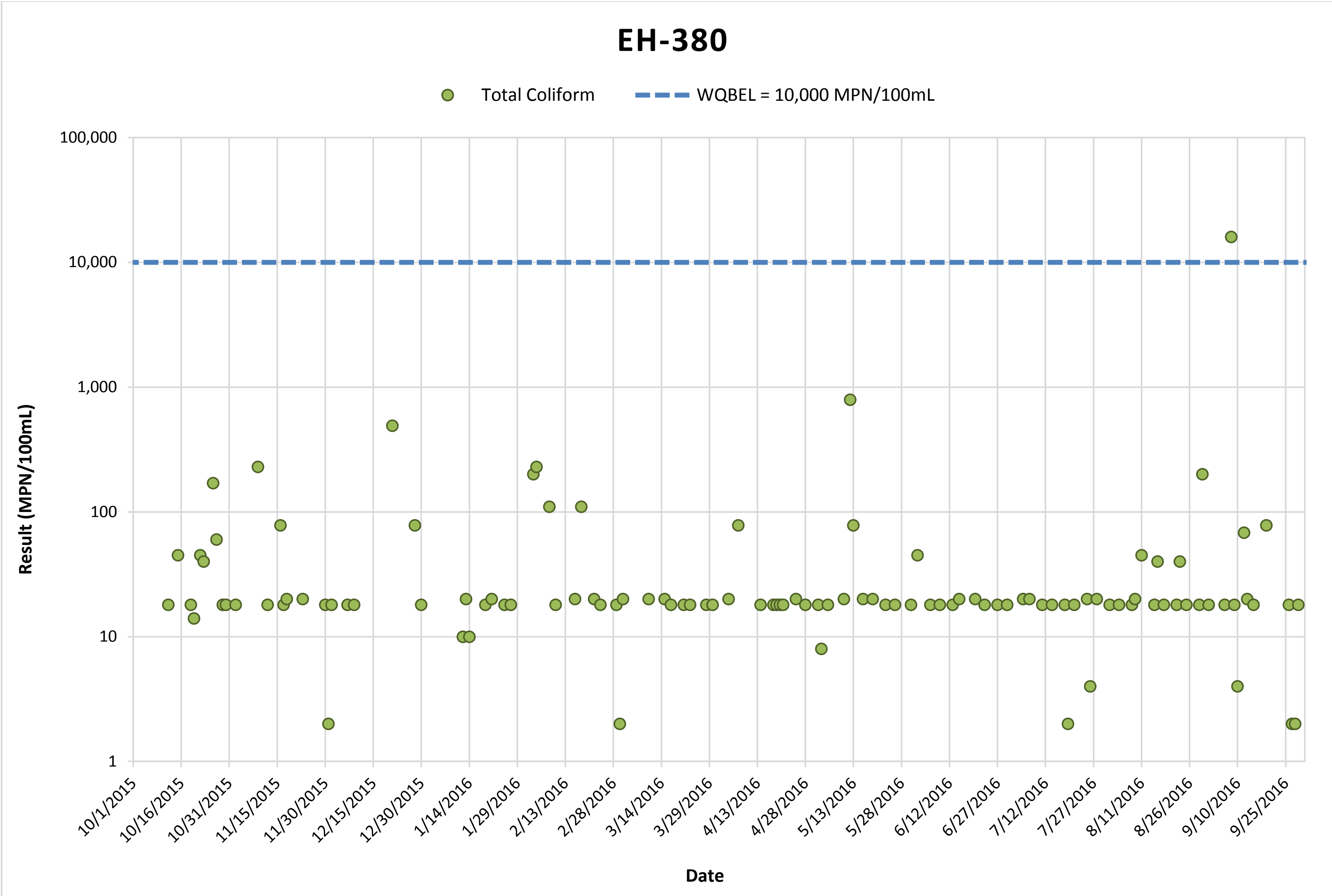

Figure 2-7
Total Coliform Concentrations at AB 411 Site EH-380

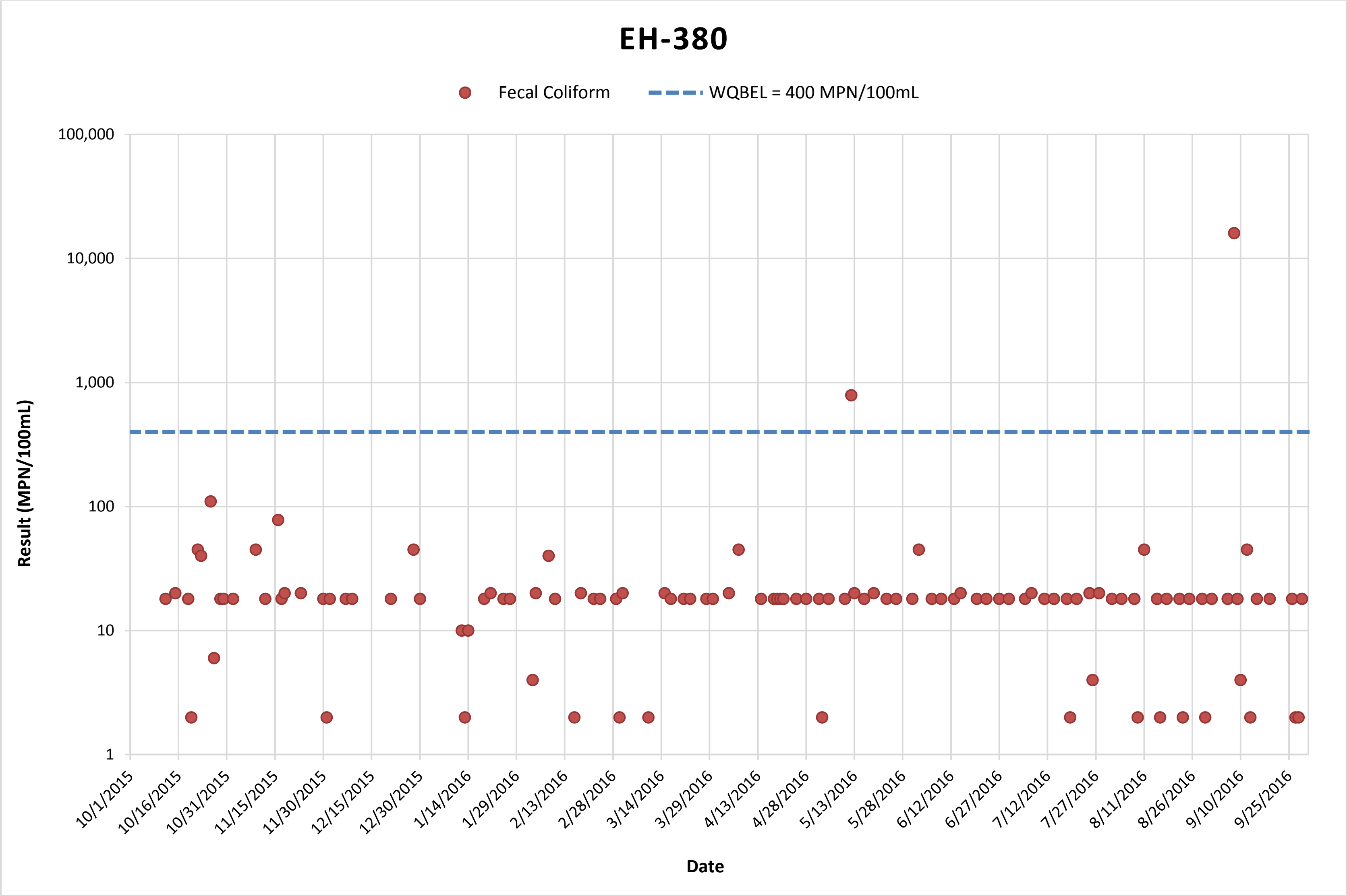

Figure 2-8
Fecal Coliform Concentrations at AB 411 Site EH-380

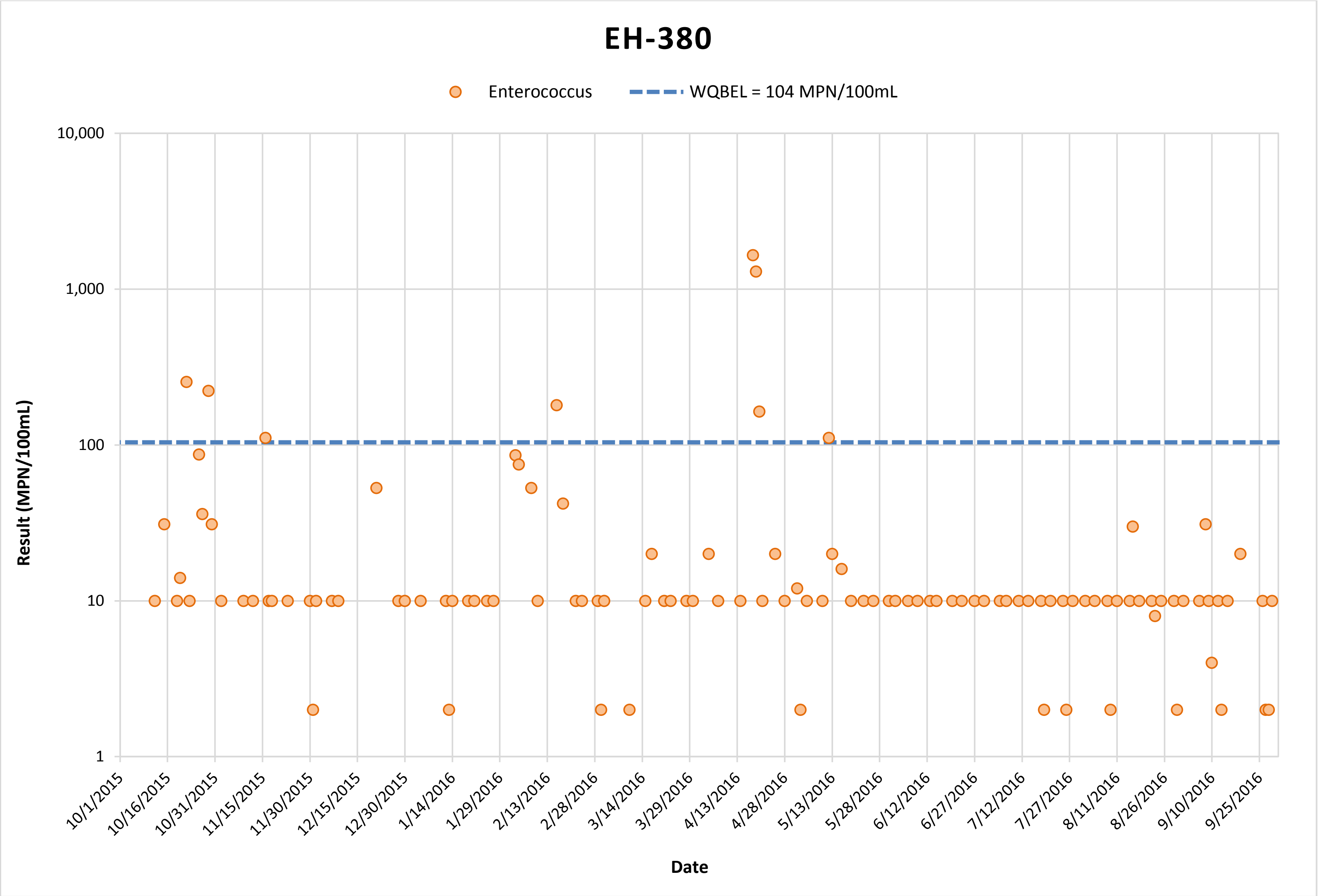

Figure 2-9
***Enterococcus* Concentrations at AB 411 Site EH-380**

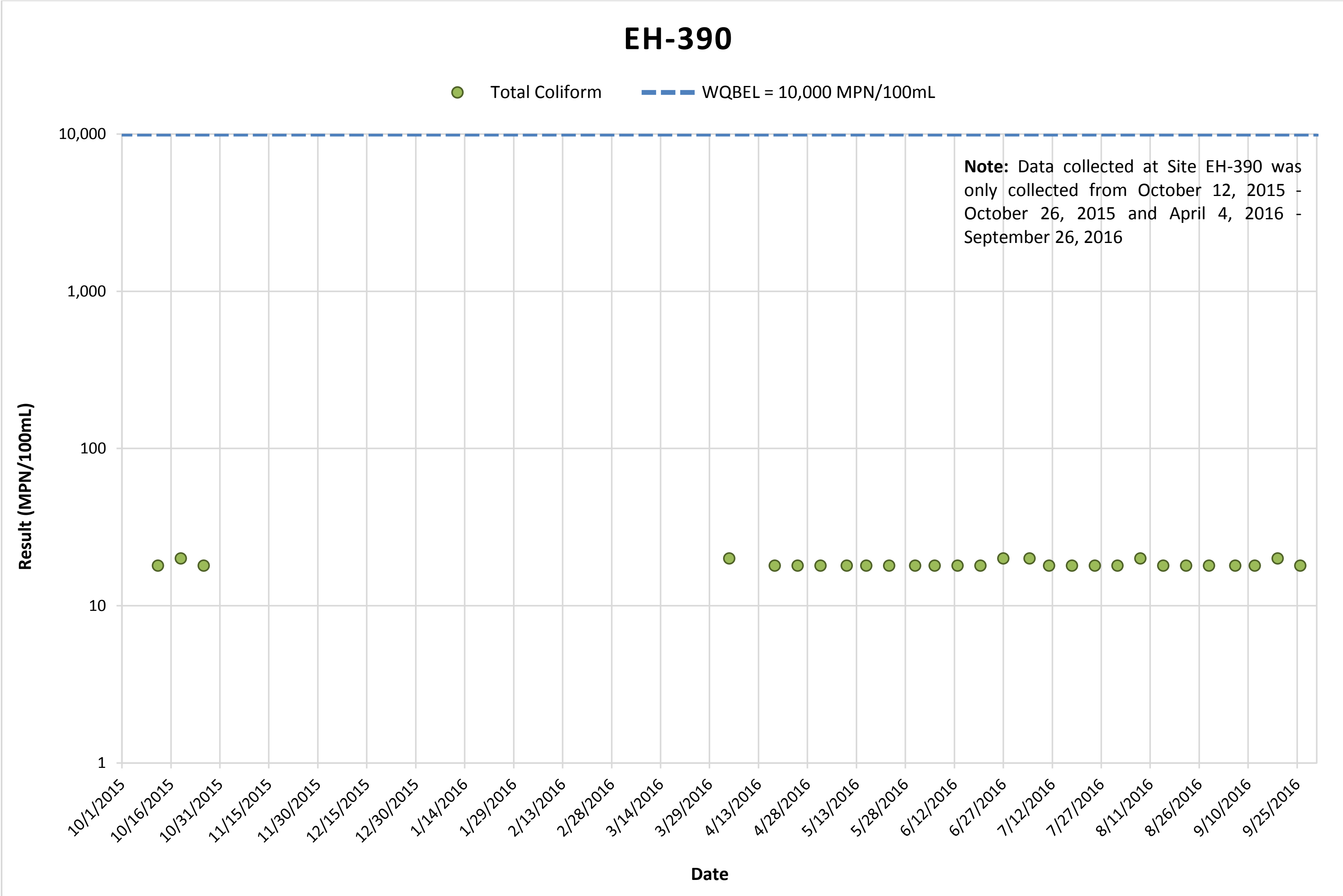

Figure 2-10
Total Coliform Concentrations at AB 411 Site EH-390

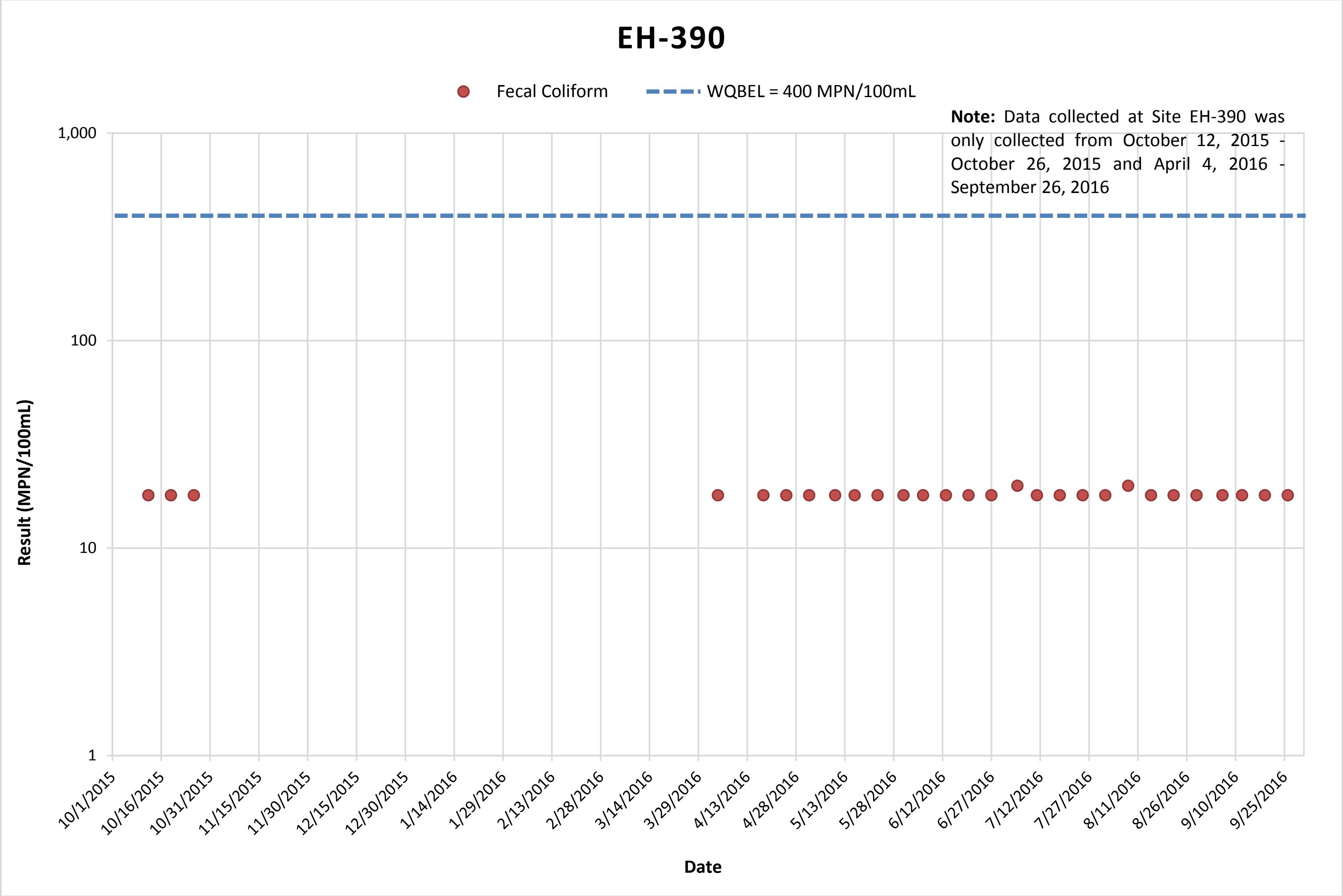

Figure 2-11
Fecal Coliform Concentrations at AB 411 Site EH-390

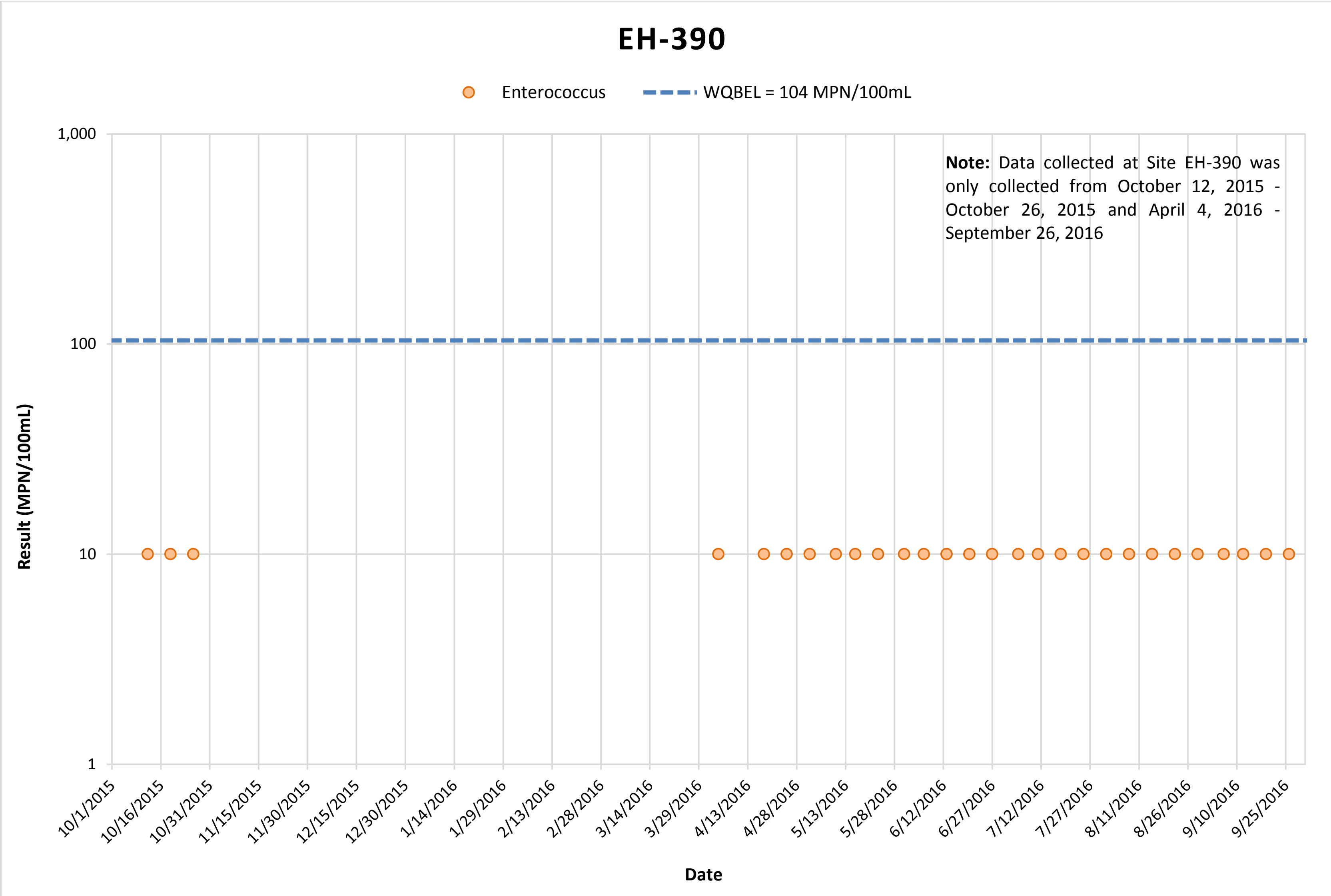

Figure 2-12
***Enterococcus* Concentrations at AB 411 Site EH-390**

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2.5 Hydromodification Monitoring Program

The Hydromodification Monitoring Program (HMP) was initially developed in response to the requirements of the 2007 MS4 Permit. The Monitoring Plan is defined in Chapter 8 of the HMP, and was updated by the San Diego County Regional Copermittees and accepted by the Regional Board in February 2014. The Effectiveness Assessment of the San Diego HMP Report was submitted to the Regional Board in December 2016.

The Effectiveness Assessment of the San Diego HMP attempts to determine whether the requirements were fully met in the checklist in Chapter 8 of the HMP. Monitoring results and program evaluations indicate that the HMP elements are protecting stream physical integrity (Regional Board, 2016). Additionally, the report provides answers regionally to three questions:

1. Do field observations confirm that the HMP appropriately defines the flow rate (expressed as a function of the 2-year runoff event) that initiates the movement of channel bed and bank material? The Effectiveness Assessment determined that the HMP does appropriately define the flow rate that initiates movement of channel bed and bank materials (Regional Board, 2016).

2. Are hydromodification mitigation facilities adequately meeting flow duration design criteria outlined in the HMP? The initial plan for this phase of the assessment was to couple BMP monitoring and channel monitoring. The slow pace of development during the economic recession in the first few years of the project did not allow for this to happen. The study plan was changed and one best management practice (BMP) location was monitored during the 2015–2016 wet season for flow. Analysis for this one location over the year showed that significant peak flow attenuation occurred and, during the monitored events, the BMP performed as designed to prevent hydromodification (Regional Board, 2016).

3. What is the effect of development on receiving water channel cross-section stability downstream of urban development? The Effectiveness Assessment found that there were no major changes in channel stability within the nine monitored sites during the monitoring period, which included a relatively dry period due to drought conditions (Regional Board, 2016).

The report provided details of the small changes in channel geomorphology for the five sites located in the San Dieguito WMA, as summarized in Table 2-6.

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Table 2-6
San Dieguito River WMA HMP Monitoring Site Summary

Site Name and Number	HMP Monitoring Type	Evidence of Erosion/ Deposition?	Repeat Assessment?	Susceptibility Class Changed?	Notes and interpretation. Is change (if observed) indicative of instability in channel or watershed?
Ramona RH-1	Reference	2–4 inches of deposition in long profile, no change in cross-section	Yes	No	Fine sediment from watershed has formed a thin layer on the channel bed over original bed (also sand). Appears to be cyclical deposition, potentially sheet wash from the surrounding former floodplain terrace, likely to be washed out in subsequent years. Site appears stable.
Schoolhouse RH-2	Reference	9–18 inches of fine sediment deposition in channel	Yes	No	No significant fine sediment from watershed (potential fire effects). Deposition is pronounced enough to potentially cause channel infilling/avulsion and lateral migration within the valley floor. Potentially unstable site in medium term.
Bear Valley DH-2	Development	Up to 9 inches of erosion over a short reach	Yes	No	Local scour set against overall influx of fine sediment (potentially from development upstream). Possible migration of outside bend and infilling/avulsion of downstream channel.

Table 2-6 (continued)
San Dieguito River WMA HMP Monitoring Site Summary

Site Name and Number	HMP Monitoring Type	Evidence of Erosion/ Deposition?	Repeat Assessment?	Susceptibility Class Changed?	Notes and interpretation. Is change (if observed) indicative of instability in channel or watershed?
MDS DH-3	Development	Development 6-12 inches of upstream erosion, 6-12 inches of deposition downstream	Yes	No	Upstream sections of channel have eroded due to watershed runoff, depositing sediment in culvert backwater. Incision and channel widening occurring between two grade controls. Site appears moderately unstable in medium term.
Saratoga UH-1	Urban	Upstream headcut migration and downstream deposition	Yes	No	Headcut migrating through reach causing upstream incision and downstream deposition. Headcut likely to proceed until arrested by grade control. Site appears unstable.

HMP = Hydromodification Monitoring Program; Source: (Regional Board, 2016)

2.6 Bacteria TMDL Monitoring

The 2015–2016 San Dieguito River Hydrologic Unit (HU) Bacteria Total Maximum Daily Load (Bacteria TMDL) compliance monitoring program was designed to meet the requirements of the MS4 Permit. The Bacteria TMDL monitoring program assesses the conditions of the receiving waters and has the following objectives:

- ❖ Characterize levels of bacteria concentrations at compliance monitoring locations.
- ❖ Track progress toward meeting the Bacteria TMDL numeric targets.

FIB sampling was completed for the compliance monitoring season (October 2015 through September 2016). Wet weather samples were collected between October 1, 2015, and April 30, 2016, within the first 72 hours of the end of rainfall for three wet weather events. Dry weather samples were collected at least weekly in October 2015 and from April 2016 through September 2016, and at least monthly on dry weather days from November 1, 2015, through March 31, 2016. Compliance monitoring location information is presented in Table 2-7. The Bacteria TMDL Compliance Monitoring Report is provided in Attachment B.

Annual Compliance Reports summarize FIB concentrations and key hydrologic data by season. Compliance is assessed by comparing analytical results for *Enterococcus*, fecal coliform, and total coliform with applicable receiving water limitations (RWLs), in accordance with the Bacteria TMDL requirements in Attachment E of the MS4 Permit. The RWLs are a combination of numeric targets for bacteria density and allowable exceedance frequencies. The single-sample maximum numeric targets are required to be achieved only during wet weather with a 22% final allowable exceedance frequency. For dry weather days, the 30-day geometric mean numeric targets must be achieved with a 0% exceedance frequency. The compliance schedule includes interim milestones that must be achieved to demonstrate progress prior to attaining full compliance with the TMDL. Wet weather samples were collected for three wet weather events.

Table 2-7
TMDL Monitoring Station

Monitoring Location	Monitoring Identification	Latitude	Longitude
San Dieguito Lagoon Mouth	EH-380	32.975	–117.271

Summary of Results for 2015–2016

Analytical results for total coliform, fecal coliform, and *Enterococcus* at San Dieguito Lagoon Mouth were compared with numeric targets established in the Bacteria TMDL and MS4 Permit. Results are as follows:

- ❖ During wet weather, total coliform and fecal coliform did not exceed their corresponding single-sample limits (exceedance frequency = 0% for both constituents); *Enterococcus* exceeded its single sample limit of 104 most probable number per 100 milliliters (MPN/100 mL) at a rate of 13.6%. Therefore, EH-380 is in compliance with interim and final wet weather single-sample maximum RWLs for all three constituents.

- During the wet season, which evaluates a combination of both wet and dry weather samples, EH-380 achieved a 0% geometric mean exceedance frequency for all compliance constituents and is in compliance with interim and final dry weather geometric mean RWLs.
- During the dry season, when recreational activities occur with more regularity, EH-380 achieved a 0% exceedance frequency for all three compliance constituents, and is in compliance with interim and final dry weather geometric mean RWLs.

3 Dry Weather Outfall Assessments and Illicit Discharges

The purpose of this program is to identify non-storm water and illicit discharges within each Responsible Agency's jurisdiction, determine which discharges are transient flows and which are persistent flows, and prioritize the dry weather MS4 discharges that will be investigated and eliminated. The dry weather MS4 outfall monitoring component involves the following types of data collection activities for the San Dieguito River WMA:

- Dry Weather MS4 Outfall Field Screening: inspecting major outfalls during dry weather conditions to identify and prioritize persistently flowing outfalls.
- Dry Weather Persistent MS4 Outfall Discharge Monitoring: testing the discharge for various pollutants and comparing the results to the NALs.

3.1 Non-Storm Water MS4 Outfall Monitoring Data

During the 2015–2016 monitoring season (October 2015 through September 2016), the Responsible Agencies implemented the first year of dry weather outfall discharge monitoring in accordance with Provision D.2.b of the MS4 Permit. The goals of dry weather outfall monitoring are to:

- Identify non-storm water and illicit discharges within each Responsible Agency's jurisdiction.
- Prioritize dry weather MS4 discharges that will be investigated and eliminated.
- Assess effectiveness of JRMPs toward effectively prohibiting non-storm water discharges into the MS4.

Dry weather outfall data are provided in Attachment C.1. Attachment D includes a QA/QC summary of the dry weather outfall data collected. Details of the monitoring methodology are provided in the San Dieguito River WMA MS4 Outfall Monitoring Plan, available on the Project Clean Water website (Project Clean Water, 2016). The following subsections present the results of dry weather discharge monitoring in the San Dieguito River WMA.

3.2 Non-Storm Water Action Level Comparisons

Data collected as part of the dry weather MS4 outfall discharge monitoring were compared with NALs per the MS4 Permit. The results are summarized in Tables 3-1 through 3-5.

The MS4 Permit NALs vary according to the receiving water of the MS4 discharge (i.e., there are separate NALs for discharges to ocean surf zone, lagoons/harbors/bays/estuaries, and inland surface waters). As summarized in Table 3-1, three dry weather MS4 outfall discharge monitoring locations flow to ocean surf zone receiving waters. In three of the four samples collected, the total coliform and fecal coliform concentrations did not exceed the NALs, and concentrations of *Enterococcus* in all samples exceeded the NAL. Note that sites within the City of Del Mar's jurisdiction were dry during at least one monitoring event and no sample was collected. For the site within the City of Solana Beach's jurisdiction, a low flow diverter has been installed.

However, persistent flows at the outfall are still being originated from a small area downstream of the low flow diverter. Further studies are planned to determine the source of flow.

Table 3-1
NAL Comparison for MS4 Outfalls to Ocean Surf Zone

Analyte	NAL	Monitoring Location			
		City of Del Mar[1]		City of Solana Beach	
		S-05[2,3]	S-07[4]	S-25	
		8/12/2016	6/30/2016	8/12/2016	6/30/2016
Total Coliform	10000/1000* MPN/100 mL	30	**1600**	1600	8000
Fecal Coliform	400 MPN/100 mL	4	**1600**	23	40
Enterococcus	104 MPN/100 mL	**1400**	**500**	**280**	**5000**

*The NAL is 1,000 MPN/100mL when the fecal/total coliform ratio exceeds 0.1.

1. The City of Del Mar originally identified stations S-06 and S-07 as its highest priority persistently flowing outfalls in the San Dieguito River WMA WQIP. However, S-06 was dry during site visits on both 6/30/16 and 8/12/16 and no sample could be collected.
2. Site S-05 is not classified as a major MS4 outfall. Outfall diameter is less than 36 inches.
3. Site S-05 was classified as a persistently flowing outfall and sampled beginning 8/12/16. As the outfall does not qualify as a major MS4 outfall, this sampling is voluntary.
4. Site S-07 was dry during the second outfall monitoring event on 8/12/16. No sample was collected.

Bold = exceedance of NAL
µg/L = micrograms per liter; MPN/100 mL = most probable number per 100 milliliters; NAL = non-storm water action level

One major MS4 outfall, DW0033, flows to the San Dieguito Lagoon. This outfall is within the jurisdiction of the City of San Diego (City). As summarized in Table 3-2, two samples were collected from DW0033. With the exception of *Enterococcus* and dissolved copper, all results were detected below the appropriate NALs. The City has just begun implementation of its WQIP strategies, focused primarily on bacteria and low flow reduction, during the 2015–2016 monitoring year. The City plans to continue implementing the strategies without modification and work towards eliminating dry weather flows.

Table 3-2
NAL Comparison for MS4 Outfalls to Lagoon and Estuary Waters

Analyte	NAL	Monitoring Location	
		DW0033	
		City of San Diego	
		2/16/2016	4/5/2016
Dissolved Cadmium	16 µg/L	ND	ND
Dissolved Chromium VI	83 µg/L	ND	ND
Dissolved Copper	5.8 µg/L	**7**	**6**
Enterococcus	104 MPN/100 mL	**740**	**340**
Fecal Coliform	400 MPN/100 mL	120	230
Dissolved Lead	14 µg/L	ND	ND
Dissolved Nickel	14 µg/L	2.6	ND
pH	6.0-9.0	8.3	7.9
Dissolved Silver	2.2 µg/L	ND	ND
Turbidity	225 NTU	1.73	3.46
Dissolved Zinc	95 µg/L	11	26

Bold = exceedance of NALµg/L = micrograms per liter; MPN/100 mL = most probable number per 100 milliliters; NTU = nephelometric turbidity unit; ND = not detected

Eleven major MS4 outfalls that flow into inland surface waters were monitored (Tables 3-3 through 3-5): one outfall each in the City of Escondido and the City of Poway (Table 3-3), four outfalls in the City of San Diego (Table 3-4), and five major outfalls in the County (Table 3-5). A total of 293 of the 396 results were below appropriate NALs (including 160 non-detects). The NALs were exceeded for dissolved oxygen, copper, *Enterococcus*, fecal coliform, iron, manganese, methylene blue active substance (MBAS), total nitrogen, total phosphorous, and turbidity collectively within these outfalls. Some of these analytes are found in groundwater and may be from unidentified groundwater intrusion. Other analytes will be addressed by the strategies developed by the Responsible Agencies. The San Dieguito River WMA Responsible Agencies have just begun implementation of the WQIP; they plan to continue implementing the strategies without modification, and work toward eliminating dry weather flows. Additionally, they have implemented their IDDE programs, as summarized in Section 3.3.1, to identify sources of illicit dry weather discharges.

Table 3-3
NAL Comparison for MS4 Outfalls to Inland Surface Waters – City of Escondido and City of Poway

Analyte	NAL	Monitoring Location			
		City of Escondido		City of Poway	
		HDG_102[1]		140[2]	
		4/20/2016	8/30/2016	7/29/2016	8/2/2016
Dissolved Cadmium	** µg/L	ND (11.28)	ND (11.31)	ND (6.5)	0.2 (8.9)
Dissolved Chromium III	** µg/L	ND (1075.38)	ND (1078.32)	0.1 (581.09)	ND (825.57)
Dissolved Chromium VI	16 µg/L	ND	0.32	ND	ND
Dissolved Copper	** µg/L	13 (58.49)	2.8 (58.66)	4 (30.77)	**95 (44.39)**
DO	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	6	6.67	8.9	10.8
Enterococcus	61 MPN/100 mL	**280**	**1400**	**11000**	**5000**
Fecal Coliform	400 MPN/100 mL	**900**	**800**	**17000**	**70000**
Total Iron	0.3 mg/L	0.031	0.04	**0.464**	0.167
Dissolved Lead	** µg/L	ND (24.54)	ND (24.61)	0.1 (11.62)	0.08 (17.89)
Total Manganese	0.05 mg/L	0.014	0.0093	**0.126**	**0.078**
MBAS	0.5 mg/L	ND	ND	ND	ND
Dissolved Nickel	** µg/L	0.51 (333.38)	0.71 (334.32)	2 (176.53)	4 (253.72)
pH	Not in the range of 6.5-8.5	8.11	8.23	7.5	7.4
Dissolved Silver	** µg/L	ND (150.76)	ND (151.63)	ND (41.39)	4 (86.53)
Total Nitrogen	1.0 mg/L	**5.88**	**6.82**	**4.2**	**6.7**
Total Phosphorus	0.1 mg/L	**0.11**	**0.19**	**0.52**	**1.28**
Turbidity	20 NTU	2.9	1.6	5.95	7.12
Dissolved Zinc	** µg/L	18 (759.48)	6 (761.62)	10 (401.75)	51 (577.75)

Bold = exceedance of NAL

** = California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent non-storm water action level

µg/L = micrograms per liter; mg/L = milligrams per liter; MPN/100 mL = most probable number per 100 milliliters;
NTU = nephelometric turbidity unit; ND = not detected; NA = not analyzed; - = missing data; ( ) = Numbers in parentheses adjacent to analytical results are CTR Freshwater Continuous Concentration Hardness dependent values from 40 Code of Federal Regulations (CFR) 131.38(b)(1) calculated using the hardness result of the receiving water for each designated monitoring location: [1]HDG_102RW and [2]140-MS4

Table 3-4
NAL Comparison for MS4 Outfalls to Inland Surface Waters – City of San Diego

Analyte	NAL	Monitoring Location							
		City of San Diego							
		DW0284[1]		DW0317[2]		DW0333[1]		DW0636[1]	
		2/16/2016	4/5/2016	2/16/2016	4/5/2016	2/16/2016	4/5/2016	2/16/2016	4/5/2016
Dissolved Cadmium	** µg/L	ND (11.11)	ND (12.11)	ND (8.18)	ND (8.38)	ND (11.11)	ND (12.11)	ND (11.11)	ND (12.11)
Dissolved Chromium III	** µg/L	ND (1056.73)	ND (1163.74)	ND (751.07)	ND (772.21)	0.79 (1056.73)	ND (1163.74)	ND (1056.73)	ND (1163.74)
Dissolved Chromium VI	16 µg/L	0.63	ND	ND	ND	4.4	3	ND	ND
Dissolved Copper	** µg/L	**160 (57.43)**	14 (63.51)	2.8 (40.22)	ND (41.4)	33 (57.43)	5.9 (63.51)	5.2 (57.43)	5.7 (63.51)
DO	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	8.2	8.43	7.27	7.42	7.51	NA	8.53	8.41
Enterococcus	61 MPN/100 mL	**660**	**7200**	**200**	**160**	**560**	**1800**	**80**	**180**
Fecal Coliform	400 MPN/100 mL	ND	**7900**	40	ND	60	**2300**	ND	45
Total Iron	0.3 mg/L	**0.79**	0.19	0.044	0.035	0.13	0.049	**0.78**	**3.8**
Dissolved Lead	** µg/L	ND (24.04)	ND (26.91)	ND (15.95)	3.7 (16.5)	ND (24.04)	3.7 (26.91)	ND (24.04)	4.8 (26.91)
Total Manganese	0.05 mg/L	**0.061**	0.044	**0.11**	**0.1**	0.013	ND	**0.38**	**0.94**
MBAS	0.5 mg/L	0.16	0.091	0.063	ND	0.11	0.085	0.11	0.06
Dissolved Nickel	** µg/L	3.8 (327.41)	ND (361.71)	2.9 (230.1)	ND (236.8)	4.9 (327.41)	ND (361.71)	3.6 (327.41)	ND (361.71)
pH	Not in the range of 6.5-8.5	7.8	7.8	8.1	8	7.9	7.8	8.1	8.5
Dissolved Silver	** µg/L	ND (145.32)	ND (177.96)	ND (70.94)	ND (75.2)	ND (145.32)	ND (177.96)	ND (145.32)	ND (177.96)
Total Nitrogen	1.0 mg/L	**78**	**5.8**	**3.5**	**3.2**	**5.5**	**6.4**	**4.1**	**2.9**
Total Phosphorus	0.1 mg/L	**9.4**	**0.49**	0.033	0.037	**0.27**	**0.5**	0.087	**0.69**
Turbidity	20 NTU	**31.33**	**21.52**	2.81	0.13	0.42	NA	4.72	9.08
Dissolved Zinc	** µg/L	38 (745.85)	24 (824.13)	ND (523.9)	11 (539.16)	20 (745.85)	73 (824.13)	18 (745.85)	13 (824.13)

Bold = exceedance of NAL
** = California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent non-storm water action level; µg/L = micrograms per liter; mg/L = milligrams per liter; MPN/100 mL = most probable number per 100 milliliters;
NTU = nephelometric turbidity unit; ND = not detected; NA = not analyzed; - = missing data; ( ) = Numbers in parentheses adjacent to analytical results are CTR Freshwater Continuous Concentration Hardness dependent values from 40 Code of Federal Regulations (CFR) 131.38(b)(1) calculated using the hardness result of the receiving water for each designated monitoring location: [1]SDCMLS and [2]SDCTWAS-1

Table 3-5
NAL Comparison for MS4 Outfalls to Inland Surface Waters – County of San Diego

Analyte	Non-Storm water Action Level (Maximum Daily Action Level)	Monitoring Location									
		County of San Diego									
		MS4-SDG-072[1]		MS4-SDG-074[1]		MS4-SDG-077[1]		MS4-SDG-080[2]		MS4-SDG-115[3]	
		3/28/2016	6/30/2016	3/28/2016	6/30/2016	3/28/2016	6/30/2016	3/28/2016	6/30/2016	3/29/2016	7/7/2016
Dissolved Cadmium	** µg/L	ND (11.88)	0.2 (14.96)	0.2 (11.88)	0.8 (14.96)	ND (11.88)	3 (14.96)	0.09 (7.28)	0.2 (8.2)	ND (7.84)	ND (10.15)
Dissolved Chromium III	** µg/L	0.1 (1138.65)	0.06 (1472.93)	0.4 (1138.65)	0.06 (1472.93)	0.2 (1138.65)	0.3 (1472.93)	0.08 (659.65)	ND (753.19)	ND (716.96)	ND (955.31)
Dissolved Chromium VI	16 µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dissolved Copper	** µg/L	6 (62.09)	2 (81.21)	22 (62.09)	3 (81.21)	10 (62.09)	3 (81.21)	9 (35.13)	2 (40.34)	2 (38.32)	0.6 (51.69)
DO	< 5 mg/L (WARM Water) < 6 mg/L (COLD Water)	**5.74**	9.35	**2.48**	6.34	**0.49**	9.85	6.63	6.3	8.1	6.68
Enterococcus	61 MPN/100 mL	**800**	**80**	**340**	**17000**	**3000**	**1400**	**70**	**900**	ND	2
Fecal Coliform	400 MPN/100 mL	**500**	300	**700**	**5000**	**700**	**2000**	ND	**70000**	ND	ND
Total Iron	0.3 mg/L	**0.546**	**0.305**	0.179	**0.802**	**0.356**	0.103	0.017	0.056	0.042	0.022
Dissolved Lead	** µg/L	0.08 (26.24)	ND (35.25)	0.1 (26.24)	ND (35.25)	0.07 (26.24)	0.06 (35.25)	ND (13.6)	ND (16)	ND (15.07)	ND (21.32)
Total Manganese	0.05 mg/L	**0.165**	**0.304**	**0.195**	**0.384**	**0.265**	**0.089**	0.029	0.045	**0.075**	**0.059**
MBAS	0.5 mg/L	**0.8**	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dissolved Nickel	** µg/L	2 (353.66)	2 (461.39)	4 (353.66)	5 (461.39)	2 (353.66)	2 (461.39)	3 (201.23)	4 (230.77)	0.7 (219.31)	0.4 (295)
pH	Not in the range of 6.5-8.5	7.05	6.8	6.69	6.76	7.22	7.34	7.93	7.47	7.35	7.15
Dissolved Silver	** µg/L	ND (169.99)	ND (291.88)	ND (169.99)	ND (291.88)	ND (169.99)	ND (291.88)	ND (54.02)	ND (71.37)	ND (64.35)	ND (117.57)
Total Nitrogen	1.0 mg/L	0.6	**2.2**	**7.9**	**2.3**	**5.5**	**3**	**2.7**	**1.5**	**12.1**	**5.9**
Total Phosphorus	0.1 mg/L	**0.26**	**0.43**	**0.2**	**0.32**	**0.33**	**0.92**	**0.16**	**0.2**	0.02	0.02 J
Turbidity	20 NTU	5.14	8.11	3.98	0.99	**65.6**	9.18	0.18	3.07	0.15	0
Dissolved Zinc	** µg/L	17 (805.75)	12 (1051.61)	**1290 (805.75)**	13 (1051.61)	42 (805.75)	6 (1051.61)	14 (458.07)	4 (525.43)	11 (499.3)	0.3 (671.92)

Bold = exceedance of NAL

** = California Toxics Rule (CTR) Freshwater Continuous Concentration Hardness dependent non-storm water action level; µg/L = micrograms per liter; mg/L = milligrams per liter; MPN/100 mL = most probable number per 100 milliliters; NTU = nephelometric turbidity unit;

ND = not detected; NA = not analyzed; - = missing data; ( ) =Numbers in parentheses adjacent to analytical results are CTR Freshwater Continuous Concentration Hardness dependent values from 40 Code of Federal Regulations (CFR) 131.38(b)(1) calculated using the hardness result of the receiving water for each designated monitoring location: [1]MS4-SDG-072RW; [2]MS4-SDG-080RW; and [3]MS4-SDG-115RW

3.3 Non-Storm Water MS4 Outfall Monitoring Data Assessments

Assessments of jurisdictional MS4 monitoring programs were conducted individually by the jurisdictions, and watershed-wide. Per Provision D.4. of the MS4 Permit, assessments include the following:

- Progress of IDDE programs toward effectively prohibiting non-storm water and illicit discharges into the MS4 within Copermittees' jurisdictions.
- Identification of known and suspected controllable sources (e.g., facilities, areas, land uses, pollutant-generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the WMA, sources of transient and persistent flows within the Copermittee's jurisdiction in the WMA that have been reduced or eliminated, and modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in Copermittee inventories.
- Based on the dry weather MS4 outfall discharge field screening monitoring, assessment and reporting of the following:
    - For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identification of the known and suspected sources within the Copermittee's jurisdiction in the WMA that may cause or contribute to the NAL exceedances.
    - Calculations or estimates of the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in the Copermittee's jurisdiction identified as having persistent dry weather flows during the monitoring year.

Each Copermittee is required to conduct field screening to determine which non-storm water MS4 outfall discharges are transient or persistent non-storm water flows. Data collected during dry weather MS4 outfall monitoring are used to prioritize the non-storm water MS4 discharges that will be investigated and eliminated.

3.3.1 Illicit Discharge Detection and Elimination Program Data and Assessment

The San Dieguito River WMA Responsible Agencies implemented IDDE program activities in effort to detect and eliminate illicit discharges and improper disposal of wastes into the MS4. The Responsible Agencies initiated 341 IDDE inspections, during which 273 non-storm water discharges were discovered. 231 of these non-storm water discharges were classified as illicit discharges or connections. Illicit discharge investigations included visual observations, additional site visits, field sampling, photo documentation, and follow-up/enforcement activities, as appropriate.

In the course of investigating these non-storm water and illicit discharges, 261 non-storm water discharges, or 96 percent, were eliminated, as shown in Table 3-6. The most common source of illicit discharges is generally irrigation runoff. Other significant sources include groundwater seepages, commercial washing activities, chlorinated pool discharges, and illicit discharges/connections.

Table 3-6
Dry Weather Discharge Investigations and Discharges Eliminated in the 2015–2016 Monitoring Year

Copermittee	Number of IDDE Investigations Initiated	Number of Sources of Non-Storm Water Discharges Identified	Number of Non-Storm Water Discharges Eliminated	Number of Sources of Illicit Discharges or Connections Identified	Number of Illicit Discharges or Connections Eliminated
City of San Diego	171	143	141	142	140
City of Del Mar	40	40	40	8	8
City of Escondido	40	40	40	40	40
City of Poway	11	11	3	11	3
City of Solana Beach	28	28	27[1]	22	21[1]
County of San Diego	51	11	10	8	8
Total	**341**	**273**	**261**	**231**	**220**

1. City of Solana Beach is working with property manager to determine source if illicit discharge. Solana Beach will continue to investigate to see that the issue is resolved.

IDDE = illicit discharge detection and elimination

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3.3.2 Classification of Major MS4 Outfalls Within each Copermittee's Jurisdiction

To address the MS4 Permit requirements, the Responsible Agencies determined the number of major MS4 outfalls within their jurisdictions within the WMA. Table 3-7 lists the number of major outfalls for each Responsible Agency within the San Dieguito River WMA. Each major outfall was classified as follows:

- Persistent – having flowing, pooled, or ponded water more than 72 hours after a measurable rainfall event of 0.1 inch or greater during the three most recent consecutive monitoring and/or inspection events;
- Transient – having flowing, pooled, or ponded water during at least one but not on all three most recent consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation ≥0.1 inch;
- Tidal – having persistent or transient flow with ocean tides as the source;
- Dry – having no flowing, pooled, or ponded water during the previous three consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation ≥0.1 inch; and
- Unknown – site cannot be evaluated, or has not been visited enough times to determine flow status.

In the San Dieguito River WMA, 47% of the major outfalls were classified as persistently flowing outfalls. Table 3-8 and Figure 3-1 present percentages of all classifications of major outfalls in the 2015–2016 monitoring year. No outfalls were classified as tidal during the monitoring period.

Table 3-7
Number of Major Outfalls in San Dieguito River WMA

Copermittee	Total Number of Major Outfalls	Number of Major Outfall Stations Visited	Number of Major Outfall Visual Observations	Subwatershed	HSA	Number of Major Outfalls per HSA
City of San Diego[1]	43	43[2]	61	San Dieguito River Below Lake Hodges	905.11	15
					905.12	12
				San Dieguito River Above Lake Hodges	905.21	6
					905.22	8
					905.31	1
					905.32	1
City of Del Mar[3]	6[4]	6[4]	80[5]	San Dieguito River Below Lake Hodges	905.11	6[4]
City of Escondido[3]	3	3	6	San Dieguito River Above Lake Hodges	905.21	3
City of Poway[3]	14	14	23	San Dieguito River Above Lake Hodges	905.22	14
City of Solana Beach[3]	3	3	11	San Dieguito River Below Lake Hodges	905.11	3
County of San Diego[3]	20	20	45	San Dieguito River Below Lake Hodges	905.11	8
					905.12	2
				San Dieguito River Above Lake Hodges	905.21	5
					905.23	1
					905.32	1
					905.41	3
Total	**89**	**89**	**233**			

1. The City of San Diego has 502 outfalls within the City jurisdiction. The City of San Diego, in accordance with Provision D.2.a(2).(a).(iv) of the MS4 Permit, is required to screen 500 sites City-wide once per year. The City is not required to screen 500 sites within each watershed.
2. Includes visits to one or more upstream proxy sites for 16 outfalls. Proxy sites were visited when outfall was inaccessible to field crews.
3. For Responsible Agencies with fewer than 125 major outfalls in the WMA, 80% of total major outfalls presented in the table must be screened twice per year.
4. Total includes five major outfalls as well as one non-major outfall (S-05) that is monitored voluntarily.
5. 66 observations were made at major outfalls within the WMA, plus an additional 14 observations at non-major outfall S-05.

HSA = hydrologic subarea

Table 3-8
Flow Classification of Major Outfalls in San Dieguito River WMA

Copermittee	Sub-Watershed	HSA	Persistent	Transient	Dry	Unknown
City of San Diego	San Dieguito River Below Lake Hodges	905.11	8	2	4	1
City of San Diego	San Dieguito River Below Lake Hodges	905.12	8	4	0	0
City of San Diego	San Dieguito River Above Lake Hodges	905.21	5	1	0	0
City of San Diego	San Dieguito River Above Lake Hodges	905.22	7	0	1	0
City of San Diego	San Dieguito River Above Lake Hodges	905.31	0	0	1	0
City of San Diego	San Dieguito River Above Lake Hodges	905.32	0	0	1	0
City of San Diego	Jurisdictional Total		28	7	7	1
City of Del Mar	San Dieguito River Below Lake Hodges	905.11	1	2	3	0
City of Escondido	San Dieguito River Above Lake Hodges	905.21	1	1	1	0
City of Poway	San Dieguito River Above Lake Hodges	905.22	1	2	11	0
City of Solana Beach	San Dieguito River Below Lake Hodges	905.11	1	1	1	0
County of San Diego	San Dieguito River Below Lake Hodges	905.11	8	0	0	0
County of San Diego	San Dieguito River Below Lake Hodges	905.12	1	0	1	0
County of San Diego	San Dieguito River Above Lake Hodges	905.21	1	2	2	0
County of San Diego	San Dieguito River Above Lake Hodges	905.23	0	0	1	0
County of San Diego	San Dieguito River Above Lake Hodges	905.32	0	0	1	0
County of San Diego	San Dieguito River Above Lake Hodges	905.41	0	0	3	0
County of San Diego	Jurisdictional Total		10	2	8	0
WMA Total			**42**	**15**	**31**	**1**

HSA = hydrologic subarea

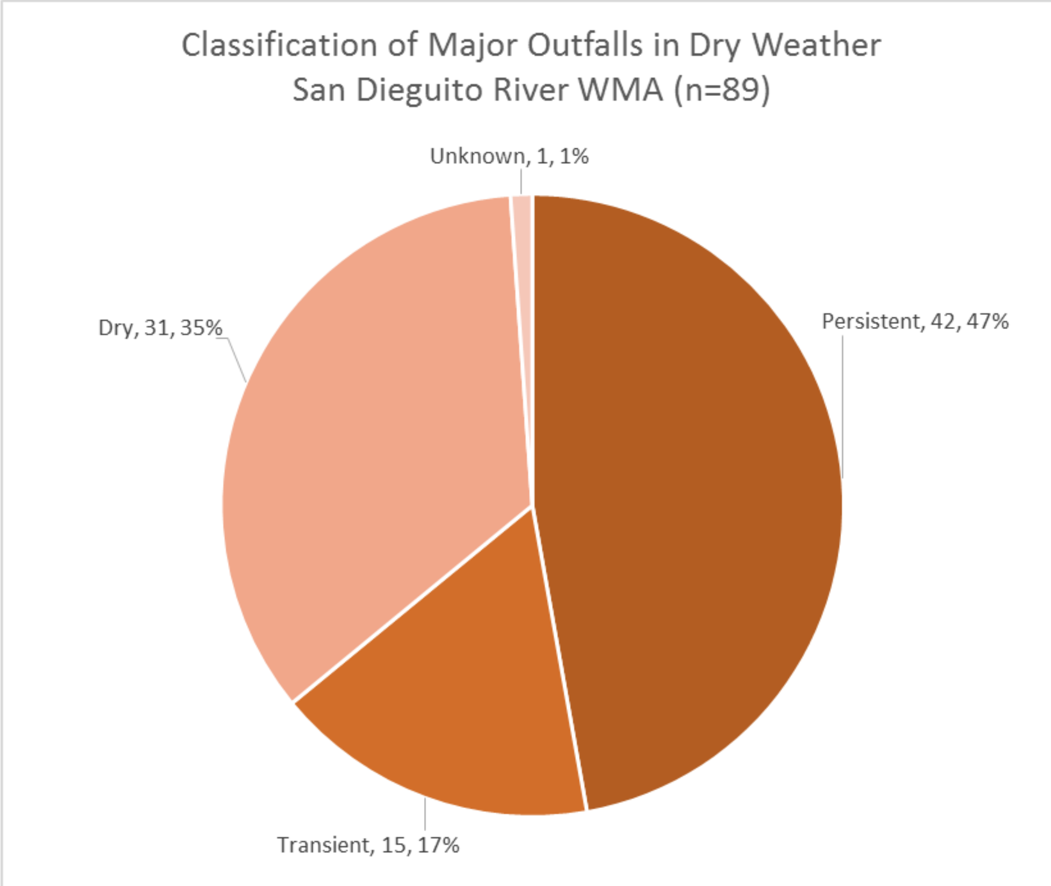

Figure 3-1
Classification of Major Dry Weather MS4 Outfalls in San Dieguito River WMA

3.3.3 Visual Observations at Major MS4 Outfalls

MS4 outfall visual assessments were performed as required by Table D-5 of the MS4 Permit. Table 3-9 presents the results of visual assessments relating to trash, including whether trash was observed during each visual observation event, and, if so, the approximate number of pieces of trash. During the 2015-2016 monitoring year, greater than 99% of visual observations indicated no or low (<50 pieces) presence of trash. Additional visual observations are provided in Attachment C.2.

Table 3-9
Trash Assessment Visual Observations in the 2015–2016 Monitoring Year

Copermittee	HSA	Number of Major Outfall Visual Observations with Trash Assessments[1]	Number of Observations with No Trash Present	Number of Observations with Trash Present		
				Low (<50 pieces)	Medium (50 to 400 pieces)	High (>400 pieces)
City of San Diego[2]	905.11	28	14	14	0	0
	905.12	17	9	8	0	0
	905.21	10	5	5	0	0
	905.22	12	7	5	0	0
	905.31	1	1	0	0	0
	905.32	1	1	0	0	0
	Subtotal	**69**	**37**	**32**	**0**	**0**
City of Del Mar	905.11	80	61	19	0	0
	Subtotal	**80**	**61**	**19**	**0**	**0**
City of Escondido	905.21	6	3	3	0	0
	Subtotal	**6**	**3**	**3**	**0**	**0**
City of Poway	905.22	23	14	9	0	0
	Subtotal	**23**	**14**	**9**	**0**	**0**
City of Solana Beach	905.11	11	11	0	0	0
	Subtotal	**11**	**11**	**0**	**0**	**0**
County of San Diego	905.11	20	2	14	0	0
	905.12	5	2	2	0	0
	905.21	10	4	5	1	0
	905.23	2	0	2	0	0
	905.32	2	1	1	0	0
	905.41	6	1	4	1	0
	Subtotal	**45**	**10**	**28**	**2**	**0**
	Total	**234**	**136**	**91**	**2**	**0**

1. Trash assessments not conducted for all visual observations. Values in this column may not match total numbers of visual observations in Table 3-7.
2. Visual observations sometimes included more than one upstream proxy site for a given outfall on a single site visit. All observations counted here.

> = greater than; < = less than; HSA = hydrologic subarea

3.3.4 Controllable and Non-Controllable Sources of Flow

MS4 Permit requirements call for the classification of sources of observed flowing or ponded water in dry weather. Known, controllable sources, such as irrigation runoff and residential washing, were identified by observation. Other suspected sources of flow were noted and may have included items such as broken pipes. Non-controllable sources were also identified during dry weather visual observations and included mostly groundwater seepage. Unidentified sources of flow were also noted during dry weather visual observations. Tables 3-10 and 3-11 present results of visual observation identifications of controllable and non-controllable sources, respectively, made in the 2015–2016 monitoring year.

Table 3-10
Controllable Sources of Flow Observed in the 2015-2016 Monitoring Year

Copermittee	Number of Flowing or Ponded Observations at Major Outfall[1]	Known Controllable Sources		Suspected Controllable Sources	
		Irrigation Runoff	Other Discharges	Irrigation Runoff	Other Discharges
City of San Diego	51	2	3[2]	15	3[3]
City of Del Mar	19	Source information collected in IDDE program.			
City of Escondido	3	0	0	1	0
City of Poway	3	3	0	0	0
City of Solana Beach	6	Source information collected in IDDE program.			
County of San Diego	26	3	0	57	10[4]
Total	**108**	**8**	**3**	**73**	**13**

1. Note that the number of flowing or ponded observations may not be the same as the number of Persistent or Transient outfalls presented in Table 3-8. Some outfall stations were visited more than once.
2. One pool/spa chlorination discharge, one construction-related discharge, one backflow leak of water utility line discharge.
3. One pumped ground water (uncontaminated) discharge, two water line break underground discharges.
4. One residential washing discharge, three other illicit discharges, six commercial washing activity discharges.

Table 3-11
Non-Controllable Sources of Flow Observed in the 2015–2016 Monitoring Year

Copermittee	Known Uncontrollable Sources	Suspected Uncontrollable Sources
	Groundwater Seepage	Groundwater Seepage
City of San Diego	1	5
City of Del Mar	Source information collected in IDDE program.	
City of Escondido	0	1
City of Poway	0	0
City of Solana Beach	Source information collected in IDDE program.	
County of San Diego	0	11
Total	**1**	**17**

Non-storm water discharges (NSWDs) that have been reduced or eliminated during the 2015–2016 monitoring year have also been identified during the visual observations that were conducted by each Copermittee. Table 3-12 presents the number of discharges eliminated through visual outfall monitoring, including the identified sources of eliminated discharges. Additional runoff sources were eliminated through inspection and enforcement action under the Copermittees' IDDE program, as noted in Section 3.3.1.

Table 3-12
Dry Weather Discharges Eliminated in the 2015–2016 Monitoring Year

Copermittee	Number of Eliminated Discharges	Types of Eliminated Discharges
City of San Diego	1	Water Department Backflow Leak
City of Del Mar	40	Residential and Commercial
City of Escondido	0	NA
City of Poway	0	NA
City of Solana Beach	27	Residential and Commercial
County of San Diego	0	NA
Total	**68**	NA

NA = not applicable

Per MS4 Permit requirements, Responsible Agencies must identify modifications to the field screening monitoring locations and frequencies for the major MS4 outfalls in their inventories. Table 3-13 summarizes these modifications, based on the findings of visual observations during the 2015–2016 monitoring year.

Table 3-13
Modifications to Dry Weather Field Screening Locations and Frequencies

Copermittee	Number of Outfalls Added to Priority Persistent Flow Outfall List	Number of Outfalls Removed from Priority Persistent Flow Outfall List	Number of Outfalls Added to MS4 Inventory	Number of Outfalls Removed from MS4 Inventory
City of San Diego	5	0	1	0
City of Del Mar	0	0	0	0
City of Escondido	0	0	0	1[1]
City of Poway	0	0	0	1[2]
City of Solana Beach	1	0	0	0
County of San Diego	0	0	0	0
Total	**6**	**0**	**1**	**2**

1. Station HDG_101 found to not be an outfall.
2. Station 54 removed from inventory. Found to be upstream of another outfall.

MS4 = municipal separate storm sewer system

3.4 Non-Storm Water Volume and Pollutant Load Assessment

Copermittees must assess the non-storm water volumes and pollutant loads collectively discharged from their jurisdictions in the San Dieguito River WMA, per MS4 Permit Provision D.4.b(1)(c). The methodology used to calculate the non-storm water volumes and loads is provided in Attachment C.3.

3.4.1 Identification of Dry Weather Days

The first step in calculating annual non-storm water volumes and pollutant loads is to determine the number of dry weather days in the monitoring year. The number of dry weather days was determined using County of San Diego ALERT station data (https://sandiego.onerain.com). The Rancho Bernardo ALERT station was selected to represent rainfall conditions in the San Dieguito River WMA. This representative ALERT station was also utilized in Wet Weather MS4 Outfall Discharge Monitoring Assessments, and is the station closest to a majority of wet weather MS4 outfall discharge monitoring stations.

A wet weather day was defined as any day with at least 0.1 inch of measurable rainfall within a 24-hour period, and the subsequent 72 hours. Dry weather days were defined as all other days during the monitoring year (October 1 through September 30). Table 3-14 presents the number of dry weather days identified in the San Dieguito River WMA during the 2015–2016 monitoring season.

Table 3-14
San Dieguito River WMA Dry Weather Days by Month

<table>
<tr><th>Month</th><th>Number of Days</th><th>Storm Dates</th><th>Number of Storm Days</th><th>Number of Storm Days +72 Hours</th><th>Number of Dry Days</th></tr>
<tr><td>October 2015</td><td>31</td><td>October 4-5, 2015</td><td>2</td><td>5</td><td>26</td></tr>
<tr><td rowspan="4">November 2015</td><td rowspan="4">30</td><td>November 2-3, 2015</td><td rowspan="4">5</td><td rowspan="4">15</td><td rowspan="4">15</td></tr>
<tr><td>November 15, 2015</td></tr>
<tr><td>November 25, 2015</td></tr>
<tr><td>November 27, 2015</td></tr>
<tr><td rowspan="4">December 2015</td><td rowspan="4">31</td><td>December 11, 2015</td><td rowspan="4">4</td><td rowspan="4">13</td><td rowspan="4">18</td></tr>
<tr><td>December 13, 2015</td></tr>
<tr><td>December 19, 2015</td></tr>
<tr><td>December 22, 2015</td></tr>
<tr><td rowspan="2">January 2016</td><td rowspan="2">31</td><td>January 5-7, 2016</td><td rowspan="2">4</td><td rowspan="2">7</td><td rowspan="2">24</td></tr>
<tr><td>January 31, 2016</td></tr>
<tr><td>February 2016</td><td>29</td><td>NA</td><td>0</td><td>3</td><td>26</td></tr>
<tr><td rowspan="2">March 2016</td><td rowspan="2">31</td><td>March 6-7, 2016</td><td rowspan="2">3</td><td rowspan="2">9</td><td rowspan="2">22</td></tr>
<tr><td>March 11, 2016</td></tr>
<tr><td rowspan="2">April 2016</td><td rowspan="2">30</td><td>April 7, 2016</td><td rowspan="2">3</td><td rowspan="2">7</td><td rowspan="2">23</td></tr>
<tr><td>April 9-10, 2016</td></tr>
<tr><td>May 2016</td><td>31</td><td>May 5-6, 2016</td><td>2</td><td>5</td><td>26</td></tr>
<tr><td>June 2016</td><td>30</td><td>NA</td><td>0</td><td>0</td><td>30</td></tr>
<tr><td>July 2016</td><td>31</td><td>NA</td><td>0</td><td>0</td><td>31</td></tr>
<tr><td>August 2016</td><td>31</td><td>NA</td><td>0</td><td>0</td><td>31</td></tr>
<tr><td>September 2016</td><td>30</td><td>September 20-21, 2016</td><td>2</td><td>5</td><td>25</td></tr>
</table>

NA = not applicable, no storms recorded

3.4.2 Non-Storm Water Volume Assessment

An annual non-storm water volume was calculated for each persistently flowing major MS4 outfall in each Copermittee's jurisdiction. The calculation methods used differed, depending on the availability of flow data for each site. Details of each calculation method are presented in the Dry Weather Assessment Methodology in Attachment C.3. The methods are summarized as follows:

- ❖ Scenario A: If a major MS4 outfall station was visited once during the monitoring year, and a single discrete flow rate was measured, this flow rate was applied across all dry weather days within the year.
- ❖ Scenario B: If a major MS4 outfall station was visited more than once during the monitoring year, and more than one discrete flow rate was measured, monthly dry weather flow volumes were calculated. The monthly flow volume calculation method varied based on whether a flow measurement was logged at the outfall during that month. For calendar months in which the outfall was visited one or more times, the mean of the measured flow rates was applied to all dry weather days within the month. For calendar months in which the outfall was not visited, the mean of all flow rates observed at that site during the calendar year was applied.
- ❖ Scenario C: If a major MS4 outfall station was monitored continuously for a period of time longer than a day, a measured daily flow volume was calculated for each monitored day. The mean of these daily flow volumes was applied to all non-monitored dry days.
- ❖ Scenario D: If a major MS4 outfall station was not visited during the monitoring year, the mean of annual outfall flow volumes for all monitored stations in the jurisdiction in the WMA was applied. This scenario was not encountered during the 2015–2016 monitoring season.

Within all these scenarios, observations of ponding (i.e., evidence of non-storm water in the MS4, with no connectivity to the receiving water) were assigned a flow rate of zero. If a station was observed to be flowing, but no flow rate was recorded, the average non-zero flow rate for that station was applied to that observation.

This methodology assumes that a persistently flowing major MS4 outfall is flowing on 100% of dry weather days. This assumption is highly conservative. Additional limitations to the methodology are listed in Section 3.4.6. Major limitations include assuming that rates of dry weather discharge equal the measured values throughout the entire month or year (depending on the calculation scenario used), as well as assuming that pollutant concentrations can be represented by samples collected just twice per year at five or fewer outfalls per jurisdiction.

Tables 3-15 through 3-20 present the outfalls that were identified by each Copermittee as persistently flowing. The number of visual observations made at these locations during the 2015–2016 monitoring year is also presented, and the number of flowing, ponded, and dry observations from these site visits is summarized. Finally, the annual dry weather flow volume modeled from each site is presented, as well as the total dry weather flow volume collectively discharged from persistently flowing sites within each Copermittee's jurisdiction in the WMA.

Table 3-15
City of Del Mar 2015–2016 Dry Weather Persistent Flow Volume

Station ID[1]	Number of Visual Observations in 2015–2016	Continuous Flow Monitoring Conducted?	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
S-05[2]	14	N	7	0	7	225,220
Total						**225,220**

1. Del Mar outfall S-07 was classified as highest priority, but was re-classified as transient following the 2015-2016 monitoring season. No dry weather flows volumes or loads are presented. Analytical results for this outfall are included in Attachment C.1.
2. Outfall S-05 is less than 36 inches in diameter and not classified as a major MS4 outfall. It is monitored voluntarily.

cf = cubic feet

Highest priority persistently flowing outfalls indicated in **bold**.

Table 3-16
City of Escondido 2015–2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Continuous Flow Monitoring Conducted?	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
ES_HDG_102	2	Y	2	0	0	252,480
Total						**252,480**

cf = cubic feet

Highest priority persistently flowing outfalls indicated in **bold**.

Table 3-17
City of Poway 2015–2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Continuous Flow Monitoring Conducted?	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
140	2	N	0	2	0	0
Total						**0**

cf = cubic feet
Highest priority persistently flowing outfalls indicated in **bold**.

Table 3-18
City of Solana Beach 2015–2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Continuous Flow Monitoring Conducted?	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
SB-25	5	N	5	0	0	6,004
Total						**6,004**

cf = cubic feet
Highest priority persistently flowing outfalls indicated in **bold**.

Table 3-19
City of San Diego 2015–2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Continuous Flow Monitoring Conducted?	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
DW0001	1	N	0	1	0	0
DW0005	1	N	0	1	0	0
DW0033	5	N	1	4	0	49,550
DW0284	6	N	1	5	0	78,252
DW0317	4	N	1	3	0	1,602,783
DW0332	1	N	0	1	0	0
DW0333	3	N	0	3	0	0
DW0619	1	N	0	1	0	0
DW0636	4	N	4	0	0	211,644
DW0689	1	N	1	0	0	45,317

Table 3-19 (continued)
City of San Diego 2015–2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016	Continuous Flow Monitoring Conducted?	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
DW0759	1	N	1	0	0	3,066,535
DW0889	1	N	1	0	0	20,444
DW0892	1	N	1	0	0	1,529,292
DW0913	1	N	1	0	0	509,953
DW0914	1	N	1	0	0	338,455
DW0949	1	N	1	0	0	509,953
DW0956	1	N	1	0	0	20,444
DW1019	1	N	1	0	0	1,147,111
DW1099	1	N	0	1	0	0
DW1100	1	N	1	0	0	85,182
DW1109	1	N	1	0	0	2,669,021
DW1110	1	N	1	0	0	1,019,339
DW1117	1	N	1	0	0	0
DW1118	1	N	1	0	0	0
DW1119	1	N	1	0	0	32,369
DW1120	1	N	1	0	0	2,044,357
DW1121	1	N	0	1	0	0
DW1138	1	N	1	0	0	1,272,044
Total						**16,252,045**

cf = cubic feet

Highest priority persistently flowing outfalls indicated in **bold**.

Table 3-20
County of San Diego 2015–2016 Dry Weather Persistent Flow Volume

Station ID	Number of Visual Observations in 2015–2016[1]	Continuous Flow Monitoring Conducted?	Number of Flowing Observations	Number of Ponded Observations	Number of Dry Observations	Annual Non-Storm Water Volume (cf)
MS4-SDG-072[1]	11	Y	11	0	0	76,711
MS4-SDG-074	3	N	3	0	0	540,534
MS4-SDG-075	2	N	0	2	0	0
MS4-SDG-077[1]	11	Y	0	10	1	36,395
MS4-SDG-080[1]	12	Y	11	0	1	2,086,703
MS4-SDG-084[1]	11	Y	11	0	0	92,295
MS4-SDG-085[1]	11	Y	11	0	0	910,340
MS4-SDG-115[1]	11	Y	11	0	0	1,891,296
MS4-SDG-144	2	N	2	0	0	48,346
MS4-SDG-171	2	N	0	2	0	0
Total						**5,682,620**

3. Sites with continuous flow equipment installed were visited up to twice per month from December 2015 through April 2016 to gather baseline flow data. Continuous flow monitoring conducted from the period of May 2016 through September 2016.

cf = cubic feet

Highest priority persistently flowing outfalls indicated in **bold**.

3.4.3 Non-Storm Water Load Assessment

The Copermittees estimated the annual non-storm water pollutant loads collectively discharged from their persistently flowing major MS4 outfalls to receiving waters in the MS4.

A load was calculated for each pollutant required to be analyzed at each high priority outfall, based on the arithmetic mean of the analytical results from the two dry weather outfall monitoring events at that outfall during the monitoring year. For each non-high priority persistently flowing outfall in a Copermittee's jurisdiction in the WMA, the mean of that Copermittee's monitored outfall results for each pollutant was applied. For any pollutants not detected at the method detection limit (MDL), a concentration of MDL/2 was applied in calculating the loads. The annual non-storm water pollutant loads collectively discharged from each jurisdiction are presented in Table 3-21. The non-storm water pollutant loads for each persistently flowing major MS4 outfall are presented in Attachment C.4.

Table 3-21
Persistent Flow Non-Storm Water Pollutant Loads by Jurisdiction

Analyte	**Units**	**Jurisdiction**					
Jurisdiction	-	City of Del Mar	City of Escondido	City of Poway	City of San Diego	City of Solana Beach	County of San Diego
Annual Dry Weather Flow Volume	cf	225,220	252,480	0	16,252,044	6,004	5,682,620
Conventional Parameters							
Chloride	lb	7,959	2,829	0	501,471	82.46	223,903
Hardness (Total)	lb	7,950	8,338	0	784,795	147.1	342,122
MBAS	lb	0.7238	0.6305	0	136.28	0.0562	24.455
Indicator Bacteria							
Enterococcus	MPN	9.02E+12	6.01E+12	0	5.01E+14	4.49E+11	2.35E+14
Fecal Coliform	MPN	3.27E+11	6.08E+12	0	4.45E+14	5.36E+09	2.35E+15
Total Coliform	MPN	4.93E+11	3.65E+13	0	9.72E+15	8.16E+11	3.03E+16
Total Metals							
Aluminum	lb	0.2497	0.4886	0	121.74	0.0219	17.627
Cadmium	lb	0.0014	0.0020	0	0.5914	3.75E-05	0.1685
Chromium	lb	NR[1]	0.0808	0	1.8132	NR[1]	0.1819
Chromium (III)	lb	NR[1]	0.0808	0	NR[2]	NR[1]	0.1819
Chromium (VI)	lb	NR[1]	0.0065	0		NR[1]	0.1774
Copper	lb	1.157	0.1497	0	43.861	0.0054	3.6064
Iron	lb	0.4271	0.5595	0	636.32	0.0292	43.57
Lead	lb	0.0043	0.0024	0	1.8099	9.37E-05	0.0587
Manganese	lb	0.1452	0.1836	0	194.78	0.0067	34.588
Mercury	lb	0.0006	0.0079	0	0.0507	1.50E-05	0.0142
Nickel	lb	NR[1]	0.0102	0	2.8860	NR[1]	1.3361
Silver	lb	NR[1]	0.0039	0	1.3951	NR[1]	0.0355
Zinc	lb	0.1621	0.1970	0	33.099	0.0081	35.820
Dissolved Metals							
Aluminum	lb	0.0732	0.1253	0	16.877	0.0111	1.7648
Cadmium	lb	0.0009	0.0020	0	0.5707	3.56E-05	0.0743
Chromium	lb	NR[1]	0.0808	0	1.3735	NR[1]	0.0279
Chromium (III)	lb	NR[1]	0.0808	0	0.3019	NR[1]	0.0279
Chromium (VI)	lb	NR[1]	0.0065	0	0.8119	NR[1]	0.1774
Copper	lb	1.0711	0.1245	0	22.096	0.0034	1.7167
Iron	lb	0.0898	0.1340	0	83.986	0.0135	5.469
Lead	lb	0.0004	0.0024	0	1.6618	2.44E-05	0.0112
Manganese	lb	0.1137	0.1222	0	133.90	0.0021	30.275
Mercury	lb	0.0029	0.0079	0	0.0507	4.50E-05	NA
Nickel	lb	NR[1]	0.0096	0	3.0405	NR[1]	0.8515
Silver	lb	NR[1]	0.0039	0	1.3951	NR[1]	0.0177
Zinc	lb	0.1290	0.1891	0	22.042	0.0041	34.844

Table 3-21 (continued)
Persistent Flow Non-Storm Water Pollutant Loads by Jurisdiction

Analyte	Units	Jurisdiction					
Jurisdiction	-	City of Del Mar	City of Escondido	City of Poway	City of San Diego	City of Solana Beach	County of San Diego
Annual Dry Weather Flow Volume	cf	225,220	252,480	0	16,252,044	6,004	5,682,620
Nutrients							
Ammonia N	lb	0.2445	3.704	0	3,915	0.2305	64.46
Nitrite as N[3]	lb	0.0507	2.086	0	690.87	0.1387	2.4253
Nitrate as N[3]	lb	31.10	86.38	0	2,802.9	0.3205	1,587.2
Nitrate/Nitrite N[3]	lb	31.10	NR	0	NR	0.4592	1,610.0
Total Nitrogen	lb	40.28	100.1	0	11,322	1.668	1,811.4
TKN	lb	11.067	13.63	0	8,445	1.199	218.54
Phosphate, Dissolved P	lb	0.4097	NA	0	1,098	0.1106	40.11
Phosphorus, Total	lb	1.473	2.364	0	1,184	0.1631	56.42
Orthophosphate as P	lb	1.166	2.601	0	331.63	0.0937	47.95
Sulfate as SO4	lb	5,206	NA	0	407,157	106.6	141,668
Solid Parameters							
TDS	lb	25,369	18,237	0	1,828,083	348.4	701,954
TSS	lb	47.58	45.95	0	14,919	2.436	805.6
Synthetic Organics							
Pentachlorophenol	lb	0.0080	0.0079	0	5.0461	0.0002	0.1969

1. NAL analyte not required for Ocean Receiving Waters
2. Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
3. Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NA = not analyzed; NR = not required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; TSS = total suspended solids

3.4.4 Percent Contribution from Known Sources

Table 3-22 summarizes the percentage of non-storm water volume and load contributions from known sources. This value was calculated by dividing the observed flow rate for each known source by the estimated annual outfall flow volume presented in Section 3.4.2. It was assumed that the known source was flowing for the entire day on which the source was observed. Additionally, it was assumed that the percent load contribution is equal to the percent flow contribution for each known source.

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Table 3-22
Percent Contribution from Known Sources

Copermittee	Station ID	Observation Date	Known Source	Known Source Flow Rate (cfs)	Known Source Daily Flow Volume (cf)	Annual Outfall Non-Storm Water Flow Volume (cf)	Percent Contribution from Known Source (%)
City of San Diego	DW0033	9/16/2016	Irrigation Runoff	0	0	49,550	0%
	DW0284	9/16/2016	Pool/Spa Chlorinated	0	0	78,252	0%
		9/16/2016	Irrigation Runoff	0	0		0%
	DW1109	2/8/2016	Uncontaminated Infiltration into MS4	0.10	8,640	2,669,021	0.32%
	DW1120	2/9/2016	Backflow Leak	0.02	1,728	2,044,357	0.09%
City of Del Mar	No known sources observed.						
City of Escondido	No known sources observed.						
City of Poway	140	7/29/2016	Irrigation Runoff	0	0	0	0%
		8/2/2016	Irrigation Runoff	0	0	0	0%
City of Solana Beach	No known sources observed.						
County of San Diego	MS4-SDG-115	8/19/2016	Irrigation Runoff	0	0	1,891,296	0%

cf = cubic feet; cfs = cubic feet per second; ID = identification

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3.4.5 Percent Contribution from Sources Not Subject to Copermittee Legal Authority

Copermittees did not identify sources not subject to their legal authority within the San Dieguito River WMA during dry weather monitoring.

3.4.6 Dry Weather Assessment Methodology Assumptions and Limitations

Calculation of the MS4 Permit-required assessments necessitates a number of assumptions to translate the monitoring data into conclusions regarding flow volume and load for the entire WMA. These assumptions may introduce potential sources of error, while propagating potential errors inherent to the monitoring data. These assumptions and sources of error are summarized as follows:

- Monitoring Error—Annual non-storm water volumes and pollutants loads are based on the results from dry weather visual observations and dry weather outfall monitoring events. Error in the monitoring data could have the effect of propagating error in all subsequent calculations. Potential sources of error in the monitoring data include the following:
  - Monitored Flow Selection—The pollutant loading estimations rely on monitoring data from one or more non-storm water visual observations per major MS4 outfall per year. The 2015–2016 monitoring year is the first year of dry weather flow volume and load calculation, and this period generally has represented a drought condition, which can affect the type and volume of non-storm water sources such as irrigation and groundwater. The potential for inter-annual variability is a source of error in both the flow and chemistry data.
  - Flow Measurement Method—The MS4 Outfall Monitoring Plan provides different options to determine the non-storm water volume: (1) field-based estimation methods (e.g., “float method” or “bucket and stopwatch method”), and (2) equipment-based flow measurements. The method chosen varies among outfalls and Copermittees, introducing inter-site variability in volume estimations. The field-based estimation methods introduce potential human error in using stopwatches and error in determining volume amounts in non-graduated buckets. The consistent equipment-based flow monitoring approach is more accurate and precise compared with the field-based estimation methods. However, this approach introduces variability through the flow measurement device and sensor type used to account for site-specific conditions, and can also be cost and time prohibitive across the number of outfalls monitored. Each measurement device and sensor type has an inherent accuracy range (e.g., ±2% accuracy for sub area-velocity [sub-AV] probes). Additionally, each flow measurement device and sensor type can produce slightly different values for the same event, adding inter-site variability.
  - Rainfall Measurement—Accuracy in determining the number of dry days relies on the accuracy of the rainfall measurements representing that outfall. Rainfall

measurements were based on the County of San Diego ALERT rain gauge closest to the majority of wet weather outfalls in each WMA, and not site-specific rainfall data. Rainfall totals across the San Diego area can vary widely within a given storm.

- Chemistry Results—An attempt to maintain regional consistency in reporting limits (RLs) and MDLs was made. However, differences in lab capabilities can sometimes lead to different RLs and MDLs. This variability can introduce error if constituent concentrations are near or below the MDL for one monitoring event or Copermittee, and the MDL differs for another monitoring event or Copermittee. An attempt was made to account for this type of error by assigning constituents that were not detected a value of MDL/2 for the purposes of the assessment calculations.

- Assessment Methodology Error—The assessments require a series of assumptions and extrapolations regarding the determination of annual volumes and pollutant loadings. Each assumption carries the possibility of error, including the following:

  - Annual Volume Estimation Representativeness—Regardless of the flow measurement method utilized, error is introduced when utilizing the median of more than one field measurement to determine an annual volume estimation. It is assumed that these field measurements are representative of “typical” non-storm water conditions because persistently flowing non-storm water flows are relatively consistent through the year. However, this may not be the case, and error could be introduced into these estimations. For example, groundwater base flows can increase during the wet season, increasing dry weather flow rates. Or, alternatively, irrigation and irrigation runoff may increase during the dry season, increasing dry weather flow rates. Unless flow observations are made throughout the year under a variety of conditions, this seasonal variation may not be captured.

  - Annual Volume Estimation Confidence—Based on availability of data, multiple calculation methods are used to estimate annual flow volume. The confidence associated with each estimate varies because different sample sizes are used for each estimate. That is to say, volumes calculated on the basis of continuous flow data are associated with a higher confidence than volumes based on one or two instantaneous flow measurements.

  - Annual Pollutant Load Estimations—The annual volume estimation error introduced previously disseminates into the annual pollutant load estimations through calculations discussed in Section 3.4.3. Although persistent non-storm water flows are relatively consistent throughout the year, collecting two grab samples in one year provides a very brief snapshot in time of the pollutant concentration at an outfall, which may not be indicative of typical conditions or pollutant loadings. Additionally, using an arithmetic mean as a “typical” value of pollutant concentrations to estimate pollutant loads can introduce error if the sample size of the mean is too small, as means are sensitive to sample size.

4 Wet Weather Outfall Data and Assessments

During the 2015–2016 monitoring season, the first year of wet weather outfall discharge monitoring was conducted in accordance with Provision D.2.c of the MS4 Permit. The goals of wet weather outfall monitoring are the following:

- Identify pollutants in storm water discharges from the MS4;
- Guide pollutant source identification efforts; and
- Determine compliance with the water quality-based effluent limitations (WQBELs) associated with the applicable TMDLs presented in Attachment E of the MS4 Permit.

Wet weather outfall monitoring was initiated following completion and acceptance of the San Dieguito River WMA WQIP. This program built upon the transitional wet weather outfall discharge monitoring completed during the 2013–2014 and 2014–2015 monitoring seasons. Details of the monitoring methodology are provided in the San Dieguito River WMA MS4 Outfall Monitoring Plan, available on the Project Clean Water website (Project Clean Water, 2016).

This section presents the results of wet weather discharge monitoring in the San Dieguito River WMA, as well as the results of the required Storm Water Pollutant Discharge Reduction Assessments.

4.1 Storm Water Action Level Comparisons

The data collected as part of the wet weather MS4 outfall discharge monitoring were compared with the SALs and HPWQC WQBELs per MS4 Permit Provision D.4.b.(2)(c)(ii). These comparisons are shown in Table 4-1 and Table 4-2, respectively.

Three storm water action level exceedances were recorded for all wet weather MS4 outfall discharge monitoring locations within the San Dieguito River WMA. Two of these exceedances were for nitrate + nitrite as N at SDC-1 in the City of Del Mar, and one at SDC-2 in the City of Escondido. In addition, the total copper concentration slightly exceeded the storm water action level at SDC-1. During the 2015–2016 monitoring year, the City of Del Mar and City of Escondido have just begun implementation of their WQIP strategies that have primary and secondary pollutant reduction benefits for metals and nutrients. They plan to continue implementing the strategies without modification to realize the rewards of these pollutant reduction benefits. Previous monitoring efforts indicated sources of elevated copper may include copper roofing and rain gutters, copper pipes, and brake dust from transportation corridors through copper brake pad wear.

Table 4-1
MS4 Outfall Storm Water Action Level Comparison

Analyte	SAL	Monitoring Location					
		SDC-1	SDC-2	SDC-3	SDC-4	SDC-5	SDC-6
		City of Del Mar	City of Escondido	City of Poway	City of San Diego	City of Solana Beach	County of San Diego
Total Cadmium	3 µg/L	0.32	ND	ND	0.073 J	0.20	ND
Total Copper	127 µg/L	**130**	22	8.2	31	44	10
Total Lead	250 µg/L	11	0.71	0.46	3.9	2.9	0.29
Nitrate + Nitrite as N	2,600 µg/L	**2,700**	**4,900**	470	830	1,000	1,600
Total Phosphorous	1.46 mg/L	1.0	0.25	0.16	0.31	0.44	0.43
Total Zinc	976 µg/L	490	33	15	63	220	33
Turbidity	126 NTU	41.1	5.27	5.55	24.5	51.6	29.3

Bold = exceedance of SAL
µg/L = micrograms per liter; J = estimate; mg/L = milligrams per liter; MS4 = municipal separate storm sewer system;
N = nitrogen; ND = not detected; NTU = nephelometric turbidity unit; SAL = storm water action level

There were numerous exceedances of the Bacteria TMDL WQBELs during the 2015–2016 monitoring year for the wet weather MS4 outfall discharge monitoring locations in the San Dieguito River WMA. For *Enterococcus,* concentrations for all samples exceeded the WQBEL. In four of the six total coliform samples and five of the six fecal coliform samples, concentrations exceeded the respective WQBELs. During the 2015–2016 monitoring year, the Responsible Agencies have just begun to implement their WQIP strategies that have primary and secondary pollutant reduction benefits for bacteria. They plan to continue implementing the strategies without modification to realize the rewards of these pollutant reduction benefits and will work toward meeting the goals related to the HPWQC. Additionally, results for the first year of Bacteria TMDL monitoring indicate that the receiving water is in compliance with both interim and final wet weather receiving water limitations.

Table 4-2
MS4 Outfall Water Quality-Based Effluent Limitations Comparison

Analyte	WQBEL	Monitoring Location					
		SDC-1	SDC-2	SDC-3	SDC-4	SDC-5	SDC-6
		City of Del Mar	City of Escondido	City of Poway	City of San Diego	City of Solana Beach	County of San Diego
Enterococcus	61 (104[1]) MPN/100mL	**6,131**	**1,607**	**7,701**	**6,800**	**9,208**	**6,800**
Total Coliforms	10,000 MPN/100mL	**70,000**	**28,000**	**220,000**	3,400	**1,600,000**	10,000
Fecal Coliforms	400 MPN/100mL	**7,900**	**28,000**	**3,300**	**520**	**31,000**	280

1. A single sample maximum of 104 MPN/100mL may be applied as a receiving water limitation for creeks designated as "moderately or lightly used" or less frequent usage in the Basin Plan.

Bold = exceedance of WQBEL

MPN/100mL = most probable number per 100 milliliters; MS4 = municipal separate storm sewer system;

WQBEL = water quality-based effluent limitation

4.2 Wet Weather Outfall Monitoring

4.2.1 Wet Weather Outfall Monitoring Locations

Each Responsible Agency selected wet weather MS4 outfall discharge monitoring locations from their inventories developed pursuant to Provision D.2.a.(3)(a)(i) of the MS4 Permit for the San Dieguito River WMA. These locations were compliant with the MS4 Permit requirements for wet weather outfall site selection:

- ❖ At least five wet weather MS4 outfall discharge monitoring locations that are representative of storm water discharges from areas consisting primarily of residential, commercial, industrial, and typical mixed-use land uses present within the San Dieguito River WMA; and
- ❖ At least one wet weather MS4 outfall discharge monitoring location for each Responsible Agency within the San Dieguito River WMA.

The six stations monitored during the 2015–2016 monitoring season are presented in Table 4-3. Each wet weather MS4 outfall discharge monitoring location in the San Dieguito River WMA was sampled once during the 2015–2016 monitoring season. All six stations were also monitored during the 2014–2015 monitoring season (second transitional monitoring season). Five of the six stations were also monitored during the 2013–2014 monitoring season (first transitional monitoring season). The MS4 outfall station that changed from the first to second transitional year was MS4-SDC-3 in the City of Poway. The outfall monitoring locations and their associated drainage areas are shown in Figure 4-1. Land use types within the outfall drainage area for each location are described in Table 4-5.

Table 4-3
2015–2016 San Dieguito River WMA Wet Weather Outfall Monitoring Locations

Monitoring Location	Responsible Agency	Jurisdictional Identifier	Latitude	Longitude	HSA Name	HSA Number
MS4-SDC-1	City of Del Mar	S-06	32.95995	-117.26826	Rancho Santa Fe	905.11
MS4-SDC-2	City of Escondido	HDG_102	33.06951	-117.07136	Del Dios	905.21
MS4-SDC-3[1]	City of Poway	306-1761, 1	33.00932	-117.02583	Green	905.22
MS4-SDC-4	City of San Diego	DW001	33.05223	-117.06648	Del Dios	905.21
MS4-SDC-5	City of Solana Beach	Seascape Sur	32.98544	-117.27306	Rancho Santa Fe	905.11
MS4-SDC-6	County of San Diego	COSD MS4 SDG01	33.00303	-117.11602	La Jolla	905.12

1. Monitoring location MS4-SDC-3 was relocated between the 2013–2014 and 2014–2015 monitoring years. The Jurisdictional Identifier of the previous monitoring location is 306-1749.1.

HSA = hydrologic subarea

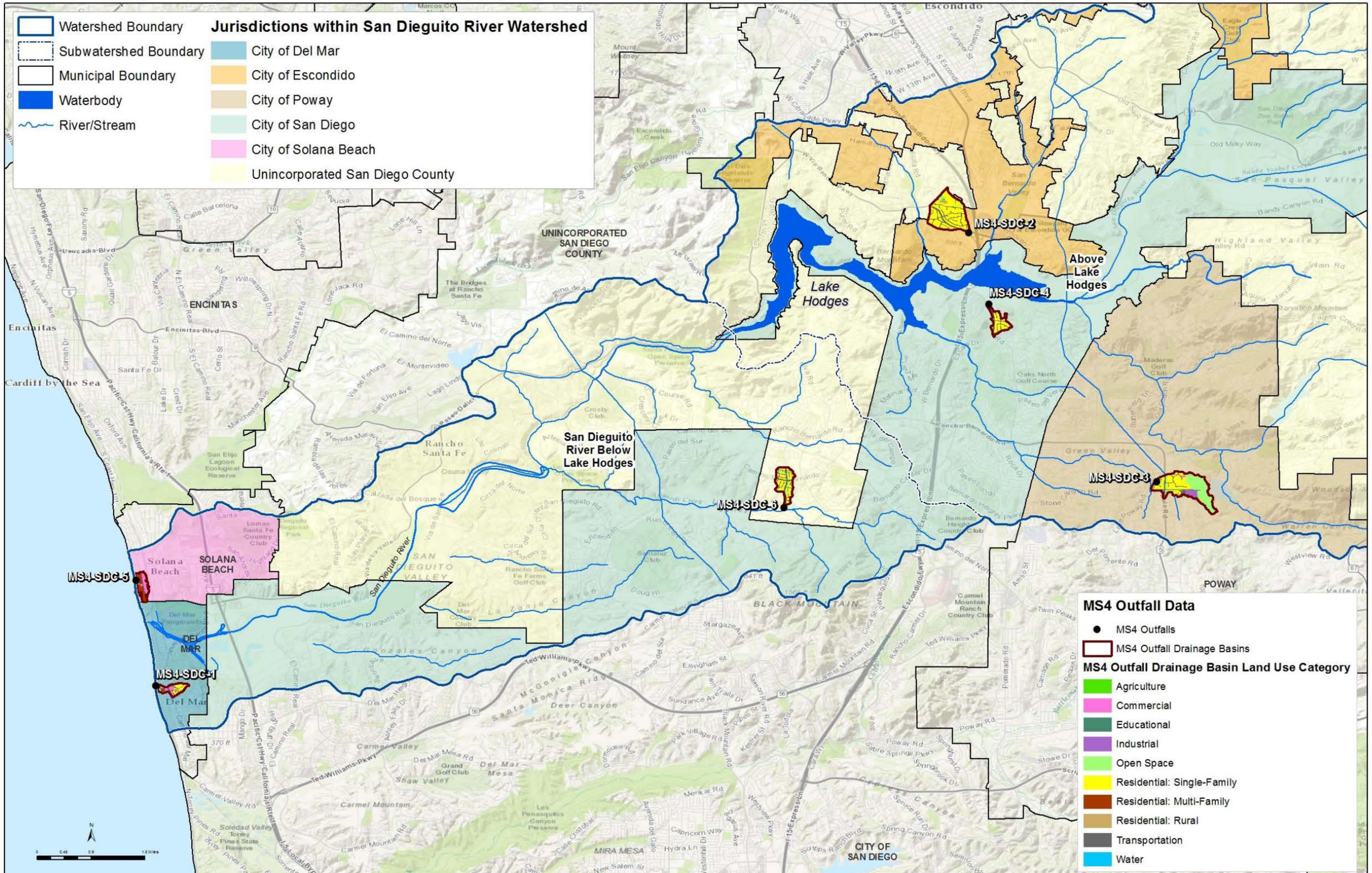

Figure 4-1
San Dieguito River WMA Wet Weather Outfall Monitoring Locations

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4.2.2 Wet Weather Outfall Monitoring Event Field Observations

The San Dieguito River WMA wet weather outfall locations were monitored during the wet season (i.e., October 1, 2015, through April 30, 2016), across two storm events on January 31, 2016, and March 6, 2016. Each location was monitored once.

During the wet weather monitoring event, narrative descriptions and field observations were recorded at each MS4 outfall discharge monitoring location. Flow was measured using a Hach Sigma 950 flow meter with sub-AV probe in accordance with the United States Environmental Protection Agency (USEPA) Storm Water Sampling Guidance Document (EPA-833-B-92-001), as described in the San Dieguito WMA MS4 Outfall Monitoring Plan. Rainfall statistics for each monitored event were based on a nearby San Diego County Flood Control District ALERT station. The closest ALERT station to each monitoring location was selected.

Details, including date and duration of the storm events sampled, rainfall estimates of the storm event, and duration between the storm event sampled and the end of the previous measurable storm event with over 0.1 inch of rainfall, are presented in Table 4-4. Hydrographs for each monitored event, displaying event flows and rainfall amounts, are presented in Attachment E.1.

Table 4-4
2015–2016 San Dieguito River WMA Wet Weather Outfall Monitoring Event Field Observations

Monitoring Location	Storm Event Date	ALERT Station	Storm Duration (hours)	Rainfall Depth (inches)	Rainfall Intensity (inches/ hour)	Antecedent Dry Days	Flow Volume (cf)
MS4-SDC-1	3/5/2016	Encinitas	12	0.27	0.0225	16	2,714
MS4-SDC-2	3/5/2016	Escondido	10.13	0.34	0.0336	16	21,745
MS4-SDC-3	3/6/2016	Rancho Bernardo	10.75	0.25	0.0232	34	5,599
MS4-SDC-4	1/30/2016	Rancho Bernardo	22.92	1.03	0.0449	23	11,482
MS4-SDC-5	3/5/2016	Encinitas	12	0.27	0.0225	16	4,317
MS4-SDC-6	1/31/2016	Rancho Bernardo	22.92	1.03	0.0449	23	125,596

cf=cubic feet

4.2.3 Wet Weather Outfall Monitoring Event Analytical Results

During each wet weather event, samples were collected according to the procedures described in the San Dieguito River WMA MS4 Outfall Monitoring Plan.

Grab samples were collected for bacterial indicators and receiving water hardness. The grab samples were collected after the second hour of storm water runoff and before the sixth hour of storm water runoff. If the storm duration was less than two hours, the grab samples were collected as close to the peak flow as possible. A time-weighted composite sample was collected for all other analytes. All samples were collected in accordance with SWAMP protocols and following the QA and QC procedures outlined in the San Dieguito River WMA MS4 Outfall Monitoring Plan.

In situ turbidity measurements were collected using a LaMotte 2020 Portable Turbidity Meter. All other field measurements were collected using YSI Pro Plus Quatro field meter.

The required analyses were based upon the following four groupings of constituents, per Provision D.2.c(5)(f) of the MS4 Permit:

- Constituents contributing to the HPWQC identified in the San Dieguito River WMA WQIP;
- Constituents listed as a cause for impairment of receiving waters in the San Dieguito River WMA, as listed on the 2010 Clean Water Act (CWA) Section 303(d) List of Water Quality Limited Segments (303(d) List);
- Constituents for implementation plans or load reduction plans (e.g., Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for the San Dieguito River WMA where the Responsible Agencies are listed as responsible parties under the TMDLs in Attachment E of the MS4 Permit; and
- Applicable SAL constituents listed in Provision C.2 of the MS4 Permit.

Receiving water hardness samples were collected for each wet weather outfall station discharging to a fresh water receiving water. The receiving water hardness results were used to evaluate compliance with the USEPA one-hour maximum concentration criteria for metals, in the case of any SAL exceedances. Receiving water hardness samples were not collected for wet weather outfalls discharging to an ocean receiving water, or to a bay or estuary.

The 2015–2016 monitoring year wet weather outfall analytical results for the San Dieguito River WMA are presented in tabular form in Attachment E.2. Attachment D includes a QA/QC summary of the wet weather outfall data collected.

4.3 Volumes and Loads of Storm Water Discharges

Per Provision D.4.b.(2)(b)(i) of the MS4 Permit, the Responsible Agencies are required to use a watershed model or other method to calculate the following:

1. The average storm water runoff coefficient for each land use type within the WMA;

2. The volume of storm water and pollutant loads discharged from the monitored MS4 outfalls in the jurisdiction of each Responsible Agency to receiving waters within the WMA for each storm event with measurable rainfall greater than 0.1 inch;
3. The total flow volume and pollutant loadings discharged from the jurisdiction of each Responsible Agency within the WMA over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and
4. The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea to receiving waters or within each jurisdiction of within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the WMA for each storm event with measurable rainfall greater than 0.1 inch.

The following sections present the results of these assessments. The methodology used follows the methodology presented in the Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan (San Diego County Regional Copermittees, 2015). Changes from the transitional methodology are noted below. The methodology is presented in Attachment E.3. Complete tables of storm water volumes and pollutant loads can be found in Attachment E.4.

The calculation of the MS4 Permit-required assessments necessitates a number of assumptions to extrapolate the available monitoring data into watershed-wide estimates of discharge volumes and pollutant loads. These extrapolations introduce potential sources of error in addition to error sources inherent to the monitoring data. A summary of these assumptions and sources of error follows:

- ❖ Potential Sources of Error Inherent to Monitoring—Runoff coefficients and pollutant loads are based on the results from wet weather outfall monitoring events. Error in the monitoring data could have the effect of propagating error in all subsequent calculations. Potential sources of error in the monitoring data include the following:
  - ➢ Monitored Storm Selection—The calculation relies on monitoring data from one storm event per year. Although a range of storm conditions have been targeted over the period of monitoring (2013–2016), this period generally has represented drought conditions. Inter-annual variability in storm duration, intensity, and rainfall depth, in can be a source of error in both the flow and chemistry data.
  - ➢ Drainage Area Delineation—The accuracy of the observed outfall runoff coefficient calculation relies on the accuracy of the drainage area delineation for that outfall. Drainage area delineations were based on the most recent jurisdictional delineation, some of which were based on desktop analysis of GIS data layers. The accuracy of this delineation depends upon the accuracy of the underlying data layers.

  - Flow Measurement Method—A consistent flow monitoring approach is described in the Monitoring Plan. However, this approach allows for variability in the flow measurement device and sensor type used to account for site-specific conditions. Each measurement device and sensor type has an inherent accuracy range (e.g., ±2% accuracy for sub-AV probes). Additionally, each flow measurement device and sensor type can produce slightly different values for the same event, adding a layer of inter-site variability.

  - Rainfall Measurement—The accuracy of the observed outfall runoff coefficient calculation relies on the accuracy of the rainfall measurement for that event at that outfall. Rainfall measurements were based on the nearest County of San Diego ALERT rain gauge to each outfall and not site specific rain data. Rainfall totals across the San Diego area can vary widely within a given storm.

  - Chemistry Results—An attempt to maintain consistent RLs and MDLs across the monitoring seasons was made. However, differences in lab capabilities can sometimes lead to different RLs and MDLs. This variability can introduce error if constituent concentrations are near or below the MDL one monitoring year, and the MDL changes. For the assessment calculations, an attempt was made to account for this type of error by assigning a value of MDL/2 to constituents that were not detected.

- Potential Sources of Error Inherent to the Assessment Methodology—The assessments require that a series of assumptions and extrapolations be made regarding land use based runoff coefficients and pollutant concentrations. Each assumption carries the possibility of error, including the following:

  - Observed Outfall Runoff Coefficient Calculation—Total rainfall of a monitored storm event, not accounting for rainfall intensity or duration, is considered in these calculations. Storms of higher intensity generally produce more runoff for a given rainfall amount than storms of lower intensity. Therefore, a storm with an equal total rainfall but a higher intensity than another storm would be expected to exhibit a higher runoff volume or flow rate.

  - Outfall Drainage Area Land Use Representativeness—While an attempt has been made to select outfall monitoring locations with drainage areas of one primary land use type, the reality of storm water drainage systems in urban and suburban areas is that most monitoring locations are a mixture of multiple land use categories. To calculate the runoff coefficient from each land use category, the observed runoff coefficient is compared to standard values calculated using the San Diego County Hydrology Manual (County of San Diego, 2003). A correction factor based on the ratio of the observed runoff coefficient to the calculated runoff coefficient is then applied to each land use category to derive land use runoff coefficients.

- WMA Land Use Representativeness—Not all land use categories within the WMA are represented by the monitored drainage areas. Therefore, the pollutant concentration and runoff coefficient for one land use are sometimes substituted for another land use. For example, Open Space pollutant event mean concentrations (EMCs) and runoff coefficients may be used as a proxy for agriculture land use values, in the absence of monitoring data from agricultural land uses. These proxies are summarized in Table 4-5.

- Land Use EMC Assumptions—Apportioning pollutant loads to each land use type requires an assumption of pollutant concentrations that are "typical" of each land use category. To calculate a pollutant concentration from each land use category, the observed pollutant concentrations are compared with typical (arithmetic mean) values calculated on the basis of land use studies in the Los Angeles and San Diego areas (see Attachment E.3). A correction factor based on the ratio of the observed pollutant concentration to the calculated typical pollutant concentration is then applied to each land use category to derive land use concentrations. Using an arithmetic mean as a "typical" value can introduce error if the sample size of the mean is too small, because means are sensitive to sample size. However, literature values did not exist for all pollutants analyzed, and therefore an additional assumption is made that similar pollutants have similar land-use-based concentrations For example, it is assumed that ratios of other dissolved metals concentrations from the analyzed land use categories follow the ratios of dissolved copper concentrations from those land use categories. This assumes that all dissolved metals behave similarly to dissolved copper, which is not necessarily the case. The full list of assumptions is provided in Attachment E.3.

- Variability of Standard Runoff Coefficient and Pollutant Concentration Values—The mean standard runoff coefficients and pollutant concentrations are used in the assessments. In reality, there is a range associated with the real-world land use runoff conditions for both runoff coefficients and pollutant concentrations. For example, land use runoff pollutant concentrations can vary based on socio-economic factors across a single land use category. The 2015 City of San Diego trash study found that median income of people living in a given drainage area affected trash assessment results at the corresponding outfall. It is possible a similar pattern could be seen for other pollutants (City of San Diego, 2015).

4.3.1 Land Use Storm water Runoff Coefficient (D.4.b.(2)(b)(i)[a])

The average storm water runoff coefficient ("C") was calculated for each land use type in the WMA, based on data collected through three seasons of wet weather MS4 outfall monitoring (2013–2014, 2014–2015, and 2015–2016). This calculation is based on the measured flow and rainfall values for each monitored outfall (Table 4-2), along with the outfall drainage area characteristics. The quantity (area and percentage) of each land use type by outfall drainage area is presented in Table 4-5. Agriculture and Open Space land uses are subdivided by hydrologic soil group (A, B, C, or D).

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Table 4-5
2015–2016 San Dieguito River WMA Wet Weather Outfall Monitoring Stations – Drainage Area Land Use

Land Use Category[1]	San Dieguito River WMA											
	MS4-SDC-1		MS4-SDC-2		MS4-SDC-3		MS4-SDC-4		MS4-SDC-5		MS4-SDC-6	
	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%
Agriculture-A	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture-B	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture-C	0	0%	0.95	1%	0	0%	0	0%	0	0%	0	0%
Agriculture-D	0	0%	0.09	0%	0	0%	0	0%	0	0%	0	0%
Commercial	7.2	20%	0	0%	1.4	1%	0	0%	14.0	35%	0	0%
Educational	0	0%	0	0%	0	0%	0	0%	0	0%	0.74	1%
Industrial	0	0%	0.02	0%	11.3	6%	0	0%	0	0%	0	0%
Mixed Use	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Open Space-A	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Open Space-B	1.7	5%	1.9	1%	35.6	19%	0.19	0%	0.15	0%	0	0%
Open Space-C	0	0%	2.6	2%	33.0	17%	3.0	6%	0	0%	0	0%
Open Space-D	0	0%	2.2	1%	18.1	9%	0.04	0%	0	0%	10.3	14%
Residential: Multi Family	1.2	3%	0	0%	0	0%	0	0%	22.0	54%	0	0%
Residential: Rural	0	0%	2.9	2%	0.16	0%	0	0%	0	0%	0	0%
Residential: Single Family	15.5	43%	129.2	74%	70.8	37%	30.0	63%	0	0%	38.8	53%
Transportation	10.6	29%	33.9	20%	20.8	11%	14.6	31%	4.3	11%	23.5	32%
Water[1]	0	0%	0	0%	0	0%	0	0%	0	0%	0.12	0%
TOTAL	36.2	100%	173.9	100%	191.2	100%	47.8	100%	40.5	100%	73.4	100%

1. Water land use excluded from MS4 outfall assessments. Water land use assumed to be a sink for runoff storage.

% = percent; WMA = Watershed Management Area

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The observed “C” was calculated for each outfall, based on the monitored event characteristics (event flow, event rainfall, and outfall drainage area). For outfalls that were monitored for more than one monitoring season, the “C” is averaged across all years of monitoring at that outfall. This value was compared with the expected “C” for each outfall, based on runoff coefficients listed in the San Diego County Hydrology Manual (County of San Diego, 2003) The current observed “C” value for each outfall, as well as the expected “C” for each outfall, is presented in Table 4-6.

Table 4-6
2015–2016 San Dieguito River WMA Observed vs. Expected Outfall Runoff Coefficients

Monitoring Location	Observed “C”	Hydrology Manual “C”
MS4-SDC-1	0.23	0.61
MS4-SDC-2	0.17	0.52
MS4-SDC-3	0.03	0.45
MS4-SDC-4	0.28	0.54
MS4-SDC-5	0.14	0.69
MS4-SDC-6	0.59	0.54

The WMA “C” for each land use was calculated using an area-weighted average of all monitored event “C” values for the monitored wet weather outfalls. To improve the accuracy of the calculation over time, historical (2013–2015) and current (2015–2016) “C” values were included in the calculation. The historical and 2015–2016 WMA area-weighted average “C” values for each land use are presented in Table 4-7.

Table 4-7
Current and Historical San Dieguito River WMA Calculated Land Use Runoff Coefficients

Land Use Category	2013–2014 Land Use "C"	2014–2015 Land Use "C"	2015–2016 Land Use "C"
Agriculture-A[1,2]	0.06	0.03	0.03
Agriculture-B[1,2]	0.06	0.03	0.03
Agriculture-C[1,2]	0.04	0.04	0.04
Agriculture-D[1,2]	0.38	0.17	0.16
Commercial	0.23	0.28	0.26
Educational	0.73	0.49	0.54
Industrial	0.34	0.04	0.05
Mixed Use[3]	0.17	0.23	0.21
Open Space-A[2,4]	0.06	0.03	0.03
Open Space-B[2]	0.06	0.03	0.03
Open Space-C[2]	0.04	0.04	0.04
Open Space-D[2]	0.38	0.17	0.16
Residential: Multi Family	0.11	0.18	0.16
Residential: Rural	0.03	0.04	0.04
Residential: Single Family	0.23	0.22	0.21
Transportation	0.43	0.37	0.36

1. Because of limited WMA monitoring data for agriculture land use, "C" and event mean concentrations (EMC) values are based on San Dieguito River WMA monitored outfalls data for Open Space with corresponding soil type land use type.
2. Agriculture and Open Space land use types were divided into subgroups based on hydrologic soil type. See http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ny/soils/?cid=nrcs144p2_027279 for more information on hydrologic soil types.
3. "C" and EMC values are based on San Dieguito River WMA monitored outfalls data for Commercial and Multi-Family Residential land use types (averaged).
4. Open Space-A land use, Runoff "C," and EMC values are based on San Dieguito River WMA monitored outfalls data for Open Space-B land use type.

4.3.2 Monitored MS4 Outfall Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[b])

The volume of storm water and pollutant loads discharged from the MS4 outfalls to receiving waters in the jurisdictions within the WMA was calculated for each storm event with measurable rainfall greater than 0.1 inch. The wet season rainfall data for the ALERT rain gauge closest to each monitoring location were used to calculate the qualifying measured rainfall for each site. Table 4-8 presents the annual wet season storm water volume and pollutant load discharged from each outfall.

Table 4-8
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads by Drainage Area 2015–2016

Analyte	Units	MS4-SDC-1	MS4-SDC-2	MS4-SDC-3	MS4-SDC-4	MS4-SDC-5	MS4-SDC-6
Qualifying Measured Rainfall	in	6.92	10.52	10.81	10.81	6.92	10.81
Wet Season Flow Volume	cf	206,634	1,140,896	223,829	518,989	145,242	1,704,671
Conventional Parameters							
Chloride	lb	3,225	13,533	615	2,560	1,360	20,220
Sulfate	lb	864	17,806	1,160	2,916	517	15,963
Indicator Bacteria							
Enterococcus	MPN	3.59E+13	5.19E+13	4.88E+13	9.99E+13	3.79E+13	3.28E+14
Fecal Coliform	MPN	4.62E+13	9.05E+14	2.09E+13	7.64E+12	1.27E+14	1.35E+13
Total Coliform	MPN	4.10E+14	9.05E+14	1.39E+15	5.00E+13	6.58E+15	4.83E+14
Total Metals							
Aluminum	lb	33.5	34.2	4.47	242	5.44	27.7
Cadmium	lb	0.0041	0.0015	0.0003	0.0024	0.0018	0.0022
Copper	lb	1.68	1.57	0.1146	1.00	0.3990	1.06
Iron	lb	46.4	59.8	7.96	278	7.62	31.9
Lead	lb	0.1419	0.0506	0.0064	0.1264	0.0263	0.0309
Manganese	lb	2.45	2.78	0.3493	6.48	0.3355	2.23
Mercury	lb	0.0002	0.0001	2.72E-05	0.0005	1.77E-05	0.0032
Zinc	lb	6.32	2.35	0.2096	2.04	1.99	3.51

Table 4-8 (continued)
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads by Drainage Area 2015–2016

Analyte	Units	MS4-SDC-1	MS4-SDC-2	MS4-SDC-3	MS4-SDC-4	MS4-SDC-5	MS4-SDC-6
Dissolved Metals							
Aluminum	lb	0.7740	0.7122	0.5589	1.10	0.3355	1.81
Iron	lb	1.2900	0.0392	1.22	1.20	0.5984	1.60
Manganese	lb	1.6770	0.5342	0.2096	0.1782	0.1269	0.7130
Mercury	lb	2.52E-05	0.0001	2.72E-05	0.0001	1.77E-05	0.0016
Nutrients							
Nitrate as N	lb	32.2	349	6.43	24.6	8.80	160
Nitrite as N	lb	2.32	3.63	0.1677	2.43	0.4443	5.64
TKN	lb	94.2	114	12.2	81.0	25.4	138
Total Nitrogen	lb	129	463	18.2	107	34.5	309
Dissolved Phosphorus as P	lb	5.42	11.4	1.31	3.89	2.18	36.2
Total Phosphorus as P	lb	12.9	17.8	2.24	10.0	3.99	45.8
Solid Parameters							
TDS	lb	8,643	66,239	3,633	10,692	3,718	72,365
Synthetic Organics							
Pentachlorophenol	lb	0.0075	0.0271	0.0053	ND	0.0034	ND

cf = cubic feet; in = inches; lb = pounds; MPN = most probable number; N = nitrogen; ND = not detected; P = phosphorus; TDS = total dissolved solids;
TKN = total Kjeldahl nitrogen

4.3.3 Jurisdictional Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[c])

The volume of storm water and pollutant loads discharged from the jurisdictions of Responsible Agencies within the WMA over the course of the wet season was calculated for each storm event with measurable rainfall greater than 0.1 inch. The wet season rainfall data for the closest ALERT rain gauge that most represented the WMA were used. Because the San Dieguito River WMA contains more than one ALERT rain gauge, data from the Rancho Bernardo rain gauge were used, because this station was closest to a majority of wet season MS4 outfall monitoring stations. Table 4-9 presents the annual wet season storm water volume and pollutant load discharged from the jurisdictions of Responsible Agencies in the San Dieguito River WMA.

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Table 4-9
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads by Jurisdictional Area 2015–2016

Analyte	Units	City of Del Mar	City of Escondido	City of Poway	City of San Diego	City of Solana Beach	County of San Diego
Qualifying Measured Rainfall	in	10.81[1]	10.81[1]	10.81	10.81	10.81[1]	10.81
Wet Season Flow Volume	cf	1,835,989	36,842,409	39,682,516	142,516,362	11,689,825	396,564,132
Conventional Parameters							
Chloride	lb	13,384	295,886	282,254	1,087,159	104,289	2,210,514
Sulfate	lb	13,233	276,247	328,500	1,138,400	76,027	3,324,819
Indicator Bacteria							
Enterococcus	MPN	7.03E+14	1.90E+16	1.71E+16	5.36E+16	6.96E+15	9.71E+16
Fecal Coliform	MPN	4.18E+14	1.08E+16	1.01E+16	3.24E+16	3.92E+15	6.13E+16
Total Coliform	MPN	3.11E+15	9.93E+16	5.68E+16	4.93E+17	4.86E+16	4.41E+17
Total Metals							
Aluminum	lb	77.5	1,551	1,518	5,053	562	12,040
Cadmium	lb	0.0076	0.1631	0.1439	0.6314	0.0640	1.18
Copper	lb	2.73	46.5	35.3	204	19.3	291
Iron	lb	119	2,379	2,387	7,692	844	19,184
Lead	lb	0.1559	3.41	2.80	13.6	1.38	22.0
Manganese	lb	6.02	120	130	391	41.6	1,180
Mercury	lb	0.0017	0.0337	0.0338	0.1058	0.0118	0.2541
Zinc	lb	8.96	163	112	752	73.4	924

Table 4-9 (continued)
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads by Jurisdictional Area 2015–2016

Analyte	Units	City of Del Mar	City of Escondido	City of Poway	City of San Diego	City of Solana Beach	County of San Diego
Dissolved Metals							
Aluminum	lb	2.58	36.6	31.8	137	14.9	248
Iron	lb	12.7	166	299	461	50.7	4,008
Manganese	lb	2.06	29.2	29.1	111	11.5	283
Mercury	lb	0.0017	0.0215	0.0192	0.0729	0.0083	0.1282
Nutrients							
Nitrate as N	lb	181	3,787	4,519	14,294	1,095	45,601
Nitrite as N	lb	6.90	147	159	563	46.6	1,590
TKN	lb	181	3,919	3,702	14,675	1,461	32,064
Total Nitrogen	lb	432	9,442	10,265	32,319	3,061	90,467
Dissolved Phosphorus as P	lb	27.5	472	416	1,557	175	2,525
Total Phosphorus as P	lb	44.6	742	743	2,469	270	6,188
Solid Parameters							
TDS	lb	61,697	1,282,737	1,496,008	5,357,896	362,836	14,940,030
Synthetic Organics							
Pentachlorophenol	lb	0.0593	1.05	2.00	4.40	0.2517	29.4

1. The qualifying measured rainfall amount used to calculate monitored outfall flow volumes and pollutant loads for the City of Del Mar, City of Escondido, and City of Solana Beach outfall monitoring stations (MS4-SDC-1, MS4-SDC-2, and MS4-SDC-5, respectively) was less than the rainfall amount used to calculate jurisdictional flow volumes and pollutant loads for these jurisdictions. The rainfall gauge that most represented the WMA as whole was used for WMA and jurisdictional calculations, while the rainfall gauge that most represented each outfall was used for outfall calculations.

cf = cubic feet; in = inches; lb = pounds; MPN = most probable number; N = nitrogen; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen

4.3.4 Land Use Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[d])

The percent contribution of storm water and pollutant loads discharged from each land use type within each HSA with a major MS4 outfall in the jurisdiction of each Responsible Agency within the San Dieguito River WMA was calculated. The wet season rainfall data for the ALERT rain gauge closest that most represented the WMA were used. As in the jurisdictional load calculations described in Section 4.3.3, the Rancho Bernardo ALERT station data were used to calculate the qualifying measured rainfall for the WMA. Tables 4-10 through 4-15 present, by Responsible Agency jurisdiction, the percentage of the wet season storm water volume discharged from each HSA with a major outfall in the San Dieguito River WMA. The percentage of the wet season storm water volume and pollutant loads discharged from each land use type within each HSA with a major outfall in the San Dieguito River WMA, by Responsible Agency, is presented in Attachment E.4.

Table 4-10
City of Del Mar Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 905.11 – Rancho Santa Fe	1,835,989	100%
Jurisdictional HSAs with No Major Outfall	NA	0%
Jurisdictional WMA	**1,835,989**	**100%**

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

Table 4-11
City of Escondido Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 905.21 – Del Dios	22,662,379	62%
Jurisdictional HSA 905.23 - Felicita	6,657,258	18%
Jurisdictional HSAs with No Major Outfall[1]	7,522,771	20%
Jurisdictional WMA	**36,842,409**	**100%**

1. The City of Escondido has jurisdictional land area in HSAs 905.24 and 905.32, but has no major outfalls in those HSAs.

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

Table 4-12
City of Poway Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 905.22 - Green	21,970,127	55%
Jurisdictional HSAs with No Major Outfall[1]	17,712,389	45%
Jurisdictional WMA	**39,682,516**	**100%**

1. The City of Poway has jurisdictional land area in HSAs 905.21 and 905.31, but has no major outfalls in those HSAs.

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

Table 4-13
City of San Diego Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 905.11 – Rancho Santa Fe	44,441,677	31%
Jurisdictional HSA 905.12 – La Jolla	31,354,835	22%
Jurisdictional HSA 905.21 – Del Dios	22,206,526	15%
Jurisdictional HSA 905.22 – Green	22,066,683	15%
Jurisdictional HSA 905.31 - Highland	670,656	0.47%
Jurisdictional HSA 905.32 – Las Lomas Muertas	21,293,120	15%
Jurisdictional HSAs with No Major Outfall[1]	482,864	0.33%
Jurisdictional WMA	**142,516,362**	**100%**

1. The City of San Diego has jurisdictional land area in HSAs 905.23 and 905.51, but has no major outfalls in those HSAs.

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

Table 4-14
City of Solana Beach Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 905.11 – Rancho Santa Fe	11,689,825	100%
Jurisdictional HSAs with No Major Outfall	NA	0%
Jurisdictional WMA	**11,689,825**	**100%**

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

Table 4-15
County of San Diego Percent Contribution of Storm Water Volume, by HSA

HSA	Wet Season Flow Volume (cf)	% Contribution
Jurisdictional HSA 905.11 – Rancho Santa Fe	76,990,655	19%
Jurisdictional HSA 905.12 – La Jolla	10,842,710	3%
Jurisdictional HSA 905.21 – Del Dios	31,063,275	8%
Jurisdictional HSA 905.23 - Felicita	6,075,408	2%
Jurisdictional HSA 905.32 – Las Lomas Muertas	31,444,619	8%
Jurisdictional HSA 905.41 - Ramona	81,840,245	21%
Jurisdictional HSAs with No Major Outfall[1]	158,307,220	40%
Jurisdictional WMA	**396,564,132**	**100%**

1. The County of San Diego has jurisdictional land area in HSAs 905.24, 905.31, 905.33, 905.34, 905.35, 905.36, 905.42, 905.43, 905.44, 905.45, 905.46, 905.47, 905.51, 905.52, 905.53, and 905.54, but has no major outfalls in those HSAs.

% = percent; cf = cubic feet; HSA = hydrologic subarea; NA = not applicable; WMA = Watershed Management Area

4.4 Evaluation of Monitoring Locations and Frequencies

Provision D.4.b.(2)(b)(ii) of the MS4 Permit allows the Responsible Agencies to modify the wet weather MS4 outfall discharge monitoring locations and frequencies to better identify pollutants in storm water discharges from the MS4s in the WMA.

An analysis of wet weather MS4 outfall monitoring locations was performed in the 2014–2015 Transitional Monitoring and Assessment Report for the San Dieguito River WMA (TMAR) (San Diego County Municipal Copermittees, 2016). The purpose of the recommendations provided was to accurately quantify the storm water volume and loads from the various land uses in the WMA to improve the effectiveness of MS4 monitoring in meeting the intended MS4 Permit goal. As part of the evaluation of monitoring locations, a comparison of the WMA land use with the monitored outfall drainage area land uses was performed. The results of this comparison are provided in Table 4-16.

Table 4-16
Land Use Comparison, WMA and Monitored Drainage Areas

Land Use	WMA Area (acres)[1]	WMA Area (%)[1]	Outfalls Area (acres)	Outfalls Area (%)	(% Difference)
Agricultural (Combined)	31,871	17.5%	1	0.2	-17.5
Commercial	3,059	2.1%	23	4.0	2.3
Educational	673	0.4%	1	0.1	-0.2
Industrial	1,419	0.8%	11	2.0	1.2
Mixed Use	0	0.0%	0	0.0	0.0
Open Space (Combined)	92,779	51.4%	109	19.3	-32.3
Residential: Multi-Family	923	0.5%	23	4.1	3.6
Residential: Rural	28,655	15.6%	3	0.5	-15.4
Residential: Single-Family	15,027	8.3%	284	50.5	42.2
Transportation	5,367	3.3%	108	19.1	16.1
Total	**179,776**	**–**	**563**	**–**	**–**

1. Acreage excludes state, federal, tribal, and Phase II lands

% = percent; WMA = Watershed Management Area

Because the wet weather outfall monitoring locations did not change between the 2014–2015 and 2015–2016 monitoring seasons, the conclusions reached in the TMAR remain valid:

- The wet weather MS4 outfall monitoring locations are, overall, representative of land uses in the WMA.
- Agricultural and open space land uses are under-represented in the monitored outfall drainage areas; however, the intention of monitoring is to characterize drainage from the MS4 (i.e., developed land uses).
- Single-family residential and transportation land uses are well represented in the monitored outfall drainage areas.

The evaluation of monitoring frequency includes a comparison of monitored event rainfall conditions with annual rainfall conditions. During the 2015–2016 wet season (October through April), rainfall totals at ALERT system gauges within the San Dieguito River WMA ranged from 11.22 inches at the Rancho Bernardo rain gauge to 16.66 inches at the Mt. Woodson rain gauge. All ALERT gauges within the WMA registered more rainfall during the wet season than the official National Weather Service (NWS) gauge at Lindbergh Field (7.42 inches). The storms that occurred generally had totals of less than

1 inch of rainfall, although one very large storm beginning January 4, 2016, produced more than 3 inches of rainfall throughout the WMA. The average wet season storm event rainfall total at the Rancho Bernardo ALERT gauge is 0.83 inch. The rainfall total for the outfall monitoring event that took place on March 5, 2016, was less than this average. The rainfall total for the outfall monitoring event that took place on January 30, 2016, was greater than this average.

It was recommended in the TMAR to target more monitoring events during average (greater than 0.5 inch) and large (greater than 1 inch) storms. The 2015–2016 sampling targeted one smaller (less than 0.5 inch) and one large storm. It is recommended to continue targeting storm events of various sizes during future wet seasons, to capture a range of data for “C” calculations.

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5 Special Study Assessments

Special studies for the San Dieguito River WMA have been selected to further investigate the HPWQC: impairment of contact recreation due to bacteria indicator at the Pacific Shoreline. The special studies have been conducted and are summarized and assessed in this section. Studies included the San Diego Regional Streams and Beaches Studies, the San Dieguito Bacteria Source Identification Study, and the Proposed Nutrient Load Characterization for Lake Hodges Study led by the City of San Diego's Public Utilities Department.

5.1 San Diego Regional Reference Streams and Beaches Studies

The San Diego Regional Reference Stream and Beach Studies (SCCWRP, 2015 and SCCWRP, 2016) were designed to measure FIB concentrations and loads at streams and beaches that are minimally disturbed by anthropogenic activities, representing "reference" conditions. Nutrients, metals, and toxicity data were also collected. The resulting data may be used by the Regional Board in the Bacteria TMDL Reopener to derive reasonable and accurate numeric targets for bacteria on the basis of a reference system approach.

5.1.1 San Diego Regional Reference Streams Study

The goal of the San Diego Regional Reference Stream Study was to characterize the natural background concentrations of bacteria, nutrients, heavy metals, and conventional constituents in undeveloped watershed catchments during wet and dry weather. To meet the goal, the study was designed to categorize the exceedance frequencies of FIB water quality objectives (WQOs) by geomorphologic, hydrologic, biotic, and abiotic factors. The human-associated microbial source marker was used to exclude sites and samples with potential human fecal contamination, ensuring that the documented exceedance rates are attributable to nonhuman sources. This summary focuses on presenting the findings for FIB, specifically *Escherichia coli (E. coli)*, *Enterococcus*, and total and fecal coliforms.

The San Diego Reference Stream Study had seven major findings:

1. FIB levels in natural streams likely result from a combination of natural inputs, such as wildlife, birds, and soil erosion and instream bacterial growth facilitated by high summer temperatures, availability of nutrients, and presence of decaying organic matter.

2. Storm event mean concentration exceedances were low except for *Enterococcus*. Based on seven storms, exceedances of single-sample WQOs were 0% for *E. coli*, fecal coliform, and total coliform. The exceedance frequency for *Enterococcus* on the day of the storm was 87%, compared with 37% for the following three days after the end of the storm. The exceedance frequency increased for both *E. coli* and total coliform to 29% if the pollutograph maximum was used. The number of storm events captured was not sufficient to investigate the effect of geology or watershed size on storm event mean concentrations.

3. FIB exceedances occurred in natural sites and were highest in summer dry weather (April through August). No exceedances of fecal coliform single sample WQOs were observed; however, single sample WQO exceedances of *Enterococcus* were as high as 30%. Annual 30-day geomean exceedance frequencies were 0% for both *E. coli* and fecal coliform, but were 48% and 30% for *Enterococcus* and total coliform, respectively. Exceedance frequencies were highest in the summer, particularly for *Enterococcus*, spiking up to 40% and 68% for single sample and 30-day geometric mean WQOs, respectively. Using a rolling 30-day geometric mean rather than a monthly mean to calculate exceedance frequencies increased the exceedance frequencies for *Enterococcus* and total coliform as much as 20%.

4. Temperature, and to a lesser extent, nutrients and organic carbon, was the major factor associated with elevated summer dry weather FIB concentrations and exceedance frequencies.

5. No significant relationships were found between FIB concentrations and watershed size or geology during dry weather.

6. Water column FIB concentrations could not be attributed directly to instream benthic algal biomass as a measure of stream trophic status, which was low and showed no distinct seasonal variation. In contrast, FIB, temperature, organic carbon, and nitrogen measurements spiked at the end of the season, coinciding with the end of stream flow. This cycle occurs naturally; organic carbon and nutrients are increasingly recycled from organic matter as flow diminishes and temperature increases, conditions that coincide with increased FIB concentrations.

7. Event mean concentration fluctuations during wet weather were found to be 2 to 3 times greater than dry weather FIB fluctuations. Wet and dry weather fluctuations were comparable to those documented in previous southern California regional studies.

5.1.2 San Diego Regional Reference Beaches Study

The goal of the San Diego Regional Reference Beach Study was to characterize natural background concentrations of FIB and determine WQO exceedance frequencies at two “reference” recreational beaches and their adjoining estuary or mixing zones. Two beaches in southern California, San Onofre Creek in San Diego County and Deer Creek in Ventura County, were selected for the Reference Beach Study for dry and wet weather assessments of *Enterococcus*, fecal and total coliforms, and *E. coli*. These locations were selected because watersheds discharging to the beaches were more than 93% undeveloped and had not been subject to fires within the last three years. Additionally, both beaches are openly exposed with breaking waves and contain freshwater inputs. Analysis of human genetic markers was used to eliminate sites or samples with potential human contamination and therefore not representative of reference conditions.

The San Diego Regional Reference Beach Study was initiated in October 2014 and continued through April 2016. Sampling was conducted in the ocean immediately in front of the inlet or estuary, in the inlet mouth just upstream of the mixing zone, and in the freshwater flowing creek, for a total of three locations at each reference site. Dry weather monitoring was conducted during both wet and dry seasons to characterize baseline conditions throughout the year. Bacteria samples were collected weekly, such that five samples were collected in each 30-day period, to calculate a 30-day dry weather geometric mean. In creeks, dry weather sampling occurred when there was measurable flow at a site. During wet weather, samples were collected during and after the storm. A special study was also conducted to quantify FIB concentrations in the San Onofre estuary. When the estuary was open to tidal exchange, monitoring was extended to collect samples at high and low tides at all sites.

The San Diego Regional Reference Beach Study began during an extended period of drought in the southern California region, which limited the number of samples collected from creeks and during storms, as well as the overall volume of freshwater input to beaches. Dry weather beach sampling achieved the prescribed frequency, but samples from freshwater input sources were limited by extreme drought. From the onset of sampling, San Onofre Creek did not flow during the study period because of the extended drought. Deer Creek began flowing at the end of December 2014 and ceased in early May 2015; Deer Creek did not flow during the 2015–2016 winter dry weather period. In a similar effect, wet weather sampling was limited to only one storm during this study period because of the drought conditions. However human genetic markers were detected and so the results were excluded from the exceedance frequency analysis. The estuary special study was not completed because the San Onofre estuary berm remained closed throughout the study period for all but one storm event, which coincided with a tide in excess of 7 feet. The sampling locations were deemed inaccessible during that event, and so the estuary data collected only characterize concentrations during conditions with a closed estuary mouth.

Although drought conditions limited the conditions in which data were collected, the Reference Beach Study had several key findings:

1. The ranges of annual dry weather FIB concentrations at both beaches were considered low. The ranges are comparable to results from previous FIB beach bacteria reference studies that had estuaries closed to tidal exchange (i.e., San Onofre Creek) or flow to the beach without an estuary (i.e., Deer Creek), with WQO exceedance frequencies in the range of 0% to 3.5%. Prolonged drought conditions resulted in intermittent dry weather flow at Deer Creek and no dry weather flow at San Onofre Creek, which provides important context to interpret data on exceedance frequencies.

2. Concentrations of FIB in the estuary or freshwater mixing zone of both San Onofre and Deer Creeks were typically one to three orders of magnitude higher than their respective beaches, with the highest WQO exceedance frequencies found in San Onofre Creek.

3. In the San Onofre Creek estuary, the dry weather geometric mean exceedance frequency during summer was 72% for fecal coliform; the dry weather geometric exceedance frequency during summer was 100% for both *Enterococcus* and *E. coli*. Dry weather geometric mean exceedances during wet season months ranged from roughly 55% (for total coliform) to 100% (for *Enterococcus*). The higher WQO exceedance frequencies of San Onofre Creek estuary relative to the mixing zone of Deer Creek could be expected, given the abundance of labile organic matter to support microbial growth as well as the presence of water birds typically found in estuaries.

4. At both beaches, no significant relationship was found with water temperature, salinity, or antecedent dry days. In contrast to San Onofre Beach, where FIB concentrations declined with the increasing duration of dry weather, the range and mean FIB concentrations in San Onofre Creek estuary increased with increasing antecedent dry days and salinity, suggesting that freshwater input from the ephemeral channel tended to dilute concentrations, rather than be a source of bacteria to the beach. The slight increase of FIB concentrations as a function of temperature and the lack of surface freshwater input in San Onofre Creek estuary suggests that regrowth may be a factor, which is credible given the organic rich environment of the San Onofre Creek estuary.

5.1.3 Conclusions and Recommendations

Per the MS4 Permit (Provision D.4.c) data resulting from special studies should be used to (1) assess their relevance to the Responsible Agencies' characterization of receiving water conditions, (2) understand sources of pollutants and/or stressors, and (3) control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters. The San Diego Regional Stream and Beach Reference Studies characterized FIB levels in reference waterbodies and contributed to the understanding of non-anthropogenic sources of FIB. The data generated by the study are intended to be used by the Regional Board in the Bacteria TMDL Reopener to derive reasonable and accurate numeric targets for bacteria that account for contributions from natural sources as characterized by the study.

- The San Diego Regional Stream Study is directly related to the highest priority water quality condition. The adaptive management process may use the following key findings to inform the Bacteria TMDL Reopener:
- During dry weather conditions (streams):
  - There are exceedances of FIB WQOs at natural sites for *Enterococcus* and total coliform (single sample and annual 30-day geomean).
  - These are highest during summer months (April to August).
  - There were no exceedances of the fecal coliform single sample WQOs along with a 0% exceedance frequency of the annual 30-day geomean.
  - *E. coli* also had a 0% exceedance frequency of the annual 30-day geomean.

- During wet weather conditions (streams):
  - Storm event mean concentration exceedances of single sample WQOs were 0% for *E. coli*, fecal coliform, and total coliform, but if the storm maximum pollutograph was included, there were exceedances for *E. coli* and total coliform.
  - For the storm event mean concentration exceedances of single sample WQOs for *Enterococcus*, the exceedance frequency on the day of the storm was 87%, compared with 37% for the following three days after the end of the storm.
- In summary for reference streams:
  - *Enterococcus* concentrations can often exceed the WQO in both dry and wet weather conditions in streams with no anthropogenic impacts.
  - Total coliform concentrations exceeded the WQO only during wet weather conditions in the reference watershed streams when the storm peak was incorporated into the event mean concentration.
  - *E. coli* concentrations exceeded the WQO only during wet weather conditions in the reference watershed streams when the storm peak was incorporated into the event mean concentration.
  - Fecal coliform concentrations did not exceed WQO in dry and wet weather conditions in any reference watershed streams.
- During dry weather conditions (beaches):
  - The Enterococcus dry weather annual 30-day geomean exceedance frequency was 100% for the whole year in the San Onofre Creek estuary.
  - The *Enterococcus* dry weather annual 30-day geomean exceedance frequency was 100% for the whole year in the San Onofre Creek estuary.
  - The total coliform dry weather annual 30-day geomean exceedance frequency was 55% during winter months (October to March) in the San Onofre Creek estuary.
  - The *E. coli* dry weather annual 30-day geomean exceedance frequency was 100% during summer months (April to August) in the San Onofre Creek estuary.
  - The fecal coliform dry weather annual 30-day geomean exceedance frequency was 72% during the summer months in the San Onofre Creek estuary.
- During wet weather conditions (beaches):
  - No wet weather reference samples were analyzed for the beach study because human genetic markers were found in the samples during the one wet weather sampling event..

- In summary for reference beaches:
  - *Enterococcus* dry weather 30-day geomeans were exceeded during the whole year.
  - Total coliform dry weather 30-day geomeans were exceeded during the winter months (October to March).
  - *E. coli* and fecal coliform dry weather 30-day geomeans were exceeded during the summer months.

Concentrations of FIB were one to three times higher in estuary or freshwater mixings zones than at the beaches. For reference beaches with both streams and estuaries closed from tidal exchange, *Enterococcus* exceeded WQOs. Total coliform, *E. coli*, and fecal coliform concentrations exceeding WQOs varied for seasons and waterbody types. Additionally, the variability in dry weather FIB concentrations is less than the variability in wet weather FIB event mean concentrations, confirming the findings of previous studies.

5.2 San Dieguito River WMA Bacteria Source Identification and Prioritization Process Special Study

The San Dieguito River WMA Bacteria Source Identification and Prioritization Special Study looked to assess sources of bacteria in the watershed using the San Diego Bacteria Source Identification and Prioritization Process developed in 2012 as part of the MS4 Permit Report of Waste Discharge process (San Dieguito Responsible Agencies, 2015b) (Attachment E). The original focus was on the beach and lagoon area of the lower San Dieguito River WMA, with inputs from the upper watershed were also considered where relevant and necessary to identify sources of bacteria to the beach and lagoon. After reviewing the historical water quality data, it was determined that certain areas in the WMA exhibited higher bacteria concentrations than others. This finding led to a modification in the special study design, where the bacteria source identification would be focused on the specific areas in the WMA exhibiting higher concentrations of bacteria, rather than broadly assessing the whole WMA. The Responsible Agencies examined individual focus areas within their jurisdictions to be able to modify or tailor efforts in those specific areas.

The focus area drainages were selected because of elevated *Enterococcus* concentrations and known persistent dry weather flows. *Enterococcus* was selected for its qualification as an indicator of human health risk and to remain consistent with the USEPA's 2012 Recreational Water Quality Criteria, which recommends criteria for *E.coli* and *Enterococcus* and has removed criteria for fecal coliform. The focus areas also allowed each participating Responsible Agency to identify bacteria sources to target in their jurisdictions. The study used geospatial data, water quality data, and the prioritization process to determine potential bacteria sources in selected focus areas.

Water quality samples collected during dry weather for *Enterococcus* were the primary source of information used to determine the focus areas within the San Dieguito WMA. After filtering the region-wide bacteria dataset for these conditions, a total of 38 MS4 outfall sampling locations were identified, representing 340 individual data points. After calculating the geomean for each MS4 outfall location, and evaluating the location of the outfall within the WMA, the dry weather flow at the outfall, and the land use draining to the outfall, the focus area selection process identified six focus areas, as shown in Figure 5-1.

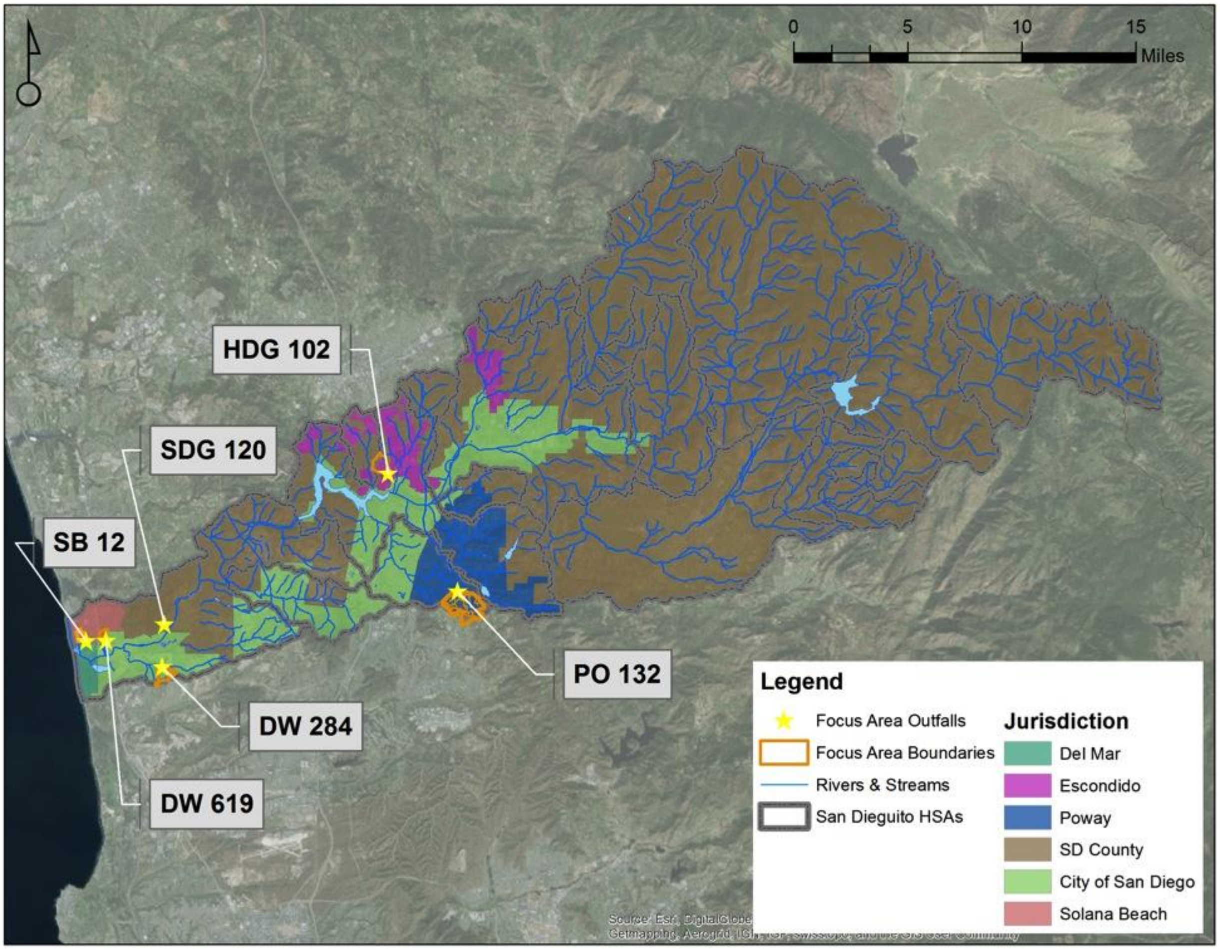

Figure 5-1
Bacteria Source Identification Special Study Focus Areas

Focus areas were selected for all Responsible Agencies other than the City of Del Mar. The City of Del Mar actively tracks and manages geospatial inventory data and conducts monthly patrols to identify any potential issues and sources related to pollutants and urban runoff. Through the analysis of bacteria concentrations (geomeans of *Enterococcus* concentrations), MS4 outfall locations within the jurisdiction, and dry weather flow observations and information, the City of Del Mar does not currently have a focus area identified. The City of Del Mar does not have any persistently flowing major MS4 outfalls that drain to the San Dieguito River or Lagoon. Based on the currently available data, no bacteria exceedances have been recorded for these locations. In addition, since 2013, the City of Del Mar has performed visual outfall monitoring at every outfall, minor or major, on a monthly basis, and the monitored outfalls identified above have never flowed persistently. An analysis of the monthly data from 2013 to the present shows six of the seven MS4 outfalls are consistently dry and one outfall has had minor flow observed twice. The City of Del Mar will continue to conduct frequent city-wide patrols and assessment of data to determine whether specific focus areas will need to be established in the future. Any changes will be documented in applicable WQIP Annual Reports or updates.

The other Responsible Agencies evaluated 50 potential bacteria sources within each focus area, and considered dry and wet weather conditions separately. Of the 50 sources of bacteria, those that were identified as present within the focus area were then prioritized. The potential bacteria sources were grouped into three categories on the basis of bacterial origin: human waste, anthropogenic nonhuman sources, and non-anthropogenic sources. Within these categories, characteristics of the potential sources are evaluated and scored on the basis of five key prioritization metrics:

- **Human health risk** refers to the nature and probability of adverse health effects for those who may be exposed to bacteria produced by a source. The level of human health risk associated with various sources is given a relative score ranging from very low risk and to an exceptionally high risk. Research indicates that the origin of the bacteria may affect the human health risk associated with recreational waters.

- **Magnitude** refers to the concentration or load of bacteria produced by a source. As part of the bacteria source prioritization process, the magnitude associated with various sources is given a relative score ranging very low concentration or load to an exceptionally high concentration or load. Elevated concentrations, even with low flow, can result in high loads, potentially causing increased bacteria concentrations in receiving waters.

- **Transport feasibility** refers to the likelihood of storm water or urban runoff containing bacteria from specific sources of reaching receiving waters. Sources with a lower probability of reaching and influencing water quality in receiving waters are assigned a low score, while sources with a higher likelihood receive a higher score. Transport feasibility is largely affected by weather conditions (i.e., wet weather versus dry weather). The presence of structural BMPs should also be considered when evaluating transport feasibility.

- The **frequency** of a source refers to its presence or absence in the WMA. Where there are relatively lower numbers of a particular source, a lower score is assigned; where there are many numbers of a particular source in the WMA, a higher score is assigned accordingly.

- The **controllability** of a source refers to the ability of the Responsible Agency to control the source with respect to its influence on bacterial water quality. Low scores are deemed difficult to control, whereas higher scores are given to sources that are considered readily controllable.

For each potential source, the Responsible Agencies ranked the five prioritization metrics using a scoring scale of 1 to 10 to evaluate human health risk, magnitude, and frequency, and a scale of 1 to 5 for transport feasibility and controllability. Scores were determined not only based on the results of the source analysis and literature review, but also on each Responsible Agency's local knowledge of the focus area. As a result of the prioritization process, each Responsible Agency ranked 50 potential bacteria sources included in the San Diego Bacteria Source Identification and Prioritization Process for its focus area. The top two bacteria sources for wet and dry weather conditions for each focus areas are presented in Table 5-1.

Table 5-1
Top Two Potential Bacteria Sources for Wet and Dry Weather in Each Focus Area

Outfall ID/Focus Area	Wet Weather Potential Bacteria Source[1]	Dry Weather Potential Bacteria Source[1]
DW-284	1. Pets (Anthropogenic Nonhuman/Domestic Animals) 2. Manure/Compost (Anthropogenic/Landscaping)	1. Pets (Anthropogenic Nonhuman/Domestic Animals) 2. Manure/Compost (Anthropogenic/Landscaping)
SDG-210	1. Illegal Discharges (Human Waste/Other Wastewater) 2. Illicit Connections (Human Waste/Other Wastewater)	1. Illegal Discharges (Human Waste/Other Wastewater) 2. Portable Toilets (Human Waste/Other Wastewater)
HDG_102	1. Leaking Failing Septic Systems (Human Waste/Sewage Infrastructure) 2. Sanitary Sewer Overflows (Human Waste/Sewage Infrastructure)	1. Leaking Failing Septic Systems (Human Waste/Sewage Infrastructure) 2. Sanitary Sewer Overflows (Human Waste/Sewage Infrastructure)
PO-132	1. Wildlife (Birds and Others) (Nonanthropogenic/Wildlife [Birds and Others]) 2. Manure/Compost (Anthropogenic/Landscaping)	1. Wildlife (Birds and Others) (Nonanthropogenic/Wildlife [Birds and Others]) 2. Sanitary Sewer Overflows (Human Waste/Sewage Infrastructure)
SB-12	1. Pets (Anthropogenic Nonhuman/Domestic Animals) 2. Manure/Compost (Anthropogenic/Landscaping)	1. Pets (Anthropogenic Nonhuman/Domestic Animals) 2. Manure/Compost (Anthropogenic/Landscaping)
DW-619	1. Leaking Sewer Pipes (Exfiltration) (Human Waste/Sewage Infrastructure) 2. Sanitary Sewer Overflows (Human Waste/Sewage Infrastructure)	1. Leaking Sewer Pipes (Exfiltration) (Human Waste/Sewage Infrastructure) 2. Sanitary Sewer Overflows (Human Waste/Sewage Infrastructure)

1. Source information presented as Source (Category/Subcategory).

5.2.1 Conclusions and Recommendations

Per the MS4 Permit (Provision D.4.c), data resulting from special studies should be used (1) assess their relevance to the Responsible Agencies' characterization of receiving water conditions, (2) understand sources of pollutants and/or stressors, and (3) control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters. The San Dieguito River WMA Bacteria Source Identification and Prioritization Special Study allowed the Responsible Agencies to prioritize potential sources of bacteria in unique focus areas using existing monitoring and geospatial data. This process can serve as a framework for the Responsible Agencies to review bacteria sources at MS4 outfalls where WQBEL exceedances occur without implementing costly source identification studies and to potentially modify or enhance WQIP strategies in these focus areas.

Each Responsible Agency now has a detailed list of sources to investigate if further exceedances are found at the focus area outfalls. Specific actions by Responsible Agencies include continued frequent city-wide patrols and assessment of data by the City of Del Mar, including determining whether specific focus areas will need to be established in the future. The City of Escondido will fill an identified data gap and conduct a source evaluation to determine the number of registered septic tanks within city limits.

5.3 Proposed Nutrient Load Characterization for Hodges Reservoir

Both the Regional Board and members of the public have requested that the Responsible Agencies further evaluate Hodges Reservoir nutrient impairments as a potential HPWQC. In the WQIP acceptance letter dated February 17, 2016, the Regional Board stated that a nutrient impairment in Hodges Reservoir is "significantly impacting the use of Lake Hodges waters for municipal water supply, restricting water supply blending opportunities, and increasing treatment costs for downstream water supply agencies" (Regional Board, 2016). Maintaining the quality of local potable water supplies is of particular importance as California experiences its fifth consecutive year of drought conditions; as of April 2016, Hodges Reservoir was operating at 40% of capacity (San Diego County Water Authority, 2016).

In fiscal year (FY) 16, the Responsible Agencies completed the Lake Hodges Nutrients Evaluation Technical Memorandum to analyze the receiving water and MS4 data collected. In addition, the Responsible Agencies and the City of San Diego Public Utilities Department (Public Utilities) are currently developing a Study Plan, Monitoring Plan, and Quality Assurance Project Plan (QAPP) for what is now called the Hodges Reservoir Nutrient Source Study.

The goals of the Hodges Reservoir Nutrient Source Study are as follows:

- ❖ Develop a conceptual model that incorporates applicable information from existing models and other available information from Public Utilities, and MS4 inputs within the subwatershed above Hodges Reservoir (subwatershed) to characterize all sources of nutrients in Hodges Reservoir and the subwatershed.
- ❖ Provide data recommendations to refine existing watershed models developed by Public Utilities.

- Develop a study plan to fully characterize the sources detailed in the nutrient conceptual model and available information on identified sources from previous and ongoing studies. The study plan will incorporate pertinent findings from data already collected and ongoing reservoir monitoring projects conducted by Public Utilities, and identify any data gaps. It will include recommended future data collection to refine the conceptual model, as well as the data needed to refine existing models. The monitoring plan and QAPP will provide framework for future monitoring efforts.

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6 Publicly Available Data

The MS4 Permit requires the Responsible Agencies to provide monitoring data and assessment results to the public. The following sections provide the locations where the public may obtain this information.

6.1 California Environmental Data Exchange Network Upload and Retrieval

Provision F.4.a.(6) of the MS4 Permit requires monitoring data collected as part of the San Dieguito River WMA MAP to be uploaded to CEDEN. Certifications from CEDEN confirming data upload as required will be included in Attachment G.

CEDEN is a central location for finding and sharing information about California's waterbodies and aggregates water quality, aquatic habitat, and wildlife health data. The data are accessible in downloadable forms at www.ceden.org.

Data collected under the San Dieguito River WMA MAP for the October 2015–September 2016 monitoring year will be available in 2017. Data in the CEDEN are searchable by date and by location, project, station, or parameter. Data collected as part of the programs described in this Monitoring Results and Assessment Appendix of the San Dieguito River WQIP Annual Report can be retrieved using the project names listed in Table 6-1.

Table 6-1
Project Names for CEDEN Data Retrieval

Monitoring Program	CEDEN Project Name Field Name "ProjectCode"
MS4 Outfall (Wet and Dry Weather)	MS4_WW_OFM MS4_DW_OFSM
Bacteria TMDL	SanDieguito_BacteriaTMDL

CEDEN = California Environmental Data Exchange Network; MS4 = Municipal Separate Storm Sewer System;
TBD = to be determined; TMDL = Total Maximum Daily Load

6.2 Regional Clearing House

For the 2015–2016 monitoring year, the Responsible Agencies are providing the following data and documentation on the Project Clean Water website (Project Clean Water, 2016), which can be accessed by the general public:

- 2015–2016 Annual Report, including all appendices and associated attachments, including:
  - JRMP Annual Report for each Responsible Agency within the WMA
  - Monitoring Results and Assessment Appendix

  - SMC Bioassessment Summary
  - Bacteria TMDL Compliance Report
  - Reports from special studies conducted in the WMA not previously submitted (San Dieguito River WMA Bacteria Source Identification and Prioritization Process Special Study)
- BMP Design Manual for each Responsible Agency within the WMA and all updated versions with date of update
- Monitoring data uploaded to the CEDEN with links to the uploaded data
- Available geographic information system (GIS) data, layers, and/or shapefiles used to develop the maps to support the WQIP, Annual Reports, and JRMPs

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Attachment A – SMC Bioassessment Summary Tables

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Table A-1
Index of Biotic Integrity Scores for the San Dieguito and Los Peñasquitos Watershed Bioassessment Monitoring Sites. May, 2016.

Monitoring Site	Standard IBI Score (0-100 Scale)	IBI Rating	% CF+CG		% Non-Insect Taxa		% Tolerant Taxa		Number Coleoptera Taxa		Number Predator Taxa		% Intolerant Individuals		Number EPT Taxa	
			Metric value	IBI score	Metric value	IBI score	Metric value	IBI score	Metric value	IBI score	Metric value	IBI score	Metric value	IBI score	Metric value	IBI score
Santa Ysabel Creek 905PS0026	44	Fair	84%	4	22%	6	44%	0	6	10	16	10	2%	1	1	0
San Dieguito River 905M21725	13	Very Poor	88%	3	25%	6	38%	0	0	0	3	0	0%	0	1	0
Lusardi Creek 905M21737	24	Poor	86%	3	14%	8	39%	0	0	0	6	3	1%	1	4	2
Lusardi Creek 905M21737 Duplicate	21	Poor	90%	2	19%	7	38%	0	0	0	8	5	0%	0	3	1

Notes:
CF+CG = Collector-Filterer + Collector-Gatherer Functional Feeding Groups
EPT = Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies)

Table A-2
Summary of CSCI Supplemental Scores for the San Dieguito and Los Peñasquitos Watershed Bioassessment Monitoring Sites. May, 2016

Station Code	% Ambiguous Individuals	% Ambiguous Taxa	Expected Taxa (E)	Mean Observed Taxa (O)	O/E	O/E Percentile[1]	MMI Score	MMI Percentile[1]	CSCI Score	CSCI Percentile[1]
905PS0026	2.207131	13.63636	6.232188	4.85	0.778218	0.12	0.726188	0.06	0.752203	0.06
905M21725	2.469136	4.166667	7.68677	6.0	0.780562	0.12	0.463377	0.00	0.621969	0.01
905M21737	0.00	0.00	7.790641	5.0	0.641796	0.03	0.533502	0.00	0.587649	0.01
905M21737 Dup	0.176056	3.333333	7.790641	6.5	0.834334	0.19	0.499327	0.00	0.666831	0.02

Notes:
1. Proportion of sites within the statewide reference pool that the test site scored better than

Table A-3
Taxonomic Listing of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Table A-3
Taxonomic Listing of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Taxon	TV	FFG	905PS0026	905M21725	905M21737	905M21737 Duplicate
			Santa Ysabel Creek	San Dieguito River	Lusardi Creek	Lusardi Creek
PHYLUM ARTHROPODA						
Insecta						
Ephemeroptera (mayflies)						
_ Baetidae	4	cg				
_ *Baetis*	5	cg		4	63	86
_ *Baetis adonis*	5	cg			15	7
_ *Callibaetis* sp	9	cg	150			
_ *Fallceon* sp	4	cg			60	49
Odonata (dragonflies, damselflies)						
_ Coenagrionidae	9	p	4			
_ *Argia* sp	7	p			2	9
_ *Ischnura* sp	9	p			2	
_ Libellulidae			3			
_ *Brechmorhoga mendax*	9	p			1	1
_ *Libellula* sp	9	p	2			
_ *Pachydiplax longipennis*	9	p	1			

Table A-3
Taxonomic Listing of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Taxon	TV	FFG	905PS0026	905M21725	905M21737	905M21737 Duplicate
			Santa Ysabel Creek	San Dieguito River	Lusardi Creek	Lusardi Creek
Trichoptera (caddisflies)						
_ Hydroptilidae	4	ph				
_ *Hydroptila* sp	6	ph			35	11
_ Psychomyiidae						
_ *Tinodes* sp	2	sc			1	
Hemiptera (true bugs)						
_ Corixidae	8	p	1			1
Coleoptera (beetles)						
_ Dryopidae						
_ *Postelichus productus*	5	sh	9			
_ Dytiscidae						
_ Colymbetinae	5	p	2			
_ Hydroporinae	5	p	2			
_ *Agabus*	5	p	2			
_ *Hydroporus* sp	5	p	2			
_ *Sanfillipodytes sp*	5	p	1			
_ *Stictotarsus*	5	p	2			
_ *Stictotarsus striatellus*	5	p	1			
_ Gyrinidae						
_ *Gyrinus* sp	5	p	6			
_ Hydrophilidae						

Table A-3
Taxonomic Listing of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Taxon	TV	FFG	905PS0026	905M21725	905M21737	905M21737 Duplicate
			Santa Ysabel Creek	San Dieguito River	Lusardi Creek	Lusardi Creek
Tropisternus sp	5	p	1			
Diptera (true flies)						
Brachycera				4		
Ceratopogonidae	6	p				
Bezzia/Palpomyia	6	p				2
Culicoides	6	p		3		
Forcipomyia sp	6	cg	1			
Chironomidae	6	cg				
Ablabesmyia sp	8	cg	13			1
Alotanypus sp	7	p	6			
Apedilum sp	6	cg	2	1		
Chironomus sp	10	cg	9			
Corynoneura sp	7	cg	13	4	4	4
Cricotopus sp	7	cg	1	8		
Cricotopus Bicinctus group	7	cg		10		
Eukiefferiella sp	8	om		1	8	15
Limnophyes sp	8	cg	5	11	3	1
Micropsectra sp	7	cg	11	6	10	7
Microtendipes sp	6	cf	1			
Parametriocnemus sp	5	cg		18	11	12
Paramerina sp	6	p	15			

Table A-3
Taxonomic Listing of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Taxon	TV	FFG	905PS0026	905M21725	905M21737	905M21737 Duplicate
			Santa Ysabel Creek	San Dieguito River	Lusardi Creek	Lusardi Creek
_ *Paraphaenocladius sp*	4	cg		2	3	
_ *Pentaneura sp*	6	p			8	6
_ *Procladius* sp	9	p	2			
_ *Pseudosmittia sp*		cg		1		
_ *Rheocricotopus sp*	6	om			7	5
_ *Rheotanytarsus sp*	6	om			3	
_ *Tanypus* sp	10	p		5		
_ *Tanytarsus* sp	6	cf	52	8	2	4
_ Culicidae			11			
_ *Anopheles* sp	8	cg	27		1	
_ *Culex* sp	8	cg	189			
_ Dixidae						
_ *Dixella* sp	2	cg	9			
_ Empididae	6	p				
_ *Hemerodromia* sp	6	p			3	1
_ Ephydridae						
_ Muscidae	6	p				1
_ Psychodidae		cg				
- *Pericoma/Telmatoscopus* sp	4	cg		1	1	1
_ Simuliidae						

Table A-3
Taxonomic Listing of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Taxon	TV	FFG	905PS0026	905M21725	905M21737	905M21737 Duplicate
			Santa Ysabel Creek	San Dieguito River	Lusardi Creek	Lusardi Creek
_ *Simulium* sp	6	cf		8	241	288
_ Stratiomyidae						
- *Caloparyphus/Euparyphus* sp	8	cg			1	
_ *Euparyphus* sp	8	cg				1
_ *Myxosargus* sp	8	cg			1	
_ Tipulidae	4					
_ *Tipula* sp	4	om		1	1	
Malacostraca						
Amphipoda (scuds)						
_ Hyalellidae						
_ *Hyalella* sp	8	cg		30	63	46
Decapoda (crayfish)						
_ Cambaridae	8	sh		2		
Ostracoda (seed shrimp)	8	cg	10		3	5
PHYLUM CHELICERATA						
Arachnida						
Acari (mites)						
_ Hygrobatidae						
_ *Atractides* sp	8	p	1			
_ Lebertiidae						

Table A-3
Taxonomic Listing of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Taxon	TV	FFG	905PS0026	905M21725	905M21737	905M21737 Duplicate
			Santa Ysabel Creek	San Dieguito River	Lusardi Creek	Lusardi Creek
_ *Lebertia* sp	8	p	2			
PHYLUM PLATYHELMINTHES						
Turbelleria (flatworms)	4	p	1			
PHYLUM NEMERTEA						
Enopla (tongueworms)						
Hoplonemertea						
_ Tetrastemmatidae						
_ *Prostoma* sp	8	p		3	3	1
PHYLUM ANNELIDA						
Hirudinea (leeches)			1			
Oligochaeta (earthworms)	5	cg	2	28		1
PHYLUM MOLLUSCA						
Gastropoda (snails)						
Pulmonata						
_ Physidae						
_ *Physa* sp	8	sc	14	1	5	3
Bivalvia (clams)						
Veneroida						
_ Corbiculidae						
_ *Corbicula* sp	10	cf		2		
_ Speaeriidae						

Table A-3
Taxonomic Listing of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Taxon	TV	FFG	905PS0026 Santa Ysabel Creek	905M21725 San Dieguito River	905M21737 Lusardi Creek	905M21737 Duplicate Lusardi Creek
Pisidium sp	8	cf	2			
		Total	**589**	**162**	**561**	**569**

Notes:
TV=Tolerance Value: range is 0-10; 0 is intolerant to impairment. FFG=Functional Feeding Group; cg=collector gatherer, cf=collector filterer, om=omnivore, p=predator, ph=piercer herbivore, sc=scraper, sh=shredder

Table A-4
Ranked Abundance of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016.

Taxon	TV	FFG	905PS0026		905M21725		905M21737		905M21737 Duplicate		Total
			Santa Ysabel Creek		San Dieguito River		Lusardi Creek		Lusardi Creek		
			Abundance	% Composition	Abundance	% Composition	Abundance	% Composition	Abundance	% Composition	
Simulium sp	6	cf			8	4.9%	241	43.0%	288	50.6%	537
Culex sp	8	cg	189	32.1%							189
Baetis	5	cg			4	2.5%	63	11.2%	86	15.1%	153
Callibaetis sp	9	cg	150	25.5%							150
Hyalella sp	8	cg			30	18.5%	63	11.2%	46	8.1%	139
Fallceon sp							60	10.7%	49	8.6%	109
Tanytarsus sp			52	8.8%	8	4.9%	2	0.4%	4	0.7%	66
Hydroptila sp	6	ph					35	6.2%	11	1.9%	46
Parametriocnemus sp	5	cg			18	11.1%	11	2.0%	12	2.1%	41
Micropsectra sp			11	1.9%	6	3.7%	10	1.8%	7	1.2%	34
Oligochaeta (earthworms)	5	cg	2	0.3%	28	17.3%			1	0.2%	31
Anopheles sp	8	cg	27	4.6%			1	0.2%			28
Corynoneura sp			13	2.2%	4	2.5%	4	0.7%	4	0.7%	25
Eukiefferiella sp					1	0.6%	8	1.4%	15	2.6%	24
Physa sp	8	sc	14	2.4%	1	0.6%	5	0.9%	3	0.5%	23
Baetis adonis	5	cg					15	2.7%	7	1.2%	22
Limnophyes sp			5	0.8%	11	6.8%	3	0.5%	1	0.2%	20
Ostracoda (seed shrimp)	8	cg	10	1.7%			3	0.5%	5	0.9%	18
Paramerina sp			15	2.5%							15
Ablabesmyia sp			13	2.2%					1	0.2%	14
Pentaneura sp	6	p					8	1.4%	6	1.1%	14
Rheocricotopus sp	6	om					7	1.2%	5	0.9%	12
Argia sp	7	p					2	0.4%	9	1.6%	11
Culicidae			11	1.9%							11
Cricotopus Bicinctus group					10	6.2%					10
Postelichus productus	5	sh	9	1.5%							9
Chironomus sp			9	1.5%							9
Cricotopus sp			1	0.2%	8	4.9%					9
Dixella sp	2	cg	9	1.5%							9
Prostoma sp	8	p			3	1.9%	3	0.5%	1	0.2%	7
Gyrinus sp	5	p	6	1.0%							6
Alotanypus sp			6	1.0%							6
Paraphaenocladius sp	4	cg			2	1.2%	3	0.5%			5
Tanypus sp	10	p			5	3.1%					5

Table A-4 (continued)
Ranked Abundance of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Taxon	TV	FFG	905PS0026 Santa Ysabel Creek		905M21725 San Dieguito River		905M21737 Lusardi Creek		905M21737 Duplicate Lusardi Creek		Total
			Abundance	% Composition	Abundance	% Composition	Abundance	% Composition	Abundance	% Composition	
Coenagrionidae	9	p	4	0.7%							4
Brachycera					4	2.5%					4
Hemerodromia sp	6	p					3	0.5%	1	0.2%	4
Libellulidae			3	0.5%							3
Culicoides	6	p			3	1.9%					3
Apedilum sp			2	0.3%	1	0.6%					3
Rheotanytarsus sp	6	om					3	0.5%			3
Pericoma/Telmatoscopus sp	4	cg			1	0.6%	1	0.2%	1	0.2%	3
Ischnura sp	9	p					2	0.4%			2
Brechmorhoga mendax	9	p					1	0.2%	1	0.2%	2
Libellula sp	9	p	2	0.3%							2
Corixidae	8	p	1	0.2%					1	0.2%	2
Colymbetinae			2	0.3%							2
Hydroporinae			2	0.3%							2
Agabus	5	p	2	0.3%							2
Hydropours sp	5	p	2	0.3%							2
Stictotarsus	5	p	2	0.3%							2
Bezzia/Palpomyia	6	p							2	0.4%	2
Procladius sp			2	0.3%							2
Tipula sp	4	om			1	0.6%	1	0.2%			2
Cambaridae	8	sh			2	1.2%					2
Lebertia sp	8	p	2	0.3%							2
Corbicula sp	10	cf			2	1.2%					2
Pisidium sp	8	cf	2	0.3%							2
Pachydiplax longipennis	9	p	1	0.2%							1
Tinodes sp	2	sc					1	0.2%			1
Sanfillipodytes sp	5	p	1	0.2%							1
Stictotarsus striatellus	5	p	1	0.2%							1
Tropisternus sp	5	p	1	0.2%							1
Forcipomyia sp	6	cg	1	0.2%							1
Microtendipes sp			1	0.2%							1
Pseudosmittia sp		cg			1	0.6%					1
Muscidae	6	p							1	0.2%	1
Caloparyphus/Euparyphus sp	8	cg					1	0.2%			1

Table A-4 (continued)
Ranked Abundance of Benthic Macroinvertebrates Collected from the Los Peñasquitos/San Dieguito WMA Bioassessment Monitoring. May, 2016

Taxon	TV	FFG	905PS0026		905M21725		905M21737		905M21737 Duplicate		Total
			Santa Ysabel Creek		San Dieguito River		Lusardi Creek		Lusardi Creek		
			Abundance	% Composition	Abundance	% Composition	Abundance	% Composition	Abundance	% Composition	
Euparyphus sp	8	cg							1	0.2%	1
Myxosargus sp	8	cg					1	0.2%			1
Atractides sp	8	p	1	0.2%							1
Turbelleria (flatworms)	4	p	1	0.2%							1
Hirudinea (leeches)			1	0.2%							1
		Total	**589**	**100.0%**	**162**	**100%**	**561**	**100%**	**569**	**100%**	**1881**

Notes:
TV=Tolerance Value: range is 0-10; 0 is intolerant to impairment. FFG=Functional Feeding Group; cg=collector gatherer, cf=collector filterer, om=omnivore, p=predator, ph=piercer herbivore, sc=scraper, sh=shredder

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Summary of Los Penasquitos/San Dieguito WMA Bioassessment Monitoring CRAM Attribute Scores. May, 2016

Metrics		Site		
		San Dieguito River (905M21725)	**Lusardi Creek (905M21737)**	**Santa Ysabel Creek (905PS0026)**
Approx. Length (m)		150	150	150
Average Bankfull Width (m)		4.5	10.0	18.0
Wetland Sub-type		Non-confined	Non-confined	Non-confined
Buffer Coverage (%)		100	100	100
Average Buffer Width (m)		189	244	250
CRAM Riverine Wetlands Scoring				
Landscape and Buffer Context	Stream Corridor Continuity	A	A	A
	Percent of AA with Buffer	A	A	A
	Average Buffer Width	B	A	A
	Buffer Condition	B	A	A
	Final Attribute Score	**90.3**	**100**	**100**
Hydrology	Water Source	C	C	B
	Channel Stability	B	A	A
	Hydrologic Connectivity	A	C	A
	Final Attribute Score	**75.0**	**66.7**	**91.7**
Physical Structure	Structural Patch Richness	C	A	B
	Topographic Complexity	C	B	B
	Final Attribute Score	**50.0**	**87.5**	**75.0**
Biotic Structure	Number of Plant Layers	A	A	A
	Number of Co-dominant Species	A	B	B
	Percent Invasion	C	A	B
	Horizontal Interspersion	B	B	B
	Vertical Biotic Structure	A	C	B
	Final Attribute Score	**86.1**	**72.2**	**77.8**
Overall AA Score		**75.0**	**82.0**	**86.0**

Attachment B – Bacteria TMDL Compliance Report

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SAN DIEGUITO RIVER WATERSHED MANAGEMENT AREA

BACTERIA TOTAL MAXIMUM DAILY LOAD

2015–2016 COMPLIANCE MONITORING REPORT

Submitted to the San Diego Regional Water Quality Control Board by:

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
San Diego, California

Mikhail Ogawa Engineering, Inc.
Del Mar, California

January 2017

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ACRONYMS AND ABBREVIATIONS

%	percent
AB 411	(California) Assembly Bill 411, the Beach Safety Act
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
Bacteria TMDL	*A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek),* 2010
Bight ’08	Southern California Bight 2008 Regional Monitoring Program
CFU	colony-forming unit
Compliance Monitoring Plan	*San Dieguito River WMA Bacteria TMDL Compliance Monitoring Plan* (June 2015)
CWA	Clean Water Act
DW	dry weather
EH-380	San Dieguito Lagoon Mouth compliance monitoring location
EM&TS	(City of San Diego) Environmental Monitoring & Technical Services Laboratory
FIB	fecal indicator bacteria
FY	fiscal year
ID	identification
MDL	method detection limit
MNAS	Miramar Naval Air Station
Miramar	Marine Corps Air Station Miramar
mL	milliliters
MNAS	Miramar Naval Air Station
MPN	most probable number
MS4	municipal separate storm sewer system
MS4 Permit	*National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region,* Order Number R9 2013-0001, 2013
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWS	National Weather Service
Ocean Plan	*California Ocean Plan,* SWRCB Resolution No. 2012-0056, 2012
RA	Responsible Agency
REC-1	water contact recreation beneficial use (beneficial use)
Regional Board	San Diego Regional Water Quality Control Board
RL	reporting limit
RWL	receiving water limitation
SANDAG	San Diego Association of Governments
SCCWRP	Southern California Coastal Water Research Project

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SM	USEPA Standard Method
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load
USEPA	United States Environmental Protection Agency
WMA	watershed management area
WQBELs	water quality-based effluent limitations
WW	wet weather

EXECUTIVE SUMMARY

This report presents the 2015–2016 compliance monitoring data required by the Bacteria Total Maximum Daily Load (TMDL)[1] for the San Dieguito River Watershed Management Area (WMA), as incorporated into the Municipal Separate Storm Sewer System (MS4) Permit[2] (San Diego Regional Water Quality Control Board [Regional Board], 2010 and 2013, respectively).

The Bacteria TMDL Compliance Monitoring Program is designed to assess the conditions of the receiving waters and has the following objectives:

- Characterize levels of bacteria concentrations at compliance monitoring locations.
- Track progress toward meeting the Bacteria TMDL numeric targets.

Fecal indicator bacteria[3] (FIB) sampling for the compliance monitoring period (October 2015 through September 2016) was conducted at the following beach compliance monitoring location:

- **San Dieguito Lagoon Mouth–EH-380:** The Pacific Ocean Shoreline at the San Dieguito Lagoon Mouth.

Wet weather samples were collected between October 1, 2015, and April 30, 2016, within 72 hours of the end of rainfall for three wet weather events. Dry weather samples were collected at least weekly in October 2015 and from April 2016 through September 2016, and at least monthly on dry weather days from November 1, 2015, through March 31, 2016. Weekly monitoring was scheduled so that at least five samples were collected in each calendar month. Samples were analyzed for the FIB compliance constituents: total coliform, fecal coliform, and *Enterococcus*.

This report summarizes FIB concentrations and key hydrologic data at the compliance monitoring location by season. Compliance was assessed by comparing analytical results for total coliform, fecal coliform, and *Enterococcus* with the applicable receiving water limitations (RWLs), in accordance with the Bacteria TMDL requirements in Attachment E of the MS4 Permit. The RWLs are a combination of numeric targets for bacteria density and allowable exceedance frequencies. The MS4 Permit clarifies the final RWLs (in terms of the most probable number [MPN]) for total coliform, fecal coliform, and *Enterococcus*. The single-sample maximum numeric targets are required to be achieved only during wet weather, with an allowable exceedance frequency of 22 percent (%). For dry weather days, the 30-day geometric mean numeric targets must be achieved, with a 0% exceedance frequency. Table ES-1 lists the numeric targets for beaches.

[1] *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek),* Resolution No. R9-2010-0001, Regional Board, February 10, 2010 (Bacteria TMDL).

[2] *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region,* Order Number R9-2013-0001, Regional Board, May 14, 2013 (MS4 Permit).

[3] Fecal indicator bacteria (FIB) include total coliform, fecal coliform, and *Enterococcus*.

**Table ES-1.
Final Receiving Water Limitations for Beaches**

(Maximum Bacteria Densities and Allowable Exceedance Frequencies)

Constituent	Wet Weather Days [a] Single-Sample Maximum		Dry Weather Days [b] 30-Day Geometric Mean	
	Numeric Target [c] (MPN/100mL)	Final Allowable Exceedance Frequency [d]	Numeric Target [e] (MPN/100mL)	Final Allowable Exceedance Frequency
Total Coliform	10,000	22%	1,000	0%
Fecal Coliform	400	22%	200	0%
Enterococcus	104	22%	35	0%

Notes:
% = percent; mL = milliliters; MPN = most probable number
Source (including footnotes): Bacteria TMDL, Regional Board, Order No. R9-2010-0001, 2010.

a. Wet weather days are defined as days with rainfall events of 0.2 inch or greater, plus the following 72 hours.
b. Dry weather days are defined as days with less than 0.2 inch of rainfall observed on each of the previous 3 days.
c. Wet weather numeric objectives are based on the single-sample maximum (or equivalent) water quality objectives in the *California Ocean Plan* (State Water Resources Control Board [SWRCB], 2012). Compliance with the wet weather TMDLs in the receiving water is based on the frequency of the wet weather days in any given year exceeding the wet weather numeric objective, but the 30-day geometric mean must also be met.
d. The wet weather allowable exceedance frequency is set at 22%. In the calculation of the wet weather TMDLs, the Regional Board chose to apply the 22% allowable exceedance frequency as determined for Leo Carrillo Beach in Los Angeles County. At the time the wet weather watershed model was developed, this 22% exceedance frequency was the only reference beach exceedance frequency that was available. The 22% allowable exceedance frequency that is used to calculate the wet weather TMDLs is justified because the San Diego region watersheds' exceedance frequencies will likely be close to the value calculated for Leo Carrillo Beach, and are consistent with the exceedance frequency that was applied by the Los Angeles Regional Board.
e. Dry weather numeric objectives are based on the 30-day geometric mean (or equivalent) water quality objectives in the California Ocean Plan (SWRCB, 2012). Compliance with the dry weather TMDLs in the receiving water is based on the frequency of the dry weather geometric mean exceeding the dry weather numeric objective.

Monitoring Results and Compliance Discussion

In accordance with the monitoring and assessment requirements in the MS4 Permit, three separate weather-based evaluations were used to address the program objectives: wet weather, wet season, and dry season. Table ES-2 summarizes the 2015–2016 exceedance frequency results and compares them with interim and final allowable exceedance frequencies.

Table ES-2.
2015–2016 Bacteria TMDL Exceedance Frequency Results for San Dieguito River WMA

Site ID	Bacteria TMDL Constituent	Wet Weather [a] Single-Sample Maximum (CFU/100mL)			Wet Season [a, c] 5-Sample Geometric Mean (CFU/100mL)			Dry Season [b] 30-Day Geometric Mean (CFU/100mL)		
		2015–2016 [d] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency	2015–2016 [e] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency	2015–2016 [e] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency
EH-380	Total Coliform	0%	33%	22%	0%	3.0%	0%	0%	3.0%	0%
	Fecal Coliform	0%	33%	22%	0%	5.5%	0%	0%	5.5%	0%
	Enterococcus	13.3%	36%	22%	0%	8.5%	0%	0%	8.5%	0%

Notes:
% = percent; CFU = colony-forming unit; EH-380 = San Dieguito Lagoon Mouth; mL = milliliters; TMDL = total maximum daily load
Green shaded cells show the 2015-2016 observed exceedance frequency.

a. October 1, 2015–April 30, 2016
b. May 1, 2016–September 30, 2016
c. In accordance with the MS4 Permit, wet and dry weather FIB data were combined to calculate geometric means for the wet season and compared to the dry weather RWLs as shown in Table ES-1.
d. The exceedance frequency was derived by dividing the total number of wet weather days (days with 0.2 inch of rainfall or greater plus the following 72 hours) that exceeded the single-sample maximum numeric target divided by the total number of wet weather days during the wet season. To determine exceedances for non-sampled wet weather days, the geometric mean of the analytical results from three monitored storm events was applied to the remaining observed wet weather days that were not sampled. The results from the total number of wet weather days, with either assigned averages or analyzed result values, were then compared with single-sample maximum numeric targets.
e. The exceedance frequency was derived by dividing the total number of geometric exceedances by the total number of geometric means calculated during the season.

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Wet Weather Single-Sample Maximum Exceedance Frequencies

The wet weather exceedance rate applies only to wet weather days (days with 0.2 inch of rainfall or more, plus the following 72 hours) between October 1 and April 30 of each year. Wet weather exceedance rates for total coliform, fecal coliform, and *Enterococcus* were derived by calculating the average result of wet weather samples and applying that average to the remaining (not sampled) observed wet weather days. Sampling results and the assigned averages were compared with single-sample maximum numeric targets, as established in the Bacteria TMDL. A total of three storm events were sampled during the 2015–2016 wet weather season, at the following location:

- **EH-380:** During wet weather, the receiving waters at the San Dieguito Lagoon Mouth achieved 0% single-sample maximum exceedance frequencies for compliance constituents total coliform and fecal coliform. The single-sample maximum exceedance frequency for *Enterococcus* was 13.3%.

Wet Season Geometric Mean Exceedance Frequencies

The wet season is from October 1 through April 30 of each year. Wet season exceedance rates for total coliform, fecal coliform, and *Enterococcus* are derived by calculating a rolling geometric mean using results from the last five sampling results (combined dry weather and wet weather):

- **EH-380:** During the wet season, the receiving waters at the San Dieguito Lagoon Mouth achieved a 0% exceedance frequency for compliance constituents total coliform, fecal coliform, and *Enterococcus.*

Dry Season Geometric Mean Exceedance Frequencies

The dry season is May 1 through September 30 of each year. Dry season exceedance rates for total coliform, fecal coliform, and *Enterococcus* are derived by calculating a rolling 30-day geometric mean using the last five sampling results, as described in the *California Ocean Plan* (Ocean Plan) (SWRCB, 2012), at the compliance monitoring location:

- **EH-380:** During the dry season, the receiving waters at the San Dieguito Lagoon Mouth achieved a 0% exceedance frequency for compliance constituents total coliform, fecal coliform, and *Enterococcus.*

Summary

Wet and dry weather data collected during the 2015–2016 wet season and the 2016 dry season were used to evaluate compliance on the basis of current conditions. Overall, the San Dieguito Lagoon Mouth compliance monitoring location achieved full compliance with dry and wet weather RWLs for the 2015–2016 monitoring year.

During the wet season, which evaluates a combination of both wet and dry weather samples, *Enterococcus* (during wet weather) was the only constituent detected in concentrations that exceeded the wet weather single-sample maximum. However, the *Enterococcus* exceedance frequency was not above the interim allowable exceedance frequency and, therefore, the San Dieguito Lagoon Mouth compliance monitoring location achieved full compliance with the RWL during wet weather. The San Dieguito Lagoon Mouth compliance monitoring location also achieved full compliance with the RWL during the wet season for all three FIB constituents.

During the dry season, when recreational activities occur with more regularity, the San Dieguito Lagoon Mouth location achieved 0% exceedance frequencies for compliance constituents total coliform, fecal coliform, and *Enterococcus*.

Collectively, the datasets suggest that, during the monitoring year, bacteria densities support water contact recreation beneficial use (REC-1) conditions in the San Dieguito River WMA.

Ongoing Efforts

Certain studies and activities of the San Dieguito River WMA RAs may provide additional data that could be used in subsequent Bacteria TMDL compliance assessments:

- The City and County of San Diego are participating in data assessments and coordination meetings with the Regional Board and other RAs to determine potential modifications to be considered in the Bacteria TMDL Reopener. During the Bacteria TMDL Reopener, the Regional Board may update the TMDL based on current data and United States Environmental Protection Agency (USEPA) policy, which may lead to revised terms of compliance. The Bacteria TMDL Reopener is in progress and is expected to be completed in 2018.
- The RAs have completed the San Diego Regional Reference Stream and San Diego Regional Reference Beaches Studies. The data are being used in the Bacteria TMDL Reopener to evaluate natural sources of bacteria in reference streams and at beaches and these data are being utilized in the Bacteria TMDL Reopener to update numeric targets (Southern California Coastal Water Research Project [SCCWRP], 2015, 2016).
- The RAs completed a bacteria source identification study specific to the San Dieguito River WMA. Additional information regarding bacteria densities and sources in the San Dieguito River WMA may be included in the Water Quality Improvement Plan Annual Report.
- RAs will continue to monitor for the Bacteria TMDL Compliance Monitoring Program for fiscal year (FY)17.

1.0 INTRODUCTION

This report presents the 2015–2016 San Dieguito River Watershed Management Area (WMA) Bacteria Total Maximum Daily Load (TMDL)[4] (San Diego Regional Water Quality Control Board [Regional Board], 2010) compliance monitoring data, in accordance with Attachment E.6 of the Municipal Separate Storm Sewer System (MS4) Permit[5]. The San Dieguito River WMA Bacteria TMDL Compliance Monitoring Plan (Compliance Monitoring Plan) was developed to meet the Bacteria TMDL requirements of the MS4 Permit and to generate data to support the San Dieguito River WMA Water Quality Improvement Plan (San Dieguito River WMA Responsible Agencies [RAs] 2015, 2016). Supporting information for this Compliance Monitoring Report is in the Compliance Monitoring Plan and San Dieguito River WMA Water Quality Improvement Plan located on the Project Clean Water website (www.projectcleanwater.org).

The Bacteria TMDL Compliance Monitoring Program is designed to assess the conditions of the receiving waters and has the following objectives:

- Characterize levels of bacteria concentrations at the compliance monitoring locations.
- Track progress toward meeting the Bacteria TMDL numeric targets.

In accordance with the Compliance Monitoring Plan, the San Dieguito River WMA RAs monitored the Pacific Ocean Shoreline at the San Dieguito Lagoon Mouth (San Dieguito Lagoon Mouth compliance monitoring location, EH-380). Table 1-1 provides the location name and coordinates for the compliance monitoring location, and Figure 1-1 presents a map of the compliance monitoring location within the watershed. Indicator bacteria sampling for the 2015–2016 compliance monitoring season was conducted during wet and dry weather at the San Dieguito Lagoon Mouth compliance monitoring location and samples were analyzed for three fecal indicator bacteria (FIB) compliance constituents: total coliform, fecal coliform, and *Enterococcus.*

Table 1-1.
Bacteria TMDL Compliance Monitoring Location

Site ID	Site Name	Site Type	Latitude	Longitude
EH-380 [a]	San Dieguito Lagoon Mouth	Pacific Ocean Shoreline	32.975	-117.271

Notes:
ID = identification
a. Approximately 25 meters north of the river outlet.

[4] *Resolution No. R9-2010-0001, A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)* (San Diego Regional Water Quality Control Board [Regional Board], 2010).

[5] *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region,* Order Number R9-2013-0001, Regional Board, May 14, 2013 (MS4 Permit).

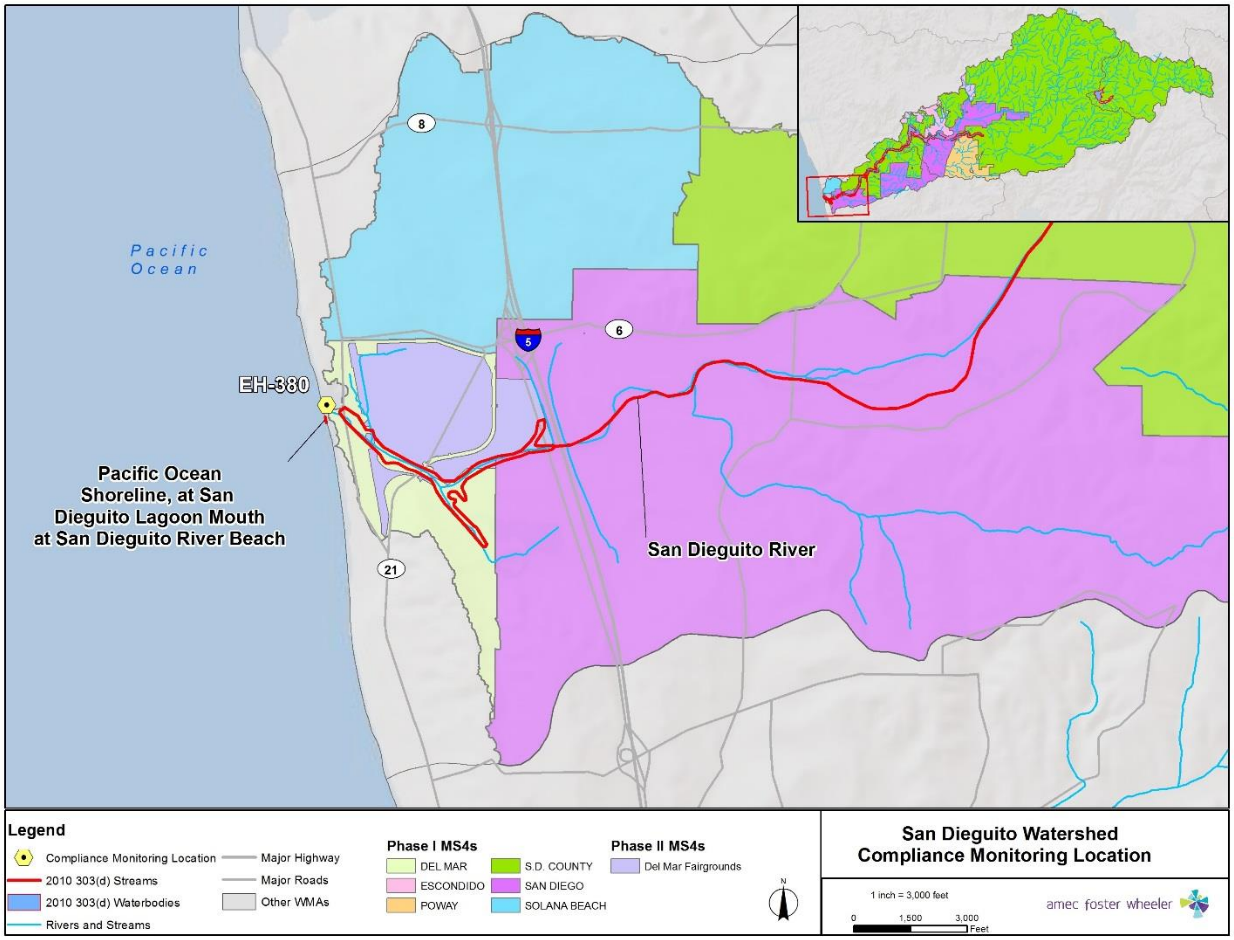

Figure 1-1.
San Dieguito River WMA Compliance Monitoring Location, EH-380

1.1 Document Overview

This report has five sections that contain the following information:

- **Section 1—Introduction:** Information on purpose of report, the Bacteria TMDL, compliance monitoring location, numeric targets, and schedule.
- **Section 2—Monitoring Results Summary:** Overview of the compliance monitoring conducted during the reporting period, including any changes to monitoring or analytical methods, hydrology summaries, event data and observations, and FIB concentration in wet and dry weather during 2015–2016, along with an evaluation of seasonal patterns in FIB concentrations.
- **Section 3— Compliance Evaluation:** Evaluation of current receiving water conditions and a comparison with the Bacteria TMDL receiving water limitations (RWLs) based on 2015–2016 data.

- **Section 4—Summary:** Program objectives and ongoing efforts.
- **Section 5— References:** Sources used to prepare this report.

1.2 Compliance Requirements for Bacteria Total Maximum Daily Load

As described in the San Dieguito River WMA Water Quality Improvement Plan, the basis for Bacteria TMDL compliance is demonstrated through interim and final water quality-based effluent limitations (WQBELs). The WQBELs include RWLs for the San Dieguito Lagoon Mouth compliance monitoring location and are provided in Table 1-2.

Table 1-2.
Final Receiving Water Limitations for Beaches

(Maximum Bacteria Densities and Allowable Exceedance Frequencies)

Constituent	Wet Weather Days [a]		Dry Weather Days [b]	
	Single-Sample Maximum (MPN/100mL) [c]	Single-Sample Maximum Allowable Exceedance Frequency [d]	30-Day Geometric Mean (MPN/100mL) [e]	30-Day Geometric Mean Allowable Exceedance Frequency
Total Coliform	10,000	22%	1,000	0%
Fecal Coliform	400	22%	200	0%
Enterococcus	104	22%	35	0%

Notes:
% = percent; mL = milliliters; MPN = most probable number
Source (including footnotes): Bacteria TMDL, Regional Board, Order No. R9-2010-0001, 2010.

a. Wet weather days are defined as days with rainfall events of 0.2 inch or greater, plus the following 72 hours.
b. Dry weather days are defined as days with less than 0.2 inch of rainfall observed on each of the previous 3 days.
c. Wet weather numeric objectives are based on the single-sample maximum (or equivalent) water quality objectives in the *California Ocean Plan* (State Water Resources Control Board [SWRCB], 2012). Compliance with the wet weather TMDLs in the receiving water is based on the frequency of the wet weather days in any given year exceeding the wet weather numeric objective, but the 30-day geometric mean must also be met.
d. The wet weather allowable exceedance frequency is set at 22%. In the calculation of the wet weather TMDLs, the Regional Board chose to apply the 22% allowable exceedance frequency as determined for Leo Carrillo Beach in Los Angeles County. At the time the wet weather watershed model was developed, this 22% exceedance frequency was the only reference beach exceedance frequency that was available. The 22% allowable exceedance frequency that is used to calculate the wet weather TMDLs is justified because the San Diego region watersheds' exceedance frequencies will likely be close to the value calculated for Leo Carrillo Beach, and are consistent with the exceedance frequency that was applied by the Los Angeles Regional Board.
e. Dry weather numeric objectives are based on the 30-day geometric mean (or equivalent) water quality objectives in the *California Ocean Plan* (SWRCB, 2012). Compliance with the dry weather TMDLs in the receiving water is based on the frequency of the dry weather geometric mean exceeding the dry weather numeric objective.

The San Dieguito River WMA Water Quality Improvement Plan provides the compliance timeline for the Bacteria TMDL, and outlines the interim and final reduction milestones for both dry and wet weather. Per Attachment E.6.c(1) of the MS4 Permit, interim compliance dates may be modified by an accepted Water Quality Improvement Plan. Full dry weather compliance requires a 0 percent (%) exceedance frequency for all dry weather periods by 2021, and full wet weather compliance requires a 22% allowable exceedance frequency during wet weather periods by 2031.

The "existing" or historical exceedance frequency is used to calculate 50% interim milestones for both wet and dry weather. Progress toward achieving dry weather and wet weather milestones is demonstrated through comparison with interim and final allowable exceedance frequencies. Table 1-3 presents dry weather existing, interim, and final allowable exceedance frequencies. Per the San Dieguito River WMA Water Quality Improvement Plan, the 50% reduction milestone is to be met in 2019 for the Cities of Del Mar, Escondido, Poway, San Diego, and Solana Beach and in 2020 for the County of San Diego, with a 100% reduction milestone in 2021 for all RAs.

Table 1-3.
San Dieguito River WMA Bacteria TMDL Compliance Reduction Milestones—Dry Weather

Constituent	Receiving Water Exceedance Frequency		
	"Existing" Exceedance Frequency [a,b]	2019 [c] or 2020 [d] Interim Milestone	2021 [e] Final Compliance
Total Coliform	6%	3%	0%
Fecal Coliform	11%	5.5%	0%
Enterococcus	17%	8.5%	0%

Notes:
% = percent; ID = identification
a. Percentage fractions are rounded to the nearest whole number.
b. "Existing" dry weather exceedance frequency is determined using the historical data from January 1, 1996, to December 31, 2002, comparing the total number of historical geometric means with TMDL numeric targets. The existing dry weather exceedance frequency was derived using available California Assembly Bill 411 (AB 411) data from 1996 through 2002.
c. Interim milestone for the Cities of Escondido, Del Mar, Poway, San Diego, and Solana Beach.
d. Interim milestone for the County of San Diego.
e. The final milestone is a 100% reduction from the existing exceedance frequency to the allowable exceedance frequency

Table 1-4 presents wet weather existing, interim, and final allowable exceedance frequencies. Per the San Dieguito River WMA Water Quality Improvement Plan, the 50% reduction milestone is to be met in 2024 for the Cities of Del Mar, Escondido, Poway, San Diego, and Solana Beach and 2028 for the County of San Diego, with a 100% reduction milestone in 2031 for all RAs.

Table 1-4.
San Dieguito River WMA Bacteria TMDL Compliance Reduction Milestones—Wet Weather

Constituent	Receiving Water Exceedance Frequency		
	"Existing" Exceedance Frequency [a]	2024[b] or 2028[c] Interim Milestone	2031[d] Final Compliance
Total Coliform	44%	33%	22%
Fecal Coliform	43%	33%	22%
Enterococcus	49%	36%	22%

Notes:
% = percent; ID = identification
a. Source: Bacteria TMDL
b. Interim milestone for the Cities of Escondido, Del Mar, Poway, San Diego, and Solana Beach.
c. Interim milestone for the County of San Diego.
d. The final milestone is a 100% reduction from the existing frequency to the allowable exceedance frequency.

1.3 Monitoring and Analytical Methods

The Pacific Ocean Shoreline at San Dieguito Lagoon Mouth segment named in the Bacteria TMDL was removed from the Clean Water Act 303(d)-List for REC-1 impairment in 2010 and is considered de-listed. Per Attachment E of the MS4 Permit, because of the de-listed status of their segment, the San Dieguito River WMA RAs have the flexibility to propose alternative monitoring procedures (such as reduced monitoring) for Bacteria TMDL compliance monitoring as part of the Water Quality Improvement Plan and its updates. For their first year of implementation, the RAs elected to monitor more frequently than the minimum monitoring requirements described in Attachment E of the MS4 Permit.

The Compliance Monitoring Plan describes the monitoring and analytical methods (Sections 3 and 4) and data management methods (Section 5.1). Compliance monitoring was performed in accordance with the Compliance Monitoring Plan, except as noted in Sections 1.3.1 and 1.3.2 and the Quality Assurance Quality Control Summary (Appendix A).

1.3.1 Dry Weather Monitoring

Per the Compliance Monitoring Plan, weekly dry weather monitoring was scheduled for the months of April through October so that five samples were collected in each calendar month. However, in May 2016 and September 2016, only four samples were collected in each of these months because of wet weather interference.

1.3.2 Precipitation Data

Per the Compliance Monitoring Plan, precipitation data from the National Weather Service (NWS) Del Mar rain gauge were to be used to track the total number of wet weather days as defined in the MS4 Permit. However, the NWS Del Mar rain gauge was relocated in September 2015, and was also missing data for a portion of the 2015–2016 monitoring year. To provide a more complete dataset, the NWS Miramar Naval Air Station (MNAS) gauge was used in its place. Because MNAS officially became Marine Corps Air Station Miramar (Miramar) in 1999, this gauge is referred to as the Miramar gauge in this document (Shettle, 2001). The Miramar gauge is technically within the Mission Bay WMA; however, it is the nearest gauge that is representative of rainfall in the middle of the San Dieguito River WMA. Historical daily rainfall amounts generated by the NWS will be used to assess the annual rainfall and historical average for San Diego County.

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2.0 MONITORING RESULTS SUMMARY

This section outlines hydrology summaries, event data and observations, and FIB concentrations for both wet and dry weather conditions.

Precipitation data from the NWS Miramar rain gauge were used to track the total number of wet weather days as defined in the MS4 Permit. Historical daily rainfall amounts generated by the NWS at the Miramar rain gauge were used to compare the annual rainfall and historical averages for San Diego County.

A summary of quality assurance and quality control data is provided in Appendix A. Field measurements and analytical results for wet weather are presented in Appendix B. Field measurements and analytical results for dry weather are presented in Appendix C.

2.1 Wet Weather Compliance Monitoring

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) conducted wet weather monitoring at the San Dieguito Lagoon Mouth compliance monitoring location, EH-380. Three storm events were monitored during the 2015–2016 wet season, as summarized in Section 2.1.1. The RAs elected to monitor during wet weather at a higher frequency than required by the Compliance Monitoring Plan to provide additional baseline data. Storms resulting in greater than 0.2 inch of precipitation were targeted for analysis. One grab sample was collected per storm event along with *in situ* field measurements within 72 hours of the end of precipitation. Event field data, including atmospheric conditions, sample characteristics, sampling times, field measurements, and other notable observations, were documented. Bacteria grab samples were submitted to Weck Laboratories Inc. or the City of San Diego's Environmental and Technical Services (EM&TS) Laboratory for analysis.

2.1.1 Wet Weather Hydrology Summary

Precipitation data from the Miramar gauge were used to track the total number of wet weather days. Measured rainfall is also compared with the historical average measured at Miramar from 1981 to 2010. This comparison will support future evaluations of annual precipitation and potential effects on FIB concentrations or the assessment of exceedances. The rainfall data were accessed through the National Oceanic and Atmospheric Agency (NOAA) National Centers for Environmental Information website (http://www.ncdc.noaa.gov/cdo-web/).

Total precipitation recorded at Miramar for the 2015–2016 wet season was 10.74 inches, which was below the historical average of 10.97 inches. The season began with above-average rainfall in October 2015; below-average rainfall was recorded in November and December 2015, and February and March 2016; above-average rainfall was recorded in January and April 2016.

Table 2-1 summarizes wet weather monthly precipitation data for the Miramar gauge for this wet season, along with the historical data for comparison.

Table 2-1.
Wet Weather Monthly Rainfall Summary

Month	Miramar Rainfall (inches)	
	2015–2016 Monitoring Season	1981–2010 Historical Average
October	0.53	0.36
November	0.47	1.19
December	1.3	1.86
January	6.0	2.18
February	0.06	2.60
March	1.29	2.07
April	1.09	0.71
Total Rainfall	**10.74**	**10.97**

Source: NOAA National Centers for Environmental Information website (http://www.ncdc.noaa.gov/cdo-web/)

Three storm events were successfully monitored at the San Dieguito Lagoon Mouth compliance monitoring location. The monitored storms represent storms of various sizes, as recorded at the Miramar gauge. Wet Weather Event 1 was a large storm with 5.39 inches of rainfall, and Wet Weather Event 2 was a smaller storm with 0.59 inch of rainfall. Wet Weather Event 3 was a medium storm with 0.85 inch of rainfall. Table 2-2 presents the precipitation as measured at the Miramar gauge for the three monitored wet weather events. Each monitored storm event is described in detail in the following sections.

These storms depict the usual range of events that may occur during the wet season. The watershed response varies throughout the wet season, based on factors such as antecedent soil moisture conditions, impervious area, rainfall amount, and rainfall intensity. During larger storms, runoff from pervious surfaces can increase after soils are completely saturated. Earlier in the wet season, soil conditions throughout the watershed are drier and increased infiltration results in less runoff. Later in the wet season, the ground is more saturated, resulting in greater volumes discharged to ocean receiving waters.

Table 2-2.
Total Rainfall for 2015–2016 Monitored Events

Event	Event Start Date	Event End Date	Sampling Date	Rainfall Miramar (inches)
Wet Weather Event 1	1/4/2016	1/11/2016	1/9/2016	5.39
Wet Weather Event 2	1/30/2016	2/3/2016	2/3/2016	0.59
Wet Weather Event 3	3/5/2016	3/11/2016	3/10/2016	0.85

2.1.1.1 Wet Weather Event 1 – January 9, 2016

A qualifying wet weather event (greater than or equal to 0.2 inch of rainfall preceded by at least 72 hours of less than 0.1 inch of rainfall) began on January 4, 2016. This event was the largest storm event of the 2015–2016 wet season, with a total of 5.39 inches of rainfall. The greatest amount of rainfall occurred on January 6 (2.03 inches), followed by January 5, 2016 (1.87 inches) and January 7, 2016 (1.26 inches), with lesser amounts recorded on January 4, 8, and 9, 2016 (0.08 inch, 0.14 inch, and 0.01 inch, respectively).

Wet weather samples were collected within 72 hours after the end of a storm event. Bacteria grab samples were collected at the San Dieguito Lagoon Mouth compliance monitoring location at 12:12pm on January 9, 2016, approximately 34 hours after the end of precipitation. Grab samples were submitted to Weck Laboratories Inc. for analysis within the prescribed holding times. In addition, *in situ* field measurements and field observations were collected and recorded for the location.

2.1.1.2 Wet Weather Event 2 – February 3, 2016

The second monitored storm event began on January 30, 2016. On January 30, 2016, 0.02 inch of rainfall was measured, followed by 0.57 inch on January 31, 2016, as recorded at the Miramar gauge. Precipitation totals exceeded 0.2 inch at the Miramar gauge (0.59 inch). Bacteria grab samples were collected at the San Dieguito Lagoon Mouth compliance monitoring location at 10:35am on February 3, 2016, approximately 68 hours after the end of precipitation. Grab samples were submitted to Weck Laboratories Inc. for analysis within the prescribed holding times. In addition, *in situ* field measurements and field observations were collected and recorded for the location.

2.1.1.3 Wet Weather Event 3 – March 10, 2016

The third monitored event for the 2015–2016 wet season began on March 5, 2016. Showers continued through March 7, 2016. Precipitation totals exceeded 0.2 inch, with the Miramar gauge recording 0.85 inch of rainfall.

A wet weather sample was collected at the San Dieguito Lagoon Mouth compliance monitoring location approximately 57 hours after the end of precipitation. Bacteria grab samples were collected at the compliance monitoring location at 8:40am on March 10, 2016. Grab samples were submitted to Weck Laboratories Inc. for analysis within the prescribed holding times. In addition, *in situ* field measurements and field observations were collected and recorded for the location.

2.1.2 Wet Weather FIB Concentrations

Elevated FIB concentrations were observed only during one of the three monitoring events, for one of the three compliance constituents. For Wet Weather Event 1, which was the largest monitored storm with 5.39 inches of rainfall, *Enterococcus* concentrations were elevated above the numeric target; fecal and total coliform concentrations, however, were not elevated. Wet Weather Events 2 and 3 did not have elevated concentrations of any of the three compliance constituents. Table 2-3 presents 2015–2016 wet weather analytical results for compliance constituents. Figure 2-1 illustrates 2015–2016 wet weather bacteria densities as compared with the single-sample maximum numeric targets. Additional wet weather monitoring data or information are included in the following appendices:

- Appendix B: Optional field measurements for 2015–2016 wet weather monitoring;
- Appendix D: 2015–2016 wet weather laboratory reports; and
- Appendix E: 2015–2016 wet weather field data sheets.

Table 2-3.
Wet Weather Analytical Results for San Dieguito River WMA

Analyte	Unit	Numeric Target	Method	MDL[a]	RL[a]	Analytical Results – Site ID EH-380		
						Wet Weather Event 1 1/9/2016 [c]	Wet Weather Event 2 2/3/2016 [c]	Wet Weather Event 3 3/10/2016 [c]
Total Coliform	CFU/100mL	10,000	SM 9222B	2	2 (20 [b])	2,600	200	<20
Fecal Coliform	CFU/100mL	400	SM 9222D	2	2	270	4	2
Enterococcus	CFU/100mL	104	USEPA 1600	1	2 (10 [b])	**290**	86	<2

Notes:
% = percent; CFU = colony-forming unit; EH-380 = San Dieguito Lagoon Mouth; ID = identification; mL = milliliters; TMDL = total maximum daily load; MDL = method detection limit; RL = reporting limit; SM = USEPA Standard Method; USEPA = United States Environmental Protection Agency;
Bolded value = concentration exceeds the single-sample maximum numeric target.
a. MDL/RL values vary with the dilutions used to generate plates within the countable range.
b. Reporting limit used for Wet Weather Event 1.
c. Date sample was collected.

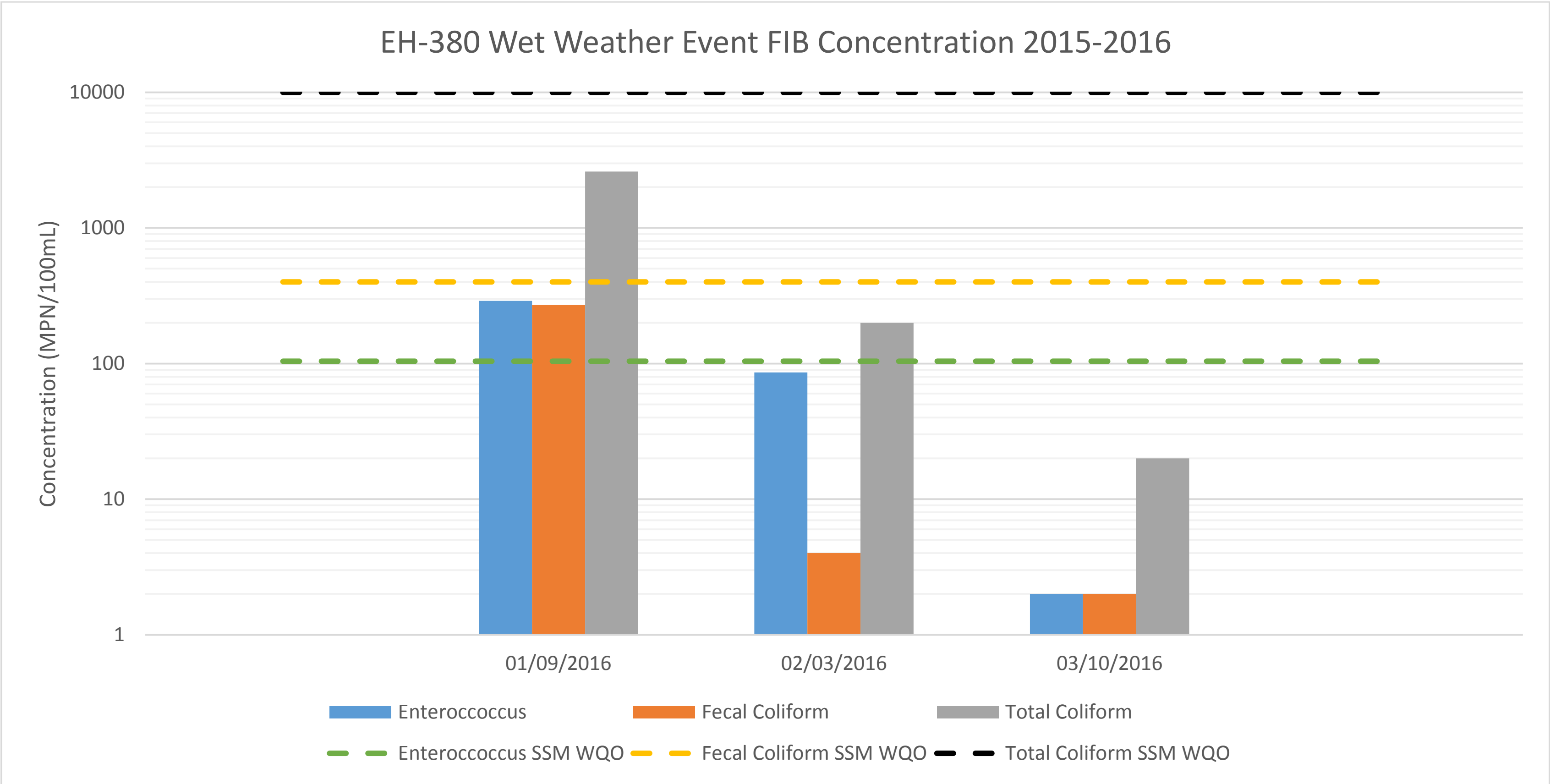

Figure 2-1.
2015–2016 Wet Weather Fecal Indicator Bacteria Concentrations – EH-380

2.2 Dry Weather Compliance Monitoring

Dry weather monitoring was performed during both the wet season (October 1, 2015, through April 30, 2016) and the dry season (May 1, 2016, through September 30, 2016). As specified in the Compliance Monitoring Plan, the following sampling was conducted:

- Weekly dry weather monitoring in October 2015 and from April 2016 through September 2016.
  - RAs elected to perform weekly monitoring during October 2015 and from April 2016 through September 2016 to capture potential conditions with more recreational activities, consistent with the recreational monitoring season of the California Assembly Bill 411 (the Beach Safety Act, or AB 411) program. Weekly dry weather sampling is also above and beyond the requirements of Attachment E of the MS4 Permit: only monthly sampling is required.
  - At least five samples were collected in each calendar month, except during May 2016 and September 2016, when only four samples were collected because of wet weather interference.
- Monthly dry weather monitoring from November 2015 through March 2016.

Dry weather events, as defined by Attachment E of the MS4 Permit, may occur on dry weather days with an antecedent dry period of 72 hours with less than 0.1 inch of rainfall. All dry weather samples were collected by the City of Del Mar's Clean Water Program on behalf of the RAs. Bacteria samples were submitted to the City of San Diego's EM&TS Laboratory for analysis.

2.2.1 Dry Weather Monitoring Summary

During each successful dry weather event, water grab samples were collected in the receiving waters at the San Dieguito Lagoon Mouth compliance monitoring location. Tables presenting dry weather FIB concentrations and field measurements for the 2015–2016 monitoring year are provided in Appendix C.

The field scientists noted visual observations during each dry weather sampling event. In general, field observations such as the presence of algae or trash occurred only during a few sampling events. Table 2-4 presents sampling event information (approximate tidal stage and total antecedent dry weather days before each event), with wet season dry weather sampling dates highlighted in blue.

During the wet season (October through April), a total of 15 dry weather sampling events were conducted at the San Dieguito Lagoon Mouth compliance monitoring location.

During the dry season (May through September), a total of 25 dry weather sampling events were scheduled at the San Dieguito Lagoon Mouth compliance monitoring location. In both May and September 2016, one planned sampling event was canceled because of rainfall. Therefore, the total sample count for San Dieguito Lagoon Mouth was 23 for the dry season.

Table 2-4.
Dry Weather Sampling Summary and Antecedent Dry Days

Date Visited	Tide Height [a] (feet)	Antecedent Dry Days [b]	
		<0.1 inch	<0.2 inch
10/12/2015	3	6	6
10/13/2015	5	7	7
10/19/2015	5	13	13
10/20/2015	5	14	14
10/27/2015	2	21	21
11/19/2015	2.6	16	16
12/1/2015	4.4	28	28
1/13/2016	5	5	6
2/16/2016	2	16	16
3/1/2016	2	30	30
4/5/2016	3	25	25
4/13/2016	3.5	3 [c]	3 [c]
4/19/2016	5	9	9
4/20/2016	5.2	10	10
4/26/2016	2.3	16	16
5/2/2016	2	22	22
5/3/2016	1.5	23	23
5/16/2016	4	10	10
5/31/2016	4	25	25
6/6/2016	2	31	31
6/9/2016	3	34	34
6/13/2016	3	38	38
6/20/2016	5	45	45
6/30/2016	2.5	55	55
7/5/2016	4	60	60
7/7/2016	4	62	62
7/11/2016	3.5	66	66
7/19/2016	5.3	74	74
7/26/2016	1	81	81
8/1/2016	4	87	87
8/9/2016	2	95	95
8/16/2016	4	102	102
8/23/2016	2	109	109
8/30/2016	3	116	116
9/6/2016	4	123	123
9/13/2016	4	130	130
9/27/2016	3	6	7
9/28/2016	4	7	8

Notes:
Source = National Oceanographic and Atmospheric Administration (NOAA)
DW = dry weather
Blue-shading indicates dry weather events during the wet season.

a. Tide height is approximate and pertains to all sampled sites.
b. National Weather Service (NWS) archived rain gauge data for Miramar were used to determine antecedent dry days, unless otherwise noted.
c. 4/13/16 was defined as a wet weather day based on precipitation >0.2 inch on 4/10/16. However, hourly weather observations at the Miramar gauge place the end of measureable precipitation on 4/10/16 at 04:55 PDT, before the first sampling time. Thus, samples collected on 4/13/16 were collected >72 hours after the end of precipitation and are considered dry weather samples.

Although total measured rainfall during the wet season was below average, above average rainfall was recorded throughout the 2016 dry season. From May 1, 2016, through September 30, 2016, a total of 0.95 inch of precipitation was measured at the Miramar station. Table 2-5 summarizes total monthly rainfall for the 2016 dry season.

Table 2-5.
Dry Season Monthly Rainfall Summary

Month	Miramar Rainfall (inches)	
	2015–2016 Monitoring Season	1981–2010 Historical Average
May	0.59	0.16
June	0	0.06
July	0	0.06
August	0	0.02
September	0.36	0.19
Total Rainfall	**0.95**	**0.49**

2.2.2 Dry Weather FIB Concentrations

Dry weather samples were collected during the 2015–2016 wet season and the 2016 dry season, as noted in Section 2.2. Dry weather samples collected during the 2016 dry season consistently displayed lower bacteria concentrations than dry weather samples collected during the wet season.

During the dry weather conditions in the dry season, no elevated FIB concentrations at the San Dieguito Lagoon Mouth compliance monitoring location were observed, which is typically when beach visitation and recreation use are at the highest levels. During dry weather conditions in the wet season, fecal and total coliform concentrations were not observed to be elevated; however, *Enterococcus* concentrations exceeded the single-sample maximum for two events: one in October 2015 and one in February 2016. Based on current monitoring, the sources of elevated FIB concentrations are not known; potential sources include land areas draining directly to the San Dieguito Lagoon Mouth and Pacific Ocean and natural sources (regrowth and marine life). Marine mammals, birds, and seaweed are potential natural sources of bacteria. According to the Southern California Bight 2008 Regional Monitoring Program (Bight ’08) Shoreline Microbiology Study conducted by the Southern California Coastal Water Research Project (SCCWRP) at Southern California beaches (SCCWRP, 2012), resident bird populations are natural sources of FIB; FIB regrowth on beach wrack and beach sand is a potential source of increased FIB densities.

Figure 2-2 depicts FIB concentrations for each dry weather monitored event between October 1, 2015, and September 30, 2016. The blue-shaded area indicates dry weather results generated during the wet season, when elevated FIB densities are more likely to occur.

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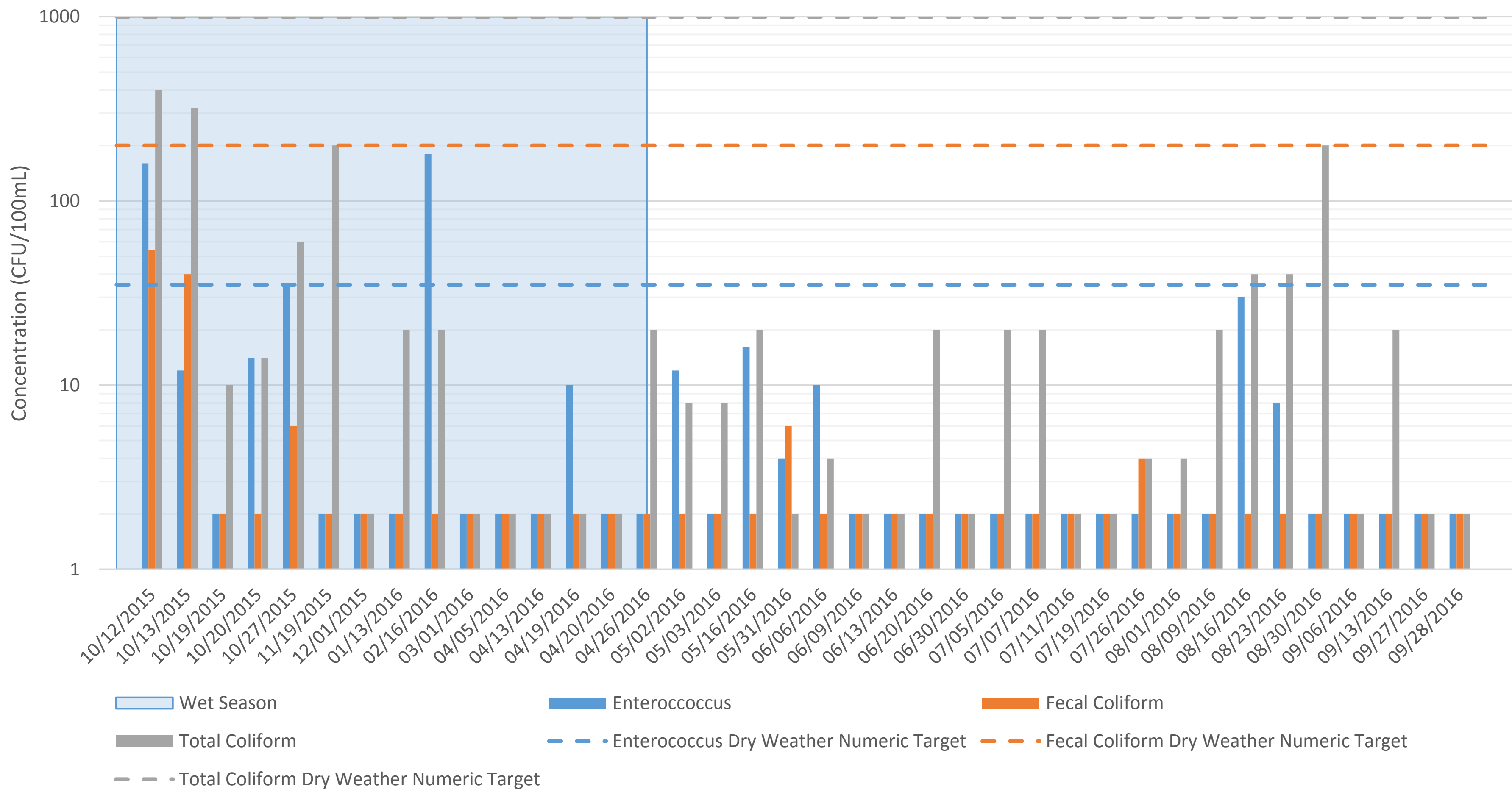

Figure 2-2
2015–2016 Dry Weather Fecal Indicator Bacteria Concentrations – EH-380

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3.0 COMPLIANCE EVALUATION

This section presents the results of the compliance evaluation for dry and wet seasons in accordance with the assessment requirements of Attachment E of the MS4 Permit.

3.1 Compliance Evaluation Methods

Separate evaluations were completed using geometric means for dry season dry weather and wet season combined all weather, and single-sample maximums for wet weather results as described in this report. FIB data collected between October 2015 and September 2016 in accordance with the Compliance Monitoring Plan were used in the compliance assessments.

Several inconsistencies were identified in Attachment E.6.6 of the MS4 Permit that may affect the interpretation of compliance; these inconsistencies are explained in detail in Appendix F.

3.1.1 Wet Weather Single-Sample Maximum Exceedance Frequency

Wet weather exceedances are based on a comparison of the rate of exceedances of the single-sample maximum numeric target with the allowable 22% exceedance frequency. Wet weather events include the storm day(s) (0.2 inch of rainfall or greater) and the following 72 hours, resulting in a minimum wet weather event duration of 4 days. Per of Attachment E of the MS4 Permit, for monitored storm events, the highest reported result from a storm event is applied to each day for the duration of that event. An inferred exceedance rate must be calculated to account for non-monitored storm events.

For the remaining wet weather days that are not associated with a monitored event, the average (geometric mean) of the highest reported results from each of the three monitored wet weather events is assigned to the remaining wet weather days in the wet season:

$$\text{Geometric Mean} = \quad n^{th} \text{ root of } (X_1)(X_2)_{\dots} X_n$$

where: $X_1, X_2, etc.$ is the highest reported concentrations of the monitored event
n is the number of monitored storm events

The wet weather exceedance frequency is then determined by dividing the number of wet weather days that exceeded the single-sample maximum numeric target by the total number of wet weather days observed during the 2015–2016 wet season. A list of observed wet weather days for the 2015–2016 wet season, both monitored and observed, is provided in Appendix B.

$$\text{Wet Weather Exceedance Frequency (\%)} = 100 * \frac{\Sigma(\text{WWD} > \text{Wet Weather RWL})}{\Sigma \text{WWD}}$$

where: ΣWWD is the sum of wet weather days (0.2 inch of rainfall or more) and the following 72 hours

3.1.2 Wet Season Geometric Mean and Exceedance Frequency

Per of Attachment E of the MS4 Permit, a wet season exceedance frequency was calculated using the combined wet and dry weather results between October 1 and April 30 and compared with dry weather RWLs. During the wet season, the amount of time summarized by each geometric mean varies. Dry weather sampling was conducted weekly during the wet season in October 2015 and April 2016, and monthly from November 2015 through March 2016. In addition, three wet weather events were monitored during the wet season; one sample was collected for each wet weather event. A rolling geometric mean calculation was calculated from the five most recent wet season samples. With each subsequent sample collected, the first sample from the preceding five-sample geometric mean was dropped. The wet season geometric mean is calculated as follows:

$$\text{5-Sample Geometric Mean} = n\sqrt{(X_1)(X_2)(X_3)(X_4)(X_5)}$$

where: n is the number of individual results used in the calculation
X_n is sample *n* result (e.g., X_1 = November result, X_2 = Wet Weather 1 Result)

A wet season exceedance occurs when a geometric mean exceeds the dry weather numeric target. The first geometric mean was calculated after the fifth sample in October. To determine the wet season exceedance frequency, the number of wet season geometric means that exceed the dry weather numeric target was divided by the total number of calculated wet season geometric means, as expressed below.

$$\text{Wet Season Exceedance Frequency (\%)} = 100 * \frac{\text{Wet Season } G_n > \text{DW NT}}{\text{Wet Season } G_n}$$

where: Wet Season G_n is the number of wet season geometric means
DW NT is the dry weather numeric target

3.1.3 Dry Season Geometric Mean and Exceedance Frequency

Per Attachment E of the MS4 Permit, the geometric mean calculation should be consistent with that in the Ocean Plan (SWRCB, 2012). A 30-day rolling geometric mean calculation was based on a minimum of five samples for any 30-day period. Geometric means were calculated as follows:

$$\text{30-Day Geometric Mean} = n\sqrt{(X_1)(X_2)(X_3)(X_4)(X_5)}$$

where: n is the number of individual results used in the calculation
X_n is week *n* result (e.g., X_1 = week 1 result)

Dry weather monitoring began in early May 2016; the first geometric mean was calculated after the fifth sample. With each subsequent sample collected, the first sample from the preceding five-sample geometric mean was dropped outside of a 30-day window. Samples collected between May 1 and September 30 are used in this calculation.

A dry weather exceedance occurs when the geometric mean exceeds the dry weather numeric target. The first exceedance rate was calculated after the first geometric mean calculation. The number of geometric means that exceed the dry weather numeric target is divided by the total number of calculated dry season geometric means to determine the dry season exceedance frequency, as expressed below:

$$\text{Dry Season Exceedance Frequency (\%)} = 100 * \frac{\text{Dry Season } G_{\boldsymbol{n}} > \text{DW NT}}{\text{Dry Season } G_n}$$

where: Dry Season G_n is the number of dry season geometric means
DW NT is the dry weather numeric target

3.2 Wet Weather Exceedance Rates and Compliance Evaluation

During the 2015–2016 wet season, 45 wet weather days were observed, as recorded by the Miramar gauge, and are presented in Appendix B. For the compliance monitoring location, this assessment applies the average of the three wet weather sampling results to each non-sampled wet weather day. A total of 15 of the 45 wet weather days were associated with sampled storm events (three storm events plus the following 72 hours per event) and the average of the results was assigned to each of the remaining 30 wet days.

Based on current monitoring, the San Dieguito River WMA is meeting interim and final RWLs for total coliform, fecal coliform, and *Enterococcus.* The San Dieguito River WMA achieved 0% wet weather exceedance frequencies for total and fecal coliforms. There was one wet weather exceedance for *Enterococcus*, and the geometric mean of the three wet weather results did not exceed the single-sample maximum numeric target. Based on the compliance requirements, the single *Enterococcus* exceedance was applied to all six wet weather days for the wet weather event. As a result, the wet weather exceedance frequency for *Enterococcus* in the San Dieguito River WMA is 13.3% (6 wet weather day exceedances divided by 45 wet weather day results). The 13.3% exceedance frequency is below the allowable interim and final Bacteria TMDL wet weather exceedance frequencies.

Table 3-1 presents wet weather single-sample maximum exceedance frequencies for the San Dieguito Lagoon Mouth compliance monitoring location. The geometric means are presented in the table to illustrate the averages (means) derived from the three sampled events applied to the remaining non-sampled wet weather days, as compared with the numeric target.

Table 3-2 compares 2015–2016 exceedance frequencies with historical exceedance rates, and interim and final RWLs.

Table 3-1.
2015–2016 Wet Weather Single-Sample Maximum Exceedance Rates

Site ID	Analyte	Single-Sample Maximum (CFU/100mL)		Number of Results	Number of Exceedances	2015–2016 Wet Weather Exceedance Rate
		Numeric Target	Geometric Mean			
EH-380	Total Coliform	10,000	218.3	44	0	0%
	Fecal Coliform	400	12.9	44	0	0%
	Enterococcus	104	36.8	44	6	13.3%

Notes:
% = percent; ID = identification; CFU = colony-forming unit; mL = milliliters
Site IDs: EH-380 = San Dieguito Lagoon Mouth
Bolded values = Geometric mean or exceedance rate is greater than the final allowable limit established in the Bacteria TMDL.

Table 3-2.
2015–2016 Wet Weather Exceedance Rates and Compliance Reduction Milestones

Site ID	Analyte	Existing Exceedance Rate [a]	2015–2016 Exceedance Rate	50% Reduction Milestone	50% Reduction Achieved?	Final Allowable RWLs	100% Reduction Achieved?
EH-380	Total Coliform	44%	0%	33%	Yes	22%	Yes
	Fecal Coliform	43%	0%	33%	Yes	22%	Yes
	Enterococcus	49%	13.3%	36%	Yes	22%	Yes

Notes:
% = percent; ID = identification; RWL = receiving water limitation
Site IDs: EH-380 = San Dieguito Lagoon Mouth.
Bolded values = Current rate exceeds final Bacteria TMDL RWLs.
a. Existing exceedance rate for wet season is a modeled estimate established in the Bacteria TMDL.

3.3 Wet Season Geometric Mean Exceedance Rates

The overall wet season evaluation combines bacteria results during both dry weather and wet weather events. Higher exceedance rates are expected during the wet season, with the inclusion of storm samples that reflect high-flow conditions. However, based on the 2015–2016 monitoring, the San Dieguito River WMA is currently meeting interim and final goals for total coliform, fecal coliform, and *Enterococcus* with 0% wet season exceedance frequencies for all FIB.

Table 3-3 presents the wet season geometric mean exceedance rates for the San Dieguito Lagoon Mouth compliance monitoring location, based on the available data, including the number of geometric means calculated from the results, the number of geometric means that exceeded the numeric target, and the maximum geometric mean.

Table 3-4 compares current wet season geometric exceedance frequencies with the existing dry weather exceedance rates and the status of progress as compared with interim and final RWLs.

Table 3-3.
2015–2016 Wet Season Geometric Mean Exceedance Rates

Site ID	Analyte	5-Sample Geometric Mean (CFU/100mL)		Number of Geomeans	Number of Exceedances	2015–2016 Wet Season Exceedance Rate
		Numeric Target	Maximum Geomean			
EH-380	Total Coliform	1,000	83.9	14	0	0%
	Fecal Coliform	200	8.8	14	0	0%
	Enterococcus	35	28.2	14	0	0%

Notes:
% = percent; CFU = colony forming unit; ID = identification; mL = milliliters
Site IDs: EH-380 = San Dieguito Lagoon Mouth.

Table 3-4.
2015–2016 Wet Season Exceedance Rates and Compliance Reduction Milestones

Site ID	Analyte	Existing Exceedance Rate [a]	Exceedance Rate	50% Reduction Milestone	50% Reduction Achieved?	Final Allowable RWLs	100% Reduction Achieved?
EH-380	Total Coliform	6%	0%	3.0%	Yes	0%	Yes
	Fecal Coliform	11%	0%	5.5%	Yes	0%	Yes
	Enterococcus	17%	0%	8.5%	Yes	0%	Yes

Notes:
% = percent; ID = identification; RWL = receiving water limitation
Site IDs: EH-380 = San Dieguito Lagoon Mouth.
RWL = receiving water limit; TMDL = total maximum daily load
a. Existing exceedance rate is based on available 1996–2002 historical data.

3.4 Dry Season Exceedance Rates

The overall dry season evaluation combines bacteria results during dry weather events from May 1 through September 30, 2016. Lower exceedance rates are typically expected during the dry season, which do not include the influence of wet weather events that reflect high-flow conditions. FIB compliance constituent concentrations were below the numeric objects and the interim and final RWLs were met at the San Dieguito Lagoon Mouth during the 2016 dry season with zero exceedances.

Dry season monitoring occurred weekly, and exceedances were based on a 30-day geometric mean composed of the preceding five samples. Of the 23 monitored events during the dry season at the San Dieguito Lagoon Mouth compliance monitoring location, there were zero exceedances of total and fecal coliform and *Enterococcus*. In addition, the San Dieguito Lagoon Mouth geometric mean did not exceed dry weather numeric objectives during the dry season for the FIB compliance constituents.

Table 3-5 presents the dry season geometric mean exceedance rates for the San Dieguito Lagoon Mouth, including the number of geometric means calculated from the results, the number of geometric means that exceeded the numeric target, and the maximum geometric mean.

Table 3-6 compares current dry season geometric exceedance frequencies with the existing dry weather exceedance rates, and provides the status of progress as compared with interim and final RWLs.

Table 3-5.
2016 Dry Season Geometric Mean Exceedance Rates

Site ID	Analyte	30-Day Geometric Mean (CFU/100mL)		Number of Geomeans	2016 Number of Exceedances	2016 Dry Season Exceedance Rate
		Dry Numeric Target	Maximum Geomean			
EH-380	Total Coliform	1,000	30.3	16	0	0%
	Fecal Coliform	200	2.49	16	0	0%
	Enterococcus	35	4.8	16	0	0%

Notes:
% = percent; CFU = colony-forming units; ID = identification; mL = milliliters;
Site IDs: EH-380 = San Dieguito Lagoon Mouth.

Table 3-6.
Dry Season Exceedance Rates and Compliance Reduction Milestones

Site ID	Analyte	Existing Exceedance Rate [a]	2016 Exceedance Rate	50% Reduction Milestone	50% Reduction Achieved?	100% Reduction Final RWLs	100% Reduction Achieved?
EH-380	Total Coliform	6%	0%	3.0%	Yes	0%	Yes
	Fecal Coliform	11%	0%	5.5%	Yes	0%	Yes
	Enterococcus	17%	0%	8.5%	Yes	0%	Yes

Notes:
% = percent; ID = identification; RWL = receiving water limitation
Site IDs: EH-380 = San Dieguito Lagoon Mouth.
a. Existing exceedance rate was calculated based on available 1996 - 2002 historical data.

3.5 Wet and Dry Season Overview

Figures 3-1 through 3-3 present the 2015–2016 rolling geometric means throughout the wet and dry season from October 1, 2015, through September 30, 2016. Wet season geometric means are illustrated using a yellow line with yellow markers throughout the blue areas (wet season), which reflects the rolling geometric mean using the last five samples. Wet weather numeric targets are illustrated with a blue dashed line. FIB concentrations in dry and wet weather are indicated with gold circles and blue circles, respectively. The gray line with gray markers illustrates the rolling 30-day geometric means throughout the dry season (May through September). Dry weather Bacteria TMDL numeric targets are illustrated with an orange dashed line.

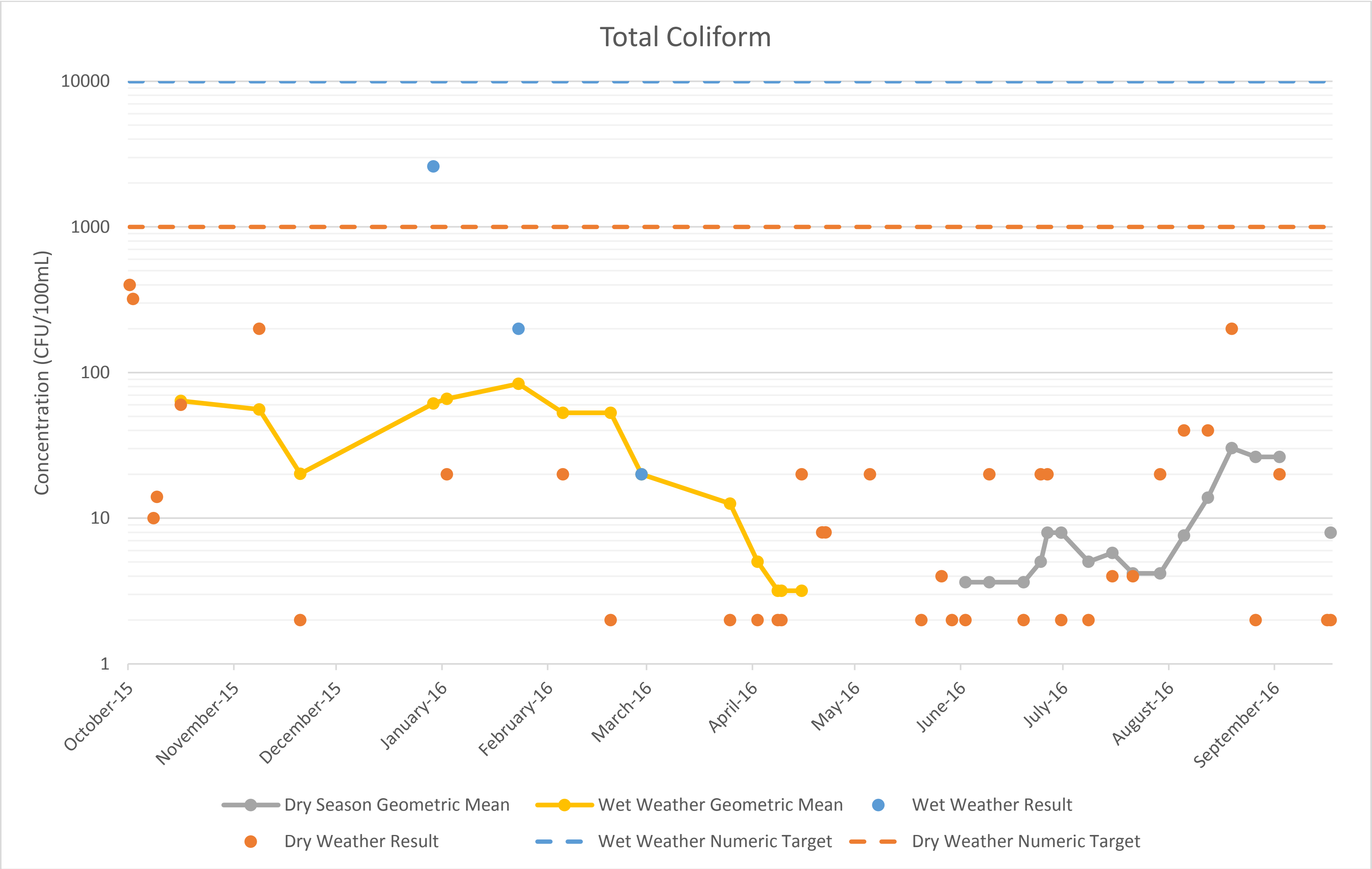

Figure 3-1.
Total Coliform Densities and Geometric Means, 2015–2016 Wet and Dry Season – EH-380

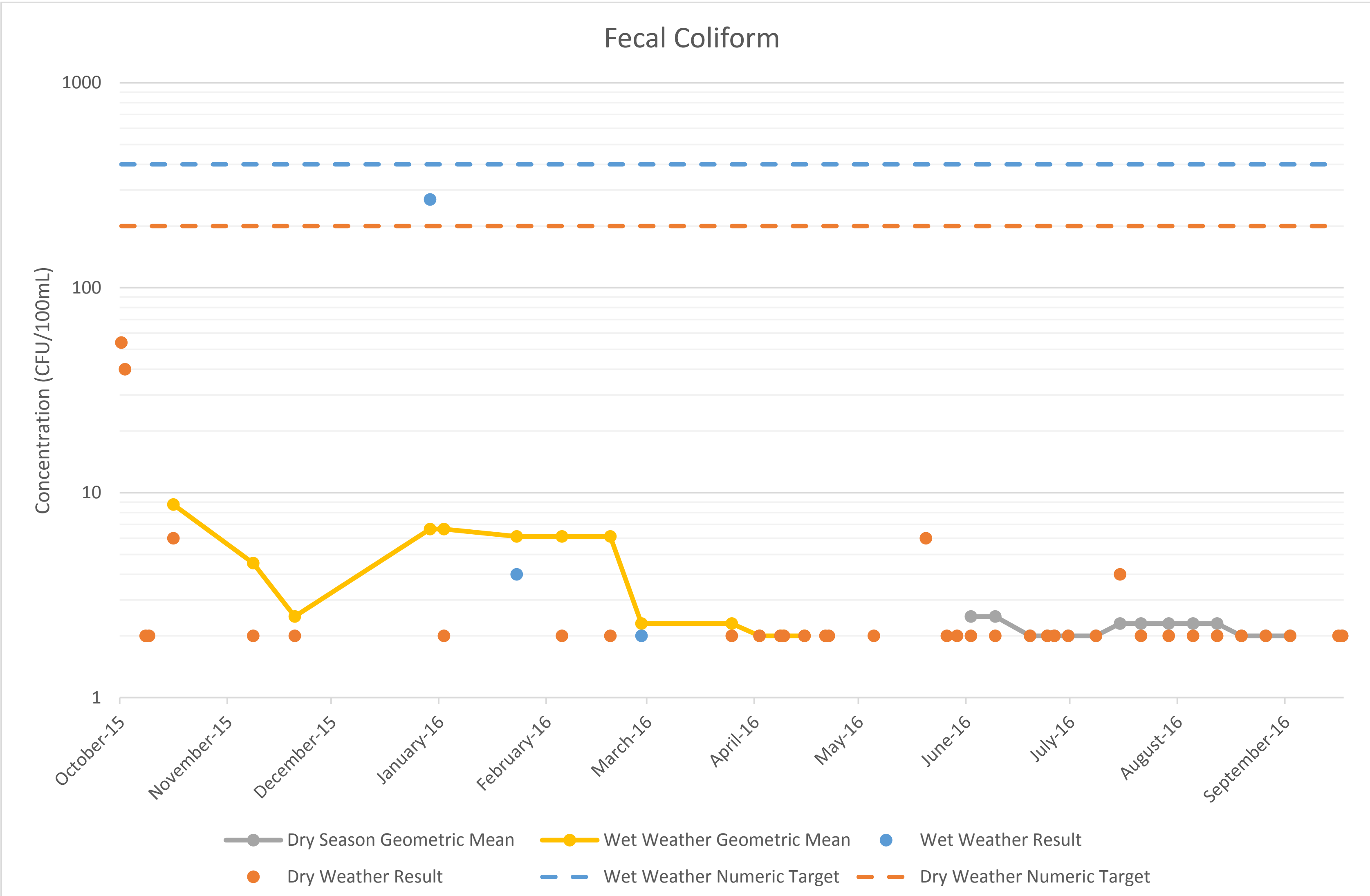

Figure 3-2.
Fecal Coliform Densities and Geometric Means, 2015–2016 Wet and Dry Season – EH-380

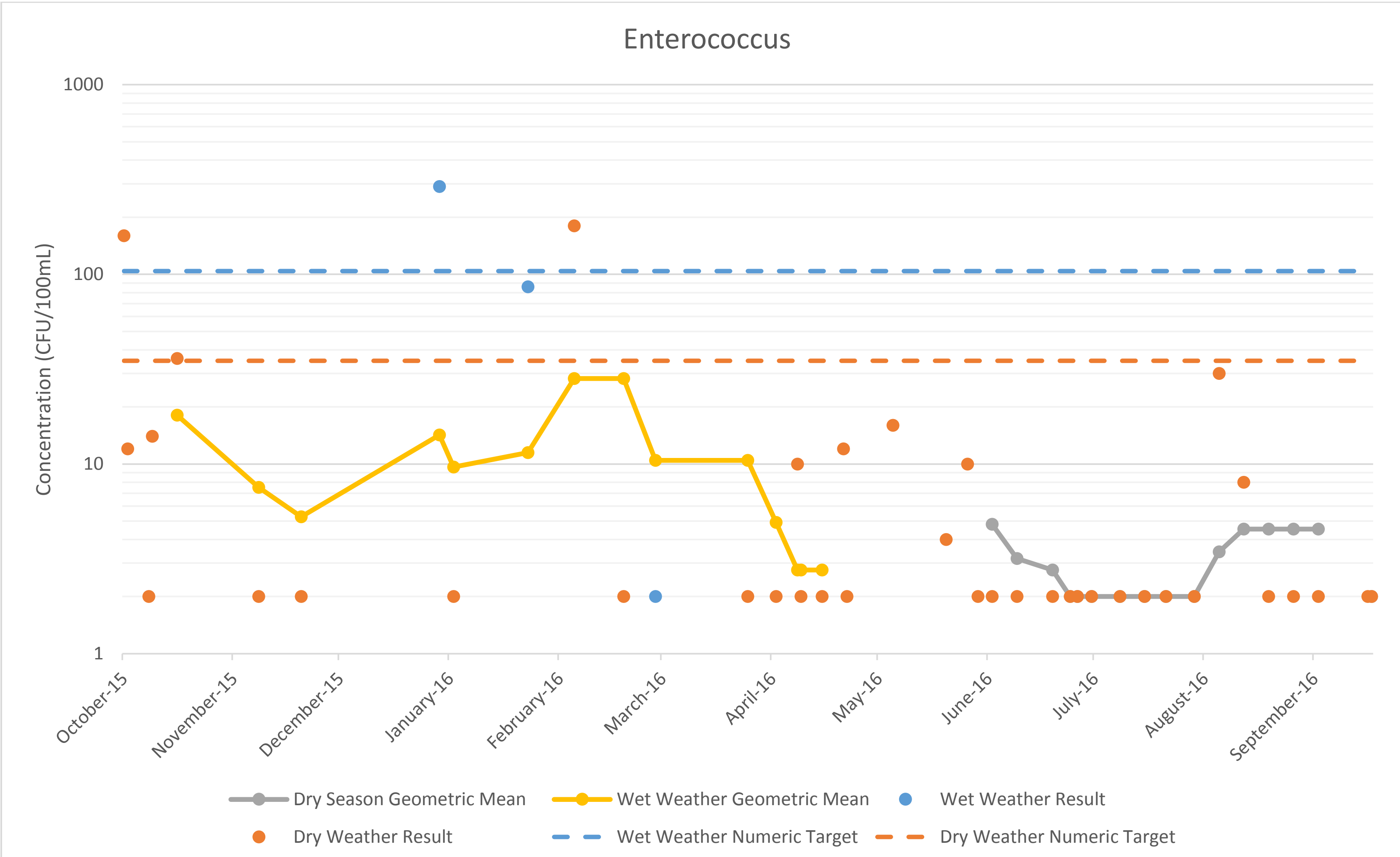

Figure 3-3.
***Enterococcus* Densities and Geometric Means, 2015–2016 Wet and Dry Season – EH-380**

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3.6 Progress Toward Attaining Interim and Final Receiving Water Limitations

Table 3-7 depicts the general progress toward meeting interim and final numeric targets by season for the San Dieguito Lagoon Mouth compliance monitoring location. This table indicates whether targets for collective FIB have been met (●), have been partially met (**O**), or have not yet been met (**X**). A partially met goal means that at least one of the FIB constituents is meeting the RWL.

Table 3-7.
General Progress Toward Interim and Final Targets
for San Dieguito River WMA, 2015–2016

Monitoring Location	2015–2016 Wet Weather Single-Sample Maximum		2015–2016 Wet Season Geomeans		2016 Dry Season Geomeans	
	Interim	Final	Interim	Final	Interim	Final
EH-380	●	●	●	●	●	●

Note:
Site IDS: EH-380 = San Dieguito Lagoon Mouth
● = Currently, interim or final receiving water limitations (RWLs) have been fully achieved.
O = Currently, interim or final RWLs have been partially achieved, but not all compliance constituents have attained the RWL.
X = Currently, no fecal indicator bacteria (FIB) constituents meet Bacteria Total Maximum Daily Load (TMDL) RWL.

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4.0 SUMMARY

This section describes current receiving water conditions in the San Dieguito River WMA related to the project goals. Dry and wet weather data collected during the 2015–2016 wet season, and dry weather data from the 2016 dry season were used to evaluate compliance on the basis of current conditions.

4.1 Characterization of Current FIB Concentrations

Overall, the San Dieguito Lagoon Mouth achieved full compliance with wet weather, wet season, and dry season interim and final RWLs for the 2015–2016 monitoring season.

During the wet weather, the San Dieguito River WMA compliance monitoring location achieved a 0% exceedance frequency for both total coliform and fecal coliform and a 13.3% exceedance frequency for *Enterococcus.* The final allowable exceedance frequency for wet weather is 22%.

During the wet season, which evaluates a combination of both wet and dry weather samples using dry weather geometric mean RWLs, 0% exceedance frequencies were achieved for all compliance constituents. Full compliance with both interim and final dry weather RWLs was achieved for the 2015–2016 wet season.

During the dry season, when recreational activities occur with more regularity, the San Dieguito River WMA compliance monitoring location achieved 0% exceedance frequencies for compliance constituents total coliform, fecal coliform, and *Enterococcus*. Collectively, these datasets suggest that, for most of the year, bacteria densities support REC-1 conditions in the San Dieguito River WMA.

The 2015–2016 monitoring results are summarized below.

Wet Weather Single-Sample Maximum Comparison

- An exceedance of *Enterococcus* was detected during one wet weather event at the San Dieguito Lagoon Mouth.
- The compliance monitoring location is achieving interim and final wet weather RWLs for all three compliance constituents.

Wet Season Geometric Mean Comparison

- The compliance monitoring location is achieving interim and final dry weather RWLs for all three compliance constituents for combined wet and dry samples during the wet season.

Dry Season Geometric Mean Comparison

- The compliance monitoring location is achieving interim and final dry weather RWLs for all three compliance constituents during the dry season.

Table 4-1 presents the 2015–2016 exceedance frequency results by season in the San Dieguito River WMA.

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Table 4-1.
2015–2016 Bacteria TMDL Exceedance Frequency Results for San Dieguito River WMA

Site ID	Bacteria TMDL Constituent	Wet Weather [a] Single-Sample Maximum (CFU/100mL)			Wet Season [a, c] 5-Sample Geometric Mean (CFU/100mL)			Dry Season [b] 30-Day Geometric Mean (CFU/100mL)		
		2015–2016 [d] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency	2015–2016 [e] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency	2015–2016 [e] Exceedance Frequency	Interim Allowable Frequency	Final Allowable Frequency
EH-380	Total Coliform	0%	33%	22%	0%	3%	0%	0%	3%	0%
	Fecal Coliform	0%	33%	22%	0%	5.5%	0%	0%	5.5%	0%
	Enterococcus	13.3%	36%	22%	0%	8.5%	0%	0%	8.5%	0%

Notes:
% = percent; CFU = colony-forming unit; EH-380 = San Dieguito Lagoon Mouth; ID = identification; mL = milliliters; TMDL = total maximum daily load
Green shaded cells show the 2015-2016 observed exceedance frequency.

a. October 1, 2015–April 30, 2016
b. May 1, 2016–September 30, 2016
c. In accordance with the MS4 Permit, wet and dry weather FIB data were combined to calculate geometric means for the wet season and compared to dry weather RWLs as shown in Table ES-1.
d. The exceedance frequency was derived by dividing the total number of wet weather days (days with 0.2 inch of rainfall or greater plus the following 72 hours) that exceeded the single-sample maximum numeric target divided by the total number of wet weather days during the wet season. To determine exceedances for non-sampled wet weather days, the geometric mean of the analytical results from three monitored storm events was applied to the remaining observed wet weather days that were not sampled. The results from the total number of wet weather days, with either assigned averages or analyzed result values, were then compared with single-sample maximum numeric targets.
e. The exceedance frequency was derived by dividing the total number of geometric exceedances by the total number of geometric means calculated during the season.

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5.0 REFERENCES

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APPENDIX A

QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

A.1 Quality Assurance/Quality Control Summary

Quality assurance and quality control (QA/QC) activities from both field sampling and laboratory analyses have been assessed to ensure that they to conform sampling techniques to Surface Water Ambient Monitoring Program (SWAMP) protocol. Additionally, deviations from the Compliance Monitoring Plan are discussed herein. The field quality control (QC) samples are used to measure potential contamination and sampling error introduced before the submittal of samples to the laboratory. Laboratory QA/QC activities provide information needed to evaluate laboratory contamination, analytical precision, and analytical accuracy.

Deviations from the Compliance Monitoring Plan

Optional Field Measurements - Dissolved oxygen was added as an optional field measurement for dry weather monitoring during the 2015-2016 monitoring year. It was not measured during wet weather monitoring. Additionally, minor adjustments were made to the detection ranges as noted in Table A-1 to reflect the actual meters used.

Table A-1.
Optional In-Situ Field Measurements and Detection Ranges

Parameter	Method	Range	Units
Conductivity [a,b]	Field Meter	0 to 200	mS/cm
pH [a,b]	Field Meter	0 to 14	pH units
Temperature [a,b]	Field Meter	-5 to 55	°C
Dissolved Oxygen [a,b]	Field Meter	0 to 50	mg/L
Turbidity [a,c]	Field Meter	0 to 1,000	NTU

Notes:

a. Wet weather field measurements were collected with a Horiba U-52. Dissolved oxygen was not measured during wet weather.
b. Dry weather field measurements were collected with a Hanna HI 98194 from 10/20/2015 onward. The samples taken before these dates were collected with a PC Tester 35 Multi-Parameter.
c. Dry Weather field measurement was collected with a Hanna HI 93414.

µS/cm = microSiemens per centimeter; °C = degree Celsius; NTU = Nephelometric Turbidity Unit

Dry Weather Monitoring – Per the Compliance Monitoring Plan, weekly dry weather monitoring was scheduled so that five samples were collected in each calendar month. However, in May 2016 and September 2016, only four samples were collected in each of these months because of wet weather interference.

Precipitation Data - Per the Compliance Monitoring Plan, precipitation data from the National Weather Service (NWS) Del Mar rain gauge were to be used to track the total number of wet weather days as defined in the MS4 Permit. However, the NWS Del Mar rain gauge was relocated in September 2015, and was also missing data for a portion of the 2015–2016 monitoring year. To provide a more complete dataset, the NWS Miramar Naval Air Station (MNAS) gauge was used in its place. Because the MNAS officially became the Marine Corps Air Station Miramar (Miramar) in 1999, this gauge is referred to as the Miramar gauge herein (Shettle 2001). The

Miramar gauge is technically within the Mission Bay WMA; however, it is the nearest gauge that is representative of rainfall in the middle of the San Dieguito River watershed. Historical daily rainfall amounts generated by the NWS will be used to assess the annual rainfall and historical average for San Diego County.

Field Quality Control

The number and frequency of field QC samples collected are presented in Table A-2. Field grab QC samples were submitted blind to the analytical laboratory. For laboratory replicates, additional samples were collected and clearly identified on the chain of custody (COC) form. Field blanks are samples of reagent-grade, analyte-free, deionized water collected in the field to verify the field conditions and air deposition are non-contaminating during field sampling activities. Field blanks were analyzed for the same suite of analyses as regular samples. The project frequency for field blanks is 5 percent of the total sample count. Concentrations of field blanks should be below the reporting limit (RL) for each analyte. Duplicate samples consist of two distinct samples (an original and a duplicate) of the same matrix collected at the same time and location using the same sampling technique. Field duplicate samples were collected by filling two grab sample containers at the same time, or in rapid sequence. The purpose of field duplicates is to measure the consistency of field sampling; project frequency for field duplicates is 5 percent of samples. The result for each field duplicate is compared with the sample result to estimate a relative percent difference between the two sample results.

Table A-2.
Field Quality Control Parameters

Field QC	Frequency	Acceptance Limit
Field Blank	≥ 5% of all project samples	Concentrations should be below the RL
Field Duplicate	≥ 5% of all project samples	$R(log) \leq 3.27\bar{R}$

Notes:
RL = reporting limit; $R_{(log)}$ = range of logarithms for each pair of duplicates; $\bar{R}$ = mean of $R_{(log)}$ for duplicates analyzed

Of the three wet weather field samples, one field blank and one duplicate were collected to assess QA/QC. The frequency for both field blanks and duplicates is 33.3 percent, which is above the required frequency of 5 percent of all project samples. The field blank sample concentrations were not detected at or above the reporting limit of 2 colony-forming units per 100 milliliters (CFU/100mL) for fecal coliform and total coliform, and were within the acceptance limits. The *Enterococcus* concentration was also not detected at or above the reporting limit of 1 CFU/100mL, and was within the acceptance limits.

The one set of wet weather field duplicate results were within the acceptance criteria. The differences of the logarithms were less than the mean logarithmic difference multiplied by 3.27. Values for field duplicate differences were calculated between 0.15 and 0.95, below the $3.27\bar{R}$ value of 1.52; thus, duplicate values were within the acceptance limits.

Of the 38 dry weather field samples, field blanks were collected for 7 samples and duplicates for 9 samples. Both are above the required frequency of 5 percent for all project samples, with a frequency of 18.4 percent for field blanks and 23.7 percent for duplicates. The field blank sample concentration on March 1, 2016, for *Enterococcus* was reported as 2 CFU/100mL, which was above the reporting limit of 1 CFU/100mL. Therefore, this result was not within acceptance limits. All other field blank sample concentrations were less than the reporting limit of 1 CFU/100mL, and within acceptance limits.

The range of logarithms for dry weather field duplicate results on March 1, 2016, for total coliform was 1.2, which is more than $3.27\bar{R}$ = 0.86, the mean logarithmic difference multiplied by 3.27. Therefore, this result was not within acceptance limits. The remaining wet weather field duplicate results were all less than 0.86, and were within the acceptance limits.

Laboratory Quality Control

Laboratory QC samples include laboratory duplicates, and the positive and negative controls described in Table A-3. Laboratory QC sampling results were provided in a laboratory report and SWAMP compatible electronic data deliverable (EDD) with a batch identification (ID) number to correlate with the corresponding environmental sample data set. The table below describes the frequency and types of quality control samples for each constituent category.

Laboratory Replicate – For a laboratory replicate, a sample is prepared and analyzed twice to assess the repeatability (precision). The results are evaluated by calculating the relative percent difference (RPD) between the two sets of results. This serves as a measure of the reproducibility, or precision, of the sampling analysis. A minimum of one laboratory replicate is analyzed per batch.

Positive and Negative Controls – A negative control is created as a separate plate count after the buffered rinse water is filtered and incubated the same way as a sample. There should be no bacteria growth on the filter after incubation. It is used to detect laboratory bacterial contamination of the sample. A positive control is created as a separate plate count after a water sample known to contain bacteria (such as wastewater treatment plant influent) is filtered and incubated the same way as a sample. There should be bacteria growth on the filter after incubation. It is used to detect procedural errors or the presence of contaminants in the laboratory analysis that might inhibit bacteria growth.

Table A-3.
Laboratory Quality Control Parameters

Laboratory QC	Frequency	Acceptance Limit
Laboratory Replicate	One per 20 samples or analytical batch, whichever is more frequent	$R(log) \leq 3.27\bar{R}$
Positive and Negative Controls	Per new lot or batch	Positive Control = Growth on filter Negative Control = No growth on filter

Notes:
RL = reporting limit; $R_{(log)}$ = range of logarithms for each pair of duplicates; $\bar{R}$ = mean of $R_{(log)}$ for duplicates analyzed

Data qualifiers are used to clarify and define each concentration result. The data qualifiers for wet weather concentrations include:

- “e” for estimated value;
- “<” for less than;
- “=” for equal to;
- “ND” for non-detect; and
- “None” for no qualifier.

For the data qualifiers for wet weather samples including field blanks and duplicates, “e” occurs in 20 percent of the samples, “<” occurs in 13 percent of the samples, “=” occurs in 40 percent of the samples, “ND” occurs in 20 percent of the samples, and “None” occurs in 7% of the samples.

The data qualifiers for dry weather concentrations include:

- “e” for estimated value;
- “<” for less than; and
- “None” for no qualifier.

For the data qualifiers for dry weather samples, including field blanks and duplicates, “e” occurs in 34.5 percent of the samples, “<” occurs in 63.5 percent of the samples, and “None” occurs in 2 percent of the samples.

APPENDIX B

2015–2016 WET WEATHER ANALYTICAL RESULTS

Table B-1
2015–2016 Wet Weather Field Results

Station ID	Date	Time	Temp (°C)	Conductivity (mS/cm)	Turbidity (NTU)	pH
EH-380-RW	1/9/2016	12:10	16.98	43.4	27.9	8.06
EH-380-RW	2/3/2016	10:35	17.19	40.2	12.2	8.1
EH-380-RW	3/10/2016	8:39	18.22	38.1	20.6	7.93

Notes:
°C = degree Celsius; ID = identification; mS/cm = microSiemens per centimeter; NTU = nephelometric turbidity units

Table B-2
2015–2016 Wet Weather Analytical Results

Site ID	Sample ID	Sample Date	Time	Analyte	Method	Qualifier	Result	Reporting Units	Reporting Limit	Lab
EH-380-RW	1516-W1-EH-380-G-01	1/9/2016	12:12	Fecal Coliform	SM 9222 D	=	270	CFU/100 mL	2	WECK
EH-380-RW	1516-W1-EH-380-G-01	1/9/2016	12:12	Total Coliform	SM 9222 B	=	2600	CFU/100 mL	20	WECK
EH-380-RW	1516-W1-EH-380-G-01	1/9/2016	12:12	*Enterococcus*	USEPA 1600	=	290	CFU/100 mL	10	WECK
EH-380-RW-DUP	1516-W1-EH-380-G-02	1/9/2016	12:12	Fecal Coliform	SM 9222 D	=	2400	CFU/100 mL	20	WECK
EH-380-RW-DUP	1516-W1-EH-380-G-02	1/9/2016	12:12	Total Coliform	SM 9222 B	=	5100	CFU/100 mL	20	WECK
EH-380-RW-DUP	1516-W1-EH-380-G-02	1/9/2016	12:12	*Enterococcus*	USEPA 1600	=	410	CFU/100 mL	10	WECK
FIELD BLANK	1516-W1-EH-380-G-03	1/9/2016	12:12	Fecal Coliform	SM 9222 D	ND[a]	2	CFU/100 mL	2	WECK
FIELD BLANK	1516-W1-EH-380-G-03	1/9/2016	12:12	Total Coliform	SM 9222 B	ND[a]	2	CFU/100 mL	2	WECK
FIELD BLANK	1516-W1-EH-380-G-03	1/9/2016	12:12	*Enterococcus*	USEPA 1600	ND[a]	1	CFU/100 mL	1	WECK
EH-380-RW	EH-380-RW-G-01-160203	2/3/2016	10:35	Total Coliform	MF, SM 9222B	e	200	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160203	2/3/2016	10:35	Fecal Coliform	MF, 9222D	e	4	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160203	2/3/2016	10:35	*Enterococcus*	MF, EPA 1600	None	86	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160310	3/10/2016	8:40	Total Coliform	SM 9222 B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160310	3/10/2016	8:40	Fecal Coliform	SM 9222 D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160310	3/10/2016	8:40	*Enterococcus*	USEPA 1600	<	2	CFU/100 mL	2	MML

Notes:
CFU/100 mL = colony-forming units per 100 milliliters; ID = identification;MF-Membrane Filtration, MML-City of San Diego EM&TS laboratory, ND = non-detect; NTU = nephelometric turbidity units; SM = Standard Method; USEPA = United States Environmental Protection Agency
a. The qualifier ND denotes non-detect. Weck Laboratories uses this qualifier in conjunction with the detection limit to represent a non-detect. The City of San Diego EM&TS laboratory reports non-detects with a less-than (<) qualifier in conjunction with the detection limit.

Table B-3.
2015-2016 Wet Weather Days

Wet Weather Day No.	2015-2016 Wet Weather Days	
	Date	Rainfall (inches)
1	10/4/2015	0.25
2	10/5/2015	0.25
3	10/6/2015	0
4	10/7/2015	0
5	10/8/2015	0
6	11/3/2015	0.27
7	11/4/2015	0.01
8	11/5/2015	0
9	11/6/2015	0
10	12/11/2015	0.28
11	12/12/2015	0
12	12/13/2015	0.24
13	12/14/2015	0
14	12/15/2015	0
15	12/16/2015	0
16	12/22/2015	0.48
17	12/23/2015	0.05
18	12/24/2015	0
19	12/25/2015	0.01
20	1/5/2016	1.87
21	1/6/2016	2.03
22	1/7/2016	1.26
23	1/8/2016	0.14
24	1/9/2016	0.01
25	1/10/2016	0
26	1/31/2016	0.57
27	2/1/2016	0
28	2/2/2016	0
29	2/3/2016	0
30	3/6/2016	0.26
31	3/7/2016	0.56
32	3/8/2016	0
33	3/9/2016	0
34	3/10/2016	0
35	3/11/2016	0.24
36	3/12/2016	0
37	3/13/2016	0.04
38	3/14/2016	0.02
39	4/7/2016	0.41
40	4/8/2016	0.12
41	4/9/2016	0
42	4/10/2016	0.49

Table B-2. (cont.)
2015-2016 Wet Weather Days

Wet Weather Day No.	2015-2016 Wet Weather Days	
	Date	Rainfall (inches)
43	4/11/2016	0
44	4/12/2016	0
45	4/13/2016	0

Notes: Blue shaded = Sampled wet weather events.
Non-shaded = Non-sampled wet weather days.
Actual sampling dates: 01/09/2016; 02/03/2016; 3/10/2016.
Wet Weather day is defined as precipitation ≥0.2” + 72 hours

APPENDIX C

2015–2016 DRY WEATHER ANALYTICAL RESULTS

Table C-1
2015–2016 Dry Weather Field Results

Station ID	Date	Time	Temp (°C)	Dissolved Oxygen	Conductivity (mS/cm)	Turbidity (NTU)	pH
EH-380-RW	10/12/2015	11:45	23.7	7.12	55.2	5.06	8.1
EH-380-RW	10/13/2015	12:25	27.6	6.95	52.5	6.66	8.1
EH-380-RW	10/19/2015	11:11	23.30	7.33	59.50	1.52	8.30
EH-380-RW	10/20/2015	11:11	23.00	-	25.97	1.56	8.12
EH-380-RW	10/27/2015	12:30	21.40	7.62	50.20	5.50	8.10
EH-380-RW	11/19/2015	11:35	20.06	-	45.39	1.60	7.88
EH-380-RW	12/1/2015	1:00	18.70	5.15	45.44	0.90	7.63
EH-380-RW	1/13/2016	12:30	15.99	6.3	44.6	2.54	7.75
EH-380-RW	2/16/2016	11:00	18.56	6.3	45.62	2.6	7.28
EH-380-RW	3/1/2016	10:48	18.19	5.08	45.13	2.65	8.56
EH-380-RW	4/5/2016	10:30	17.65	5.7	45.6	1.54	7.83
EH-380-RW	4/13/2016	10:45	18.84	6.95	-	1.14	8.23
EH-380-RW	4/19/2016	10:39	19.46	6.3	45.28	2.65	8.14
EH-380-RW	4/20/2016	10:40	19.07	7.31	22.80	1.29	8.39
EH-380-RW	4/26/2016	10:45	18.61	6.13	45.07	1.7	8.11
EH-380-RW	5/2/2016	11:00	20.06	6.02	45.45	2.62	8.67
EH-380-RW	5/3/2016	10:50	20.68	6.07	45.85	1.6	8.46
EH-380-RW	5/16/2016	10:24	20.30	-	45.50	0.98	7.78
EH-380-RW	5/31/2016	10:20	18.32	7.07	45.8	1.07	8.23
EH-380-RW	6/6/2016	10:40	17.47	6.80	45.55	0.90	8.26
EH-380-RW	6/9/2016	10:21	17.57	6.24	45.59	1.39	6.24
EH-380-RW	6/13/2016	10:30	18.31	6.43	45.97	0.70	7.47
EH-380-RW	6/20/2016	10:40	19.71	6.69	46.28	1.15	8.02
EH-380-RW	6/30/2016	10:30	22.62	5.68	45.48	0.76	8.10
EH-380-RW	7/5/2016	10:40	22.18	5.98	45.82	1.32	7.85

Table C-1 (continued)
2015–2016 Dry Weather Field Results

Station ID	Date	Time	Temp (°C)	Dissolved Oxygen	Conductivity (mS/cm)	Turbidity (NTU)	pH
EH-380-RW	7/7/2016	10:25	22.55	5.33	45.63	1.65	8.09
EH-380-RW	7/11/2016	10:05	21.02	5.94	22.9	1.17	8.42
EH-380-RW	7/19/2016	10:30	23.38	5.05	22.67	1.30	7.98
EH-380-RW	7/26/2016	10:35	24.45	4.85	45.81	1.14	8.12
EH-380-RW	8/1/2016	10:40	24.75	4.62	45.9	0.7	7.92
EH-380-RW	8/9/2016	10:30	22.45	4.65	44.89	1.47	7.9
EH-380-RW	8/16/2016	10:30	20.25	8.63	45.34	1.2	7.56
EH-380-RW	8/23/2016	8:45	21.55	5.84	22.45	1.92	8.03
EH-380-RW	8/30/2016	10:30	21.35	5.11	45.87	0.84	8.21
EH-380-RW	9/6/2016	10:36	21.55	5.84	22.45	1.92	8.03
EH-380-RW	9/13/2016	10:15	20.62	4.45	85	-	7.97
EH-380-RW	9/27/2016	10:35	20.29	4.58	84.65	1.92	8.03
EH-380-RW	9/28/2016	10:10	19.62	4.84	84.87	1.41	8.28

Notes:
°C = degree Celsius; ID = identification; mS/cm = microSiemens per centimeter; NTU = nephelometric turbidity units

Table C-2
Dry Weather Analytical Results

Site ID	Sample ID	Sample Date	Time	Analyte	Method	Qualifier	Result	Reporting Units	Reporting Limit	Lab
EH-380-RW	EH-380-RW-G-01-151012	10/12/2015	11:45 AM	Total Coliform	MF, SM 9222B	e	400	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151012	10/12/2015	11:45 AM	Fecal Coliform	MF, 9222D	None	54	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151012	10/12/2015	11:45 AM	*Enterococcus*	MF, USEPA 1600	e	160	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-151012	10/12/2015	11:45 AM	Total Coliform	MF, SM 9222B	None	600	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-151012	10/12/2015	11:45 AM	Fecal Coliform	MF, 9222D	None	48	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-151012	10/12/2015	11:45 AM	*Enterococcus*	MF, USEPA 1600	e	260	CFU/100 mL	2	MML
FIELD BLANK	FIELD BLANK-151012	10/12/2015	12:20 PM	Total Coliform	MF, SM 9222B	<	1	CFU/100 mL	1	MML
FIELD BLANK	FIELD BLANK-151012	10/12/2015	12:20 PM	Fecal Coliform	MF, 9222D	<	1	CFU/100 mL	1	MML
FIELD BLANK	FIELD BLANK-151012	10/12/2015	12:20 PM	*Enterococcus*	MF, USEPA 1600	<	1	CFU/100 mL	1	MML
EH-380-RW	EH-380-RW-G-01-151013	10/13/2015	12:25 PM	Total Coliform	MF, SM 9222B	e	320	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151013	10/13/2015	12:25 PM	Fecal Coliform	MF, 9222D	e	40	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151013	10/13/2015	12:25 PM	*Enterococcus*	MF, USEPA 1600	e	12	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151019	10/19/2015	11:11 AM	Total Coliform	MF, SM 9222B	e	10	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151019	10/19/2015	11:11 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151019	10/19/2015	11:11 AM	*Enterococcus*	MF, USEPA 1600	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151020	10/20/2015	1:10 PM	Total Coliform	MF, SM 9222B	e	14	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151020	10/20/2015	1:10 PM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151020	10/20/2015	1:10 PM	*Enterococcus*	MF, USEPA 1600	e	14	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151027	10/27/2015	12:30 PM	Total Coliform	MF, SM 9222B	e	60	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151027	10/27/2015	12:30 PM	Fecal Coliform	MF, 9222D	e	6	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151027	10/27/2015	12:30 PM	*Enterococcus*	MF, USEPA 1600	e	36	CFU/100 mL	2	MML

Table C-2 (continued)
Dry Weather Analytical Results (continued)

Site ID	Sample ID	Sample Date	Time	Analyte	Method	Qualifier	Result	Reporting Units	Reporting Limit	Lab
EH-380-RW	EH-380-RW-G-01-151119	11/19/2015	11:35 AM	Total Coliform	MF, SM 9222B	<	200	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151119	11/19/2015	11:35 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151119	11/19/2015	11:35 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151201	12/01/2015	1:30 PM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151201	12/01/2015	1:30 PM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-151201	12/01/2015	1:30 PM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160113	01/13/2016	12:30 PM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160113	01/13/2016	12:30 PM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160113	01/13/2016	12:30 PM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160216	02/16/2016	11:00 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160216	02/16/2016	11:00 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160216	02/16/2016	11:00 AM	*Enterococcus*	MF, USEPA 1600	e	180	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160301	03/01/2016	10:48 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160301	03/01/2016	10:48 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160301	03/01/2016	10:48 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160301	03/01/2016	10:48 AM	Total Coliform	MF, SM 9222B	e	32	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160301	03/01/2016	10:48 AM	Fecal Coliform	MF, 9222D	e	6	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160301	03/01/2016	10:48 AM	*Enterococcus*	MF, USEPA 1600	e	2	CFU/100 mL	2	MML
FIELD BLANK	FIELD BLANK-160301	03/01/2016	9:50 AM	Total Coliform	MF, SM 9222B	<	1	CFU/100 mL	1	MML
FIELD BLANK	FIELD BLANK-160301	03/01/2016	9:50 AM	Fecal Coliform	MF, 9222D	<	1	CFU/100 mL	1	MML
FIELD BLANK	FIELD BLANK-160301	03/01/2016	9:50 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	1	MML

Table C-2 (continued)
Dry Weather Analytical Results (continued)

Site ID	Sample ID	Sample Date	Time	Analyte	Method	Qualifier	Result	Reporting Units	Reporting Limit	Lab
EH-380-RW	EH-380-RW-G-01-160405	04/05/2016	10:30 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160405	04/05/2016	10:30 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160405	04/05/2016	10:30 AM	*Enterococcus*	MF, USEPA 1600	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01	04/13/2016	10:45 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01	04/13/2016	10:45 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01	04/13/2016	10:45 AM	*Enterococcus*	MF, USEPA 1600	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160419	04/19/2016	10:39 AM	Total Coliform	MF, SM 9222B	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160419	04/19/2016	10:39 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160419	04/19/2016	10:39 AM	*Enterococcus*	MF, USEPA 1600	e	10	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160419	04/19/2016	10:39 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160419	04/19/2016	10:39 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
FIELD BLANK	EH-380-RW-G-03-160419	04/19/2016	10:39 AM	Total Coliforms	MF, SM 9222B	<	1	CFU/100 mL	1	MML
FIELD BLANK	EH-380-RW-G-03-160419	04/19/2016	10:39 AM	Fecal Coliforms	MF, 9222D	<	1	CFU/100 mL	1	MML
FIELD BLANK	EH-380-RW-G-03-160419	04/19/2016	10:39 AM	Enterococcus	MF, EPA 1600	<	1	CFU/100 mL	1	MML
EH-380-RW-DUP	EH-380-RW-G-03-160419	04/19/2016	10:39 AM	*Enterococcus*	MF, USEPA 1600	None		CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160420	04/20/2016	10:40 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160420	04/20/2016	10:40 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160420	04/20/2016	10:40 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160426	04/26/2016	10:45 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160426	04/26/2016	10:45 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160426	04/26/2016	10:45 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML

Table C-2 (continued)
Dry Weather Analytical Results (continued)

Site ID	Sample ID	Sample Date	Time	Analyte	Method	Qualifier	Result	Reporting Units	Reporting Limit	Lab
EH-380-RW	EH-380-RW-G-01-160502	05/02/2016	11:00 AM	Total Coliform	MF, SM 9222B	e	8	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160502	05/02/2016	11:00 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160502	05/02/2016	11:00 AM	*Enterococcus*	MF, USEPA 1600	e	12	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160503	05/03/2016	10:50 AM	Total Coliform	MF, SM 9222B	e	8	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160503	05/03/2016	10:50 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160503	05/03/2016	10:50 AM	*Enterococcus*	MF, USEPA 1600	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160516	05/16/2016	10:24 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160516	05/16/2016	10:24 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160516	05/16/2016	10:24 AM	*Enterococcus*	MF, USEPA 1600	e	16	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160531	05/31/2016	10:20 AM	Total Coliform	MF, SM 9222B	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160531	05/31/2016	10:20 AM	Fecal Coliform	MF, 9222D	e	6	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160531	05/31/2016	10:20 AM	*Enterococcus*	MF, USEPA 1600	e	4	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160531	05/31/2016	10:20 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160531	05/31/2016	10:20 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160531	05/31/2016	10:20 AM	*Enterococcus*	MF, USEPA 1600	e	12	CFU/100 mL	2	MML
FIELD BLANK	EH-380-RW-G-03-160531	05/31/2016	10:20 AM	Total Coliform	MF, SM 9222B	<	1	CFU/100 mL	1	MML
FIELD BLANK	EH-380-RW-G-03-160531	05/31/2016	10:20 AM	Fecal Coliform	MF, 9222D	<	1	CFU/100 mL	1	MML
FIELD BLANK	EH-380-RW-G-03-160531	05/31/2016	10:20 AM	*Enterococcus*	MF, USEPA 1600	<	1	CFU/100 mL	1	MML
EH-380-RW	EH-380-RW-G-01-160606	06/06/2016	10:40 AM	Total Coliform	MF, SM 9222B	e	4	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160606	06/06/2016	10:40 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160606	06/06/2016	10:40 AM	*Enterococcus*	MF, USEPA 1600	e	10	CFU/100 mL	2	MML

Table C-2 (continued)
Dry Weather Analytical Results (continued)

Site ID	Sample ID	Sample Date	Time	Analyte	Method	Qualifier	Result	Reporting Units	Reporting Limit	Lab
EH-380-RW	EH-380-RW-G-01-160609	06/09/2016	10:21 AM	Total Coliform	MF, SM 9222B	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160609	06/09/2016	10:21 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160609	06/09/2016	10:21 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160613	06/13/2016	10:30 AM	Total Coliform	MF, SM 9222B	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160613	06/13/2016	10:30 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160613	06/13/2016	10:30 AM	Enterococcus	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160620	06/20/2016	10:40 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160620	06/20/2016	10:40 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160620	06/20/2016	10:40 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160630	06/30/2016	10:30 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160630	06/30/2016	10:30 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160630	06/30/2016	10:30 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160630	06/30/2016	10:30 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160630	06/30/2016	10:30 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160630	06/30/2016	10:30 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
FIELD BLANK	FIELD BLANK-160630	06/30/2016	10:30 AM	Total Coliform	MF, SM 9222B	<	1	CFU/100 mL	1	MML
FIELD BLANK	FIELD BLANK-160630	06/30/2016	10:30 AM	Fecal Coliform	MF, 9222D	<	1	CFU/100 mL	1	MML
FIELD BLANK	FIELD BLANK-160630	06/30/2016	10:30 AM	*Enterococcus*	MF, USEPA 1600	<	1	CFU/100 mL	1	MML
EH-380-RW	EH-380-RW-G-01-160705	07/05/2016	10:55 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160705	07/05/2016	10:55 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160705	07/05/2016	10:55 AM	Enterococcus	MF, USEPA 1600	<	2	CFU/100 mL	2	MML

Table C-2 (continued)
Dry Weather Analytical Results (continued)

Site ID	Sample ID	Sample Date	Time	Analyte	Method	Qualifier	Result	Reporting Units	Reporting Limit	Lab
EH-380-RW	EH-380-RW-G-01-160707	07/07/2016	10:25 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160707	07/07/2016	10:25 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160707	07/07/2016	10:25 AM	*Enterococcus*	MF, USEPA 1600	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160711	07/11/2016	10:05 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160711	07/11/2016	10:05 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160711	07/11/2016	10:05 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160719	07/19/2016	10:30 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160719	07/19/2016	10:30 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160719	07/19/2016	10:30 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160726	07/26/2016	10:35 AM	Total Coliform	MF, SM 9222B	e	4	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160726	07/26/2016	10:35 AM	Fecal Coliform	MF, 9222D	e	4	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160726	07/26/2016	10:35 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160801	08/01/2016	10:40 AM	Total Coliform	MF, SM 9222B	e	4	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160801	08/01/2016	10:40 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160801	08/01/2016	10:40 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160809	08/09/2016	10:30 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160809	08/09/2016	10:30 AM	Fecal Coliform	MF, 9222D	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160809	08/09/2016	10:30 AM	*Enterococcus*	MF, USEPA 1600	e	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160816	08/16/2016	8:27 AM	Total Coliform	MF, SM 9222B	e	40	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160816	08/16/2016	8:27 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160816	08/16/2016	8:27 AM	*Enterococcus*	MF, USEPA 1600	e	30	CFU/100 mL	2	MML

Table C-2 (continued)
Dry Weather Analytical Results (continued)

Site ID	Sample ID	Sample Date	Time	Analyte	Method	Qualifier	Result	Reporting Units	Reporting Limit	Lab
EH-380-RW	EH-380-RW-G-01-160823	08/23/2016	8:45 AM	Total Coliform	MF, SM 9222B	e	40	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160823	08/23/2016	8:45 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160823	08/23/2016	8:45 AM	*Enterococcus*	MF, USEPA 1600	e	8	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160830	08/30/2016	10:36 AM	Total Coliform	MF, SM 9222B	<	200	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160830	08/30/2016	10:36 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160830	08/30/2016	10:36 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160830	08/30/2016	10:36 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160830	08/30/2016	10:36 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160830	08/30/2016	10:36 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
FIELD BLANK	EH-380-RW-G-03-160830	08/30/2016	10:36 AM	Total Coliform	MF, SM 9222B	<	1	CFU/100 mL	1	MML
FIELD BLANK	EH-380-RW-G-03-160830	08/30/2016	10:36 AM	Fecal Coliform	MF, 9222D	<	1	CFU/100 mL	1	MML
FIELD BLANK	EH-380-RW-G-03-160830	08/30/2016	10:36 AM	*Enterococcus*	MF, USEPA 1600	<	1	CFU/100 mL	1	MML
EH-380-RW	EH-380-RW-G-01-160906	09/06/2016	10:36 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160906	09/06/2016	10:36 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160906	09/06/2016	10:36 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160913	09/13/2016	10:45 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160913	09/13/2016	10:45 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160913	09/13/2016	10:45 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160913	09/13/2016	10:45 AM	Total Coliform	MF, SM 9222B	<	20	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160913	09/13/2016	10:45 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160913	09/13/2016	10:45 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML

Table C-2 (continued)
Dry Weather Analytical Results (continued)

Site ID	Sample ID	Sample Date	Time	Analyte	Method	Qualifier	Result	Reporting Units	Reporting Limit	Lab
EH-380-RW	EH-380-RW-G-01-160927	09/27/2016	10:35 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160927	09/27/2016	10:35 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160927	09/27/2016	10:35 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160927	09/27/2016	10:35 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160927	09/27/2016	10:35 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW-DUP	EH-380-RW-G-02-160927	09/27/2016	10:35 AM	*Enterococcus*	MF, USEPA 1600	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160928	09/28/2016	10:10 AM	Total Coliform	MF, SM 9222B	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160928	09/28/2016	10:10 AM	Fecal Coliform	MF, 9222D	<	2	CFU/100 mL	2	MML
EH-380-RW	EH-380-RW-G-01-160928	09/28/2016	10:10 AM	*Enterococcus*	MF, USEPA 1600	e	2	CFU/100 mL	2	MML

Notes:
CFU/100 mL = colony-forming units per 100 milliliters; ID = identification; MF= membrane filtration, MML= City of San Diego E&MTS Laboratory, mS/cm = microSiemens per centimeter; ND = non-detect; NTU = nephelometric turbidity units; SM = Standard Method; USUSEPA = United States Environmental Protection Agency

APPENDIX D

WET WEATHER ANALYTICAL LABORATORY REPORTS

Project Name: San Dieguito Bacteria TMDL
Project Number: 5025-15-1110

Analysis Request and Chain of Custody

6A11004

AMEC Environment & Infrastructure,
Attn: Roshan Sirimanne / Darcy Ebentier
9177 Sky Park Court San Diego, CA 92123
Office: (858) 514-6475 Cell: (760) 525-5809
Fax: (858) 278-5300

Weck Laboratories, Inc.
Attn: Hai Van Nguyen
14859 East Clark Avenue, City of Industry, CA 91745
Office: (626) 336-2139 x 102 Fax: (626) 336-2634
After Hours: 626-926-4105 / 626-926-4256

Sample ID	Date	Time	Analyses Required	Matrix	Size	Preservative	Bottle Count
1516- W 1 -EH-380-G- 01	1/9/16	1212	Enterococcus (EPA 1600) Fecal Coliform (SM 9222 D) Total Coliform (SM 9222 B)	Saltwater	120mL	Na2S2O3	3
1516- W 1 -EH-380-G- 02	↓	1212	Enterococcus (EPA 1600) Fecal Coliform (SM 9222 D) Total Coliform (SM 9222 B)	Saltwater	120mL	Na2S2O3	3
1516- W 1 -EH-380-G- 03	↓	1212	Enterococcus (EPA 1600) Fecal Coliform (SM 9222 D) Total Coliform (SM 9222 B)	Saltwater	120mL	Na2S2O3	3

Relinquished By	Date/Time	Received By	Date/Time
Print: Paige Santhanet Org: 5025 Sign: [signature]	Date: 1/9/16 Time:	Print: Org: Sign:	Date: Time:
Print: Org: AMEC Sign:	Date: Time:	Print: Org: Sign:	Date: Time:
Print: Paige Santhanet Org: AMEC Sign: [signature]	Date: 1/9/16 Time: 16:58	Print: ALICE LEE Org: Sign: AL	Date: 1/9/16 Time: 16:58

Notes/Comments:
MTF methods (SM9221) may be used for turbid samples for fecal coliform and total coliform only. Please notify AMEC project manager immediately of any holding time issues or laboratory accidents that may require resampling.

3.8°C

Sampler's Initials: PS DE

Page: 1 of 1

Project Name: San Dieguito Bacteria TMDL
Project Number: 5025-15-1110

Analysis Request and Chain of Custody

AMEC Environment & Infrastructure,
Attn: Roshan Sirimanne / Darcy Ebentier
9177 Sky Park Court San Diego, CA 92123
Office: (858) 514-6475 Cell: (760) 525-5809
Fax: (858) 278-5300

City of San Diego EMTS Laboratory
Attn: Laila Othman
2392 Kincaid Road San Diego, CA 92101
Phone: 619-758-2312 Fax: 619-758-2309

Sample ID	Date	Time	Analyses Required	Matrix	Size	Preservative	Bottle Count
1516- W 2 -EH-380-G-01	2/3/16	10:35	Enterococcus (EPA 1600) Fecal Coliform (SM 9222 D) Total Coliform (SM 9222 B)	Saltwater	1000mL	None	1
1516- W____-EH-380-G-____			Enterococcus (EPA 1600) Fecal Coliform (SM 9222 D) Total Coliform (SM 9222 B)	Saltwater	1000mL	None	
1516- W____-EH-380-G-____			Enterococcus (EPA 1600) Fecal Coliform (SM 9222 D) Total Coliform (SM 9222 B)	Saltwater	1000mL	None	

Relinquished By:			Received By:		
Org: AMEC	Print: Paige Samblanet Sign: [signature]	Date: 2/3/16 Time: 2:25	Org:	Print: L. Asato Sign: [signature]	Date: 2-3-16 Time: 1430
Org:	Print: Sign:	Date: Time:	Org:	Print: Sign:	Date: Time:
Org:	Print: Sign:	Date: Time:	Org:	Print: Sign:	Date: Time:

Notes/Comments:
MTF methods (SM9221) may be used for turbid samples for fecal coliform and total coliform only. Please notify AMEC project manager immediately of any holding time issues or laboratory accidents that may require resampling.

Sampler's Initials: ________ *Page:* ___ *of* ___

Project Name: San Dieguito Bacteria TMDL
Project Number: 5025-15-1110

Analysis Request and Chain of Custody

AMEC Environment & Infrastructure,
Attn: Roshan Sirimanne / Darcy Ebentier
9177 Sky Park Court San Diego, CA 92123
Office: (858) 514-6475 Cell: (760) 525-5809
Fax: (858) 278-5300

WET EVENT

City of San Diego EMTS Laboratory
Attn: Laila Othman
2392 Kincaid Road San Diego, CA 92101
Phone: 619-758-2312 Fax: 619-758-2309

Sample ID	Date	Time	Analyses Required	Matrix	Size	Preservative	Bottle Count
1516- W 3 -EH-380-G- 01	3/10/16	0840	Enterococcus (EPA 1600) Fecal Coliform (SM 9222 D) Total Coliform (SM 9222 B)	Saltwater	1000mL	None	1
1516- W____-EH-380-G-____			Enterococcus (EPA 1600) Fecal Coliform (SM 9222 D) Total Coliform (SM 9222 B)	Saltwater	1000mL	None	
1516- W____-EH-380-G-____			Enterococcus (EPA 1600) Fecal Coliform (SM 9222 D) Total Coliform (SM 9222 B)	Saltwater	1000mL	None	

APS

Relinquished By: Print: Sarah Seifert *Org:* 3/10/16 Sign: [signature]	Date: Amec Time: 0933	*Received By:* Print: Joseph [illegible] *Org:* Sign: [signature]	Date: 3-10-16 Time: 0935
Relinquished By: Print: *Org:* Sign:	Date: Time:	*Received By:* Print: *Org:* Sign:	Date: Time:
Relinquished By: Print: *Org:* Sign:	Date: Time:	*Received By:* Print: *Org:* Sign:	Date: Time:

Notes/Comments:
MTF methods (SM9221) may be used for turbid samples for fecal coliform and total coliform only. Please notify AMEC project manager immediately of any holding time issues or laboratory accidents that may require resampling.

Sampler's Initials: ______ ***Page:*** ___ ***of*** ___

AMEC Environment & Infrastructure
9177 Sky Park Court, Ste A
San Diego CA, 92123

Date Received: 01/09/16 16:58
Date Reported: 03/18/16 16:59

6A11004-01 **1516-W1-EH-380-G-01**

Sampled: 01/09/16 12:12 **Sampled By:** PS,DE **Matrix:** Water

Microbiological Parameters by Standard Methods

Method: EPA 1600 Batch: W6B0039 Prepared: 01/09/16 20:00 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Enterococcus	**290**	10	10	CFU/100 ml	10	01/10/16 20:00	

Method: SM 9222B/D Batch: W6B0019 Prepared: 01/09/16 19:20 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Total Coliform	**2600**	20	20	CFU/100 ml	20	01/10/16 19:00	

Method: SM 9222B/D Batch: W6B0029 Prepared: 01/09/16 18:25 Analyst: _wcm

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Fecal Coliform	**270**	2.0	2.0	CFU/100 ml	2	01/10/16 19:00	

Weck Laboratories, Inc 14859 East Clark Avenue, City of Industry, California 91745-1396 (626) 336-2139 FAX (626) 336-2634

Public Utilities

Environmental Monitoring and Technical Services
2392 Kincaid Rd. MS 45A, San Diego, CA 92101
Tel (619) 758-2361   Fax (619) 758-2309

TMDL Bacteriological Results

11/01/2016

Source			Total Coliforms	Fecal Coliforms	Enterococcus
Sample Date	Station	Time	CFU/100 mL	CFU/100 mL	CFU/100 mL
02/03/2016	**EH-380-RW-G-01**	1035	200e	4e	86

e, estimated value, plate count falls outside recommended reporting limits per EPA method guidelines.
ND, No data; the total number of bacterial colonies, coliforms plus non-coliform exceed 200 colonies per plate

SD Public Utilities

Environmental Monitoring and Technical Services
2392 Kincaid Rd. MS 45A, San Diego, CA 92101
Tel (619) 758-2361 Fax (619) 758-2309

TMDL Bacteriological Results

11/01/2016

Source			Total Coliforms	Fecal Coliforms	Enterococcus
Sample Date	Station	Time	CFU/100 mL	CFU/100 mL	CFU/100 mL
03/10/2016	**EH-380-RW-G-01**	840	<20	2e	<2

e, estimated value, plate count falls outside recommended reporting limits per EPA method guidelines.
ND, No data; the total number of bacterial colonies, coliforms plus non-coliform exceed 200 colonies per plate

APPENDIX E

WET WEATHER
FIELD DATA FORMS

Bacteria TMDL Monitoring
FIELD DATA SHEET

Site ID: EH-380 Date: 1/9/16 Time: 12:10
Watershed: ~~[illegible]~~ San Dieguito [X] Receiving Water [] Storm Drain
Field Crew: DE PS Photos Collected? [X] Yes [] No Photo Count#: 3
Observed Land Use: [X] Residential [X] Commercial [] Industrial [] Agricultural [X] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather: [] Partly Cloudy [] Sunny [X] Overcast [] Fog [] Rain [] Drizzle
Tide: [] N/A [] Low [] Incoming [] High [X] Outgoing Tide Height: 1.8 ft. (PS)
Last Rain: [X] > 72 hours [X] < 72 hours
Rainfall: [] None [] < 0.1" [X] > 0.1"

BEACH CHARACTERISTICS

Biology: [] None [] Insects [X] Algae [X] Mollusk [] Snails [] Crustacean [X] Other dogs
Deposits: [] None [X] Sediment/Gravel [] Oily Deposits [] Stains [] Fine Particulates [X] Other Sand
Vegetation: [] None [] Limited [] Excessive [X] Normal [] Other

RUNOFF CHARACTERISTICS

Composition: [X] Sandy [X] Rocky [] Grass
Floatables: [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other
Beach Odor: [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other
Beach Color: [X] None [] Yellow [] Brown [] White [] Gray [] Other
Beach Clarity: [X] Clear [] Slightly Cloudy [] Opaque [] Other

ACTIVITIES/INDICATORS

[] Evidence Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments #
[] Waste Water Discharge [] Leaking Trashcan [X] Dom. Animals # 25 dogs
[] Sewer Overflow [] Food Waste/scraps [] Birds #
[] Trash Accumulation [] Seaweed Accumulation [] Wildlife #
[] Organic Matter [] Children (Diapers) # [] Other

FLOW CONDITIONS

Outfall Reaches Receiving Waters? [] Yes [] No [X] N/A [] Dry [] Ponded [] Trickle [X] Tidal
Flow Estimation:
~~Width / Diameter ___ ft. / in. Depth ___ ft. / in. Velocity ___ ft/sec. Flow ___ cfs / gpm~~ NA

FIELD MEASUREMENTS

pH: 8.06 Temp(°C): 16.58 Turbidity (NTU): 27.9 Sp Conductivity (~~µS~~ mS/cm): 43.4 ⇒ 43400 µs/cm

SAMPLE COLLECTION

[] Visited, Not Sampled
Grab Sample Collected? [X] Yes [] No QAQC Sample Collected? [X] Yes [] No QAQC Type:
Sample ID: 2015-W1-EH-380-G01 Sample ID: 2015-W1-EH-380-G02, G03 [X] DUP
Date: 1/9/16 Time: 1212 Date: 1/9/16 Time: 1212 [X] FB

SAMPLE CHARACTERISTICS

[] N/A
Floatables: [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other
Sample Odor: [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other
Sample Color: [X] None [] Yellow [] Brown [] White [] Gray [] Other
Sample Clarity: [X] Clear [] Slightly Cloudy [] Opaque [] Other

COMMENTS:

~~Trash Assessment on Reverse Side of this Field Sheet~~ N/A

Bacteria TMDL Monitoring
FIELD DATA SHEET

Site ID: EH-380 Date: 2/3/2016 Time: 10:35
Watershed: SDG [X] Receiving Water [] Storm Drain
Field Crew: PS + DA Photos Collected? [X] Yes [] No Photo Count#: 3
Observed Land Use: [] Residential [] Commercial [] Industrial [] Agricultural [X] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather [] Partly Cloudy [X] Sunny [] Overcast [] Fog [] Rain [] Drizzle
Tide [] N/A [] Low [] Incoming [] High [X] Outgoing Tide Height: 1 ft.
Last Rain [X] > 72 hours [X] < 72 hours
Rainfall [X] None [] < 0.1" [X] > 0.1"

BEACH CHARACTERISTICS

Biology [X] None [] Insects [] Algae [] Mollusk [] Snails [] Crustacean [] Other ____
Deposits [X] None [] Sediment/Gravel [] Oily Deposits [] Stains [] Fine Particulates [] Other ____
Vegetation [] None [] Limited [] Excessive [X] Normal [] Other ____

RUNOFF CHARACTERISTICS N/A

Composition: [] Sandy [] Rocky [] Grass
Floatables [] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other ____
Beach Odor [] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other ____
Beach Color [] None [] Yellow [] Brown [] White [] Gray [] Other ____
Beach Clarity [] Clear [] Slightly Cloudy [] Opaque [] Other ____

ACTIVITIES/INDICATORS

[] Evidence Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments # ____
[] Waste Water Discharge [] Leaking Trashcan [X] Dom. Animals # 20 dogs
[] Sewer Overflow [] Food Waste/scraps [X] Birds # 5
[] Trash Accumulation [X] Seaweed Accumulation [] Wildlife # ____
[] Organic Matter [] Children (Diapers) # ____ [] Other ____

FLOW CONDITIONS

Outfall Reaches Receiving Waters? [X] Yes [] No [] N/A [] Dry [] Ponded [] Trickle [] Tidal
Flow Estimation:
Width | Diameter N/A [ ] ft. | in. Depth [ ] ft. | in. Velocity [ ] ft/sec. Flow [ ] cfs | gpm

FIELD MEASUREMENTS

pH: 8.10 Temp(°C): 17.19 Turbidity (NTU): 12.2 Sp Conductivity (µS/cm): 40,200

SAMPLE COLLECTION [] Visited, Not Sampled

Grab Sample Collected? [X] Yes [] No QAQC Sample Collected? [] Yes [X] No QAQC Type:
Sample ID: ISL6-W2-EH380-G-01 Sample ID: ____ [] DUP
Date: ____ Time: ____ Date: ____ Time: ____ [] FB

SAMPLE CHARACTERISTICS [] N/A

Floatables [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other ____
Sample Odor [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other ____
Sample Color [X] None [] Yellow [] Brown [] White [] Gray [] Other ____
Sample Clarity [X] Clear [] Slightly Cloudy [] Opaque [] Other ____

COMMENTS:

~~Trash Assessment on Reverse Side of this Field Sheet~~ N/A

Bacteria TMDL Monitoring
FIELD DATA SHEET

Site ID: EH380 Date: 3/10/16 Time: 0839

Watershed: SDG [X] Receiving Water [] Storm Drain

Field Crew: D Arthur, S Seifert Photos Collected? [X] Yes [] No Photo Count#: 3

Observed Land Use: [] Residential [] Commercial [] Industrial [] Agricultural [X] Park Beach [] Open

ATMOSPHERIC CONDITIONS

Weather [] Partly Cloudy [X] Sunny [] Overcast [] Fog [] Rain [] Drizzle

Tide [] N/A [] Low [X] Incoming [X] High PS [] Outgoing Tide Height: 4.7 ft.

Last Rain ~~[X] > 72 hours~~ DE ~~[X] < 72 hours~~

Rainfall ~~[X] None~~ DE [] < 0.1" [X] > 0.1"

BEACH CHARACTERISTICS

Biology [] None [] Insects [X] Algae seaweed [] Mollusk [] Snails [] Crustacean [] Other ______

Deposits [X] None [] Sediment/Gravel [] Oily Deposits [] Stains [] Fine Particulates [] Other ______

Vegetation [] None [X] Limited [] Excessive [] Normal [] Other ______

RUNOFF CHARACTERISTICS

Composition: [X] Sandy [] Rocky [] Grass

Floatables [] None [] Trash [X] Bubbles/Foam [] Sheen [] Fecal Matter [] Other ______

Beach Odor [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other ______

Beach Color [X] None [] Yellow [] Brown [] White [] Gray [] Other ______

Beach Clarity [X] Clear [] Slightly Cloudy [] Opaque [] Other ______

ACTIVITIES/INDICATORS

[] Evidence Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments # ______

[] Waste Water Discharge [] Leaking Trashcan [] Dom. Animals # ______

[] Sewer Overflow [] Food Waste/scraps [X] Birds # 2-3

[] Trash Accumulation [X] Seaweed Accumulation [] Wildlife # ______

[X] Organic Matter dog beach [] Children (Diapers) # ______ [] Other ______

FLOW CONDITIONS

Outfall Reaches Receiving Waters? [] Yes [] No [] N/A [] Dry [] Ponded [] Trickle [] Tidal

Flow Estimation:

~~Width | Diameter ______ ft. | in. Depth ______ ft. | in. Velocity ______ ft/sec. Flow ______ cfs | gpm~~ NA

FIELD MEASUREMENTS

pH: 7.93 Temp(°C): 18.22 Turbidity (NTU): 20.6 Sp Conductivity (µS/cm): 38,100

SAMPLE COLLECTION [] Visited, Not Sampled

Grab Sample Collected? [X] Yes [] No QAQC Sample Collected? [] Yes [X] No QAQC Type:

Sample ID: 1516-W3-EH-380-G-01 Sample ID: ______ [] DUP

Date: 3/10/16 Time: 08:40 Date: ______ Time: ______ [] FB

SAMPLE CHARACTERISTICS [] N/A

Floatables [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other ______

Sample Odor [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other ______

Sample Color [X] None [] Yellow [] Brown [] White [] Gray [] Other ______

Sample Clarity [X] Clear [] Slightly Cloudy [] Opaque [] Other ______

COMMENTS:

high tide - sample taken 75 ft upstream/into ocean from mixing zone

~~Trash Assessment on Reverse Side of this Field Sheet~~ N/A

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APPENDIX F

BACTERIA TMDL AND MS4 PERMIT DISCREPANCIES

F.1 Inconsistencies in Bacteria Total Maximum Daily Load (TMDL) Requirements (Attachment E.6)

The Bacteria TMDL Compliance Monitoring Program and this compliance monitoring report are designed to address the monitoring and assessment requirements defined in Attachment E.6.6 of the MS4 Permit. A number of inconsistencies were identified that may affect the interpretation of compliance.

MS4 Permit Monitoring and Assessment:

This report includes three compliance evaluations outlined in Sections 2.7 through 2.9, based on the MS4 Permit assessment requirements *(*San Diego Regional Water Quality Control Board [Regional Board], 2013*,* page E-49).

There is discrepancy between Table 6.2b–*Final Receiving Water Limitations Expressed as Bacteria Densities and Allowable Exceedance Frequencies for Creeks (Regional Board, 2013,* page E-32) and Table 6.5–*Interim Wet Weather Receiving Water Limitations Expressed as Interim Wet Weather Allowable Exceedance Frequencies (Regional Board, 2013,* page E-44).

As a clarification to the TMDLs, Table 6.2b in the MS4 Permit clarifies the final receiving water limitations (RWLs) for fecal coliform and *Enterococcus* and removes total coliform as a numeric target for creeks. However, Table 6.5 still includes a 41 percent interim wet weather allowable exceedance frequency for total coliform.

There is discrepancy between the monitoring procedures and assessment requirements. The sampling frequency defined in the monitoring procedures would provide insufficient data to complete the dry season geometric mean assessment requirement. The following are summaries of the MS4 Permit requirements and how the monitoring program addressed the discrepancies:

- The monitoring procedures of MS4 Permit Attachment E.6 require dry weather samples at creeks to be consistent with those of receiving monitoring stations in accordance with Provision D of the MS4 Permit as stated in Provision E.6.d(2)b.(i) (Regional Board, 2013, page E-50). Provision D of the MS4 Permit requires three dry weather monitoring events at receiving water stations.
- The assessment requirements for dry weather geometric mean exceedance frequencies state that the method and number of samples must be consistent with the requirements of the Basin Plan, which requires 5 samples per 30 days (Regional Board, 2010). The wet season geometric mean evaluation requirements do not stipulate that the Basin Plan methodology be applied.
- The Bacteria TMDL Monitoring Program was designed to generate the data needed to complete the assessment requirements. Dry weather monitoring was conducted at a higher frequency than required by the Bacteria TMDL monitoring procedures. Dry weather monitoring was conducted weekly during the dry season and monthly during the wet season to compare results with the dry weather geometric mean numeric targets.

There is an inconsistency between RWLs and assessment requirements that is traced back to inconsistencies between written requirements and tables in the Bacteria TMDL. The assessment section does not require a calculation of single-sample maximum (SSM) exceedances for dry weather. The following are summaries of the MS4 Permit requirements and how the monitoring program addressed the discrepancies:

- The assessment section requires exceedance frequencies to be calculated for dry season geometric means, wet season geometric means, and wet weather SSMs. The assessment requirements of the MS4 Permit are reinforced by the table of RWLs for creeks and the discussion of numeric targets, as presented in the Bacteria TMDL (Regional Board, 2010, pages A52 and A13, respectively).
- The footnotes of Table 6.2b of the MS4 Permit state that for "*dry weather days, the single sample maximum and 30-day geometric mean receiving water limitations are required to be achieved" and "wet weather days, only the single sample maximum receiving water limitations are required to be achieved" (*Regional Board, 2013, page E-32). These are not consistent with the footnotes for the same table presented in the Bacteria TMDL. The footnotes in the MS4 Permit are reinforced by the discussion of compliance with dry weather TMDLs described in the Bacteria TMDL, which states that, "*In addition to geometric means, the bacteria densities must be consistent with the SSM REC-1 WQOs in the Basin Plan for creeks.*"
- The Bacteria TMDL Compliance Monitoring Program was designed to generate the data needed to complete the assessment requirements.

The MS4 Permit assessment section clearly defines an evaluation of wet season geometric means that includes wet weather sampling results and dry weather sampling results. This assessment applies the dry weather numeric target to a data set that includes storm samples.

Attachment C – Dry Weather Outfall Information

Attachment C.1 – MS4 Outfall Dry Weather Monitoring Data
Attachment C.2 – MS4 Outfall Dry Weather Visual Observations Data
Attachment C.3 – Dry Weather Assessment Methodology
Attachment C.4 – Dry Weather Volumes and Pollutant Loads

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Attachment C.1 – Dry Weather Outfall Analytical Results

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Table C.1-1
2015-2016 San Dieguito River WMA Dry Weather Outfall Monitoring Analytical Results: City of San Diego

Analyte	Units	City of San Diego									
Location		DW033		DW0284		DW0317		DW0333		DW0636	
Date		2/16/16	4/5/16	2/16/16	4/5/16	2/16/16	4/5/16	2/16/16	4/5/16	2/16/16	4/5/16
Conventional Parameters											
Chloride	mg/L	240	160	240	300	580	600	600	600	730	770
Color	Color	15	110	88	50	< 5.0	10	25	50	25	50
DO	mg/L	4.82	5.33	8.2	8.43	7.27	7.42	7.51	NA	8.53	8.41
Outfall Hardness (Total)	mg $CaCO_3$/L	370	400	600	530	980	820	910	760	1200	1000
MBAS	mg/L	0.18	0.56	0.16	0.091	0.063 J	< 0.05	0.11	0.085 J	0.11	0.060 J
pH	pH units	8.3	7.9	7.8	7.8	8.1	8.0	7.9	7.8	8.1	8.5
Specific Conductivity	mS/cm	1.545	1.569	2.64	1.955	3.38	3.33	3.46	3.58	3.81	3.51
Temperature	°C	17.4	15.4	18.9	16.4	18.9	18.4	20.7	15.6	19.6	16.1
Turbidity	NTU	1.73	3.46	31.33	21.52	2.81	0.13	0.42	NA	4.72	9.08
Receiving Water Hardness (Total)	mg $CaCO_3$/L	370	440	880	990	580	660	880	990	880	990
Receiving Water Station		DW033		SDCMLS		SDCTWAS-1		SDCMLS		SDCMLS	
Indicator Bacteria											
Enterococcus	MPN/ 100mL	740*	340 e	660*	7,200*	200* e	160* e	560*	1,800* e	80* e	180* e
Fecal Coliform	MPN/ 100mL	120* e	230	< 20*	7,900	40* e	< 18	60* e	2,300	< 20*	45
Total Coliform	MPN/ 100mL	60,000* e	1,700	6,000* e	79,000	6,000* e	460	60,000* e	17,000	1,600* e	940
Total Metals											
Aluminum	µg/L	250	160	590	150	8.9 J	< 25	100	28 J	9.9 J	< 25
Cadmium	µg/L	< 0.25	< 2.0	0.35 J	< 2.0	< 0.25	< 2.0	< 0.25	< 2.0	< 0.25	< 2.0
Chromium	µg/L	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	5.2	3.4	< 2.5	< 2.5
Chromium (III)**	µg/L	See Dissolved Chromium (III) and Dissolved Chromium (VI)**									
Chromium (VI)**	µg/L										
Copper	µg/L	10	21	360	27	4.2	< 5.0	21	5.6 J	4.1	19
Iron	µg/L	410	470	790	190	44	35 J	130	49	780	3800
Lead	µg/L	0.76 J	< 2.5	1	2.6 J	< 0.50	2.9 J	< 0.50	3.5 J	< 0.50	5.2
Manganese	µg/L	94	210	61	44	110	100	13	< 10	380	940
Mercury	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	µg/L	2.6	< 5.0	3.9	< 5.0	2.1	< 5.0	4.1	< 5.0	3.8	< 5.0
Silver	µg/L	< 0.50	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0
Zinc	µg/L	34	27	91	61	4.6 J	29	11 J	18 J	14 J	52

Table C.1-1
2015-2016 San Dieguito River WMA Dry Weather Outfall Monitoring Analytical Results: City of San Diego (continued)

Analyte	Units	City of San Diego									
Location		DW033		DW0284		DW0317		DW0333		DW0636	
Date		2/16/16	4/5/16	2/16/16	4/5/16	2/16/16	4/5/16	2/16/16	4/5/16	2/16/16	4/5/16
		Dissolved Metals									
Aluminum	µg/L	9.3 J	< 25	13	27 J	22	28 J	< 5.0	< 25	< 5.0	30 J
Cadmium	µg/L	< 0.25	< 2.0	< 0.25	< 2.0	< 0.25	< 2.0	< 0.25	< 2.0	< 0.25	< 2.0
Chromium	µg/L	< 0.50	< 2.5	0.89 J	< 2.5	< 0.50	< 2.5	4.6	3.1 J	< 0.50	< 2.5
Chromium (III)**	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.79 J	<0.5	< 0.5	< 0.5
Chromium (VI)**	µg/L	< 0.25	< 0.25	0.63 J	< 0.25	< 0.25	< 0.25	4.4	3	< 0.25	< 0.25
Copper	µg/L	7	6 J	160	14	2.8	< 5.0	33	5.9 J	5.2	5.7 J
Iron	µg/L	49	75	290	11 J	34	14 J	34	20 J	140	210
Lead	µg/L	< 0.50	< 2.5	< 0.50	< 2.5	< 0.50	3.7 J	< 0.50	3.7 J	< 0.50	4.8 J
Manganese	µg/L	20	170	45	22	72	110	2.8	< 10	310	570
Mercury	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	µg/L	2.6	< 5.0	3.8	< 5.0	2.9	< 5.0	4.9	< 5.0	3.6	< 5.0
Silver	µg/L	< 0.50	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0	< 0.50	< 5.0
Zinc	µg/L	11 J	26	38	24	< 2.5	11 J	20	73	18 J	13 J
		Nutrients									
Ammonia N	mg/L	2.3	1.1	37	0.50	< 0.10	0.16 J	0.11 J	0.52	0.23	0.6
Nitrite as N***	mg/L	0.66	0.37	< 0.070	< 0.070	< 3.5	< 0.14	< 3.5	< 0.14	< 3.5	< 0.14
Nitrate as N***	mg/L	1.4	1.5	1.2	2	3.2	2.9	4.4	5.1	3.5	2.2
Nitrate/Nitrite N***	mg/L	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total Nitrogen	mg/L	6.3	4.3	78	5.8	3.5	3.2	5.5	6.4	4.1	2.9
TKN	mg/L	4.2	2.4	77	3.8	0.34	0.29	1.1	1.3	0.61	0.72
Phosphate, Dissolved P	mg/L	0.45	0.76	9.9	0.32	0.045 J	< 0.025	0.16	0.25	0.05	< 0.025
Phosphorus, Total	mg/L	0.51	0.85	9.4	0.49	0.033 J	0.037 J	0.27	0.5	0.087	0.69
Orthophosphate as P	mg/L	0.41	0.76	1.4	0.30	< 0.080	0.052	< 0.080	0.49	< 0.080	0.055
Sulfate as SO4	mg/L	240	310	660	340	390	400	460	430	360	430
		Solid Parameters									
TDS	mg/L	850	960	1300	1300	2100	2000	2300	2100	2600	2200
TSS	mg/L	19	38	41	40	< 0.83	1.3	14	2.9	1.7	4.1
		Synthetic Organics									
Pentachlorophenol	µg/L	< 9.9	< 9.6	< 10	< 10	< 11	< 9.6	< 10	< 9.6	< 10	< 9.7

Notes:
< = Analyte not detected at method detection limit shown; J = Analyte detected above the method detection limit but below the reporting limit; e = CFU/100mL, estimated value, plate count falls outside recommended reporting limits per EPA method guidelines; NA = Not Analyzed; NR = Not Required, * = CFU/100mL; ** = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal; *** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Table C.1-2
2015-2016 San Dieguito River WMA Dry Weather Outfall Monitoring Analytical Results: Cities of Del Mar, Solana Beach, Escondido, Poway, and County of San Diego

Analyte	Units	City of Del Mar		City of Solana Beach		City of Escondido		City of Poway		County of San Diego									
Location		S-5	S-7	SB-25		HDG_102		140		SDG-072		SDG-074		SDG-077		SDG-080		SDG-115	
Date		8/12/16	6/30/16	6/30/16	8/12/16	4/20/16	8/30/16	7/29/16	8/2/16	3/28/16	6/30/16	3/28/16	6/30/16	3/28/16	6/30/16	3/28/16	6/30/16	3/29/16	7/7/16
Conventional Parameters																			
Chloride	mg/L	530	1,220	190	250	176	183	190	230	350	520	410	1230	150	220	850	820	420	420
Color	Color	5	35	24	25	NA	11	50	60	34	20	13	16	50	97	8	15	1	2
DO	mg/L	5.80	7.60	7.83	6.91	6.00	6.67	8.9	10.8	5.74	9.35	2.48	6.34	0.49	9.85	6.63	6.3	8.1	6.68
Outfall Hardness (Total)	mg $CaCO_3$/L	545	692	383	402	485	573	424	651	566	736	403	1190	379	470	1240	1310	824	758
MBAS	mg/L	< 0.1	< 0.1	0.2	0.1	< 0.08	< 0.08	< 0.1	< 0.1	0.8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
pH	pH units	8.27	8.59	8.4	8.2	8.11	8.23	7.5	7.4	7.05	6.8	6.69	6.76	7.22	7.34	7.93	7.47	7.35	7.15
Specific Conductivity	mS/cm	2.387	4.919	923	1483	1.58	1.62	1340	1710	2.37	3.02	4.23	5.08	1.36	1.75	4.2	3.92	3.12	2.78
Temperature	°C	28.50	21.59	21.13	21.71	18.97	23.24	23.7	24.7	17.94	20.76	17.33	20.57	16.11	22.08	19.26	22.38	20.44	21.67
Turbidity	NTU	0.85	2.06	6.05	2.01	2.9	1.6	5.95	7.12	5.14	8.11	3.98	0.99	65.6	9.18	0.18	3.07	0.15	0
Receiving Water Hardness (Total)	mg $CaCO_3$/L	Not Applicable. CTR not used for NAL determination		Not Applicable. CTR not used for NAL determination		899	902	424	651	964	1320	964	1320	964	1320	495	582	548	778
Receiving Water Station						HDG_102-RW		140		MS4-SDG-072RW		MS4-SDG-072RW		MS4-SDG-072RW		MS4-SDG-080RW		MS4-SDG-115RW	
Indicator Bacteria																			
Enterococcus	MPN/ 100mL	1,400	500	280	5,000	280	1,400	11,000	5,000	800	80	340	17,000	3,000	1,400	70	900	< 2	2
Fecal Coliform	MPN/ 100mL	4	1,600	23	40	900	800	17,000	70,000	500	300	700	5,000	700	2,000	<200	70,000	< 2	< 20
Total Coliform	MPN/ 100mL	30	1,600	1,600	8,000	8,000	2,200	240,000	900,000	23,000	2,200	9,000	50,000	5,000	50,000	2,800	900,000	40	130
Total Metals																			
Aluminum	µg/L	13	161	61	56	32	30	163	333	121	251	166	48	209	54	23	59	15	6 J
Cadmium	µg/L	< 0.2	< 0.2	< 0.2	< 0.2	<0.25	< 0.25	< 0.2	0.2 J	0.2 J	0.2 J	1	< 0.2	0.3 J	< 0.2	0.6 J	0.2 J	1	0.2 J
Chromium	µg/L	NR****	NR****	NR****	NR****	< 20	< 0.50	1 J	0.2 J	1	0.7 J	1	0.6 J	0.7 J	0.8 J	0.4 J	0.6 J	0.4 J	0.3 J
Chromium (III)	µg/L	NR****	NR****	NR****	NR****	< 20	< 0.50	1	< 0.3	1	0.7 J	1	0.6 J	0.7 J	0.8 J	0.4 J	0.6 J	0.4 J	0.3 J
Chromium (VI)	µg/L	NR****	NR****	NR****	NR****	< 1.0	0.32 J	< 2	< 2	< 1	NA	< 1	NA	< 1	NA	< 1	NA	< 1	< 1
Copper	µg/L	82	9	15	14	15	4.0	6 J	111	11	7	34	6	22	6	17	5	10	0.9 J
Iron	µg/L	26	148	82	74	31	40	464	167	546	305	179	802	356	103	17	56	42	22
Lead	µg/L	0.3	0.3	0.4	< 0.2	< 0.11	< 0.50	0.5 J	0.5 J	0.3 J	0.4 J	0.6 J	0.3 J	0.3 J	0.2 J	< 0.2	< 0.2	< 0.2	< 0.2
Manganese	µg/L	10	11	29	7	14	9.3 J	126	78	165	304	195	384	265	89	29	45	75	59
Mercury	µg/L	< 0.08	0.2	< 0.08	< 0.08	<1.0	< 1.0	0.1	0.08 J	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Nickel	µg/L	NR****	NR****	NR****	NR****	0.52	0.77 J	3 J	5	3	4	5	8	2	6	4	6	0.9 J	2
Silver	µg/L	NR****	NR****	NR****	NR****	< 0.50	< 0.50	< 0.2	7	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Zinc	µg/L	11	18	25	18	19	6.0 J	16 J	63	22	22	1390	25	16	18	9	8	6	6

Table C.1-2
2015-2016 San Dieguito River WMA Dry Weather Outfall Monitoring Analytical Results: Cities of Del Mar, Solana Beach, Escondido, Poway, and County of San Diego (continued)

Analyte	Units	City of Del Mar		City of Solana Beach		City of Escondido		City of Poway		County of San Diego									
Location		S-5	S-7	SB-25		HDG_102		140		SDG-072		SDG-074		SDG-077		SDG-080		SDG-115	
Date		8/12/16	6/30/16	6/30/16	8/12/16	4/20/16	8/30/16	7/29/16	8/2/16	3/28/16	6/30/16	3/28/16	6/30/16	3/28/16	6/30/16	3/28/16	6/30/16	3/29/16	7/7/16
Dissolved Metals																			
Aluminum	µg/L	5	7	32	27	10	5.9	36	117	6 J	4 J	37	2 J	9 J	14	4 J	2 J	2 J	< 0.7
Cadmium	µg/L	< 0.07	0.9	0.1	0.09	< 0.25	< 0.25	< 0.2	0.2 J	< 0.07	0.2 J	0.2 J	0.8 J	< 0.07	3	0.09 J	0.2 J	< 0.07	< 0.07
Chromium	µg/L	NR****	NR****	NR****	NR****	< 20	< 0.50	< 0.2	< 0.2	0.1 J	0.06 J	0.4 J	0.06 J	0.2 J	0.3 J	0.08 J	< 0.06	< 0.06	< 0.06
Chromium (III)	µg/L	NR****	NR****	NR****	NR****	< 20	< 0.50	0.1 J	< 0.06	0.1 J	0.06 J	0.4 J	0.06 J	0.2 J	0.3 J	0.08 J	< 0.06	< 0.06	< 0.06
Chromium (VI)	µg/L	NR****	NR****	NR****	NR****	< 1.0	0.32 J	< 2	< 2	< 1	NA	< 1	NA	< 1	NA	< 1	NA	< 1	< 1
Copper	µg/L	76	6	8	10	13	2.8	4	95	6	2	22	3	10	3	9	2	2	0.6 J
Iron	µg/L	6	13	27	45	13	< 8.0	19 J	16 J	232	51	11	11	88	41	< 4	6 J	4 J	9 J
Lead	µg/L	< 0.06	< 0.06	0.1	< 0.06	< 0.11	< 0.50	0.1 J	0.08 J	0.08 J	< 0.06	0.01 J	< 0.06	0.07 J	0.06 J	< 0.06	< 0.06	< 0.06	< 0.06
Manganese	µg/L	8	3	6	5	10	5.5	31	74	120	256	164	361	235	81	18	42	65	55
Mercury	µg/L	0.2	0.2	0.2	< 0.08	< 1.0	< 1.0	< 0.08	< 0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	µg/L	NR****	NR****	NR****	NR****	0.51	0.71	2 J	4 J	2	2	4	5	2	2	3	4	0.7 J	0.4 J
Silver	µg/L	NR****	NR****	NR****	NR****	< 0.50	< 0.50	< 0.1	4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Zinc	µg/L	9	6	10	12	18	6.0	10 J	51	17	12	1290	13	42	6	14	4 J	11	0.3 J
Nutrients																			
Ammonia N	mg/L	< 0.02	0.25	0.45	0.78	0.15	0.32	0.86	1.05	0.17	0.43	1.26	0.15	0.1	0.7	0.09 J	0.16	0.02 J	< 0.02
Nitrite as N**	mg/L	< 0.007	< 0.007	0.26	0.48	< 0.5	0.0147	NR	NR	< 0.007	< 0.007	0.02	< 0.007	0.02	0.03	< 0.007	0.01	< 0.007	< 0.007
Nitrate as N**	mg/L	2.21	0.06	0.39	1.32	5.03	5.93	NR	NR	0.21	0.02	6.08	0.81	0.06	0.05	2.45	1.11	11.9	5.9
Nitrate/Nitrite N**	mg/L	2.21	0.07	0.65	1.8	NR	NR	1.59	2.28	0.21	0.02 J	6.1	0.81	0.08	0.08	2.45	1.12	11.9	5.9
Total Nitrogen	mg/L	2.2	22.5	5.0	3.9	5.88	6.82	4.2	6.7	0.6	2.2	7.9	2.3	5.5	3	2.7	1.5	12.1	5.9
TKN	mg/L	< 0.3	22.4	4.3	2.1	0.85	0.88	2.6	4.4	0.4	2.2	1.8	1.5	5.4	2.9	< 0.3	0.4 J	< 0.3	< 0.3
Phosphate, Dissolved P	mg/L	< 0.05	0.14	0.25	0.34	NA	NA	0.5	0.9	0.23	0.21	0.15	0.3	0.29	0.89	0.16	< 0.05	< 0.05	< 0.05
Phosphorus, Total	mg/L	0.10	0.16	0.51	0.36	0.11	0.19	0.52	1.28	0.26	0.43	0.2	0.32	0.33	0.92	0.16	0.2	0.02 J	0.02 J
Orthophosphate as P	mg/L	0.08	0.10	0.20	0.30	0.13	0.20	0.42	1.03	0.18	0.42	0.14	0.24	0.23	0.9	0.13	0.2	0.01	0.01
Sulfate as SO4	mg/L	348	754	264	305	NA	NA	279	310	310	NA	210	NA	220	NA	520	NA	360	370
Solid Parameters																			
TDS	mg/L	1700	3530	869	990	1089	1225	905	1130	1280	1770	923	2920	765	1040	2450	2390	1690	1720
TSS	mg/L	3.0	13.0	12.0	1.0	4.0	1.83	4 J	5 J	7	6.6	3	4.3	18	4.7	< 1	3.3	< 1	< 1
Synthetic Organics																			
Pentachlorophenol	µg/L	< 1.11	< 1.11	< 1.11	< 1.11	< 1.0	< 1.0	< 1.11	< 1.11	< 1.11	< 1.11	< 1.11	< 1.11	< 1.11	< 1.11	< 1.11	< 1.11	< 1.11	< 1.11

Notes:
< = Analyte not detected at method detection limit shown; J = Analyte detected above the method detection limit but below the reporting limit; e = CFU/100mL, estimated value, plate count falls outside recommended reporting limits per EPA method guidelines; NA = Not Analyzed; NR = Not Required, * = CFU/100mL; ** = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal; *** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit), ****= NAL analyte not required for Ocean Receiving Waters.

Attachment C.2 – Major MS4 Outfall Dry Weather Visual Observation Data

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Major MS4 Outfall Dry Weather Monitoring Data Files

The following dry weather MS4 outfall data files are included in this attachment:

- County of San Diego Major MS4 Outfall Dry Weather Visual Observation Data
- City of Del Mar Major MS4 Outfall Dry Weather Visual Observation Data
- City of Escondido Major MS4 Outfall Dry Weather Visual Observation Data
- City of Poway Major MS4 Outfall Dry Weather Visual Observation Data
- City of Solana Beach Major MS4 Outfall Dry Weather Visual Observation Data
- City of San Diego Major MS4 Outfall Dry Weather Visual Observation Data

All data files are referenced in the Monitoring Results and Assessment Appendix C.

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Attachment C.3 – Dry Weather Assessment Methodology

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1 Assessment of Dry Weather Outfall Monitoring Results

In 2013 the San Diego Regional Water Quality Control Board (Regional Board) issued *Order No. R9-2013-0001 (amended by Order Nos. R9-2015-0001 and R9-2015-0100), National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region*, herein referred to as the MS4 Permit, regulating MS4 discharges throughout the San Diego Region. The MS4 Permit requires a series of dry weather MS4 outfall assessments be performed annually to assess and report the progress of each Copermittee toward effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction. This Attachment describes the methodology used to perform these required assessments.

Dry weather monitoring requirements are not discussed here, and can be found in the MS4 outfall monitoring plan for each Watershed Management Area (WMA). MS4 outfall monitoring plans are available through Project Clean Water (www.projectcleanwater.org).

Per MS4 Permit Provision D.4.b(1)(b), Copermittees will annually assess and/or report the following, beginning in the Transitional Monitoring Annual Reports and continuing in the Water Quality Improvement Plan Annual Reports:

(i) The known and suspected controllable sources (e.g. facilities, areas, land uses, pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area;

(ii) Sources of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area that have been reduced or eliminated; and

(iii) Modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.

The following additional assessments, listed in Permit Provision D.4.b(1)(c), are required in the Water Quality Improvement Plan Annual Reports:

(i) The assessments listed in Provision D.4.b.(1)(b);

(ii) Based on the data collected and applicable NALs [non-storm water action levels] in the Water Quality Improvement Plan, rank the MS4 outfalls in the Copermittee's jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan, with the goal of eliminating persistent flow non-storm water discharges and/or pollutant loads in order of the ranked priority list through targeted programmatic actions and source investigations;

(iii) For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identify the known and suspected sources within the Copermittee's jurisdiction in the Watershed Management Area that may cause or contribute to the NAL exceedances;

(iv) Each Copermittee must analyze the data collected pursuant to Provision D.2.b, and utilize a model or other method, to calculate or estimate the non-storm water

volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually.

[a] Each Copermittee must calculate or estimate the annual non-storm water volumes and pollutant loads collectively discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall; and

[b] Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters.

The sections that follow describe the assessments in greater detail. Within each section are references to the data sources used in each assessment; these are suggestions for regional consistency, and additional supporting data may be used as necessary. Data sources are provided [within brackets] and include the following:

- Jurisdictional MS4 outfall inventory;
- Jurisdictional Illicit Discharge Detection and Elimination (IDDE) investigation results and follow-up actions;
- Jurisdictional Runoff Management Program (JRMP) Annual Report Forms; and
- Dry Weather MS4 Data Sharing Template (Data Sharing Template) results.

2 Provision D.4.b.(1)(b) Assessments

2.1 Persistent Flow Classification

As part of the MS4 Outfall Discharge Monitoring Station Inventory required by Permit Provision D.2.a(1), each Copermittee must identify all major outfalls that discharge directly to receiving waters within its jurisdiction in the WMA. Each Copermittee must maintain the following information for each major MS4 outfall:

- Latitude and longitude of MS4 outfall point of discharge;
- Watershed Management Area;
- Hydrologic subarea;
- Outlet size;
- Accessibility (i.e. safety and without disturbance of critical habitat);
- Approximate drainage area; and
- Classification of whether the MS4 outfall is known to have persistent dry weather flows, transient dry weather flows, no dry weather flows, or unknown dry weather flows.

Copermittees regularly update this information and include the geo-located outfalls on an MS4 map as part of their JRMP. The accuracy of the MS4 map must be confirmed during field screening monitoring. The frequency with which each Copermittee must field screen the MS4 outfalls in its inventory varies according to the number of major MS4 outfalls discharging from a Copermittee's jurisdiction to receiving waters within the region and within each WMA. The frequency of required field screening is outlined in MS4 Permit Provision D.2.a.(2)(a).

A summary of the updated persistent flow classification will also be reported in the Water Quality Improvement Plan Annual Report. This information will include the number of persistent, transient, dry, and unknown dry weather flow sites for each jurisdiction [Data Sharing Template, "Station Information" tab, "Current Flow Classification" column]. These flow classifications can be defined as the following:

- Persistent - having flowing, pooled, or ponded water more than 72 hours after a measurable rainfall event of 0.1 inch or greater during the three consecutive most recent monitoring and/or inspection events;
- Transient - having flowing, pooled, or ponded water during at least one but not on all three most recent consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation ≥ 0.1 inch;
- Tidal - persistent or transient flow with ocean tides as the source;
- Dry - having no flowing, pooled, or ponded water during the last three consecutive monitoring and/or inspection events conducted more than 72 hours after rainfall with daily precipitation ≥ 0.1 inch; and
- Unknown - site cannot be evaluated, or has not been visited enough times to determine flow status.

2.2 Known and Controllable Source Categorization

As described in Provision E.2 of the MS4 Permit, each Copermittee must seek to identify the source(s) of non-storm water discharge from their MS4, where there is evidence of non-storm water having been discharged into or from the MS4 [i.e., ponding or flow, in the absence of wet weather]. In the Water Quality Improvement Plan Annual Reports, the Copermittees will categorize the known and suspected controllable sources of transient and persistent flows within their jurisdiction in the WMA. As part of this categorization, each Copermittee will report the number of major outfalls within its jurisdiction in the WMA, the number of dry weather visual inspections performed in the monitoring year (October 1 through September 30), and the following additional information:

1) The number of sites with flowing or ponded observations in the monitoring year [Data Sharing Template, "Visual Observation" tab, "Flow Status" column];
2) Whether the sources of flow at the identified flowing and/or ponded sites are known or suspected [Data Sharing Template, "Runoff Sources" tab, "Runoff Sources Suspected or Known?" column];
3) If the source of flow is known or suspected, whether it is:
    a. Authorized by a separate NPDES Permit [Data Sharing Template, "Runoff Sources" tab, "NPDES Allowable Discharge"/ column];
    b. Identified as a category of non-storm water discharge that must be addressed as an illicit discharge, based on Provision E.2.a of the MS4 Permit [Data Sharing Template, "Runoff Sources" tab, "Unpermitted Discharge" column]; or
    c. Identified as a category of non-storm water discharge that is not controllable by the Copermittee (e.g., ground water seepage) [Data Sharing Template, "Runoff Sources" tab, "Unpermitted Discharge" column].

It should be noted that a site with flowing or ponded observations may have multiple known or suspected sources of flow. For example, a site may be impacted by both irrigation runoff and groundwater seepage.

2.3 Dry Weather Flow Elimination Assessment

As described in their Jurisdictional Runoff Management Plans (JRMPs), each Copermittee must initiate the implementation of procedures, in a timely manner, to eliminate all detected and identified illicit discharges and connections within its jurisdiction. If the Copermittee identifies the source of illicit discharge or connection as controllable, the Copermittee must implement its Enforcement Response Plan as described in its JRMP. Copermittees will submit a summary of the non-storm water discharges and illicit discharges and connections eliminated within its jurisdiction in the previous monitoring year as part of the JRMP Annual Report Form (Permit Attachment D, Section IV). Specific investigations initiated through monitoring are compiled [Data Sharing Template, "Runoff Sources" tab, "Was Flow Source Eliminated" column; Jurisdictional IDDE investigation forms (optional)] and summarized in the Water Quality Improvement Plan Annual Report Monitoring and Assessment Appendix.

2.4 Field Screening Modifications

Copermittees will identify modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.

Modifications to the field screening monitoring locations will be reported in the Water Quality Improvement Plan Annual Reports [Data Sharing Template, “Station Information” tab, “Modifications to Locations and Frequencies Necessary to Identify and Eliminate Sources of Flow D.4.b.(1).(b).(iii)” column].

3 Provision D.4.b.(1)(c) Assessments

3.1 Dry Weather MS4 Outfall Prioritization

Based on the data collected and applicable NALs in the Water Quality Improvement Plan, each Copermittee will rank the MS4 outfalls in the their jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action. The prioritization will be conducted annually by each Copermittee and will include at least five highest priority major MS4 outfalls with non-storm water persistent flows, per WMA, that will be monitored in the subsequent monitoring year. If a Copermittee has fewer than five major MS4 outfalls with non-storm water persistent flows in the WMA, all the Copermittee's persistently flowing sites in the WMA will be monitored. For Copermittee's identified as responsible parties to a TMDL in Attachment E of the MS4 Permit, additional highest priority outfall monitoring locations may be selected if five sites are not sufficient to determine compliance with the TMDL.

Each Copermittee's prioritization methodology may differ. Data that will be used in the prioritization may include but are not limited to:

- Persistent flow status (defined as evidence of flow in each of the 3 most recent visual inspections) [Data Sharing Template, "Station Information" tab, "Current Flow Classification" column];
- Receiving water connectivity [Data Sharing Template, "Visual Observations" tab, "Flow Reaches Receiving Water" column];
- Potential to contribute to Highest Priority Water Quality Condition [Data Sharing Template, "Laboratory Data" tab];
- NAL exceedance [Data Sharing Template, "Laboratory Data" tab];
- Historical data; and
- Data not collected by the Copermittees.

The updated prioritization will be included in the Water Quality Improvement Plan Annual Reports, with explanations for any sites that have been added or removed from the Copermittee's list of highest priority outfalls. Once a site has been identified as highest priority, it may only be removed from the prioritization for one of the following reasons identified in Provision D.2.B.(2).(b).(ii) of the MS4 Permit:

- The non-storm water discharges have been effectively eliminated (i.e. no flowing, pooled, or ponded water) for three consecutive dry weather monitoring events; or
- The source(s) of the persistent flows has been identified as a category of non-storm water discharges that does not require an NPDES permit and does not have to be addressed as an illicit discharge because it was not identified as a source of pollutants (i.e. constituents in non-storm water discharge do not exceed NALs), and the persistent flow can be re-prioritized to a lower priority; or
- The constituents in the persistent flow non-storm water discharge do not exceed NALs, and the persistent flow can be re-prioritized to a lower priority; or

- The source(s) of the persistent flows has been identified as a non-storm water discharge authorized by a separate NPDES permit.

If a site has been removed from the list of five highest priority outfalls, it will be replaced with the Copermittee's next highest priority major MS4 outfall in the WMA, unless there are fewer than five persistently flowing major MS4 outfalls remaining.

3.2 Analysis of NAL Exceedance

Each major MS4 outfall identified as a highest priority persistently flowing outfall will be monitored under dry conditions at least semi-annually. The semi-annual monitoring event includes field observations, field monitoring, and analytical monitoring, including monitoring of NAL constituents. NALs are based on the receiving water type, and different NALs will be applicable to different outfalls in each WMA, depending on whether the outfall discharges to ocean receiving waters, bays, harbors, lagoons, estuaries, or inland streams and rivers. The NALs are presented in tables in the MS4 Permit by receiving water type, as follows:

- Ocean Surf Zone:
  - Table C-1: total coliform, fecal coliform, and *Enterococcus*.
- Bays, Harbors, and Lagoons/Estuaries:
  - Table C-2: turbidity, pH, fecal coliform, *Enterococcus*, and priority pollutants from Table C-3 (cadmium, copper, chromium III, chromium VI, lead, nickel, silver, and zinc).
- Inland Surface Waters:
  - MS4 Permit Table C-4: dissolved oxygen, turbidity, pH, fecal coliform, *Enterococcus*, total nitrogen, total phosphorus, methylene blue active substance (MBAS), iron, manganese, and priority pollutants from Table C-3 (cadmium, copper, chromium III, chromium VI, lead, nickel, silver, and zinc).

The NALs from the MS4 Permit tables are replicated in Tables 3-1 through 3-4. The Water Quality Improvement Plans may include additional WMA-specific NALs related to the highest priority water quality conditions in that WMA, or any applicable TMDLs in Attachment E of the MS4 Permit.

Table C.2-1
Non-Storm Water Action Levels for Discharges from MS4s to Ocean Surf Zone

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Total Coliform	MPN/100mL	1,000	–	10,000/1,000[1]	OP
Fecal Coliform	MPN/100mL	200[2]	–	400	OP
Enterococcus	MPN/100mL	35	–	104[3]	OP

AMAL = average monthly action level; MDAL = maximum daily action level; OP = Ocean Plan water quality objective; MPN/100mL = most probable number per 100 milliliters

1. Total coliform density NAL is 1,000 MPN/100 mL when the fecal/total coliform ratio exceeds 0.1.
2. Fecal coliform density NAL is 200 MPN/100mL during any 30 day period.
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas."

Table C.2-2
Non-Storm Water Action Levels for Discharges from MS4s to Bays, Harbors, and Lagoons/Estuaries

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Turbidity	NTU	75	–	225	OP
pH	Units	Within limit of 6.0 to 9.0 at all times.			OP
Fecal Coliform	MPN/100mL	200[1]	–	400[2]	BP
Enterococcus	MPN/100mL	35	–	104[3]	BP
Priority Pollutants	µg/L	See Table 3-4			

BP = Basin Plan water quality objective; µg/L = microgram per liter.

1. Based on a minimum of not less than five samples for any 30-day period.
2. The NAL is reached if more than 10 percent of total samples exceed 400 MPN/100mL during any 30 day period.
3. This value has been set to the Basin Plan water quality objective for saltwater "designated beach areas" and is not applicable to water bodies that are not designated with the water contact recreation (REC-1) beneficial use.

Table C.2-3
Non-Storm Water Action Levels for Discharges from MS4s to Inland Surface Waters

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters.			BP
Turbidity	NTU	–	20	See MDAL	BP
pH	Units	Within limit of 6.5 to 8.5 at all times.			BP
Fecal Coliform	MPN/100mL	200[1]	–	400[2]	BP
Enterococcus	MPN/100mL	33	–	61[3]	BP
Total Nitrogen	mg/L	–	1.0	See MDAL	BP
Total Phosphorus	mg/L	–	0.1	See MDAL	BP
MBAS	mg/L	–	0.5	See MDAL	BP
Iron	mg/L	–	0.3	See MDAL	BP
Manganese	mg/L	–	0.05	See MDAL	BP
Priority Pollutants	µg/L	See Table 3-4			

WARM = warm freshwater habitat beneficial use; COLD = cold freshwater habitat beneficial use;
MBAS = Methylene Blue Active Substance

1. Based on a minimum of not less than five samples for any 30-day period.
2. The NAL is reached if more than 10 percent of total samples exceed 400 MPN/100mL during any 30 day period.
3. This value has been set to the Basin Plan water quality objective for saltwater “designated beach areas” and is not applicable to water bodies that are not designated with the water contact recreation (REC-1) beneficial use.

Table C.2-4
Non-Storm Water Action Levels for Priority Pollutants

Parameter	Units	Freshwater (CTR)		Saltwater (CTR)	
		MDAL	AMAL	MDAL	AMAL
Cadmium	µg/L	**	**	16	8
Copper	µg/L	*	*	5.8	2.9
Chromium III	µg/L	**	**	–	–
Chromium VI	µg/L	16	8.1	83	41
Lead	µg/L	*	*	14	2.9
Nickel	µg/L	**	**	14	6.8
Silver	µg/L	*	*	2.2	1.1
Zinc	µg/L	*	*	95	47

CTR = California Toxics Rule

* Action levels developed on a case-by-case basis (see below).

** Action levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels (MCLs) under the California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

The Cadmium, Copper, Chromium (III), Lead, Nickel, Silver, and Zinc NALs for MS4 discharges to freshwater receiving waters will be developed on a case-by-case basis based on site-specific water quality data (receiving water hardness). For these priority pollutants, refer to 40 CFR 131.38(b)(2).

For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, Copermittees will identify the known and suspected sources within the Copermittee's jurisdiction in the WMA that may cause or contribute to the NAL exceedances [Data Sharing Template, "Runoff Sources" tab; Jurisdictional IDDE forms].

3.3 Non-Storm Water Volume and Pollutant Load Assessment

Each Copermittee must analyze the data collected under the Dry Weather MS4 Outfall Discharge Monitoring program, and utilize a model or other method to calculate or estimate the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually.

3.3.1 Identification of Dry Weather Days

The first step in calculating annual non-storm water volumes and pollutant loads is to determine the number of dry weather days in the monitoring year. The number of dry weather days will be determined using County of San Diego ALERT Station Data (https://sandiego.onerain.com). A single ALERT Station will be selected to represent rainfall conditions in each WMA. This representative ALERT Station will be the same station utilized in Wet Weather MS4 Outfall Discharge Monitoring Assessments, and will be the station that is closest to a majority of wet weather MS4 outfall discharge monitoring stations. This station may vary each year, depending on the wet weather MS4 outfall discharge stations monitored and the availability of ALERT Station data.

A wet weather day is defined as any day with at least 0.1 inches of measurable rainfall within a 24-hour period, and the subsequent 72 hours. A dry weather day will be defined as all other days during the monitoring year (October 1-September 30).

3.3.2 Non-Storm Water Volume Assessment

An annual non-storm water volume will be assigned to each persistently flowing major MS4 outfall station in the Copermittee's jurisdiction in the WMA. This annual non-storm water volume will be calculated by summing a daily flow volume for each persistently flowing major MS4 outfall station across each dry weather day. The following guidelines will be applied:

- Scenario A: If a major MS4 outfall station was visited once during the monitoring year, and a single discrete flow rate was measured, this flow rate will be applied across all dry weather days within the year. In Scenario A, the following equations will be applied.

$$V_{Daily} = Q \times 86{,}400$$

$$V_{Annual\_Outfall} = V_{Daily} \times (\#Dry\ Days)$$

Where:

V_{Daily} = Daily flow volume from MS4 Outfall (cubic feet)

Q = Monitored outfall flow rate (cfs)

86,400 = Conversion Factor, seconds per day

$V_{Annual\_Outfall}$ = Annual flow volume from MS4 Outfall (cubic feet)

$\#Dry\ Days$ = Number of dry weather days as assessed at the applicable County ALERT Station

- Scenario B: If a major MS4 outfall station was visited more than once during the monitoring year, and more than one discrete flow rate was measured, monthly dry weather flow volumes will be calculated. The monthly flow volume calculation method will vary based on whether a flow measurement was logged at the outfall during that month. For calendar months in which the outfall was visited one or more times, the mean of the measured flow rates will be applied to all dry weather days within the month. For calendar months in which the outfall was not visited, the mean of all flow rates observed at that site during the calendar year will be applied. In Scenario B, the following equations will be applied.

For each month in the monitoring year with at least one site visit and corresponding instantaneous flow estimate:

$$V_{Month\_Mon} = \frac{\sum Q_{n\_Month}}{n_{Month}} \times 86{,}400 \times (\#Dry\ Days/month)$$

For each month in the monitoring year with no site visits or instantaneous flow estimates:

$$V_{Month\_NonMon} = \frac{\sum Q_{n\_Year}}{n_{Year}} \times 86{,}400 \times (\#Dry\ Days/month)$$

To calculate an annual dry weather flow volume:

$$V_{Annual\_Outfall} = \sum V_{Month\_Mon} + \sum V_{Month\_NonMon}$$

Where:

V_{Month_Mon}= Monthly flow volume from MS4 Outfall during month when outfall was visited one or more times (cubic feet)

Q_{n_Month} = Monitored outfall flow rate during visual observation event “n”, during month when outfall was visited one or more times (cfs)

n_{Month} = Number of site visits with instantaneous flow measurements during month when outfall was visited one or more times

86,400 = Conversion Factor, seconds per day

#Dry Days = Number of dry weather days as assessed at the applicable County ALERT Station

V_{Month_NonMon}= Monthly flow volume from MS4 Outfall during month when outfall was not visited (cubic feet)

Q_{n_Year} = Monitored outfall flow rate during visual observation event “n”, during monitoring year (cfs)

n_{Year}= Number of site visits with instantaneous flow measurements during monitoring year

$V_{Annual\_Outfall}$ = Annual flow volume from MS4 Outfall (cubic feet)

- Scenario C: If a major MS4 outfall station was monitored continuously for a period of time longer than a day, a measured daily flow volume will be calculated for each monitored day. The mean of these daily flow volumes will be applied to all non-monitored dry days. In Scenario C, the following equations will be applied.

$$V_{Daily\_n} = Measured\ Daily\ Flow\ Volume$$

$$V_{Daily\_Mean} = \frac{\sum V_{Daily_n}}{n}$$

$$V_{Annual\_Outfall} = \sum V_{Daily\_n} + V_{Daily\_Mean} \times (\#Dry\ Days - n)$$

Where:

V_{Daily_n} = Daily flow volume from MS4 Outfall during dry weather day with a continuous flow monitoring event (cubic feet)
V_{Daily_Mean} = Mean of measured daily outfall flow volumes (cubic feet)
n = number of dry days of continuous flow data at the outfall
$V_{Annual\_Outfall}$ = Annual flow volume from MS4 Outfall (cubic feet)
#Dry Days = Number of dry weather days as assessed at the applicable County ALERT Station

- Scenario D: If a major MS4 outfall station was not visited during the monitoring year, the mean of annual outfall flow volumes for all monitored stations in the jurisdiction in the WMA will be applied.

When the annual dry weather flow volume has been calculated for each persistently flowing major MS4 outfall within the jurisdiction within the WMA, a Copermittee's annual non-storm water volume will be calculated by summing the annual dry weather flow volume for each persistently flowing outfall.

Within all the above scenarios, observations of ponding (i.e., evidence of non-storm water in the MS4, with no connectivity to the receiving water) will be assigned a flow rate of zero.

The methodology above assumes that a persistently flowing major MS4 outfall is flowing on 100% of dry weather days. This assumption is highly conservative.

3.3.3 Non-Storm Water Pollutant Load Assessment

The Copermittees will estimate the annual non-storm water pollutant loads collectively discharged from their persistently flowing major MS4 outfalls to receiving waters in the MS4. A load will be calculated for each pollutant analyzed at each high priority outfall, based on the arithmetic mean of the analytical results from the two dry weather outfall monitoring events at that outfall during the monitoring year. The following equation will be applied:

$$Pollutant\ Load_{Annual} = \left(V_{Annual} \times \frac{Pollutant\ Concentration_{Event1} + Pollutant\ Concentration_{Event2}}{2}\right) \times \mathrm{UC}$$

Where:

$Pollutant\ Load_{Annual}$ = Annual dry weather pollutant load from monitored outfall (lb or MPN)
V_{Annual} = Annual flow volume from MS4 outfall (cubic feet)
$Pollutant\ Concentration_{Event1}$ = Pollutant concentration measured at the outfall during dry weather monitoring event 1 (units vary)
$Pollutant\ Concentration_{Event2}$ = Pollutant concentration measured at the outfall during dry weather monitoring event 2 (units vary)
UC = Unit Conversion. Varies according to units used to express pollutant concentration, but common conversions are:

a. mg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\ g}{1000mg}\right)\left(\frac{1\ lb}{453.592\ g}\right)$
b. µg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\ g}{1\times10^6 \mu g}\right)\left(\frac{1\ lb}{453.592\ g}\right)$
c. MPN/100mL: $UC = \left(\frac{100mL}{0.1L}\right)\left(\frac{28.317L}{1ft^3}\right)$

For each non-high priority persistently flowing outfall in a Copermittee's jurisdiction in the WMA, the mean of that Copermittee's monitored outfall results for each pollutant will be applied. It should be noted that only analytical data for outfalls that were identified as persistently flowing during the monitoring year will be included in the mean. In this case, the following equation will be applied:

$$Pollutant\ Load_{Annual} = \left(V_{Annual} \times Pollutant\ Concentration_{Mean}\right) \times \mathrm{UC}$$

Where:
$Pollutant\ Load_{Annual}$ = Annual dry weather pollutant load from non-monitored outfall (lb or MPN)
V_{Annual} = Annual flow volume from MS4 outfall (cubic feet)
$Pollutant\ Concentration_{Mean}$ = Mean pollutant concentration measured across high priority persistently flowing outfalls within the Copermittee's jurisdiction in the WMA during the monitoring year (units vary)
UC = Unit Conversion. Varies according to units used to express pollutant concentration, but common conversions are:

a. mg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\,g}{1000mg}\right)\left(\frac{1\,lb}{453.592\,g}\right)$
b. µg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\,g}{1\times10^6\mu g}\right)\left(\frac{1\,lb}{453.592\,g}\right)$
c. MPN/100mL: $UC = \left(\frac{100mL}{0.1L}\right)\left(\frac{28.317L}{1ft^3}\right)$

For any pollutants not detected at the method detection limit (MDL), a concentration of MDL/2 will be applied in calculating loads.

3.4 Non-Storm Loads Not Subject to Copermittee's Legal Authority

Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters. If a Copermittee has identified a source of non-storm water not subject to their jurisdiction during field screening events or IDDE inspections, the volumes and loads for this source will be quantified according to the methodology outlined in Section 3.3.

4 Dry Weather Assessment Methodology Assumptions and Limitations

The calculation of the MS4 Permit required assessments necessitates a number of assumptions be made to translate the monitoring data into conclusions regarding flow volume and load for the entire WMA. This may introduce potential sources of error, while propagating potential errors inherent to the monitoring data. A summary of these assumptions and sources of error follows:

- Monitoring Error—Annual non-storm water volumes and pollutants loads are based on the results from dry weather visual observations and dry weather outfall monitoring events. Error in the monitoring data could have the effect of propagating error in all subsequent calculations. Potential sources of error in the monitoring data include the following:
  - *Monitored Flow Selection*—The pollutant loading estimations rely on monitoring data from one or more non-storm water visual observations per major MS4 outfall per year. The 2015-2016 monitoring year is the first year of dry weather flow volume and load calculation, and this period generally has represented a drought condition. This can affect the type and volume of non-storm water sources such as irrigation and ground water. The potential for inter-annual variability is a source of error in both the flow and chemistry data.
  - *Flow Measurement Method*—The MS4 Outfall Monitoring Plans provides different options to determine the non-storm water volume: (1) field-based estimation methods (e.g., “float method” or “bucket and stopwatch method”) and (2) equipment-based flow measurements. The method chosen varies among outfalls and Copermittees, introducing inter-site variability in volume estimations. The field-based estimation methods introduce various amounts of human error with the use of stopwatches and error in determining volume amounts in non-graduated buckets. Consistent equipment-based flow monitoring approach is more accurate and precise compared to the field-based estimation methods. However, this approach introduces variability through the flow measurement device and sensor type used to account for site-specific conditions, and can also be cost and time prohibitive across the number of outfalls monitored. Each measurement device and sensor type has an inherent accuracy range (e.g., ±2% accuracy for sub-AV probes). Additionally, each flow measurement device and sensor type can produce slightly different values for the same event, adding a layer of inter-site variability.
  - *Rainfall Measurement*—The accuracy of determining the number of dry days relies on the accuracy of the rainfall measurements representing that outfall. Rainfall measurements were based on the County of San Diego ALERT rain gauge closest to the majority of wet weather outfalls in each WMA, and not site specific rain data. Rainfall totals across the San Diego area can vary widely within a given storm.

- *Chemistry Results*—An attempt to maintain regional consistency in reporting limits (RLs) and method detection limits (MDLs) was made. However, differences in lab capabilities can sometimes lead to different RLs and MDLs. This can introduce error if constituent concentrations are near or below the MDL for one monitoring event or Copermittee, and the MDL differs for another monitoring event or Copermittee. An attempt was made to account for this type of error by assigning constituents that were not detected a value of MDL/2 for the purposes of the assessment calculations.

❖ Assessment Methodology Error—The assessments require a series of assumptions and extrapolations be made regarding the determination of annual volumes and pollutant loadings. Each assumption carries the possibility of error, including the following:

- *Annual Volume Estimation Representativeness*—Regardless of the flow measurement method utilized, error is introduced when utilizing the median of more than one field measurement to determine an annual volume estimation. It is assumed these field measurements are representative of "typical" non-storm water conditions since persistently flowing non-storm water flows are relatively consistent through the year. However, this may not be the case, and error could be introduced into these estimations. For example, groundwater base flows can increase during the wet season, increasing dry weather flow rates. Or, alternatively, irrigation and irrigation runoff may increase during the dry season, increasing dry weather flow rates. Unless flow observations are made throughout the year under a variety of conditions, this seasonal variation may not be captured.

- *Annual Volume Estimation Confidence*—Based on availability of data, multiple calculation methods are used to estimate annual flow volume. The confidence associated with each estimate varies because differing amounts of data go into each estimate. That is to say, volumes calculated based on continuous flow data are associated with a higher confidence than volumes based on one or two instantaneous flow measurements.

- *Annual Pollutant Load Estimations*—The annual volume estimation error introduced previously disseminates into the annual pollutant load estimations through calculations discussed in Section 3.3.3. Although persistent non-storm water flows are relatively consistent throughout the year, collecting two grab samples in one year provides a very brief snapshot in time of the pollutant concentration at an outfall, which may not be indicative of typical conditions or pollutant loadings. Additionally, using an arithmetic mean as a "typical" value of pollutant concentrations to estimate pollutant loads can introduce error if the sample size of the mean is too small, as means are sensitive to sample size.

Attachment C.4 – Dry Weather Volumes and Pollutant Loads

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Table C.4-1
San Dieguito River WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part I

Analyte	Units	City of San Diego													
Site ID		DW0001	DW0005	DW0033	DW0284	DW0317	DW0332	DW0333	DW0619	DW0636	DW0689	DW0759	DW0889	DW0892	DW0913
Highest Priority Outfall		N	N	Y	Y	Y	N	Y	N	Y	N	N	N	N	N
Annual Flow Volume	cf	0	0	49,550	78,252	1,602,783	0	0	0	211,644	45,317	3,066,535	20,444	1,529,292	509,953
Conventional Parameters															
Chloride	lb	0	0	618.7	1319	59035	0	0	0	9909	1364	92273	615.2	46017	15345
Hardness (Total)	lb	0	0	1191	2760	90053	0	0	0	14534	2142	144919	966.1	72272	24100
MBAS	lb	0	0	1.145	0.6131	4.403	0	0	0	1.123	0.4085	27.64	0.1843	13.79	4.597
Indicator Bacteria															
Enterococcus	MPN	0	0	7.58E+11	8.71E+12	8.17E+12	0	0	0	7.79E+11	1.53E+12	1.04E+14	6.90E+11	5.16E+13	1.72E+13
Fecal Coliform	MPN	0	0	2.46E+11	8.76E+12	1.11E+12	0	0	0	1.65E+11	1.38E+12	9.31E+13	6.21E+11	4.64E+13	1.55E+13
Total Coliform	MPN	0	0	4.33E+13	9.42E+13	1.47E+14	0	0	0	7.61E+12	2.99E+13	2.02E+15	1.35E+13	1.01E+15	3.36E+14
Total Metals															
Aluminum	lb	0	0	0.6341	1.807	1.071	0	0	0	0.1480	0.3739	25.30	0.1687	12.62	4.208
Cadmium	lb	0	0	0.0017	0.0033	0.0563	0	0	0	0.0074	0.0017	0.1120	7.47E-04	0.0559	0.0186
Chromium	lb	0	0	0.0039	0.0061	0.1251	0	0	0	0.0165	0.0053	0.3561	0.0024	0.1776	0.0592
Chromium (III)*	lb	See Dissolved Chromium (III) and Dissolved Chromium (VI)*													
Chromium (VI)*	lb														
Copper	lb	0	0	0.0479	0.9453	0.3352	0	0	0	0.1526	0.1342	9.082	0.0605	4.529	1.510
Iron	lb	0	0	1.3611	2.394	3.952	0	0	0	30.26	1.8949	128.2	0.8548	63.95	21.32
Lead	lb	0	0	0.0031	0.0088	0.1576	0	0	0	0.0360	0.0051	0.3438	0.0023	0.1715	0.0572
Manganese	lb	0	0	0.4702	0.2565	10.51	0	0	0	8.720	0.5536	37.46	0.2498	18.68	6.230
Mercury	lb	0	0	1.55E-04	2.44E-04	5.00E-03	0	0	0	6.61E-04	1.41E-04	0.0096	6.38E-05	0.0048	0.0016
Nickel	lb	0	0	0.0079	0.0156	0.2301	0	0	0	0.0416	0.0082	0.5552	0.0037	0.2769	0.092
Silver	lb	0	0	0.0043	0.0067	0.1376	0	0	0	0.0182	0.0039	0.2632	0.0018	0.1313	0.044
Zinc	lb	0	0	0.0943	0.3713	1.681	0	0	0	0.4360	0.0966	6.540	0.0436	3.261	1.088
Dissolved Metals															
Aluminum	lb	0	0	0.0337	0.0977	2.501	0	0	0	0.2147	0.0444	3.007	0.0200	1.499	0.5000
Cadmium	lb	0	0	0.0017	0.0027	0.0563	0	0	0	0.0074	0.0016	0.1077	0.0007	0.0537	0.0179
Chromium	lb	0	0	0.0023	0.0052	0.0750	0	0	0	0.0099	0.0041	0.2745	0.0018	0.1369	0.0457
Chromium (III)*	lb	0	0	7.73E-04	0.0012	0.0250	0	0	0	0.0033	8.60E-04	0.0582	3.88E-04	0.0290	0.0097
Chromium (VI)*	lb	0	0	3.87E-04	0.0018	0.0125	0	0	0	0.0017	0.0025	0.1705	0.0011	0.0850	0.0283
Copper	lb	0	0	0.0201	0.4250	0.1526	0	0	0	0.0720	0.0679	4.592	0.0306	2.290	0.7636
Iron	lb	0	0	0.1918	0.7352	2.401	0	0	0	2.312	0.2481	16.79	0.1119	8.373	2.7920
Lead	lb	0	0	0.0023	0.0037	0.1976	0	0	0	0.0334	0.0045	0.3053	0.0020	0.1523	0.0508
Manganese	lb	0	0	0.2939	0.1637	9.105	0	0	0	5.814	0.3754	25.40	0.1693	12.67	4.224
Mercury	lb	0	0	1.55E-04	2.44E-04	0.0050	0	0	0	6.61E-04	1.41E-04	0.0096	6.38E-05	0.0048	0.0016
Nickel	lb	0	0	0.0079	0.0154	0.2702	0	0	0	0.0403	0.0086	0.5801	0.0039	0.2893	0.0965
Silver	lb	0	0	0.0043	0.0067	0.1376	0	0	0	0.0182	0.0039	0.2632	0.0018	0.1313	0.0438
Zinc	lb	0	0	0.0572	0.1514	0.6129	0	0	0	0.2048	0.0666	4.504	0.0300	2.246	0.7489

Table C.4-1
San Dieguito WMA River Dry Season Flow Volume and Pollutant Loads: City of San Diego Part I (continued)

Analyte	Units	City of San Diego													
Site ID		DW0001	DW0005	DW0033	DW0284	DW0317	DW0332	DW0333	DW0619	DW0636	DW0689	DW0759	DW0889	DW0892	DW0913
Highest Priority Outfall		N	N	Y	Y	Y	N	Y	N	Y	N	N	N	N	N
Annual Flow Volume	cf	0	0	49,550	78,252	1,602,783	0	0	0	211,644	45,317	3,066,535	20,444	1,529,292	509,953
Nutrients															
Ammonia N	lb	0	0	5.259	91.60	10.51	0	0	0	5.483	12.04	815.0	5.433	406.4	135.5
Nitrite as N**	lb	0	0	1.593	0.1710	91.05	0	0	0	12.02	1.856	125.6	0.8372	62.63	20.88
Nitrate as N**	lb	0	0	4.485	7.816	305.2	0	0	0	37.66	7.752	524.5	3.497	261.6	87.23
Nitrate/Nitrite N**	lb	0	0	NR	NR	NR	0	0	0	NR	NR	NR	NR	NR	NR
Total Nitrogen	lb	0	0	16.39	204.7	335.2	0	0	0	46.24	33.95	2297	15.32	1146	382.0
TKN	lb	0	0	10.21	197.4	31.52	0	0	0	8.786	25.96	1757	11.71	876.0	292.1
Phosphate, Dissolved P	lb	0	0	1.871	24.96	2.877	0	0	0	0.4129	3.384	229.0	1.526	114.2	38.08
Phosphorus, Total	lb	0	0	2.103	24.16	3.502	0	0	0	5.133	3.640	246.3	1.642	122.8	40.96
Orthophosphate as P	lb	0	0	1.810	4.152	4.603	0	0	0	0.6276	1.015	68.67	0.4578	34.25	11.42
Sulfate as SO4	lb	0	0	850.7	2443	39523	0	0	0	5219	1137	76958	513.1	38379	12798
Solid Parameters															
TDS	lb	0	0	2799	6351	205121	0	0	0	31710	5010	339038	2260	169080	56381
TSS	lb	0	0	88.16	197.8	85.80	0	0	0	38.32	45.95	3109	20.73	1551	517.1
Synthetic Organics															
Pentachlorophenol	lb	0	0	0.0148	0.0244	0.5153	0	0	0	0.0651	0.0140	0.9486	0.0063	0.4731	0.1577

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Table C.4-2
San Dieguito River WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part II

Analyte	Units	City of San Diego														
Site ID		DW0914	DW0949	DW0956	DW1019	DW1099	DW1100	DW1109	DW1110	DW1117	DW1118	DW1119	DW1120	DW1121	DW1138	**Jurisdictional Total**
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	N	N	N	**NA**
Annual Flow Volume	cf	338,455	509,953	20,444	1,147,111	0	85,182	2,669,021	1,019,339	0	0	32,369	2,044,357	0	1,272,044	**16,252,044**
Conventional Parameters																
Chloride	lb	10184	15345	615.2	34517	0	2563	80312	30672	0	0	974.0	61516	0	38276	**501,471**
Hardness (Total)	lb	15995	24100	966.1	54210	0	4026	126133	48172	0	0	1530	96613	0	60115	**784,795**
MBAS	lb	3.051	4.597	0.1843	10.34	0	0.7679	24.06	9.189	0	0	0.2918	18.43	0	11.47	**136.28**
Indicator Bacteria																
Enterococcus	MPN	1.14E+13	1.72E+13	6.90E+11	3.87E+13	0	2.88E+12	9.01E+13	3.44E+13	0	0	1.09E+12	6.90E+13	0	4.29E+13	**5.01E+14**
Fecal Coliform	MPN	1.03E+13	1.55E+13	6.21E+11	3.48E+13	0	2.59E+12	8.11E+13	3.10E+13	0	0	9.83E+11	6.21E+13	0	3.86E+13	**4.45E+14**
Total Coliform	MPN	2.23E+14	3.36E+14	1.35E+13	7.56E+14	0	5.61E+13	1.76E+15	6.72E+14	0	0	2.13E+13	1.35E+15	0	8.38E+14	**9.72E+15**
Total Metals																
Aluminum	lb	2.793	4.208	0.1687	9.466	0	0.7029	22.02	8.411	0	0	0.2671	16.87	0	10.50	**121.74**
Cadmium	lb	0.0124	0.0186	7.47E-04	0.0419	0	0.0031	0.0975	0.0372	0	0	0.0012	0.0747	0	0.0465	**0.5914**
Chromium	lb	0.0393	0.0592	0.0024	0.1332	0	0.0099	0.3099	0.1184	0	0	0.0038	0.2374	0	0.1477	**1.8132**
Chromium (III)*	lb	See Dissolved Chromium (III) and Dissolved Chromium (VI)*														
Chromium (VI)*	lb															
Copper	lb	1.002	1.510	0.0605	3.397	0	0.2523	7.905	3.019	0	0	0.0959	6.055	0	3.767	**43.861**
Iron	lb	14.15	21.32	0.8548	47.97	0	3.562	111.6	42.62	0	0	1.353	85.48	0	53.19	**636.32**
Lead	lb	0.0379	0.0572	0.0023	0.1286	0	0.0096	0.2993	0.1143	0	0	0.0036	0.2292	0	0.1426	**1.8099**
Manganese	lb	4.135	6.230	0.2498	14.01	0	1.041	32.61	12.45	0	0	0.3955	24.98	0	15.54	**194.78**
Mercury	lb	0.0011	0.0016	6.38E-05	0.0036	0	2.66E-04	0.0083	0.0032	0	0	1.01E-04	0.0064	0	0.0040	**0.0507**
Nickel	lb	0.0613	0.0923	0.0037	0.2077	0	0.0154	0.4832	0.1845	0	0	0.0059	0.3701	0	0.2303	**2.8860**
Silver	lb	0.0291	0.0438	0.0018	0.0985	0	0.0073	0.2291	0.0875	0	0	0.0028	0.1755	0	0.1092	**1.3951**
Zinc	lb	0.7218	1.088	0.0436	2.446	0	0.1817	5.692	2.174	0	0	0.0690	4.360	0	2.713	**33.099**
Dissolved Metals																
Aluminum	lb	0.3318	0.5000	0.0200	1.125	0	0.0835	2.617	0.9994	0	0	0.0317	2.004	0	1.247	**16.877**
Cadmium	lb	0.0119	0.0179	7.18E-04	0.0403	0	0.0030	0.0937	0.0358	0	0	0.0011	0.0718	0	0.0447	**0.5707**
Chromium	lb	0.0303	0.0457	0.0018	0.1027	0	0.0076	0.2389	0.0913	0	0	0.0029	0.1830	0	0.1139	**1.3735**
Chromium (III)*	lb	0.0064	0.0097	3.88E-04	0.0218	0	0.0016	0.0507	0.0193	0	0	0.0006	0.0388	0	0.0241	**0.3019**
Chromium (VI)*	lb	0.0188	0.0283	0.0011	0.0638	0	0.0047	0.1484	0.0567	0	0	0.0018	0.1137	0	0.0707	**0.8119**
Copper	lb	0.5068	0.7636	0.0306	1.718	0	0.1275	3.996	1.526	0	0	0.0485	3.061	0	1.905	**22.096**
Iron	lb	1.853	2.792	0.1119	6.280	0	0.4664	14.61	5.581	0	0	0.1772	11.19	0	6.964	**83.986**
Lead	lb	0.0337	0.0508	0.0020	0.1142	0	0.0085	0.2658	0.1015	0	0	0.0032	0.2036	0	0.1267	**1.6618**
Manganese	lb	2.803	4.224	0.1693	9.502	0	0.7056	22.11	8.443	0	0	0.2681	16.93	0	10.54	**133.90**
Mercury	lb	0.0011	0.0016	6.38E-05	0.0036	0	2.66E-04	0.0083	0.0032	0	0	1.01E-04	0.0064	0	0.0040	**0.0507**
Nickel	lb	0.0640	0.0965	0.0039	0.2170	0	0.0161	0.5049	0.1928	0	0	0.0061	0.3867	0	0.2406	**3.0405**
Silver	lb	0.0291	0.0438	0.0018	0.0985	0	0.0073	0.2291	0.0875	0	0	0.0028	0.1755	0	0.1092	**1.3951**
Zinc	lb	0.4971	0.7489	0.0300	1.685	0	0.1251	3.920	1.497	0	0	0.0475	3.002	0	1.868	**22.042**

Table C.4-2
San Dieguito River WMA Dry Season Flow Volume and Pollutant Loads: City of San Diego Part II (continued)

Analyte	Units	City of San Diego														
Site ID		DW0914	DW0949	DW0956	DW1019	DW1099	DW1100	DW1109	DW1110	DW1117	DW1118	DW1119	DW1120	DW1121	DW1138	**Jurisdictional Total**
Highest Priority Outfall		N	N	N	N	N	N	N	N	N	N	N	N	N	N	NA
Annual Flow Volume	cf	338,455	509,953	20,444	1,147,111	0	85,182	2,669,021	1,019,339	0	0	32,369	2,044,357	0	1,272,044	**16,252,044**
Nutrients																
Ammonia N	lb	89.95	135.52	5.433	304.9	0	22.64	709.3	270.9	0	0	8.602	543.3	0	338.1	**3,915.8**
Nitrite as N**	lb	13.86	20.88	0.8372	46.98	0	3.488	109.3	41.74	0	0	1.326	83.72	0	52.09	**690.87**
Nitrate as N**	lb	57.89	87.23	3.497	196.2	0	14.57	456.5	174.4	0	0	5.537	349.7	0	217.6	**2,802.9**
Nitrate/Nitrite N**	lb	NR	NR	NR	NR	0	NR	NR	NR	0	0	NR	NR	0	NR	**NR**
Total Nitrogen	lb	253.5	382.0	15.32	859.3	0	63.81	1999	763.6	0	0	24.25	1532	0	952.9	**11,322.6**
TKN	lb	193.9	292.1	11.71	657.1	0	48.80	1529	583.9	0	0	18.54	1171	0	728.7	**8,445.1**
Phosphate, Dissolved P	lb	25.27	38.08	1.526	85.65	0	6.360	199.3	76.11	0	0	2.417	152.6	0	94.98	**1,098.56**
Phosphorus, Total	lb	27.19	40.96	1.642	92.14	0	6.842	214.4	81.88	0	0	2.600	164.2	0	102.2	**1,184.4**
Orthophosphate as P	lb	7.58	11.42	0.4578	25.69	0	1.907	59.77	22.83	0	0	0.7248	45.78	0	28.48	**331.63**
Sulfate as SO4	lb	8494	12798	513.1	28788	0	2138	66982	25582	0	0	812.3	51306	0	31923	**407,157**
Solid Parameters																
TDS	lb	37420	56381	2260	126825	0	9418	295089	112699	0	0	3579	226025	0	140638	**1,828,083**
TSS	lb	343.2	517.1	20.73	1163	0	86.37	2706	1034	0	0	32.82	2073	0	1290	**14,919**
Synthetic Organics																
Pentachlorophenol	lb	0.1047	0.1577	0.0063	0.3548	0	0.0263	0.8256	0.3153	0	0	0.0100	0.6324	0	0.3935	**5.0461**

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Table C.4-3
San Dieguito WMA River Dry Season Flow Volume and Pollutant Loads: Cities of Del Mar, Solana Beach, Escondido, and Poway

Analyte	Units	City of Del Mar[1]		City of Solana Beach		City of Escondido		City of Poway	
Site ID		S-05[2]	**Jurisdictional Total**	SB-25	**Jurisdictional Total**	ES_HDG_102	**Jurisdictional Total**	140	**Jurisdictional Total**
Highest Priority Outfall		Y	**NA**	Y	**NA**	Y	**NA**	Y	**NA**
Annual Flow Volume	cf	225,220	**225,220**	6,004	**6,004**	252,480	**252,480**	0	**0**
Conventional Parameters									
Chloride	lb	7452	**7452**	82.46	**82.46**	2829	**2829**	0	**0**
Hardness (Total)	lb	7663	**7663**	147.1	**147.1**	8338	**8338**	0	**0**
MBAS	lb	0.7030	**0.7030**	0.0562	**0.0562**	0.6305	**0.6305**	0	**0**
Indicator Bacteria									
Enterococcus	MPN	8.93E+12	**8.93E+12**	4.49E+11	**4.49E+11**	6.01E+12	**6.01E+12**	0	**0**
Fecal Coliform	MPN	2.55E+10	**2.55E+10**	5.36E+09	**5.36E+09**	6.08E+12	**6.08E+12**	0	**0**
Total Coliform	MPN	1.91E+11	**1.91E+11**	8.16E+11	**8.16E+11**	3.65E+13	**3.65E+13**	0	**0**
Total Metals									
Aluminum	lb	0.1828	**0.1828**	0.0219	**0.0219**	0.4886	**0.4886**	0	**0**
Cadmium	lb	0.0014	**0.0014**	3.75E-05	**3.75E-05**	0.0020	**0.0020**	0	**0**
Chromium	lb	NR***	**NR*** **	NR***	**NR*** **	0.0808	**0.0808**	0	**0**
Chromium (III)	lb	NR***	**NR*** **	NR***	**NR*** **	0.0808	**0.0808**	0	**0**
Chromium (VI)	lb	NR***	**NR*** **	NR***	**NR*** **	0.0065	**0.0065**	0	**0**
Copper	lb	1.153	**1.153**	0.0054	**0.0054**	0.1497	**0.1497**	0	**0**
Iron	lb	0.3656	**0.3656**	0.0292	**0.0292**	0.5595	**0.5595**	0	**0**
Lead	lb	0.0042	**0.0042**	9.37E-05	**9.37E-05**	0.0024	**0.0024**	0	**0**
Manganese	lb	0.1406	**0.1406**	0.0067	**0.0067**	0.1836	**0.1836**	0	**0**
Mercury	lb	5.62E-04	**5.62E-04**	1.50E-05	**1.50E-05**	0.0079	**0.0079**	0	**0**
Nickel	lb	NR***	**NR*** **	NR***	**NR*** **	0.0102	**0.0102**	0	**0**
Silver	lb	NR***	**NR*** **	NR***	**NR*** **	0.0039	**0.0039**	0	**0**
Zinc	lb	0.1547	**0.1547**	0.0081	**0.0081**	0.1970	**0.1970**	0	**0**
Dissolved Metals									
Aluminum	lb	0.0703	**0.0703**	0.0111	**0.0111**	0.1253	**0.1253**	0	**0**
Cadmium	lb	4.92E-04	**4.92E-04**	3.56E-05	**3.56E-05**	0.0020	**0.0020**	0	**0**
Chromium	lb	NR***	**NR*** **	NR***	**NR*** **	0.0808	**0.0808**	0	**0**
Chromium (III)	lb	NR***	**NR*** **	NR***	**NR*** **	0.0808	**0.0808**	0	**0**
Chromium (VI)	lb	NR***	**NR*** **	NR***	**NR*** **	0.0065	**0.0065**	0	**0**
Copper	lb	1.0686	**1.0686**	0.0034	**0.0034**	0.1245	**0.1245**	0	**0**
Iron	lb	0.0844	**0.0844**	0.0135	**0.0135**	0.1340	**0.1340**	0	**0**
Lead	lb	4.22E-04	**4.22E-04**	2.44E-05	**2.44E-05**	0.0024	**0.0024**	0	**0**
Manganese	lb	0.1125	**0.1125**	0.0021	**0.0021**	0.1222	**0.1222**	0	**0**
Mercury	lb	0.0028	**0.0028**	4.50E-05	**4.50E-05**	0.0079	**0.0079**	0	**0**
Nickel	lb	NR***	**NR*** **	NR***	**NR*** **	0.0096	**0.0096**	0	**0**
Silver	lb	NR***	**NR*** **	NR***	**NR*** **	0.0039	**0.0039**	0	**0**
Zinc	lb	0.1265	**0.1265**	0.0041	**0.0041**	0.1891	**0.1891**	0	**0**

Table C.4-3
San Dieguito River WMA Dry Season Flow Volume and Pollutant Loads: Cities of Del Mar, Solana Beach, Escondido, and Poway (continued)

Analyte	Units	City of Del Mar[1]		City of Solana Beach		City of Escondido		City of Poway	
Site ID		S-05[2]	**Jurisdictional Total**	SB-25	**Jurisdictional Total**	ES_HDG_102	**Jurisdictional Total**	140	**Jurisdictional Total**
Highest Priority Outfall		Y	**NA**	Y	**NA**	Y	**NA**	Y	**NA**
Annual Flow Volume	cf	225,220	**225,220**	6,004	**6,004**	252,480	**252,480**	0	**0**
Nutrients									
Ammonia N	lb	0.1406	**0.1406**	0.2305	**0.2305**	3.704	**3.704**	0	**0**
Nitrite as N**	lb	0.0492	**0.0492**	0.1387	**0.1387**	2.086	**2.086**	0	**0**
Nitrate as N**	lb	31.07	**31.07**	0.3205	**0.3205**	86.38	**86.38**	0	**0**
Nitrate/Nitrite N**	lb	31.07	**31.07**	0.4592	**0.4592**	NR	**NR**	0	**0**
Total Nitrogen	lb	30.93	**30.93**	1.668	**1.668**	100.1	**100.1**	0	**0**
TKN	lb	1.758	**1.758**	1.199	**1.199**	13.63	**13.63**	0	**0**
Phosphate, Dissolved P	lb	0.3515	**0.3515**	0.1106	**0.1106**	NA	**NA**	0	**0**
Phosphorus, Total	lb	1.406	**1.406**	0.1631	**0.1631**	2.364	**2.364**	0	**0**
Orthophosphate as P	lb	1.125	**1.125**	0.0937	**0.0937**	2.601	**2.601**	0	**0**
Sulfate as SO4	lb	4893	**4893**	106.6	**106.6**	NA	**NA**	0	**0**
Solid Parameters									
TDS	lb	23902	**23902**	348.4	**348.4**	18237	**18237**	0	**0**
TSS	lb	42.18	**42.18**	2.436	**2.436**	45.95	**45.95**	0	**0**
Synthetic Organics									
Pentachlorophenol	lb	0.0078	**0.0078**	2.08E-04	**2.08E-04**	0.0079	**0.0079**	0	**0**

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen

1. Del Mar outfall S-07 was classified as a highest priority persistently flowing outfall in the WQIP, but was re-classified as transient following the 2015-2016 monitoring season. No dry weather flows volumes or loads are presented. Analytical results for this outfall are included in Attachment C.1.
2. Outfall S-05 is less than 36 inches in diameter and not classified as a major MS4 outfall. It is monitored voluntarily.

* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal

** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit), ***NAL analyte not required for Ocean Receiving Waters

Table C.4-4
San Dieguito WMA River Dry Season Flow Volume and Pollutant Loads: County of San Diego

Analyte	Units	County of San Diego										
Site ID		MS4-SDG-072	MS4-SDG-074	MS4-SDG-075	MS4-SDG-077	MS4-SDG-080	MS4-SDG-084	MS4-SDG-085	MS4-SDG-115	MS4-SDG-144	MS4-SDG-171	**Jurisdictional Total**
Highest Priority Outfall		Y	Y	N	Y	Y	N	N	Y	N	N	**NA**
Annual Flow Volume	cf	76,711	540,534	0	36,395	2,086,703	92,295	910,340	1,891,296	48,346	0	**5,682,620**
Conventional Parameters												
Chloride	lb	2083	27671	0	420.3	108775	3106	30632	49590	1627	0	**223,903**
Hardness (Total)	lb	3118	26878	0	964.5	166094	4538	44760	93394	2377	0	**342,122**
MBAS	lb	2.035	1.687	0	0.1136	6.513	0.7202	7.104	5.904	0.3773	0	**24.455**
Indicator Bacteria												
Enterococcus	MPN	9.56E+11	1.33E+14	0	2.27E+12	2.87E+13	6.17E+12	6.08E+13	8.03E+10	3.23E+12	0	**2.35E+14**
Fecal Coliform	MPN	8.69E+11	4.36E+13	0	1.39E+12	2.07E+15	2.07E+13	2.04E+14	2.95E+11	1.09E+13	0	**2.35E+15**
Total Coliform	MPN	2.74E+13	4.52E+14	0	2.83E+13	2.67E+16	2.72E+14	2.69E+15	4.55E+12	1.43E+14	0	**3.03E+16**
Total Metals												
Aluminum	lb	0.8907	3.611	0	0.2988	5.341	0.5485	5.410	1.240	0.2873	0	**17.627**
Cadmium	lb	0.0010	0.0186	0	4.54E-04	0.0521	0.0022	0.0222	0.0708	0.0012	0	**0.1685**
Chromium	lb	0.0041	0.0270	0	0.0017	0.0651	0.0037	0.0369	0.0413	0.0020	0	**0.1819**
Chromium (III)	lb	0.0041	0.0270	0	0.0017	0.0651	0.0037	0.0369	0.0413	0.0020	0	**0.1819**
Chromium (VI)	lb	0.0024	0.0169	0	0.0011	0.0651	0.0029	0.0284	0.0590	0.0015	0	**0.1774**
Copper	lb	0.0431	0.6749	0	0.0318	1.433	0.0685	0.6757	0.6435	0.0359	0	**3.6064**
Iron	lb	2.0377	16.55	0	0.5214	4.755	1.399	13.80	3.778	0.7328	0	**43.57**
Lead	lb	0.0017	0.0152	0	5.68E-04	0.0130	0.0014	0.0142	0.0118	7.55E-04	0	**0.0587**
Manganese	lb	1.123	9.769	0	0.4022	4.820	0.9277	9.150	7.911	0.4859	0	**34.588**
Mercury	lb	1.92E-04	0.0013	0	9.09E-05	0.0052	2.30E-04	0.0023	0.0047	1.21E-04	0	**0.0142**
Nickel	lb	0.0168	0.2193	0	0.0091	0.6513	0.0236	0.2324	0.1712	0.0123	0	**1.3361**
Silver	lb	4.79E-04	0.0034	0	2.27E-04	0.0130	5.76E-04	0.0057	0.0118	3.02E-04	0	**0.0355**
Zinc	lb	0.1054	23.87	0	0.0386	1.107	0.8769	8.650	0.7084	0.4594	0	**35.820**
Dissolved Metals												
Aluminum	lb	0.0239	0.6580	0	0.0261	0.3908	0.0463	0.4566	0.1387	0.0243	0	**1.7648**
Cadmium	lb	5.63E-04	0.0169	0	0.0034	0.0189	0.0027	0.0263	0.0041	0.0014	0	**0.0743**
Chromium	lb	3.83E-04	0.0078	0	5.68E-04	0.0072	7.43E-04	0.0073	0.0035	3.89E-04	0	**0.0279**
Chromium (III)	lb	3.83E-04	0.0078	0	5.68E-04	0.0072	7.43E-04	0.0073	0.0035	3.89E-04	0	**0.0279**
Chromium (VI)	lb	0.0024	0.0169	0	0.0011	0.0651	0.0029	0.0284	0.0590	0.0015	0	**0.1774**
Copper	lb	0.0192	0.4218	0	0.0148	0.7165	0.0343	0.3387	0.1535	0.0180	0	**1.7167**
Iron	lb	0.6776	0.3712	0	0.1465	0.5211	0.2622	2.586	0.7675	0.1373	0	**5.469**
Lead	lb	2.63E-04	6.75E-04	0	1.48E-04	0.0039	2.30E-04	0.0023	0.0035	1.21E-04	0	**0.0112**
Manganese	lb	0.9003	8.858	0	0.3590	3.908	0.8049	7.939	7.084	0.4216	0	**30.275**
Mercury	lb	NA	NA	0	NA	NA	NA	NA	NA	NA	0	**NA**
Nickel	lb	0.0096	0.1519	0	0.0045	0.4559	0.0145	0.1426	0.0649	0.0076	0	**0.8515**
Silver	lb	2.39E-04	0.0017	0	1.14E-04	0.0065	2.88E-04	0.0028	0.0059	1.51E-04	0	**0.0177**
Zinc	lb	0.0694	21.98	0	0.0545	1.824	0.8997	8.874	0.6671	0.4253	0	**34.844**

Table C.4-4
San Dieguito River WMA Dry Season Flow Volume and Pollutant Loads: County of San Diego (continued)

Analyte	Units	County of San Diego										
Site ID		MS4-SDG-072	MS4-SDG-074	MS4-SDG-075	MS4-SDG-077	MS4-SDG-080	MS4-SDG-084	MS4-SDG-085	MS4-SDG-115	MS4-SDG-144	MS4-SDG-171	**Jurisdictional Total**
Highest Priority Outfall		Y	Y	N	Y	Y	N	N	Y	N	N	**NA**
Annual Flow Volume	cf	76,711	540,534	0	36,395	2,086,703	92,295	910,340	1,891,296	48,346	0	**5,682,620**
Nutrients												
Ammonia N	lb	1.437	23.79	0	0.9088	16.28	1.780	17.56	1.771	0.9326	0	**64.46**
Nitrite as N**	lb	0.0168	0.3965	0	0.0568	0.8793	0.0582	0.5740	0.4132	0.0305	0	**2.4253**
Nitrate as N**	lb	0.5507	116.3	0	0.1250	231.9	16.47	162.5	1051	8.629	0	**1,587.2**
Nitrate/Nitrite N**	lb	1.0057	116.6	0	0.1818	232.5	18.34	180.9	1051	9.608	0	**1,610.0**
Total Nitrogen	lb	6.704	172.1	0	9.656	273.6	25.18	248.4	1063	13.19	0	**1,811.4**
TKN	lb	6.226	55.68	0	9.429	34.20	8.628	85.10	14.76	4.520	0	**218.54**
Phosphate, Dissolved P	lb	1.054	7.593	0	1.341	12.05	1.328	13.10	2.952	0.6957	0	**40.11**
Phosphorus, Total	lb	1.652	8.774	0	1.420	23.45	1.648	16.25	2.361	0.8632	0	**56.42**
Orthophosphate as P	lb	1.437	6.411	0	1.284	21.49	1.417	13.98	1.181	0.7425	0	**47.95**
Sulfate as SO4	lb	1485	7086	0	499.9	67740	1911	18849	43096	1001	0	**141,668**
Solid Parameters												
TDS	lb	7303	64840	0	2051	315252	9765	96317	201310	5115	0	**701,954**
TSS	lb	32.56	123.2	0	25.79	247.5	27.89	275.1	59.04	14.61	0	**805.6**
Synthetic Organics												
Pentachlorophenol	lb	0.0027	0.0187	0	0.0013	0.0723	0.0032	0.0315	0.0655	0.0017	0	**0.1969**

cf = cubic feet; lb = pounds; MPN = most probable number; N = nitrogen; NR = Not Required; P = phosphorus; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen
* = Laboratory methods for Chromium (III) and Chromium (VI) require filtering the sample; therefore, the dissolved and total fractions of Chromium (III) and Chromium (VI) are equal
** = Nitrite and nitrate can be analyzed separately or together (Table D-7, MS4 Permit)

Attachment D – Data Quality Objectives and Quality Control

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1 Data Quality Objectives

This attachment addresses Quality Assurance/Quality Control (QA/QC) activities associated with the San Dieguito River Watershed Management Area Monitoring Program for both Dry Weather Persistent MS4 Outfall Discharge Monitoring and Wet Weather MS4 Outfall Monitoring, and the relevant data quality objectives (DQOs). The QA/QC program included both field and laboratory procedures.

DQOs are quantitative and qualitative statements that define project objectives and specify the acceptable ranges of field sampling and laboratory performance. Results that did not meet data quality objectives were qualified and may be considered estimates. Data quality objectives for this project included the following:

- Precision
- Frequency

Precision describes how well repeated measurements agree. The evaluation of precision described here relates to repeated measurements/samples collected in the field (field duplicates). Precision measurements were determined by comparing results from field duplicates to the precision objectives. Relative percent differences (RPDs) were calculated to determine the precision between duplicate samples. This calculation is shown below:

$$RPD = \frac{abs[x_1 - x_2]}{0.5 * (x_1 + x_2)}$$

Where:

abs is the absolute value.

x_1 is measurement 1 (e.g., Sample).

x_2 is measurement 2 (e.g., Duplicate).

Frequency is the rate at which a required analysis is performed. The frequency of field QC samples and laboratory QC samples is verified with stated DQOs. The field QC frequency DQOs were five percent. Laboratory frequency DQOs were dependent upon the QC sample type.

DQO results for precision and frequency are presented in the following sections.

2 Field Quality Assurance/Quality Control

This section addresses QA/QC activities associated with field sampling. The field QA/QC samples were used to evaluate potential contamination and sampling errors applicable to field sampling introduced prior to submittal of the samples to the analytical laboratory. Field QA/QC procedures utilized field blanks and field duplicates. A brief summary of each measurement type is described below, followed by a summary of their respective DQOs, and frequencies in Table D-1:

- **Field Blank** – Field blanks were collected to check for cross-contamination. A field blank sample was prepared during a non-storm water monitoring event and for each type of grab sample collected as part of a storm water monitoring event. A field blank was not conducted for composite samples during the storm water monitoring event per the Monitoring Plan. The field blanks were created by pouring laboratory-grade distilled, deionized water into laboratory supplied bottles at one of the monitoring locations.

- **Field Duplicates** – Field duplicates were collected to check the reproducibility of both laboratory procedures and field collection procedures. Field duplicate samples were collected during non-storm water events and for each type of grab sample collected as part of a storm water monitoring event. A field duplicate was not collected for composite samples during the storm water monitoring event. A field duplicate of in-situ parameters was not performed per the Monitoring Plan.

Table D-1
Field Quality Control Samples

Constituent Category	Measurement Quality Objectives		Frequency of Analysis
	Field Blank	Field Duplicate	
Conventionals	<RL for target analyte	RPD < 25%[(a)]	5% of total project sample count
Indicator Bacteria	<RL for target analyte	RPD < 25%[(b)]	5% of total project sample count
Metals	<RL for target analyte	RPD < 25%[(a)]	5% of total project sample count
Nutrients	<RL for target analyte	RPD < 25%[(a)]	5% of total project sample count
Solid Parameters	<RL for target analyte	RPD < 25%[(a)]	5% of total project sample count
Organics	<RL for target analyte	Per method	5% of total project sample count

Notes: NA= Not applicable; RL = reporting limit; RPD = relative percent difference.
(a) NA if native concentration of either sample <RL.
(b) Field duplicates are not a current SWAMP requirement for indicator bacteria. However, the collection and analysis of a field duplicate is recommended.

Analytical results from the field QA/QC sampling program are summarized below.

2.1 Wet Weather Results

A field blank was collected at MS4-SDC-2 during Wet Weather Event 2 for fecal indicator bacteria analytes. No analytes were detected above their reporting limits. Table D-2 presents the reported results of the field blanks below.

Table D-2
Wet Weather Field Blank Results

Analyte	Units	Reporting Limit	MS4-SDC-2
			3/6/16
Enterococcus	MPN/100 mL	1	< 1
Fecal Coliform	MPN/100 mL	18	< 18
Total Coliform	MPN/100 mL	18	< 18

A precision goal of less than twenty-five percent RPD was assessed using results obtained from a field duplicate sample taken at RW-SDC-6 during Wet Weather Event 1. Because microbiological constituents have an exponential growth curve, their RPDs are typically higher than chemical constituents. To give an accurate representation, their results are log transformed prior to calculating the RPD value. Parameters met this DQO for the analyzed parameters total hardness, total calcium, total magnesium, and fecal indicator bacteria. Relative percent difference values calculated from field duplicate data are provided in Table D-3 below.

Table D-3
Wet Weather Field Duplicate Results

Relative Percent Difference					
Analyte	**Units**	**RW-SDC-6-01**	**RW-SDC-6-02**	**1/31/2016**	**DQO**
Parameters					
Calcium	mg/L	96	95.1	0.9%	< 25%
Hardness as CaCO3	mg/L	431	428	0.7%	< 25%
Magnesium	mg/L	46.4	46.3	0.2%	< 25%
Indicator Bacteria					
Enterococcus	log(MPN/100mL)	3.8	3.7	3%	< 25%
Fecal Coliform	log(MPN/100mL)	2.4	2.6	8%	< 25%
Total Coliform	log(MPN/100mL)	4.0	4.6	14%	< 25%

2.2 Dry Weather Results

Of the 28 dry weather samples taken within 5 jurisdictions, only one field blank collected, which was from Poway Outfall 140 on 7/29/16. No analytes were detected above their reporting limits in this field blank, as shown in Table D-4 below.

Table D-4
Dry Weather Field Blank Results

Analyte	Units	Reporting Limit	140
			7/29/2016
Conventional Parameters			
Chloride	mg/L	0.05	< 0.05
Color, True	Color Units	1	< 1
Hardness as CaCO3	mg/L	10	< 10
MBAS	mg/L	0.5	< 0.5
Indicator Bacteria			
Enterococcus	MPN/100 mL	20	< 20
Coliform, Fecal	MPN/100 mL	20	20
Coliform, Total	MPN/100 mL	20	20
Total Metals			
Aluminum	ug/L	10	7
Cadmium	ug/L	1	< 1
Chromium	ug/L	5	0.7
Chromium (III)	ug/L	1	0.7
Chromium VI	ug/L	20	< 20
Copper	ug/L	10	1
Iron	ug/L	50	49
Lead	ug/L	5	0.1
Manganese	ug/L	5	0.9
Mercury	ug/L	0.1	< 0.1
Nickel	ug/L	5	2
Selenium	ug/L	1	< 1
Silver	ug/L	1	< 1
Zinc	ug/L	20	7
Dissolved Metals			
Aluminum	ug/L	10	< 10
Cadmium	ug/L	1	< 1
Chromium	ug/L	5	0.3
Chromium (III)	ug/L	1	0.3
Chromium VI	ug/L	20	< 20
Copper	ug/L	1	0.09
Iron	ug/L	50	< 50
Lead	ug/L	1	< 1
Manganese	ug/L	5	< 5
Mercury	ug/L	0.1	< 0.1
Nickel	ug/L	5	0.3
Selenium	ug/L	1	< 1
Silver	ug/L	1	< 1
Zinc	ug/L	20	< 20

Table D-4
Dry Weather Field Blank Results (continued)

Analyte	Units	Reporting Limit	140 7/29/2016
Nutrients			
Ammonia as N	mg/L	0.1	< 0.1
Nitrate + Nitrite as N	mg/L	0.05	0.02
Nitrogen, Total	mg/L	0.5	< 0.5
Nitrogen, Total Kjeldahl	mg/L	0.5	< 0.5
Dissolved Phosphorus	mg/L	0.05	< 0.05
Total Phosphorus as P	mg/L	0.05	< 0.05
OrthoPhosphate as P	mg/L	0.05	< 0.05
Sulfate	mg/L	5	1.6
Solid Parameters			
Total Dissolved Solids	mg/L	20	< 20
Total Suspended Solids	mg/L	20	< 20
Synthetic Organics			
Pentachlorophenol	ug/L	5	< 5

A precision goal of less than twenty-five percent RPD was assessed using results obtained from field duplicate samples taken at six locations during non-storm events. Again, the fecal indicator bacteria was log transformed prior to RPD calculation. Relative percent difference values calculated from field duplicate data are provided in Table D-5 below.

Table D-5
Dry Weather Field Duplicate Results

Relative Percent Difference						
Analyte	**S-5**	**SB-25**	**SB-25**	**140**	**SDG-072**	**SDG-074**
	8/12/2016	**6/30/2016**	**8/12/2016**	**7/29/2016**	**6/30/2016**	**3/28/2016**
Conventional Parameters						
Chloride	1.9%	0.0%	11.3%	0.0%	1.9%	0.0%
Color	22.2%	4.1%	3.9%	2.0%	0.0%	7.4%
Hardness (Total)	0.2%	5.8%	1.8%	0.0%	0.7%	2.8%
MBAS	NA	NA	0.0%	NA	NA	NA
Indicator Bacteria						
Enterococcus	**26.3%**	9.8%	10.1%	1.0%	**26.2%**	4.7%
Fecal Coliform	0.0%	0.0%	**32.8%**	5.7%	8.6%	13.8%
Total Coliform	**32.1%**	0.0%	5.3%	2.8%	4.0%	4.0%
Total Metals						
Aluminum	7.4%	5.0%	**103.0%**	0.6%	**28.1%**	**44.9%**
Cadmium	NA	NA	NA	NA	NA	**107.7%**
Chromium	NA	NA	NA	22.2%	13.3%	0.0%
Chromium (III)	NA	NA	NA	22.2%	13.3%	0.0%
Chromium (VI)	NA	NA	NA	NA	NA	NA
Copper	5.0%	0.0%	**30.3%**	0.0%	0.0%	12.5%
Iron	20.7%	7.6%	**96.5%**	**53.9%**	15.7%	**52.7%**
Lead	NA	**28.6%**	NA	**33.3%**	0.0%	**28.6%**
Manganese	10.5%	23.1%	**103.4%**	**103.6%**	4.5%	4.5%
Mercury	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	0.0%	22.2%	0.0%
Silver	NA	NA	NA	NA	NA	NA
Zinc	9.5%	**27.3%**	**53.1%**	6.1%	8.7%	0.7%

Table D-5
Field Duplicate Results (continued)

Relative Percent Difference						
Analyte	**S-5**	**SB-25**	**SB-25**	**140**	**SDG-072**	**SDG-074**
	8/12/2016	**6/30/2016**	**8/12/2016**	**7/29/2016**	**6/30/2016**	**3/28/2016**
Dissolved Metals						
Aluminum	**50.0%**	6.5%	16.9%	14.9%	22.2%	11.4%
Cadmium	NA	NA	25.0%	NA	NA	0.0%
Chromium	NA	NA	NA	NA	15.4%	0.0%
Chromium (III)	NA	NA	NA	0.0%	15.4%	0.0%
Chromium (VI)	NA	NA	NA	NA	NA	NA
Copper	1.3%	0.0%	10.5%	**28.6%**	**100.0%**	16.7%
Iron	**40.0%**	10.5%	**57.1%**	14.6%	19.4%	9.5%
Lead	NA	0.0%	NA	**66.7%**	NA	0.0%
Manganese	0.0%	**40.0%**	**94.7%**	3.3%	3.8%	8.7%
Mercury	0.0%	**175.0%**	NA	NA	NA	NA
Nickel	NA	NA	NA	0.0%	0.0%	0.0%
Silver	NA	NA	NA	NA	NA	NA
Zinc	12%	0.0%	8.7%	0.0%	8.0%	9.8%
Nutrients						
Ammonia N	NA	**46.2%**	**29.5%**	1.2%	4.8%	0.8%
Nitrate as N	7.8%	5.0%	**85.4%**	NA	**176.5%**	2.8%
Nitrite as N	NA	0.0%	2.1%	NA	NA	**40.0%**
Nitrate+Nitrite N	7.8%	3.0%	**55.3%**	9.9%	**177.8%**	2.9%
Nitrogen, Total	**37.0%**	**27.3%**	**30.4%**	15.4%	12.8%	2.5%
TKN	NA	**32.4%**	**68.8%**	16.7%	0.0%	0.0%
Phosphorus, Dissolved	NA	18.2%	6.1%	0.0%	4.9%	0.0%
Phosphorus, Total	**50.0%**	9.3%	0.0%	0.0%	2.3%	0.0%
Orthophosphate as P	**28.6%**	9.5%	6.5%	2.4%	0.0%	0.0%
Sulfate	0.3%	1.9%	3.7%	2.9%	NA	4.7%
Solid Parameters						
TDS	2.4%	1.9%	2.0%	1.2%	2.3%	5.7%
TSS	NA	8.0%	NA	22.2%	**81.1%**	6.5%
Synthetic Organics						
Pentachlorophenol	NA	NA	NA	NA	NA	NA

3 Laboratory Analyses Holding Times

All wet weather samples were analyzed within the required holding time limits.

Fecal Indicator Bacteria exceeded the 8-hour hold time for the dry weather samples. Nitrate, Nitrite, and Orthophosphate exceeded the 48-hour hold time for samples taken on 2/16/16. Nitrate, Nitrite, and Total Dissolved Solids exceeded the 7 day hold time for dry weather samples taken on 3/28/16, 6/30/16, 7/29/16, and 8/12/16. All other samples were analyzed within the required holding time, as shown in Table D-6 below. The results were within the historical range, and thus are considered valid. Details of hold time exceedances are shown in Table D-7. The laboratory reports are included in Appendix C.

Table D-6
Dry Weather Holding Time Results

Analyte	Holding Time Limits	QA/QC Results
Conventional Parameters		
Chloride	28 days	Samples analyzed within holding time.
Color	48 hours	
Hardness (Total)	6 months	
MBAS	7 days until extraction; 40 days after extraction	
Indicator Bacteria		
Enterococcus	8 hours	**Dry Weather samples exceeded hold time.**
Fecal Coliform	8 hours	
Total Coliform	8 hours	
Total Metals		
Aluminum	6 months at room temp following acidification	Samples analyzed within holding time.
Cadmium	6 months at room temp following acidification	
Chromium	6 months at room temp following acidification	
Chromium (III)	6 months at room temp following acidification	
Chromium (VI)	28 days at 6°C; 24 hours without preservation	
Copper	6 months at room temp following acidification	
Iron	6 months at room temp following acidification	
Lead	6 months at room temp following acidification	
Manganese	6 months at room temp following acidification	
Mercury	90 days at room temp following acidification	
Nickel	6 months at room temp following acidification	
Silver	6 months at room temp following acidification	
Zinc	6 months at room temp following acidification	

Table D-6
Dry Weather Holding Time Result (continued)

Analyte	Holding Time Limits	QA/QC Results
Dissolved Metals		
Aluminum	6 months at room temp following acidification	Samples analyzed within holding time.
Cadmium	6 months at room temp following acidification	
Chromium	6 months at room temp following acidification	
Chromium (III)	6 months at room temp following acidification	
Chromium (VI)	28 days at 6°C; 24 hours without preservation	
Copper	6 months at room temp following acidification	
Iron	6 months at room temp following acidification	
Lead	6 months at room temp following acidification	
Manganese	6 months at room temp following acidification	
Mercury	90 days at room temp following acidification	
Nickel	6 months at room temp following acidification	
Silver	6 months at room temp following acidification	
Zinc	6 months at room temp following acidification	
Nutrients		
Ammonia N	48 hours; 28 days if acidified	Samples analyzed within holding time.
Nitrate as N	48 hours	**Dry Weather samples exceeded hold time.**
Nitrite as N	48 hours	**Dry Weather samples exceeded hold time.**
Nitrogen, Total	28 days	Samples analyzed within holding time.
TKN	7 days; 28 days if acidified	Samples analyzed within holding time.
Phosphorus, Dissolved	28 days	Samples analyzed within holding time.
Phosphorus, Total	28 days	Samples analyzed within holding time.
Orthophosphate as P	48 hours	**Dry Weather samples exceeded hold time.**
Sulfate	28 days	Samples analyzed within holding time.
Solid Parameters		
TDS	7 days	**Dry Weather samples exceeded hold time.**
TSS	7 days	Samples analyzed within holding time.
Synthetic Organics		
Pentachlorophenol	7 days until extraction; 40 days after extraction	Samples analyzed within holding time.

Table D-7
Dry Weather Holding Time Exceedances

Analyte	Station ID	Sample Date	Analyses Date	Holding Days	Holding Time Limit
Indicator Bacteria					
Enterococcus	140	7/29/2016	8/2/2016	4.0	8 hours
	140	8/2/2016	8/6/2016	4.0	
	ES_HDG_102	4/20/2016	4/21/2016	1.0	
	ES_HDG_102	8/30/2016	8/31/2016	1.0	
	MS4-SDG-072	3/28/2016	4/1/2016	4.0	
	MS4-SDG-072	6/30/2016	7/4/2016	4.0	
	MS4-SDG-074	3/28/2016	4/1/2016	4.0	
	MS4-SDG-074	6/30/2016	7/4/2016	4.0	
	MS4-SDG-077	3/28/2016	4/1/2016	4.0	
	MS4-SDG-077	6/30/2016	7/4/2016	4.0	
	MS4-SDG-080	3/28/2016	4/1/2016	4.0	
	MS4-SDG-080	6/30/2016	7/4/2016	4.0	
	MS4-SDG-115	3/29/2016	4/2/2016	4.0	
	MS4-SDG-115	7/7/2016	7/11/2016	4.0	
	S-5	8/12/2016	8/16/2016	4.0	
	S-5	8/12/2016	8/16/2016	4.0	
	S-7	6/30/2016	7/4/2016	4.0	
	SB-25	6/30/2016	7/4/2016	4.0	
	SB-25	8/12/2016	8/16/2016	4.0	
Fecal Coliforms	140	7/29/2016	8/1/2016	3.0	8 hours
	140	8/2/2016	8/5/2016	3.0	
	ES_HDG_102	4/20/2016	4/24/2016	4.0	
	ES_HDG_102	8/30/2016	9/2/2016	3.0	
	MS4-SDG-072	3/28/2016	3/31/2016	3.0	
	MS4-SDG-072	6/30/2016	7/3/2016	3.0	
	MS4-SDG-074	3/28/2016	3/31/2016	3.0	
	MS4-SDG-074	6/30/2016	7/3/2016	3.0	
	MS4-SDG-077	3/28/2016	3/31/2016	3.0	
	MS4-SDG-077	6/30/2016	7/3/2016	3.0	
	MS4-SDG-080	3/28/2016	3/31/2016	3.0	
	MS4-SDG-080	6/30/2016	7/3/2016	3.0	
	MS4-SDG-115	3/29/2016	4/1/2016	3.0	
	MS4-SDG-115	7/7/2016	7/10/2016	3.0	
	S-5	8/12/2016	8/15/2016	3.0	
	S-5	8/12/2016	8/15/2016	3.0	
	S-7	6/30/2016	7/3/2016	3.0	
	SB-25	6/30/2016	7/3/2016	3.0	
	SB-25	8/12/2016	8/15/2016	3.0	

Table D-7
Dry Weather Holding Time Exceedances (continued)

Analyte	Station ID	Sample Date	Analyses Date	Holding Days	Holding Time Limit
Indicator Bacteria					
Total Coliforms	140	7/29/2016	8/2/2016	4.0	8 hours
	140	8/2/2016	8/6/2016	4.0	
	ES_HDG_102	4/20/2016	4/24/2016	4.0	
	ES_HDG_102	8/30/2016	9/2/2016	3.0	
	MS4-SDG-072	3/28/2016	4/1/2016	4.0	
	MS4-SDG-072	6/30/2016	7/4/2016	4.0	
	MS4-SDG-074	3/28/2016	4/1/2016	4.0	
	MS4-SDG-074	6/30/2016	7/4/2016	4.0	
	MS4-SDG-077	3/28/2016	4/1/2016	4.0	
	MS4-SDG-077	6/30/2016	7/4/2016	4.0	
	MS4-SDG-080	3/28/2016	4/1/2016	4.0	
	MS4-SDG-080	6/30/2016	7/4/2016	4.0	
	MS4-SDG-115	3/29/2016	4/2/2016	4.0	
	MS4-SDG-115	7/7/2016	7/11/2016	4.0	
	S-5	8/12/2016	8/16/2016	4.0	
	S-5	8/12/2016	8/16/2016	4.0	
	S-7	6/30/2016	7/4/2016	4.0	
	SB-25	6/30/2016	7/4/2016	4.0	
	SB-25	8/12/2016	8/16/2016	4.0	
Nutrients					
Nitrate as N	DW0033	2/16/2016	2/18/2016	2.2	48 hours
	DW0284	2/16/2016	2/18/2016	2.2	
	DW0317	2/16/2016	2/18/2016	2.2	
	DW0333	2/16/2016	2/18/2016	2.1	
	DW0636	2/16/2016	2/18/2016	2.2	
	MS4-SDG-072	6/30/2016	7/8/2016	8.0	
	MS4-SDG-074	6/30/2016	7/8/2016	8.0	
	MS4-SDG-077	6/30/2016	7/8/2016	8.0	
	MS4-SDG-080	4/21/2016	4/26/2016	5.0	
	MS4-SDG-080	6/30/2016	7/8/2016	8.0	
	MS4-SDG-115	3/29/2016	4/5/2016	7.0	
	MS4-SDG-115	7/7/2016	7/12/2016	5.0	
	S-5	8/12/2016	8/17/2016	5.0	
	S-5	8/12/2016	8/17/2016	5.0	
	SB-25	6/30/2016	7/7/2016	7.0	
	SB-25	8/12/2016	8/17/2016	5.0	

Table D-7
Dry Weather Holding Time Exceedances (continued)

Analyte	Station ID	Sample Date	Analyses Date	Holding Days	Holding Time Limit
Nutrients					
Nitrite as N	DW0033	2/16/2016	2/18/2016	2.2	48 hours
	DW0284	2/16/2016	2/18/2016	2.2	
	DW0317	2/16/2016	2/18/2016	2.3	
	DW0333	2/16/2016	2/18/2016	2.1	
	DW0636	2/16/2016	2/18/2016	2.2	
Orthophosphate as P	DW0284	2/16/2016	2/18/2016	2.2	48 hours
	DW0317	2/16/2016	2/18/2016	2.2	
	DW0333	2/16/2016	2/18/2016	2.2	
	DW0333	2/16/2016	2/18/2016	2.1	
	DW0636	2/16/2016	2/18/2016	2.2	
Solid Parameters					
Total Dissolved Solids	140	7/29/2016	8/8/2016	10.0	7 days
	140	8/2/2016	8/10/2016	8.0	
	MS4-SDG-072	3/28/2016	4/5/2016	8.0	
	MS4-SDG-072	6/30/2016	7/11/2016	11.0	
	MS4-SDG-074	3/28/2016	4/5/2016	8.0	
	MS4-SDG-074	6/30/2016	7/11/2016	11.0	
	MS4-SDG-077	3/28/2016	4/5/2016	8.0	
	MS4-SDG-077	6/30/2016	7/11/2016	11.0	
	MS4-SDG-080	3/28/2016	4/5/2016	8.0	
	MS4-SDG-080	6/30/2016	7/11/2016	11.0	
	S-5	8/12/2016	8/22/2016	10.0	
	SB-25	6/30/2016	7/11/2016	11.0	
	SB-25	8/12/2016	8/22/2016	10.0	

Attachment E – Wet Weather Outfall Information

Attachment E.1 – Wet Weather Outfall Hydrographs
Attachment E.2 – Wet Weather Outfall Analytical Results
Attachment E.3 – Wet Weather Assessment Methodology
Attachment E.4 – Wet Weather HSA Storm Water Volumes and Pollutant Loads

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Attachment E.1 – Wet Weather Outfall Hydrographs

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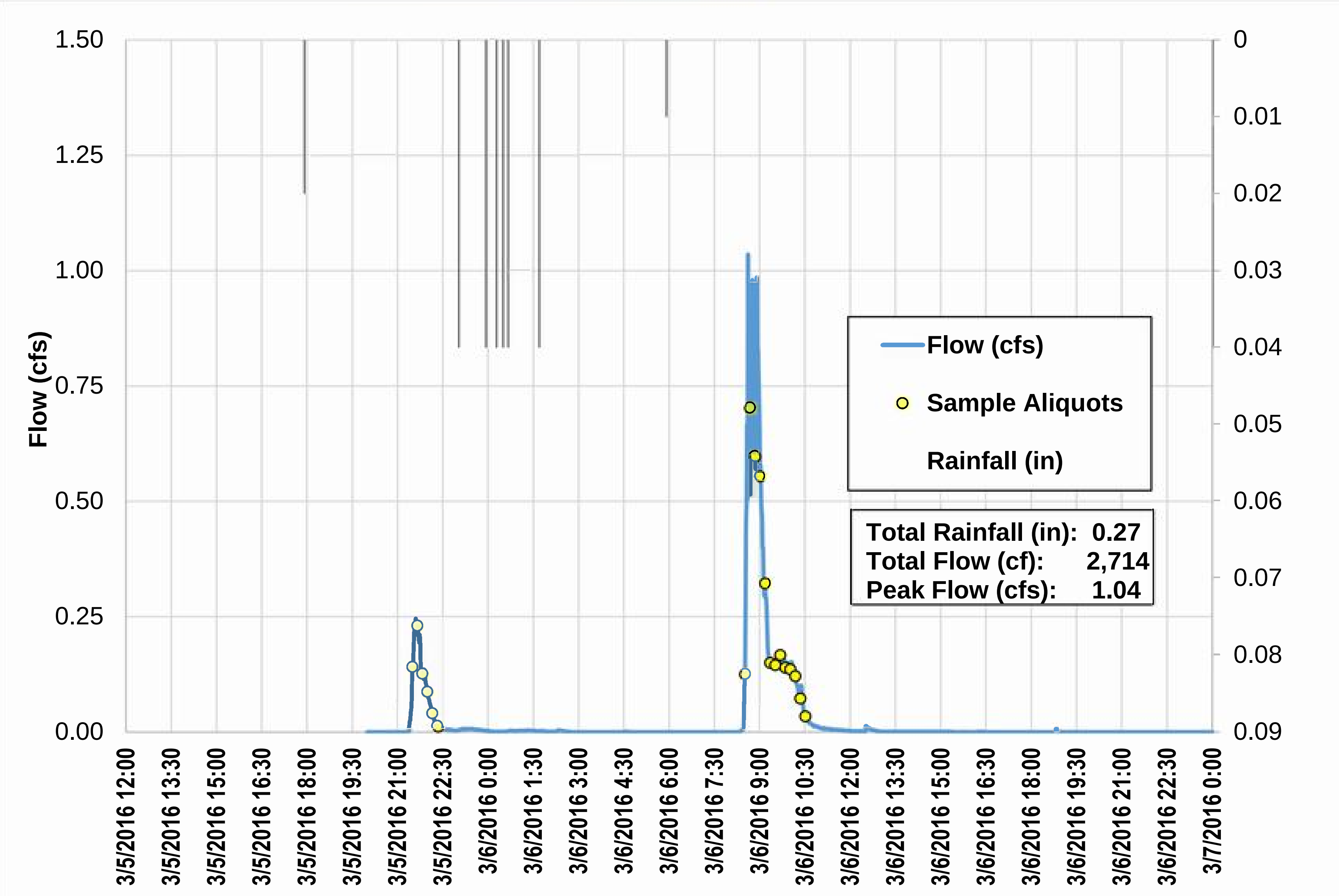

Figure E.1-1: MS4-SDC-01 Event Hydrograph

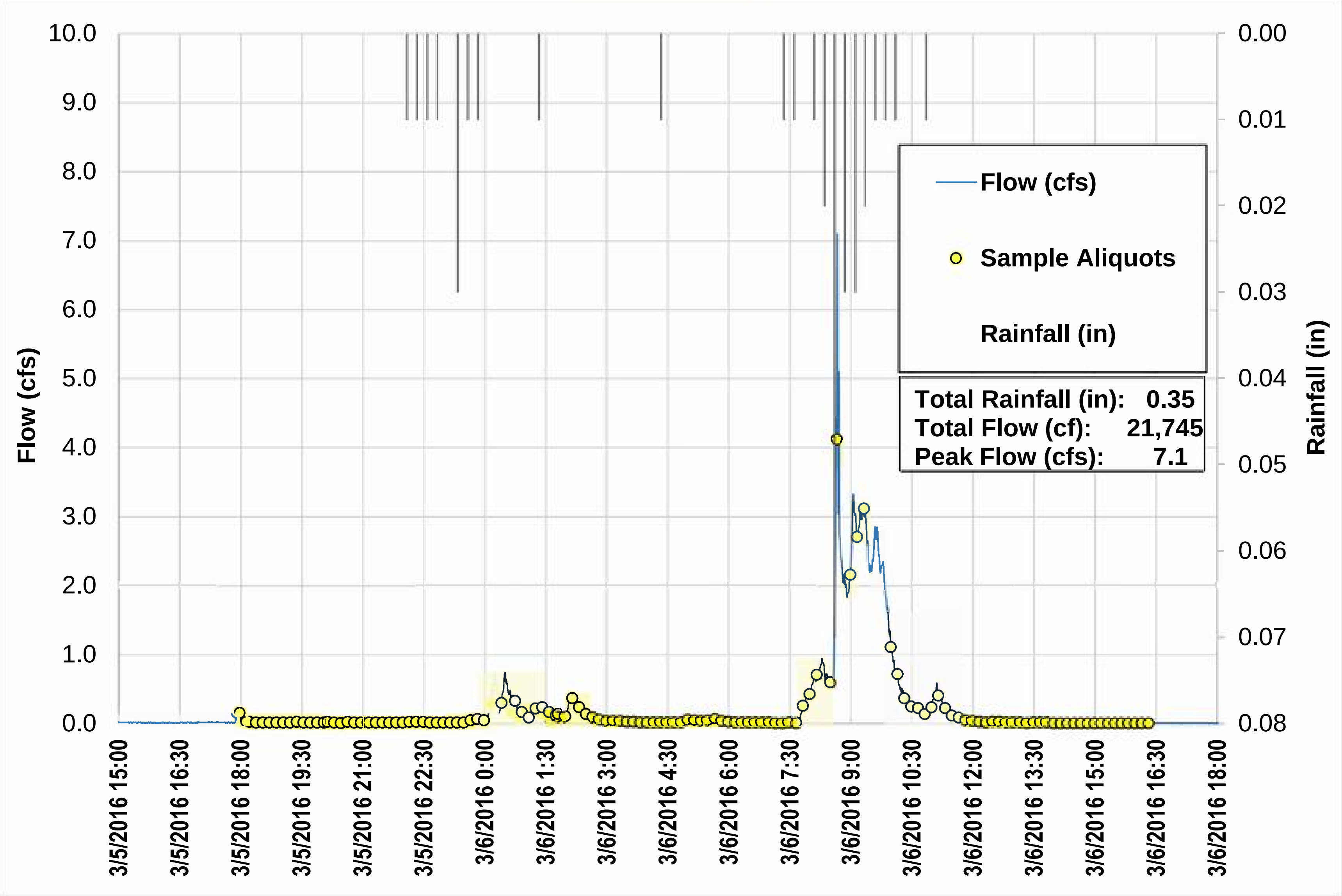

Figure E.1-2: MS4-SDC-02 Event Hydrograph

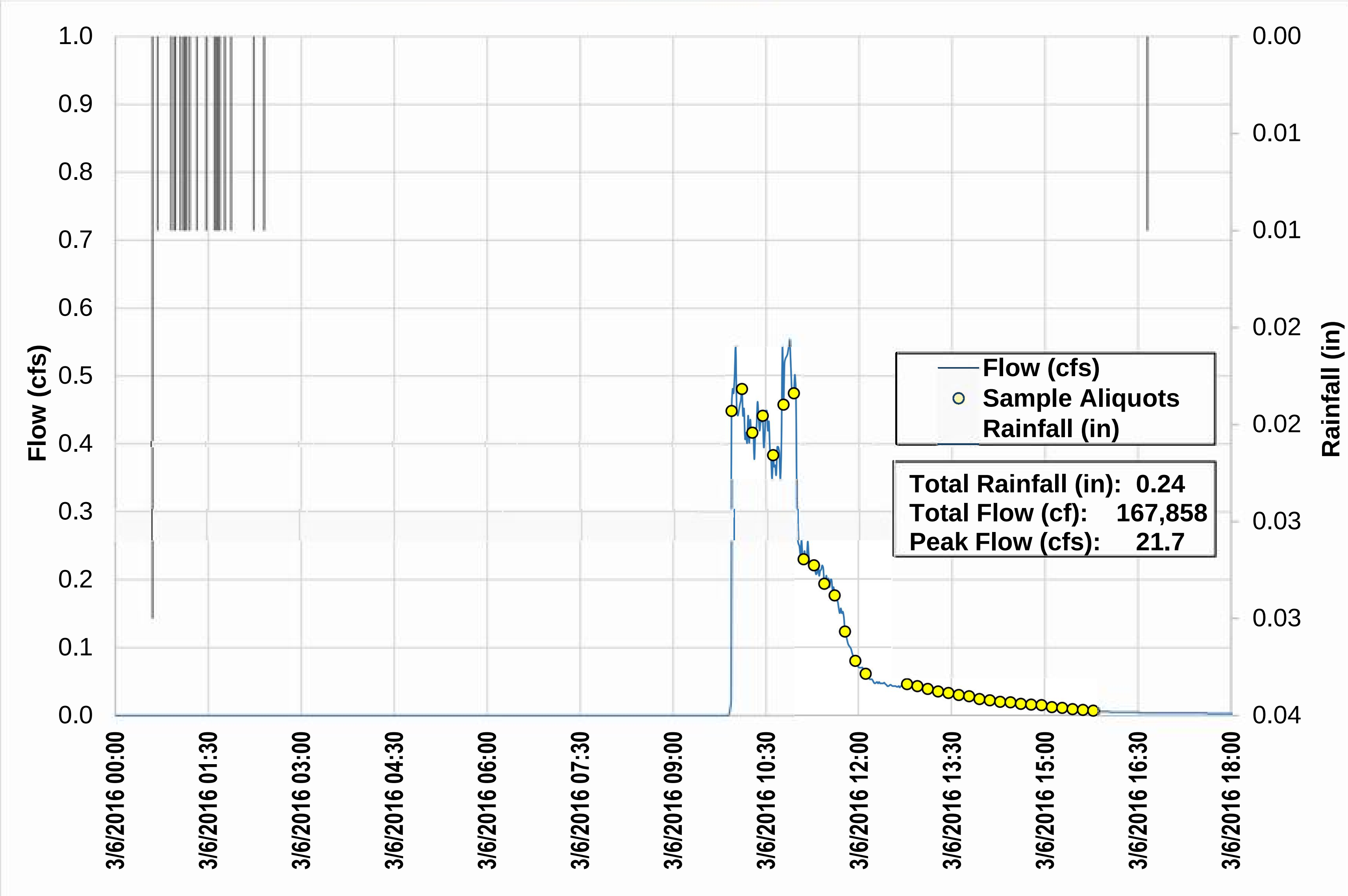

Figure E.1-3: MS4-SDC-03 Event Hydrograph

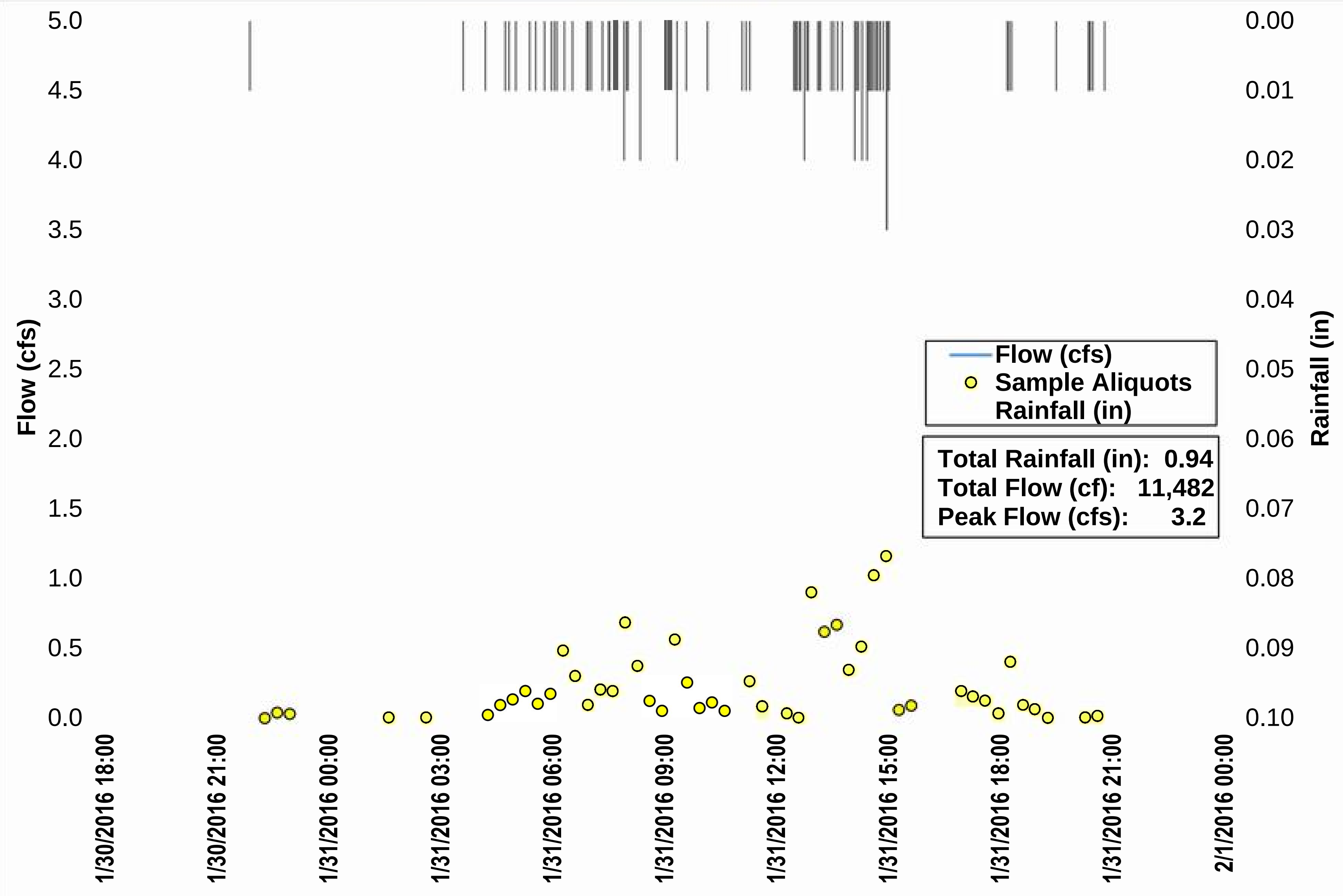

Figure E.1-4: MS4-SDC-04 Event Hydrograph

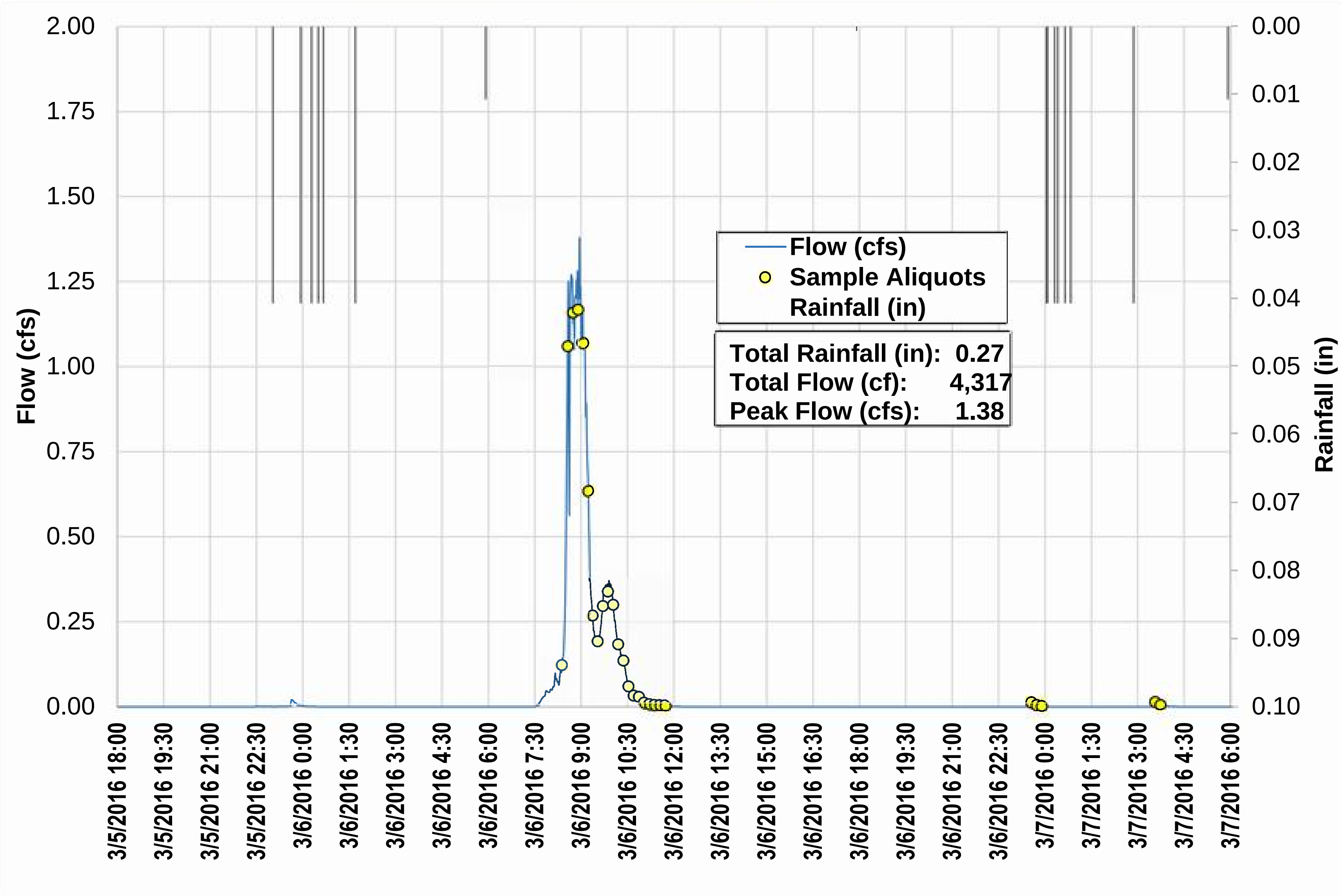

Figure E.1-5: MS4-SDC-05 Event Hydrograph

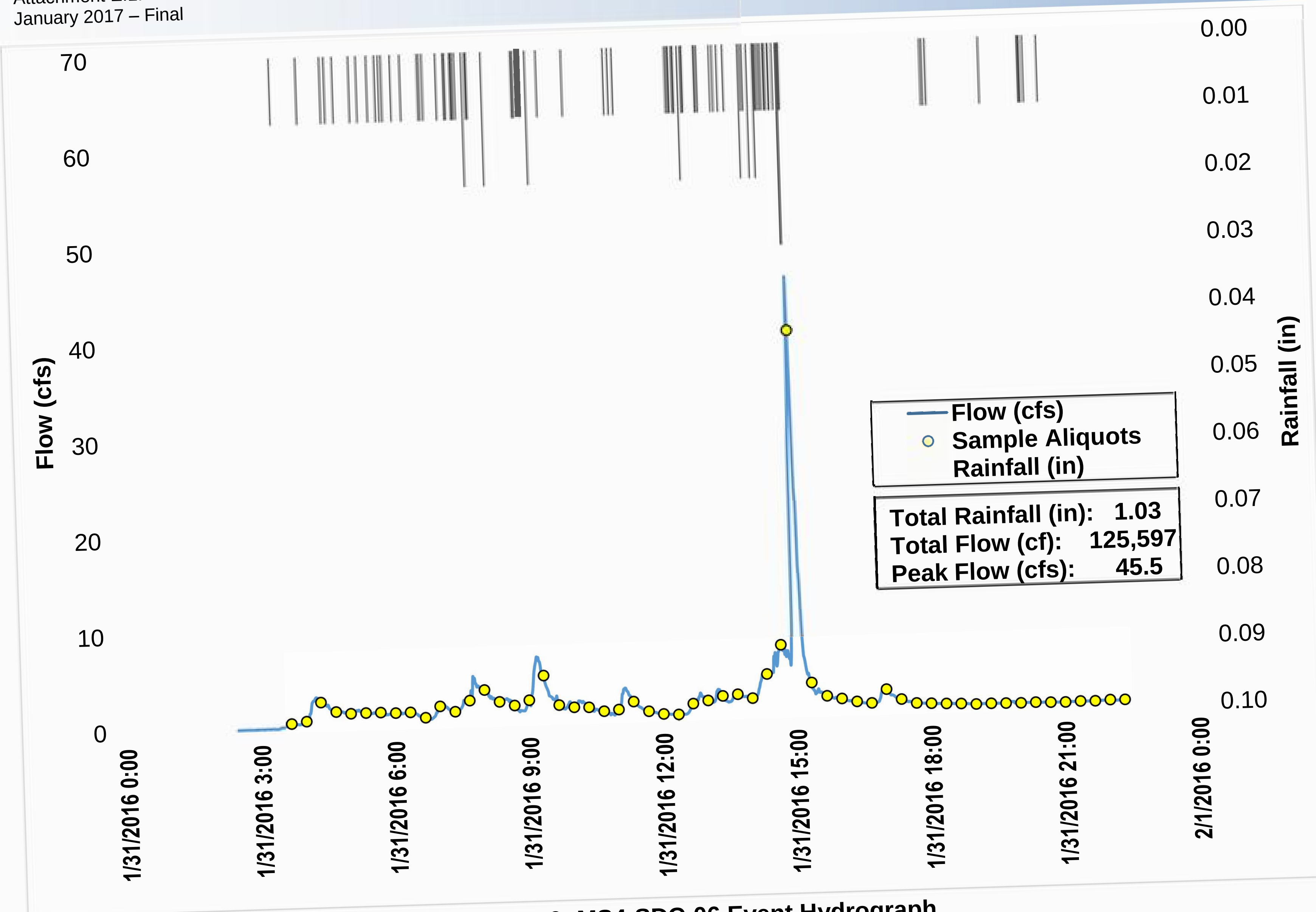

Figure E.1-6: MS4-SDC-06 Event Hydrograph

Attachment E.2 – Wet Weather Outfall Analytical Results

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Table E.2-1
2015-2016 San Dieguito River WMA Wet Weather Outfall Monitoring Analytical Results

Analyte	Units	MS4-SDC-1	MS4-SDC-2	MS4-SDC-3	MS4-SDC-4	MS4-SDC-5	MS4-SDC-6
Conventional Parameters							
Dissolved Oxygen	mg/L	7.52	7.92	6.93	7.54	10.4	10.9
Chloride	mg/L	250	190	44	79	150	190
Color (Dissolved)	color units	120	25	50	75	50	150
Color (Total)	color units	120	25	50	75	50	150
pH	pH units	8.00	8.24	8.16	7.87	8.04	7.66
Specific Conductivity	µS/cm	450	93	428	650	59	438
Sulfates	mg/L	67	250	83	90	57	150
Temperature	°C	18.6	18.6	16.8	19.2	15.7	16.2
Turbidity	NTU	41.1	5.27	5.55	51.6	24.5	29.3
Indicator Bacteria							
Enterococcus	MPN/100mL	6131	1607	7701	6800 J	9208	6800
Fecal Coliform	MPN/100mL	7900	28000	3300	520	31000	280 J
Total Coliform	MPN/100mL	70000	28000	220000	3400	1600000	10000
Total Metals							
Aluminum	µg/L	2600	480	320	7500	600	260
Cadmium	µg/L	0.32	< 0.041	< 0.041	0.073 J	0.2	< 0.041
Copper	µg/L	130	22	8.2	31	44	10
Iron	µg/L	3600	840	570	8600	840	300
Lead	µg/L	11	0.71	0.46	3.9	2.9	0.29
Manganese	µg/L	190	39	25	200	37	21
Mercury	µg/L	0.014 J	< 0.0039	< 0.0039	0.015 J	< 0.0039	0.03 J
Zinc	µg/L	490	33	15	63	220	33
Dissolved Metals							
Aluminum	µg/L	60	10	40	34	37	17
Iron	µg/L	100	< 1.1	87	37	66	15
Manganese	µg/L	130	7.5	15	5.5	14	6.7
Mercury	µg/L	< 0.0039	< 0.0039	< 0.0039	< 0.0039	< 0.0039	0.015 J

Table E.2-1 (continued)
2015-2016 San Dieguito River WMA Wet Weather Outfall Monitoring Analytical Results

Analyte	Units	MS4-SDC-1	MS4-SDC-2	MS4-SDC-3	MS4-SDC-4	MS4-SDC-5	MS4-SDC-6
Nutrients							
Nitrate as N	mg/L	2.5	4.9	0.46	0.76	0.97	1.5
Nitrite as N	mg/L	0.180	0.051 J	0.012 J	0.075 J	0.049 J	0.053 J
TKN	mg/L	7.3	1.6	0.87	2.5	2.8	1.3
Total Nitrogen	mg/L	10	6.5	1.3	3.3	3.8	2.9
Dissolved Phosphorus as P	mg/L	0.42	0.16	0.094	0.12	0.24	0.34
Total Phosphorus as P	mg/L	1	0.25	0.16	0.31	0.44	0.43
Solid Parameters							
TDS	mg/L	670	930	260	330	410	680
Synthetic Organics							
Pentachlorophenol	µg/L	0.58 J	0.38 J	0.38 J	< 0.19	0.38 J	< 0.19

Notes:
< = Analyte not detected at method detection limit shown.
J = Analyte detected above the method detection limit but below the reporting limit.

Attachment E.3 – Wet Weather Assessment Methodology

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1 Assessment of Wet Weather Outfall Results

In 2013 the San Diego Regional Water Quality Control Board (Regional Board) issued *Order No. R9-2013-0001 (amended by Order Nos. R9-2015-0001 and R9-2015-0100), National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region*, herein referred to as the MS4 Permit, regulating MS4 discharges throughout the San Diego Region. The MS4 Permit requires a series of wet weather MS4 outfall assessments be performed annually to assess and report the progress of water quality improvement strategies toward reducing pollutants in storm water discharges from the MS4. This Attachment describes the methodology used to perform these required assessments. The methodology outlined here is largely based on the transitional methodology described in the Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan (San Diego Regional Copermitees, 2015). Areas where the methodology differs from the transitional methodology are described in the relevant section, and also summarized in Section 5.0

Per MS4 Permit Provision D.4.b.(2)(b), Copermittees will annually assess and report the following:

- The average storm water runoff coefficient for each land use type within the Watershed Management Area (WMA);
- The volume of storm water and pollutant loads discharged from each of the Copermittee's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch;
- The total flow volume and pollutant loadings discharged from the Copermittee's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls;
- The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch; and
- Modifications to the wet weather MS4 outfall discharge monitoring locations and frequencies necessary to identify pollutants in storm water discharges from the MS4s in the Watershed Management Area.

Following acceptance of the Water Quality Improvement Plans and completion of the first year of Water Quality Improvement Plan Wet Weather MS4 Outfall Discharge Monitoring (2015-2016), annual assessments will also include comparison to applicable storm water action levels (SALs) in each Watershed Management Area as required by MS4 Permit Provision D.4.b.(2)(c). Compliance with applicable SALs will be used to evaluate whether the analyses and assumptions used to develop the Water Quality Improvement Plan should be updated as a component of the adaptive management process (MS4 Permit Provision B.5).

Table 1-1 provides the equations used in this methodology and lists the input and output variables for each equation. The sections that follow describe the application of these equations in greater detail.

Table 1-1
MS4 Wet Weather Outfall Assessment Equations

Permit Provision	Equation Reference	Equation	Inputs	Outputs
D.4.b.(2)(b)(1)[a]	A.1	$C_{Outfall\_Actual} = \frac{V_{Outfall\_Event}}{A_{Outfall} \times d_{Outfall\_Event}} \times \frac{12in}{1ft} \times \frac{1acre}{43{,}560\ ft^2}$	$V_{Outfall\_Event}$ (cf) $A_{Outfall}$ (acre) $d_{Outfall\_Event}$ (in)	$C_{Outfall\_Actual}$ (dimensionless)
	A.1a (Optional) [1]	$C_{Outfall\_His} = \frac{\sum_{Yr=1}^{n} C_{Outfall\_Actual\_Yr}}{n}$	$C_{Outfall\_Actual\_Yr}$ (dimensionless) n (year)	$C_{Outfall\_His}$ (dimensionless)
	A.2	$C_{Outfall\_HM} = \frac{\sum(A_{Outfall\_LU} \times C_{HM\_LU})}{\sum A_{Outfall\_LU}}$	$A_{Outfall\_LU}$ (acre) C_{HM_LU} (dimensionless)	$C_{Outfall\_HM}$ (dimensionless)
	A.3	$CF_{Outfall\_C} = \frac{C_{Outfall\_Actual}}{C_{Outfall\_HM}}$	$C_{Outfall\_Actual}$ (dimensionless) $C_{Outfall\_HM}$ (dimensionless)	$CF_{Outfall\_C}$ (dimensionless)
	A.4	$C_{Outfall\_LU} = CF_{Outfall\_C} \times C_{HM\_LU}$	$CF_{Outfall\_C}$ (dimensionless) C_{HM_LU} (dimensionless)	$C_{Outfall\_LU}$ (dimensionless)
	A.5[2]	$C_{WMA\_LU} = \frac{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU})}{\sum A_{Outfall\_LU}}$	$A_{Outfall\_LU}$ (acre) $C_{Outfall\_LU}$ (dimensionless)	C_{WMA_LU} (dimensionless)
D.4.b.(2)(b)(1)[b]	B.1	$V_{Outfall\_Annual} = (A_{Outfall} \times C_{Outfall\_Actual}) \times \sum d_{Outfall\_Annual} \times \frac{1ft}{12in} \times \frac{43{,}560ft^2}{1acre}$	$C_{Outfall\_Actual}$ (dimensionless) $A_{Outfall}$ (acre) $d_{Outfall\_Annual}$ (inches)	$V_{Outfall\_Annual}$ (cf)
	B.2[3]	$Pollutant\ Load_{Outfall} = (V_{Outfall\_Annual} \times Pollutant\ Concentration_{Outfall}) \times \mathrm{UC}$	$V_{Outfall\_Annual}$ (cf) Pollutant $Concentration_{Outfall}$ (units vary)	Pollutant $Load_{Outfall}$ (lb or MPN)
D.4.b.(2)(b)(1)[c]	C.1	$V_{WMA\_Juris\_LU} = (A_{WMA\_Juris\_LU} \times C_{WMA\_LU}) \times \sum d_{Outfall\_Annual} \times \frac{1ft}{12in} \times \frac{43{,}560ft^2}{1acre}$	C_{WMA_LU} (dimensionless) $A_{WMA\_Juris\_LU}$ (acre) $d_{Outfall\_Annual}$ (inches)	$V_{WMA\_Juris\_LU}$ (cf)
	C.2	$V_{WMA\_Juris} = \sum V_{WMA\_Juris\_LU}$	$V_{WMA\_Juris\_LU}$ (cf)	V_{WMA_Juris} (cf)
	C.3	$EMC_{Outfall\_Actual} = Pollutant\ Concentration_{Outfall}$	Pollutant $Concentration_{Outfall}$ (units vary)	$EMC_{Outfall\_Actual}$ (units vary)
	C.4	$EMC_{Outfall\_Calculated} = \frac{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU} \times EMC_{Typical\_LU})}{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU})}$	$A_{Outfall\_LU}$ (acre) $C_{Outfall\_LU}$ (dimensionless) $EMC_{Typical\_LU}$ (units vary)	$EMC_{Outfall\_Calculated}$ (units vary)
	C.5	$CF_{Outfall\_EMC} = \frac{EMC_{Outfall\_Actual}}{EMC_{Outfall\_Calculated}}$	$EMC_{Outfall\_Actual}$ (units vary) $EMC_{Outfall\_Calculated}$ (units vary)	$CF_{Outfall\_EMC}$ (units vary)
	C.6	$EMC_{Outfall\_LU} = CF_{Outfall\_EMC} \times EMC_{Typical\_LU}$	$CF_{Outfall\_EMC}$ (units vary) $EMC_{Typical\_LU}$ (units vary)	$EMC_{Outfall\_LU}$ (units vary)
	C.7	$EMC_{WMA\_LU} = \frac{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU} \times EMC_{Outfall\_LU})}{\sum(A_{Outfall\_LU} \times C_{Outfall\_LU})}$	$C_{Outfall\_LU}$ (dimensionless) $A_{Outfall\_LU}$ (acre) $EMC_{Outfall\_LU}$ (units vary)	EMC_{WMA_LU} (units vary)

Permit Provision	Equation Reference	Equation	Inputs	Outputs
	C.8[4]	$EMC_{WMA\_LU\_HIS} = \frac{\sum_{Yr=1}^{n} \sum(EMC_{WMA\_LU\_Yr})}{n}$	$EMC_{WMA\_LU\_Yr}$ (units vary) n (years)	$EMC_{WMA\_LU\_HIS}$ (units vary)
	C.9[3]	$Pollutant\ Load_{WMA\_Juris} = \sum(V_{WMA\_Juris\_LU} \times EMC_{WMA\_LU\_HIS} \times \mathrm{UC})$	$V_{WMA\_Juris\_LU}$ (cf) $EMC_{WMA\_LU\_HIS}$ (units vary)	Pollutant $Load_{WMA\_Juris}$ (lb or MPN)
D.4.b.(2)(b)(1)[d]	D.1	$V_{HSA\_Juris\_LU} = (A_{HSA\_Juris\_LU} \times C_{WMA\_LU}) \times \sum d_{Outfall\_Annual} \times \frac{1ft}{12in} \times \frac{43{,}560ft^2}{1acre}$	C_{WMA_LU} (dimensionless) $d_{Outfall\_Annual}$ (inches) $A_{HSA\_Juris\_LU}$ (acre)	$V_{HSA\_Juris\_LU}$ (cf)
	D.2	$V_{HSA\_Juris} = \sum V_{HSA\_Juris\_LU}$	$V_{HSA\_Juris\_LU}$ (cf)	V_{HSA_Juris} (cf)
	D.3	$\%V_{HSA\_Juris} = \frac{V_{HSA\_Juris}}{V_{WMA\_Juris}} \times 100$	V_{HSA_Juris} (cf) V_{WMA_Juris} (cf)	$\%V_{HSA\_Juris}$ (dimensionless)
	D.4[3]	$Pollutant\ Load_{HSA\_Juris} = \sum(V_{HSA\_Juris\_LU} \times EMC_{WMA\_LU\_HIS} \times \mathrm{UC})$	$V_{HSA\_Juris\_LU}$ (cf) $EMC_{WMA\_LU\_HIS}$ (units vary)	Pollutant $Load_{HSA\_Juris}$ (lb or MPN)
	D.5	$\%Pollutant\ Load_{HSA\_Juris} = \frac{Pollutant\ Load_{HSA\_Juris}}{Pollutant\ Load_{WMA\_Juris}} \times 100$	Pollutant $Load_{HSA\_Juris}$ (lb or MPN) Pollutant $Load_{WMA\_Juris}$ (lb or MPN)	%Pollutant $Load_{HSA\_Juris}$ (lb or MPN)

Notes:

1) For those outfalls monitored for more than one monitoring year, the outfall runoff “C” ($C_{outfall\_Actual}$) will be averaged across all years of monitoring. This average value ($C_{outfall\_His}$) is to be substituted for the calculated outfall runoff “C” ($C_{outfall\_Actual}$) in all subsequent calculations.
2) Historical data are included in this calculation. The WMA land use runoff “C” (C_{WMA_LU}) is calculated based on the area-weighted average of all years of outfall monitoring data.
3) Unit conversion (UC) varies by units used to express pollutant concentration. Common unit conversions include:
   a. mg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\,g}{1000mg}\right)\left(\frac{1\,lb}{453.592\,g}\right)$
   b. µg/L: $UC = \left(\frac{28.317L}{1ft^3}\right)\left(\frac{1\,g}{1\times10^6\mu g}\right)\left(\frac{1\,lb}{453.592\,g}\right)$
   c. MPN/100mL: $UC = \left(\frac{100mL}{0.1L}\right)\left(\frac{28.317L}{1ft^3}\right)$
4) The WMA land use EMC is averaged across all years of monitoring. This average EMC (EMCWMA_LU_HIS) is included in all subsequent calculations.

V=Runoff Volume; A=Area; d=depth; C=Runoff Coefficient
HM=County of San Diego Hydrology Manual; LU=Land Use; CF=Correction Factor; WMA=Watershed Management Area; EMC=Event Mean Concentration; HSA=Hydrologic SubArea; Juris=Jurisdictional; UC=Unit Conversion
in = inches; cf=cubic feet; lb=pounds

2 Land Use Analysis

2.1 Land Use Categorization

The process of calculating average storm water runoff coefficients for land use types first requires defining land use types within the WMA and locating the boundaries of each type. Geographic Information Systems (GIS) can be used to locate the boundaries and measure the area of each land use type. Grouping specific land use types into larger categories simplifies the calculation of average storm water runoff coefficients within the WMA. The categorizations used are based on the updated land use categorizations in the Transitional Monitoring and Assessment Program Report for the San Diego River WMA (2014-2015) (San Diego County MS4 Copermittees, 2016). These categories differ slightly from the categories presented in the Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan (San Diego Regional Copermitees, 2015).

Table 2-1 lists each San Diego Geographic Information Source (SanGIS) land use type and the corresponding land use category used in the wet weather MS4 assessments. The latest SanGIS land use GIS data layer can be downloaded from the SanGIS website (www.sangis.org).

Table 2-1
Land Use Types and Categories for Wet Weather MS4 Outfall Assessments

Land Use Category	SanGIS Land Use Type	SanGIS Land Use Code
Agriculture	Golf course	7204
	Orchard and Vineyard	8001
	Intensive Agriculture	8002
	Field Crops	8003
Commercial	Jail/Prison	1401
	Hotel/Motel (Low-Rise)	1501
	Hotel/Motel (High-Rise)	1502
	Resort	1503
	Rail Station/Transit Station	4111
	Parking Lot - Surface	4114
	Parking Lot - Structure	4115
	Park and Ride Lot	4116
	Wholesale Trade	5001
	Regional Shopping Center	5002
	Community Shopping Center	5003
	Neighborhood Shopping Center	5004
	Specialty Commercial	5005

Land Use Category	SanGIS Land Use Type	SanGIS Land Use Code
	Automobile Dealership	5006
	Arterial Commercial	5007
	Service Station	5008
	Other Retail Trade and Strip Commercial	5009
	Office (High-Rise)	6001
	Office (Low-Rise)	6002
	Government Office/Civic Center	6003
	Cemetery	6101
	Religious Facility	6102
	Library	6103
	Post Office	6104
	Fire/Police Station	6105
	Mission	6108
	Other Public Services	6109
	UCSD/VA Hospital/Balboa Hospital	6501
	Hospital - General	6502
	Other Health Care	6509
	Tourist Attraction	7201
	Stadium/Arena	7202
	Racetrack	7203
	Golf Course Clubhouse	7205
	Convention Center	7206
	Marina	7207
	Casino	7209
	Residential Under Construction	9501
	Commercial Under Construction	9502
	Office Under Construction	9504
	Olympic Training Center	7208
	Other Recreation - High	7210
	Residential Recreation	7607
Educational	SDSU/CSU San Marcos/UCSD	6801
	Other University or College	6802
	Junior College	6803
	Senior High School	6804

Land Use Category	SanGIS Land Use Type	SanGIS Land Use Code
	Junior High School or Middle School	6805
	Elementary School	6806
	School District Office	6807
	Other School	6809
	School Under Construction	9505
Industrial	Heavy Industry	2001
	Industrial Park	2101
	Light Industry - General	2103
	Warehousing	2104
	Public Storage	2105
	Extractive Industry	2201
	Junkyard/Dump/Landfill	2301
	Commercial Airport	4101
	Military Airport	4102
	General Aviation Airport	4103
	Airstrip	4104
	Communications and Utilities	4113
	Marine Terminal	4120
	Industrial Under Construction	9503
	Freeway	4112
Mixed Use	Mixed Use	9700
Residential: Multi-Family	Multi-Family Residential	1200
	Single Room Occupancy Units (SRO's)	1280
	Multi-Family Residential Without Units	1290
	Mobile Home Park	1300
	Dormitory	1402
	Military Barracks	1403
	Monastery	1404
	Other Group Quarters Facility	1409
Residential: Rural	Spaced Rural Residential	1000
Residential: Single-Family	Single Family Residential	1100
	Single Family Detached	1110

Land Use Category	SanGIS Land Use Type	SanGIS Land Use Code
	Single Family Multiple-Units	1120
	Single Family Residential Without Units	1190
Open Space	Military Use	6701
	Military Training	6702
	Weapons Facility	6703
	Other Recreation - Low	7211
	Park - Active	7601
	Open Space Park or Preserve	7603
	Beach - Active	7604
	Beach - Passive	7605
	Landscape Open Space	7606
	Undevelopable Natural Area	7609
	Vacant and Undeveloped Land	9101
Transportation	Freeway Under Construction	9507
	Railroad Right of Way	4117
	Road Right of Way	4118
	Other Transportation	4119
	Road Under Construction	9506
Water[1]	Water	9200
	Bay or Lagoon	9201
	Lake/Reservoir/Large Pond	9202

Source: San Diego County MS4 Copermittees, 2016
Notes:
1) Water land uses excluded from MS4 outfall assessments. Water land uses assumed to be a sink for runoff storage.

The Agriculture and Open Space land use categories were further subdivided based on hydrologic soil group (i.e., Soil Group A, B, C, or D). Any Agriculture or Open Space areas with an undefined soil group were classified as belonging to Soil Group D.

Federal, State, and Indian Reservation land uses were excluded from the load calculations. MS4 Permit Copermittees have limited jurisdiction over these land uses. Categorization of these land uses was based on the SanGIS LAND_OWNERSHIP_SG shape file. The following categories were excluded:

- Bureau of Land Management
- California Department of Fish and Game
- Indian Reservations

- Military Reservations
- Other Federal
- State
- State (Caltrans)
- State Parks
- U.S. Fish & Wildlife Service
- U.S. Forest Service

2.2 Expected Runoff Coefficients

Each land use category was assigned an expected runoff coefficient (Runoff "C") based on values listed in the San Diego County Hydrology Manual (County of San Diego, 2003). The Runoff "C" is a unitless coefficient representing fraction of rainfall that runs off a given land area rather than infiltrating. A larger Runoff "C" (approaching one) corresponds to a higher fraction of runoff, and typically corresponds to areas of low permeability (e.g., parking lots). A smaller Runoff "C" is often associated with undeveloped areas or other areas of high permeability.

Table 2-2 lists the expected runoff coefficients for each land use category (San Diego Regional Copermitees, 2015).

Table 2-2
Expected Runoff "C" Values by Land Use Category

Land Use Category	Runoff Coefficient
Agriculture[1]	0.2, 0.25, 0.3, OR 0.35
Commercial	0.82
Educational	0.58
Industrial	0.87
Mixed Use	0.66
Residential: Multi-Family	0.6
Residential: Rural	0.41
Residential: Single-Family	0.49
Open Space[1]	0.2, 0.25, 0.3, OR 0.35
Transportation	0.71

Notes:
1) Runoff coefficient varies by hydrologic soil group. Values presented are for soil groups A, B, C, and D, respectively.

Source: County of San Diego, 2003

2.3 Volumes and Loads of Storm Water Discharges

2.3.1 Land Use Storm Water Runoff Coefficient (D.4.b.(2)(b)(i)[a])

MS4 Permit Provision D.4.b.(2)(b)(i) requires calculation of the average storm water runoff coefficient (Runoff "C") for each land use type within the WMA. This calculation is based on the measured flow and rainfall values for each monitored outfall, along with the outfall drainage area characteristics.

The average Runoff "C" is calculated according to the following steps. The corresponding equation or equations for each step, as listed in Table 1-1, are provided in brackets.

1) Calculate the observed (actual) runoff coefficient for each monitored outfall. The observed runoff coefficient for each outfall ($C_{Outfall\_Actual}$) is calculated based on the observed runoff volume, size of the outfall drainage area, and depth of observed rainfall for the monitored storm. Rainfall data for each event is obtained from the County of San Diego Automatic Local Evaluation in Real Time (ALERT) System rain gauge closest to each monitoring station. [Equation A.1]. This is repeated for each monitored outfall in the WMA. For those outfalls monitored during more than one monitoring year (e.g., during 2014-2015 and 2015-2016), the observed runoff coefficient is averaged across all years of monitoring. This new value ($C_{Outfall\_His)}$ is used in place of $C_{Outfall\_Actual}$ in all subsequent calculations [Equation A.1.a].

2) Calculate the expected Runoff "C" for each monitored outfall. The expected Runoff "C" ($C_{Outfall\_HM}$) for each outfall is calculated based on the areas of each land use category in the outfall drainage area and the expected Runoff "C" for each land use category from the San Diego County Hydrology Manual, as listed in Table 1-2. [Equation A.2]. This is repeated for each monitored outfall in the WMA.

3) Calculate a Runoff "C" correction factor ($CF_{Outfall\_C}$) for each monitored outfall. The Runoff "C" Correction Factor is calculated by dividing the observed runoff coefficient ($C_{Outfall\_Actual}$) by the expected runoff coefficient ($C_{Outfall\_HM}$) [Equation A.3]. This is repeated for each monitored outfall in the WMA.

4) Calculate a land use Runoff "C" for each land use represented in the drainage area of each monitored outfall. A unique Runoff "C" ($C_{Outfall\_LU}$) is calculated for each land use category represented in each outfall drainage area [Equation A.4]. This is repeated for each land use category in each monitored outfall drainage area.

5) Calculate a WMA Runoff "C" for each land use category in the WMA. The WMA Runoff "C" (C_{WMA_LU}) is calculated as the area-weighted average of the outfall land use Runoff "C" values calculated in Step 4. In order to improve the accuracy of the resulting WMA Runoff "C" over time, results from each year of MS4 Outfall Monitoring are incorporated into the average [Equation A.5]. This equation is repeated for each land uses category in the WMA.

2.3.2 Monitored MS4 Outfall Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[b])

MS4 Permit Provision D.4.b.(2)(b)(i)[b] requires calculation of the storm water volume and pollutant loads discharged from each of the Responsible Agency's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area, for each storm event with measurable rainfall greater than 0.1 inch. This calculation is based on the actual Runoff "C" values, the size of each outfall drainage area, ALERT rain data for the rain gauge closest to each outfall, and the observed chemistry data.

The wet season storm water volume and pollutant loads are calculated according to the following steps. The corresponding equation or equations for each step, as listed in Table 1-1, are provided in brackets.

1) Calculate the annual storm water volume from each outfall. The storm water volume ($V_{Outfall\_Annual}$) is calculated using the actual runoff coefficient for each outfall ($C_{Outfall\_Actual}$ from Equation A.1) and the area of each outfall, multiplied by the total rainfall for the wet season. Total rainfall is calculated as the sum of rainfall from qualifying wet season rain events, based on the closest ALERT system gauge for each outfall. A qualifying storm event is defined as a wet season storm event with measureable rainfall greater than 0.1 inch. [Equation B.1]. This equation is repeated for each monitored outfall.

2) Calculate annual pollutant loads for each pollutant at each monitored outfall. The monitored event analytical result for each pollutant at each outfall is used to calculate an annual pollutant load ($PollutantLoad_{Outfall}$). [Equation B.2]. This equation is repeated for each pollutant at each monitored outfall.

2.3.3 Jurisdictional Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[c])

MS4 Permit Provision D.4.b.(2)(b)(i)[c] requires calculation of the total flow volume and pollutant loadings discharged from each Responsible Agency's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls. The WMA Runoff "C" values, calculated as described in Section 3.1, will be used in combination with land use area data and ALERT rainfall data to calculate a total flow volume for each jurisdiction. The annual volumes will be applied to pollutant event mean concentrations (EMCs) to calculate annual jurisdictional pollutant loadings.

The jurisdictional flow volume and pollutant loads are calculated according to the following steps. The corresponding equation or equations for each step, as listed in Table 1-1, are provided in brackets.

1) Calculate the wet season flow volume from each land use area in each jurisdiction in the WMA. An annual flow volume for each land use type in each jurisdiction ($V_{WMA\_Jurisd\_LU}$) is calculated using the land use Runoff "C" (C_{WMA_LU}), calculated as described in Section 3.1, the area of each land use type in each jurisdiction within the WMA, and the total qualifying wet season rainfall. The total qualifying wet season rainfall (sum of rainfall from events with rainfall totals exceeding >0.1inch) is calculated using a representative ALERT station from each WMA. If more than one ALERT station is present in a WMA, the station closest to the majority of monitoring locations will be used. [Equation C-1]. This equation is repeated for each land use type for each Responsible Agency.

2) Calculate the wet season flow volume from each jurisdiction in the WMA. The wet season flow volume from each land use in a jurisdiction will be summed to generate the wet season jurisdictional flow volume (V_{WMA_Juris}). [Equation C.2]. This equation is repeated for each Responsible Agency in the WMA.

3) Define the event mean concentration (EMC) for each monitored event. The event mean concentration (EMC) for each constituent ($EMC_{Outfall\_Actual}$) for each monitored outfall is defined as the measured constituent concentration for the outfall [Equation C.3].

4) Calculate the expected (calculated) EMC for each pollutant at each monitored outfall. An expected (calculated) EMC ($EMC_{Outfall\_Calculated}$) for each constituent at a monitored outfall will be calculated as the area-weighted average of literature EMC values for each land use type represented by the monitored outfall drainage area. The literature EMC values, based on literature EMCs provided in the San Diego River WMA Water Quality Improvement Plan (LWA & Amec Foster Wheeler, 2016) are provided in Table 2-3. [Equation C.4]. This equation is repeated for each pollutant at each monitored outfall.

5) Calculate an EMC correction factor for each pollutant measured from each monitored outfall. A ratio, or correction factor for the Estimated Mean Concentration ($CF_{Outfall\_EMC}$), is calculated using the actual EMC and the expected (calculated) EMC for each constituent at each outfall [Equation C.5]. This equation is repeated for each pollutant at each monitored outfall.

6) Calculate a land use EMC for each land use represented in the drainage area of each monitored outfall. The EMC correction factor is multiplied by the expected EMC (Table 2-3) for each constituent at each monitored outfall [Equation C.6], resulting in a corrected EMC for each constituent for each outfall ($EMC_{Outfall\_LU}$). This equation is repeated for each pollutant and each land use at each outfall.

7) Calculate a WMA EMC for each pollutant and each land use category. An EMC for each monitored constituent in the WMA by each land use type (EMC_{WMA_LU}) is then calculated as the area-weighted average of the outfall land use EMC [Equation C.7]. This equation is repeated for each pollutant and each land use in the WMA.

8) Calculate the historical average WMA EMC for each pollutant and each land use category. Each EMC calculated using Equation C.7 is averaged with the historical EMCs for that constituent and land use, to derive the historical average WMA EMC ($EMC_{WMA\_LU\_HIS}$) [Equation C.8]. This equation is repeated for each pollutant and each land use in the WMA.

9) Calculate the annual pollutant load for each pollutant from each Responsible Agency in the WMA. Wet season jurisdictional pollutant loads ($Pollutant\ Load_{WMA\_Juris}$) are calculated for each constituent by summing the load from each land use in the jurisdiction [Equation C.9]. This equation is repeated for each pollutant and each Responsible Agency.

Table 2-3
Literature EMCs by Land Use Type

Constituent	Agriculture (Row Crop)[6]	Orchard[6]	Commercial[7]	Educational	Industrial	Vacant/ Open Space	Residential: Multi-Family[7]	Residential: Rural	Residential: Single Family	Transportation
Dissolved Oxygen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Color[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Dissolved Color[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
pH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Specific Conductivity[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Sulfates[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Temperature	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Hardness[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Turbidity[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Enterococcus[1]	60300	1344	51600	2148	26703	484	11800	6684	35557	1680
Fecal Coliform	60300	1344	51600	2148	26703	484	11800	6684	35557	1680
Total Coliform[1]	60300	1344	51600	2148	26703	484	11800	6684	35557	1680
Aluminum (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Aluminum (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Beryllium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Beryllium (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Cadmium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Cadmium(Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Copper (Dissolved)	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Copper (Total)	100.1	100.1	54.84	12.02	53.54	10.6	12.1	8.36	25.96	52.2
Iron (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Iron (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Lead (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Lead (Total)	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Manganese (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Manganese (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Mercury (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Mercury (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Molybdenum (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Molybdenum (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Nickel (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Nickel (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Selenium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Selenium (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Silver (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Silver (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Thallium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4
Thallium (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Titanium (Dissolved)[4]	22.5	22.5	16.62	5.58	21.35	0.6	7.4	4.2	11.42	32.4

Constituent	Agriculture (Row Crop)[6]	Orchard[6]	Commercial[7]	Educational	Industrial	Vacant/ Open Space	Residential: Multi-Family[7]	Residential: Rural	Residential: Single Family	Transportation
Titanium (Total)[3]	30.2	30.2	14.4	7.43	20.52	3	4.5	21.38	13.03	9.2
Zinc (Dissolved)	40.1	40.1	224.4	73.13	214.58	28.1	77.5	14.99	50.02	222
Zinc (Total)	274.8	274.8	483.7	174.1	428.39	26.3	125.1	39.19	153.29	292.9
Ammonia	1.65	0.04	1.21	0.4	0.6	0.11	0.5	0.11	0.49	0.37
Nitrate	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Nitrite[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Total Orthophosphate[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
TKN	7.32	2.31	3.44	1.71	2.87	0.96	1.8	2.65	2.51	1.84
Total Nitrogen2	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
Dissolved Phosphorus	1.41	0.13	0.29	0.26	0.26	0.09	0.2	0.12	0.45	0.56
Total Phosphorus	3.34	0.36	0.32	0.46	0.45	0.12	0.23	1.59	0.49	0.68
TDS[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
TSS	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
SSC[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Trash	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DDT[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
PCP[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Chlordane[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Diazanon[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
MBAS[2]	34.4	26.11	0.55	0.61	0.87	1.17	1.51	1.5	1.58	0.74
PAHs[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
PCBs[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Organophosphorus Pesticides[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Pesticides/PCBs[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Pyrethroid Pesticides[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
Nitrogen Pesticides[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
di(2-ethylhexyl) adipate[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
di(2-ethylhexyl phthalate[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
hexachlorobenzene[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
hexachlorocyclopentadiene (HEX)[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8
2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)[5]	999.2	252.64	127.68	132.11	125.18	216.6	39.9	2523.76	123.41	77.8

Notes:
NA=Not applicable. EMCs not provided because annual load not calculated for these constituents.
1. Distribution of constituent EMCs based on values listed for fecal coliform
2. Distribution of constituent EMCs based on values listed for nitrate as N
3. Distribution of constituent EMCs based on values listed for total lead
4. Distribution of constituent EMCs based on values listed for dissolved copper.
5. Distribution of constituent EMCs based on values listed for total suspended solids.
6. Values for Agricultural land use based on average of Agriculture (Row Crop) and Orchard values.
7. Values for Mixed Use land use based on average of Commercial and Residential: Multi-Family values.

2.3.4 Land Use Flow Volume and Pollutant Loadings (D.4.b.(2)(b)(i)[d])

MS4 Permit Provision D.4.b.(2)(b)(i)[d] requires calculating the percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea (HSA) with a major MS4 outfall to receiving waters, or within each major MS4 outfall to receiving waters, in the Responsible Agency's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch. The methods used to perform these calculations are similar to those used to calculate the WMA jurisdictional storm water volumes and pollutant loads described in Section 2.4.3, except HSAs without a major outfall are excluded.

The HSA flow volume and pollutant loads are calculated according to the following steps. The corresponding equation or equations for each step, as listed in Table 1-1, are provided in brackets.

1) Calculate the wet season flow volume from each land use area in each HSA with a major outfall in the WMA. An annual flow volume for each land use type in each HSA ($V_{HSA\_Juris\_LU}$) is calculated using the land use Runoff "C" (C_{WMA_LU}), calculated as described in Section 2.4.1, the area of each land use type in each HSA in each jurisdiction within the WMA, and the total qualifying wet season rainfall. [Equation D.1]. This equation is repeated for each land use type in each HSA for each jurisdiction in the WMA.
2) Calculate the wet season flow volume from each jurisdiction in each HSA with a major outfall in the WMA. The wet season flow volume from each land use in the HSA (by jurisdiction) is added to calculate the total storm water volume by HSA (V_{HSA_Juris}) for the jurisdiction [Equation D.2]. This equation is repeated for each Responsible Agency.
3) Calculate the percent of storm water volume discharged from each HSA, by jurisdiction. A percent volume for each jurisdiction ($\%V_{HSA\_Juris}$) can be calculated by dividing the wet season flow volume from the HSA by the total jurisdictional runoff volume in the WMA [Equation D.3]. This equation is repeated for each Responsible Agency.
4) Calculate the annual pollutant load for each pollutant from each Responsible Agency in the WMA, by HSA. Pollutant loads by HSA by jurisdiction ($\text{Pollutant Load}_{HSA\_Juris}$) are calculated for each constituent by summing the load from each land use area in the HSA [Equation D.4]. This equation is repeated for each pollutant, each Responsible Agency, and each HSA in which that Responsible Agency has a major outfall.
5) Calculate the percent pollutant load contribution for each pollutant from each HSA. The percent contribution of pollutant load for each jurisdiction ($\%\text{Pollutant Load}_{HSA\_Juris}$) can be calculated by dividing the HSA pollutant load for each jurisdiction by the WMA pollutant load for that jurisdiction [Equation D.5]. This equation is repeated for each pollutant, each Responsible Agency, and each HSA in which that Responsible Agency has a major outfall.

3 Storm Water Action Level Comparison

Per MS4 Permit Provision D.4.b.(2)(c), Responsible Agencies must compare pollutant concentrations from monitored wet weather outfalls to applicable Storm Water Action Levels (SALs). The Responsible Agencies will include this comparison in each Water Quality Improvement Plan Annual Report. The SALs listed in Provision C.2 of the MS4 Permit are provided in Table 3-1. Additional SALs may apply, on a WMA-specific basis, for pollutants that cause or contribute to a receiving water condition associated with the highest priority water quality condition. These SALs will be provided in the applicable Water Quality Improvement Plan Annual Report.

Table 3-1
Storm Water Action Levels (SALs) for Discharges from MS4s to Receiving Waters

Parameter	Units	Action Level
Turbidity	NTU	126
Nitrate & Nitrite (Total)	mg/L	2.6
Phosphorus (Total P)	mg/L	1.46
Cadmium (Total Cd)[1]	µg/L	3.0
Copper (Total Cu)[1]	µg/L	127
Lead (Total Pb)[1]	µg/L	250
Zinc (Total Zn)[1]	µg/L	976

Notes:
NTU= Nephelometric Turbidity Units; mg/L = milligrams per liter; µg/L = micrograms per liter
1) If a total metals concentration exceeds the listed action level, the concentration must be compared to the California Toxics Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If the sample does not exceed the USEPA 1-hr maximum concentration criterion for the measured level of hardness, the sample results will not be considered above the SAL.

4 Summary of Changes from Transitional Methodology

The methodology presented is largely identical to the transitional methodology outlined in the Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan (San Diego Regional Copermitees, 2015). Differences from the transitional work plan include the following:

- Land use categorization, presented in Table 2-1, is based on the revised categorization presented in the San Diego River Transitional Monitoring Annual Report.
- For the purposes of calculating land use areas, agricultural and open space land uses of an undefined soil group are classified as soil group D.
- Literature EMCs are based on values listed in the San Diego River WMA Water Quality Improvement Plan (LWA & Amec Foster Wheeler, 2016). Literature EMCs for constituents not described in that document are estimated as described in Table 2-3.
- For outfalls monitored during more than one monitoring season, the outfall runoff coefficient (Runoff “C”) is averaged based on all years of monitoring.
- The WMA land use Runoff “C” is an area-weighted average across all years of monitoring.
- The land use EMC values are based on an average of the land use EMC values for all years of monitoring.
- The assessment excludes State, Federal, and Indian Reservation lands from the WMA and HSA load calculations. The transitional monitoring and assessment program excluded Federal and Indian Reservation lands only. These land uses are often outside the jurisdiction of the Copermittees.

5 References

County of San Diego. 2003. San Diego County Hydrology Manual. Prepared by the County of San Diego Department of Public Works Flood Control Section. June 2003.

Larry Walker and Associates (LWA) & Amec Foster Wheeler. 2016. San Diego River Watershed Management Area Water Quality Improvement Plan. January 2016.

San Diego County MS4 Copermittes. 2016. Transitional Monitoring and Assessment Program Report for the San Diego River WMA (2014-2015) Prepared by Weston Solutions. January 2016.

San Diego County Regional Copermittees. 2015. 2013-2014 and 2014-2015 Transitional Wet Weather MS4 Outfall Discharge Monitoring Work Plan. Prepared by Weston Solutions. January 2015.

Attachment E.4 – Wet Weather HSA Storm Water Volumes and Pollutant Loads

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Table E.4-1
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of Del Mar HSA 905.11

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	0	0	2,389,254	116,372	11,766	0	28,131	23,092	2,144	447,061	73,236	62,769	2,225,942	2,499,742	7,879,510
% Contribution	%	0%	0%	0%	0%	30%	1%	0%	0%	0%	0%	0%	6%	1%	1%	28%	32%	100%
Conventional Parameters																		
Chloride	lb	0	0	0	0	792.3	0	32.87	0	32.22	7.997	4.112	1768	162.6	295.1	4844	5445	13384
Sulfate	lb	0	0	0	0	150.8	0	30.94	0	71.52	17.75	9.836	3674	84.34	424.7	4329	4440	13233
Indicator Bacteria																		
Enterococcus	MPN	0	0	0	0	2.89E+13	0	1.37E+12	0	4.82E+11	1.20E+11	9.80E+10	5.16E+13	3.14E+12	1.26E+13	3.63E+14	2.42E+14	7.03E+14
Fecal Coliform	MPN	0	0	0	0	3.50E+13	0	3.44E+11	0	3.96E+11	9.82E+10	1.17E+11	5.11E+12	5.32E+12	2.27E+13	2.69E+14	8.06E+13	4.18E+14
Total Coliform	MPN	0	0	0	0	1.14E+15	0	1.84E+13	0	2.78E+12	6.91E+11	3.92E+11	8.74E+13	1.81E+14	6.03E+13	1.04E+15	5.73E+14	3.11E+15
Total Metals																		
Aluminum	lb	0	0	0	0	5.190	0	0.1088	0	0.1284	0.0319	0.0595	0.6977	0.6358	4.653	31.3052	34.6778	77.4886
Cadmium	lb	0	0	0	0	0.001	0	0.0000	0	0.0000	4.17E-06	3.08E-06	2.87E-04	1.18E-04	0.0004	0.0026	0.0032	0.0076
Copper	lb	0	0	0	0	0.3153	0	0.0041	0	0.0068	0.0017	0.0009	0.0627	0.0227	0.0446	0.4789	1.79	2.729
Iron	lb	0	0	0	0	6.901	0	0.2922	0	0.2022	0.0502	0.0817	2.909	0.7743	7.5146	47.33	53.00	119.1
Lead	lb	0	0	0	0	0.0220	0	0.0002	0	0.0004	9.57E-05	6.34E-05	3.10E-03	0.0024	0.0066	0.0543	0.0667	0.1559
Manganese	lb	0	0	0	0	0.3498	0	0.0121	0	0.0120	0.0030	0.0041	0.2192	0.0305	0.6042	2.279	2.506	6.020
Mercury	lb	0	0	0	0	0.0001	0	0.0000	0	0.0000	5.87E-07	8.63E-07	5.90E-05	1.35E-05	0.0001	6.94E-04	7.35E-04	0.0017
Zinc	lb	0	0	0	0	1.397	0	0.0119	0	0.0088	0.0022	0.0019	0.1099	0.1492	0.2007	1.373	5.706	8.960
Dissolved Metals																		
Aluminum	lb	0	0	0	0	0.1496	0	0.0148	0	0.0009	0.0002	0.0002	0.0053	0.0371	0.1010	0.4427	1.828	2.580
Iron	lb	0	0	0	0	0.2636	0	0.0832	0	0.0088	0.0022	0.0059	0.0161	0.0482	3.825	2.249	6.230	12.73
Manganese	lb	0	0	0	0	0.1434	0	0.0053	0	0.0009	0.0002	0.0003	0.0041	0.0118	0.1845	0.3127	1.393	2.056
Mercury	lb	0	0	0	0	4.88E-05	0	2.76E-06	0	1.71E-08	4.24E-09	3.33E-09	2.58E-06	1.12E-05	4.39E-05	2.78E-04	1.29E-03	0.0017
Nutrients																		
Nitrate as N	lb	0	0	0	0	2.736	0	0.1962	0	0.9341	0.2319	0.1833	37.83	2.119	10.20	66.72	59.51	180.7
Nitrite as N	lb	0	0	0	0	0.2585	0	0.0051	0	0.0626	0.0155	0.0078	1.065	0.1317	0.2471	2.545	2.563	6.901
TKN	lb	0	0	0	0	17.07	0	0.3458	0	0.5417	0.1345	0.1098	11.47	2.649	10.25	64.82	74.11	181.5
Total Nitrogen	lb	0	0	0	0	12.62	0	0.3400	0	2.355	0.5846	0.3456	53.65	10.26	21.73	195.7	134.36	432.0
Dissolved Phosphorus as P	lb	0	0	0	0	0.9189	0	0.0258	0	0.0233	0.0058	0.0033	1.136	0.2810	0.1331	7.913	17.01	27.45
Total Phosphorus as P	lb	0	0	0	0	1.57	0	0.0440	0	0.0583	0.0145	0.0140	1.837	0.4349	2.455	10.94	27.20	44.56
Solid Parameters																		
TDS	lb	0	0	0	0	993.4	0	88.75	0	315.8	78.38	37.68	17122	616.8	1714	19592	21138	61697
Synthetic Organics																		
Pentachlorophenol	lb	0	0	0	0	0.0022	0	0.0001	0	0.0002	4.12E-05	6.45E-05	0.0144	3.05E-04	0.0212	0.0097	0.0110	0.0593

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-2
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of Del Mar HSA 905.11

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	0	0	2,389,254	116,372	11,766	0	28,131	23,092	2,144	447,061	73,236	62,769	2,225,942	2,499,742	7,879,510
% Contribution	%	0%	0%	0%	0%	30%	1%	0%	0%	0%	0%	0%	6%	1%	1%	28%	32%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	0%	20%	1%	0%	0%	0%	0%	0%	7%	1%	1%	44%	25%	100%
Sulfate	%	0%	0%	0%	0%	9%	1%	0%	0%	0%	0%	0%	7%	1%	2%	53%	27%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	61%	0%	0%	0%	0%	0%	0%	0%	0%	0%	36%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	78%	0%	0%	0%	0%	0%	0%	0%	1%	0%	20%	1%	100%
Total Coliform	%	0%	0%	0%	0%	97%	0%	0%	0%	0%	0%	0%	0%	1%	0%	2%	0%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	0%	48%	0%	0%	0%	0%	0%	0%	0%	0%	1%	28%	22%	100%
Cadmium	%	0%	0%	0%	0%	91%	0%	0%	0%	0%	0%	0%	0%	1%	0%	4%	5%	100%
Copper	%	0%	0%	0%	0%	70%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	20%	100%
Iron	%	0%	0%	0%	0%	51%	0%	0%	0%	0%	0%	0%	0%	0%	1%	27%	21%	100%
Lead	%	0%	0%	0%	0%	78%	0%	0%	0%	0%	0%	0%	0%	1%	0%	11%	10%	100%
Manganese	%	0%	0%	0%	0%	56%	0%	0%	0%	0%	0%	0%	1%	0%	1%	23%	19%	100%
Mercury	%	0%	0%	0%	0%	10%	2%	0%	0%	0%	0%	0%	3%	0%	0%	43%	42%	100%
Zinc	%	0%	0%	0%	0%	82%	0%	0%	0%	0%	0%	0%	0%	1%	0%	5%	12%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	48%	0%	0%	0%	0%	0%	0%	0%	1%	0%	12%	39%	100%
Iron	%	0%	0%	0%	0%	60%	0%	1%	0%	0%	0%	0%	0%	1%	0%	9%	30%	100%
Manganese	%	0%	0%	0%	0%	60%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	30%	100%
Mercury	%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	20%	79%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	0%	14%	1%	0%	0%	0%	0%	0%	5%	1%	3%	52%	24%	100%
Nitrite as N	%	0%	0%	0%	0%	28%	1%	0%	0%	0%	0%	0%	6%	2%	1%	40%	23%	100%
TKN	%	0%	0%	0%	0%	62%	1%	0%	0%	0%	0%	0%	1%	1%	1%	19%	16%	100%
Total Nitrogen	%	0%	0%	0%	0%	27%	1%	0%	0%	0%	0%	0%	5%	2%	2%	43%	21%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	0%	29%	1%	0%	0%	0%	0%	0%	1%	1%	0%	27%	42%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	35%	1%	0%	0%	0%	0%	0%	1%	1%	1%	22%	39%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	0%	15%	1%	0%	0%	0%	0%	0%	7%	1%	1%	48%	25%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	0%	0%	0%	61%	0%	0%	0%	1%	1%	0%	1%	1%	17%	12%	6%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-3
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of Escondido HSA 905.21

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	135,398	23,970	36,399	1,867,240	2,185,171	178,027	0	762	356,187	530,700	1,544,812	389,565	166,142	10,044,252	4,222,799	21,681,422
% Contribution	%	0%	1%	0%	0%	9%	10%	1%	0%	0%	2%	2%	7%	2%	1%	46%	19%	100%
Conventional Parameters																		
Chloride	lb	0	436.8	49.78	209.0	29209	24258	429.7	0	2.460	1149	1089	8869	2619	968.4	95128	28674	193092
Sulfate	lb	0	969.8	119.1	434.3	5559	14716	404.5	0	5.461	2551	2605	18431	1358	1394	85011	23382	156940
Indicator Bacteria																		
Enterococcus	MPN	0	6.54E+12	1.19E+12	6.10E+12	1.07E+15	3.26E+15	1.79E+13	0	3.68E+10	1.72E+13	2.59E+13	2.59E+14	5.06E+13	4.14E+13	7.13E+15	1.27E+15	1.32E+16
Fecal Coliform	MPN	0	5.36E+12	1.42E+12	6.04E+11	1.29E+15	1.54E+14	4.50E+12	0	3.02E+10	1.41E+13	3.11E+13	2.56E+13	8.56E+13	7.44E+13	5.27E+15	4.24E+14	7.39E+15
Total Coliform	MPN	0	3.78E+13	4.74E+12	1.03E+13	4.21E+16	5.27E+15	2.40E+14	0	2.13E+11	9.93E+13	1.04E+14	4.38E+14	2.92E+15	1.98E+14	2.05E+16	3.02E+15	7.49E+16
Total Metals																		
Aluminum	lb	0	1.740	0.7210	0.0825	191.3	8.152	1.423	0	0.0098	4.578	15.77	3.500	10.24	15.27	614.8	182.6	1050
Cadmium	lb	0	2.28E-04	3.73E-05	3.39E-05	0.0329	0.0042	0.0004	0	1.28E-06	6.00E-04	8.16E-04	0.0014	0.0019	0.0013	0.0518	0.0169	0.1125
Copper	lb	0	0.0916	0.0105	0.0074	11.63	0.5995	0.0540	0	5.16E-04	0.2409	0.2296	0.3147	0.3657	0.1465	9.404	9.435	32.52
Iron	lb	0	2.742	0.9891	0.3439	254.4	43.51	3.821	0	0.0154	7.214	21.64	14.60	12.47	24.66	929.5	279.1	1595
Lead	lb	0	5.23E-03	7.67E-04	3.66E-04	0.8125	0.0444	0.0024	0	2.94E-05	0.0137	0.0168	0.0155	0.0385	0.0216	1.066	0.3515	2.389
Manganese	lb	0	0.1628	0.0497	0.0259	12.90	3.146	0.1585	0	9.17E-04	0.4283	1.088	1.099	0.4914	1.983	44.76	13.20	79.49
Mercury	lb	0	3.21E-05	1.04E-05	6.97E-06	2.82E-03	9.41E-04	6.84E-05	0	1.80E-07	8.43E-05	2.28E-04	2.96E-04	2.18E-04	2.97E-04	0.0136	0.0039	0.0225
Zinc	lb	0	0.1196	0.0232	0.0130	51.50	4.765	0.1562	0	6.74E-04	0.3147	0.5083	0.5512	2.403	0.6589	26.96	30.05	118.0
Dissolved Metals																		
Aluminum	lb	0	0.0120	0.0030	0.0006	5.513	0.2181	0.1932	0	6.75E-05	0.0315	0.0661	0.0264	0.5979	0.3315	8.693	9.626	25.31
Iron	lb	0	0.1187	0.0711	0.0019	9.719	0.7482	1.088	0	6.69E-04	0.3123	1.555	0.0806	0.7764	12.55	44.17	32.81	104.0
Manganese	lb	0	0.0125	0.0036	0.0005	5.287	0.2271	0.0698	0	7.04E-05	0.0329	0.0793	0.0206	0.1899	0.6056	6.140	7.336	20.00
Mercury	lb	0	2.32E-07	4.04E-08	3.05E-07	1.80E-03	1.92E-04	3.61E-05	0	1.30E-09	6.09E-07	8.83E-07	1.29E-05	1.81E-04	1.44E-04	0.0055	0.0068	0.0146
Nutrients																		
Nitrate as N	lb	0	12.67	2.219	4.472	100.9	147.9	2.565	0	0.0713	33.319	48.54	189.8	34.13	33.48	1310	313.4	2234
Nitrite as N	lb	0	0.8492	0.0946	0.1259	9.529	4.208	0.0669	0	0.0048	2.234	2.068	5.343	2.121	0.8110	49.98	13.50	90.93
TKN	lb	0	7.345	1.329	1.356	629.2	151.4	4.521	0	0.0414	19.32	29.08	57.55	42.67	33.63	1273	390.3	2641
Total Nitrogen	lb	0	31.93	4.184	6.342	465.1	198.4	4.445	0	0.1798	84.00	91.52	269.1	165.31	71.31	3843	707.6	5943
Dissolved Phosphorus as P	lb	0	0.3165	0.0401	0.1342	33.87	25.34	0.3377	0	0.0018	0.8327	0.8773	5.697	4.526	0.4369	155.4	89.58	317.4
Total Phosphorus as P	lb	0	0.7900	0.1699	0.2172	57.70	46.81	0.5747	0	0.0044	2.078	3.717	9.217	7.005	8.057	214.9	143.2	494.4
Solid Parameters																		
TDS	lb	0	4282	456.2	2024	36621	69793	1160	0	24.11	11264	9980	85897	9935	5626	384756	111314	733133
Synthetic Organics																		
Pentachlorophenol	lb	0	0.0022	7.80E-04	0.0017	0.0818	0.0524	0.0015	0	1.27E-05	0.0059	0.0171	0.0725	0.0049	0.0697	0.1914	0.0579	0.5598

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-4
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of Escondido HSA 905.21

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	135,398	23,970	36,399	1,867,240	2,185,171	178,027	0	762	356,187	530,700	1,544,812	389,565	166,142	10,044,252	4,222,799	21,681,422
% Contribution	%	0%	1%	0%	0%	9%	10%	1%	0%	0%	2%	2%	7%	2%	1%	46%	19%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	0%	5%	6%	0%	0%	0%	1%	1%	7%	2%	1%	63%	13%	100%
Sulfate	%	0%	0%	0%	0%	2%	5%	0%	0%	0%	1%	2%	7%	1%	1%	67%	13%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	21%	1%	1%	0%	0%	0%	0%	0%	1%	0%	73%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	38%	0%	0%	0%	0%	0%	0%	0%	2%	1%	58%	1%	100%
Total Coliform	%	0%	0%	0%	0%	82%	0%	1%	0%	0%	0%	0%	0%	5%	0%	11%	0%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	0%	18%	2%	1%	0%	0%	0%	1%	1%	1%	1%	58%	17%	100%
Cadmium	%	0%	0%	0%	0%	71%	0%	0%	0%	0%	0%	0%	0%	4%	0%	16%	8%	100%
Copper	%	0%	0%	0%	0%	40%	2%	1%	0%	0%	0%	1%	1%	1%	0%	29%	24%	100%
Iron	%	0%	0%	0%	0%	19%	2%	1%	0%	0%	0%	1%	1%	1%	1%	57%	17%	100%
Lead	%	0%	0%	0%	0%	45%	2%	1%	0%	0%	0%	0%	0%	2%	1%	36%	12%	100%
Manganese	%	0%	0%	0%	0%	22%	4%	1%	0%	0%	0%	1%	1%	1%	1%	53%	16%	100%
Mercury	%	0%	0%	0%	0%	2%	13%	0%	0%	0%	0%	0%	3%	0%	0%	60%	22%	100%
Zinc	%	0%	0%	0%	0%	55%	4%	0%	0%	0%	0%	0%	0%	2%	0%	20%	18%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	22%	3%	3%	0%	0%	0%	0%	0%	2%	0%	31%	38%	100%
Iron	%	0%	0%	0%	0%	30%	2%	5%	0%	0%	0%	0%	0%	3%	0%	26%	33%	100%
Manganese	%	0%	0%	0%	0%	32%	2%	2%	0%	0%	0%	0%	0%	1%	0%	27%	35%	100%
Mercury	%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	37%	55%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	0%	3%	4%	0%	0%	0%	1%	1%	5%	1%	2%	69%	12%	100%
Nitrite as N	%	0%	0%	0%	0%	8%	5%	0%	0%	0%	1%	1%	7%	3%	1%	61%	13%	100%
TKN	%	0%	0%	0%	0%	26%	6%	1%	0%	0%	1%	1%	2%	2%	1%	46%	15%	100%
Total Nitrogen	%	0%	0%	0%	0%	7%	4%	0%	0%	0%	1%	1%	5%	3%	1%	64%	12%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	0%	9%	8%	0%	0%	0%	0%	0%	2%	1%	0%	49%	29%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	12%	10%	0%	0%	0%	0%	0%	2%	2%	2%	43%	28%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	0%	4%	6%	0%	0%	0%	1%	1%	7%	2%	1%	65%	13%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	2%	0%	0%	25%	0%	1%	0%	0%	5%	6%	3%	2%	23%	29%	6%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-5
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of Escondido HSA 905.23

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	1,774	3,059	323,122	404,573	127,657	0	7,025	51,304	93,402	779,233	28,328	35,226	3,481,006	1,114,991	6,450,699
% Contribution	%	0%	0%	0%	0%	5%	6%	2%	0%	0%	1%	1%	12%	0%	1%	54%	17%	100%
Conventional Parameters																		
Chloride	lb	0	0	3.684	17.56	4913	4491	95.15	0	22.66	163.0	192.8	4474	190.4	204.7	32892	7672	55332
Sulfate	lb	0	0	8.812	36.50	935.1	2725	89.57	0	50.31	361.8	461.3	9297	98.78	294.6	29393	6256	50008
Indicator Bacteria																		
Enterococcus	MPN	0	0	8.78E+10	5.13E+11	1.79E+14	6.04E+14	3.97E+12	0	3.39E+11	2.44E+12	4.59E+12	1.31E+14	3.68E+12	8.74E+12	2.46E+15	3.41E+14	3.74E+15
Fecal Coliform	MPN	0	0	1.05E+11	5.07E+10	2.17E+14	2.85E+13	9.96E+11	0	2.78E+11	2.00E+12	5.50E+12	1.29E+13	6.23E+12	1.57E+13	1.82E+15	1.14E+14	2.23E+15
Total Coliform	MPN	0	0	3.51E+11	8.68E+11	7.07E+15	9.75E+14	5.31E+13	0	1.96E+12	1.41E+13	1.84E+13	2.21E+14	2.12E+14	4.18E+13	7.08E+15	8.08E+14	1.65E+16
Total Metals																		
Aluminum	lb	0	0	0.0534	0.0069	32.19	1.509	0.3151	0	0.0903	0.6494	2.793	1.766	0.7447	3.228	212.6	48.86	304.8
Cadmium	lb	0	0	2.76E-06	2.85E-06	0.0055	7.72E-04	8.31E-05	0	1.18E-05	8.51E-05	1.44E-04	7.26E-04	1.38E-04	2.83E-04	0.0179	0.0045	0.0302
Copper	lb	0	0	7.77E-04	6.23E-04	1.955	0.1110	0.0120	0	0.0048	0.0342	0.0407	0.1587	0.0266	0.0310	3.252	2.524	8.152
Iron	lb	0	0	0.0732	0.0289	42.79	8.056	0.8460	0	0.1423	1.023	3.831	7.362	0.9069	5.213	321.4	74.68	466.3
Lead	lb	0	0	5.68E-05	3.08E-05	0.1367	0.0082	5.24E-04	0	2.71E-04	0.0019	0.0030	0.0078	0.0028	0.0046	0.3685	0.0941	0.6285
Manganese	lb	0	0	0.0037	0.0022	2.169	0.5825	0.0351	0	0.0084	0.0607	0.1927	0.5546	0.0357	0.4191	15.48	3.531	23.07
Mercury	lb	0	0	7.73E-07	5.86E-07	4.74E-04	1.74E-04	1.51E-05	0	1.66E-06	1.20E-05	4.05E-05	1.49E-04	1.59E-05	6.27E-05	0.0047	0.0010	0.0067
Zinc	lb	0	0	0.0017	0.0011	8.663	0.8823	0.0346	0	0.0062	0.0446	0.0900	0.2780	0.1748	0.1393	9.321	8.039	27.68
Dissolved Metals																		
Aluminum	lb	0	0	2.23E-04	5.24E-05	0.9274	0.0404	0.0428	0	6.21E-04	0.0045	0.0117	0.0133	0.0435	0.0701	3.006	2.576	6.736
Iron	lb	0	0	0.0053	1.60E-04	1.635	0.1385	0.2409	0	0.0062	0.0443	0.2753	0.0407	0.0565	2.654	15.27	8.779	29.15
Manganese	lb	0	0	2.68E-04	4.08E-05	0.8893	0.0420	0.0155	0	6.49E-04	0.0047	0.0140	0.0104	0.0138	0.1280	2.123	1.963	5.205
Mercury	lb	0	0	2.99E-09	2.56E-08	3.02E-04	3.56E-05	8.00E-06	0	1.20E-08	8.64E-08	1.56E-07	6.52E-06	1.31E-05	3.04E-05	0.0019	0.0018	0.0041
Nutrients																		
Nitrate as N	lb	0	0	0.1642	0.3759	16.97	27.38	0.5680	0	0.6571	4.726	8.594	95.74	2.481	7.077	453.1	83.85	701.6
Nitrite as N	lb	0	0	0.0070	0.0106	1.603	0.7792	0.0148	0	0.0441	0.3168	0.3662	2.695	0.1542	0.1714	17.28	3.612	27.05
TKN	lb	0	0	0.0984	0.1140	105.8	28.03	1.001	0	0.3811	2.740	5.149	29.03	3.103	7.108	440.2	104.4	727.2
Total Nitrogen	lb	0	0	0.3096	0.5330	78.23	36.74	0.9842	0	1.657	11.91	16.21	135.8	12.02	15.07	1329	189.3	1828
Dissolved Phosphorus as P	lb	0	0	0.0030	0.0113	5.698	4.692	0.0748	0	0.0164	0.1181	0.1553	2.874	0.3291	0.0923	53.73	23.97	91.76
Total Phosphorus as P	lb	0	0	0.0126	0.0183	9.706	8.667	0.1272	0	0.0410	0.2947	0.6581	4.649	0.5094	1.703	74.29	38.32	139.0
Solid Parameters																		
TDS	lb	0	0	33.76	170.1	6160	12922	256.9	0	222.1	1598	1767	43328	722.4	1189	133034	29784	231187
Synthetic Organics																		
Pentachlorophenol	lb	0	0	5.78E-05	1.44E-04	0.0138	0.0097	3.40E-04	0	1.17E-04	8.39E-04	0.0030	0.0366	3.57E-04	0.0147	0.0662	0.0155	0.1613

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-6
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of Escondido HSA 905.23

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	1,774	3,059	323,122	404,573	127,657	0	7,025	51,304	93,402	779,233	28,328	35,226	3,481,006	1,114,991	6,450,699
% Contribution	%	0%	0%	0%	0%	5%	6%	2%	0%	0%	1%	1%	12%	0%	1%	54%	17%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	0%	3%	4%	0%	0%	0%	0%	1%	12%	1%	1%	69%	11%	100%
Sulfate	%	0%	0%	0%	0%	1%	3%	1%	0%	0%	0%	1%	11%	0%	1%	71%	10%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	12%	1%	3%	0%	0%	0%	0%	0%	0%	0%	82%	1%	100%
Fecal Coliform	%	0%	0%	0%	0%	24%	0%	1%	0%	0%	0%	0%	0%	1%	0%	73%	1%	100%
Total Coliform	%	0%	0%	0%	0%	73%	0%	4%	0%	0%	0%	0%	0%	2%	0%	20%	0%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	0%	10%	2%	2%	0%	0%	0%	1%	1%	0%	1%	68%	15%	100%
Cadmium	%	0%	0%	0%	0%	60%	0%	0%	0%	0%	0%	0%	0%	2%	0%	28%	10%	100%
Copper	%	0%	0%	0%	0%	28%	1%	2%	0%	0%	0%	0%	2%	0%	0%	40%	26%	100%
Iron	%	0%	0%	0%	0%	11%	1%	2%	0%	0%	0%	1%	1%	0%	1%	67%	15%	100%
Lead	%	0%	0%	0%	0%	31%	1%	2%	0%	0%	0%	0%	1%	1%	1%	50%	13%	100%
Manganese	%	0%	0%	0%	0%	13%	2%	2%	0%	0%	0%	0%	2%	0%	1%	64%	14%	100%
Mercury	%	0%	0%	0%	0%	1%	8%	0%	0%	0%	0%	0%	5%	0%	0%	67%	19%	100%
Zinc	%	0%	0%	0%	0%	42%	3%	1%	0%	0%	0%	0%	1%	1%	0%	30%	21%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	14%	2%	8%	0%	0%	0%	0%	0%	1%	0%	39%	36%	100%
Iron	%	0%	0%	0%	0%	19%	1%	13%	0%	0%	0%	0%	0%	1%	0%	33%	32%	100%
Manganese	%	0%	0%	0%	0%	21%	1%	5%	0%	0%	0%	0%	0%	0%	0%	36%	35%	100%
Mercury	%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	1%	0%	0%	44%	50%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%	1%	8%	0%	1%	75%	10%	100%
Nitrite as N	%	0%	0%	0%	0%	4%	3%	0%	0%	0%	0%	1%	11%	1%	1%	68%	11%	100%
TKN	%	0%	0%	0%	0%	16%	4%	1%	0%	0%	0%	0%	4%	1%	1%	58%	14%	100%
Total Nitrogen	%	0%	0%	0%	0%	4%	2%	0%	0%	0%	0%	1%	9%	1%	1%	71%	10%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	0%	5%	5%	1%	0%	0%	0%	0%	3%	0%	0%	59%	26%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	7%	7%	1%	0%	0%	0%	0%	3%	0%	1%	53%	27%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	0%	2%	3%	1%	0%	0%	0%	1%	11%	0%	1%	70%	10%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	0%	0%	0%	17%	0%	4%	0%	0%	3%	4%	5%	0%	20%	40%	6%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-7
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of Poway HSA 905.22

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	57,262	17,554	158,487	374,436	1,590,995	28,453	0	0	107,805	197,354	492,532	14,609	513,170	13,034,995	3,975,645	20,563,298
% Contribution	%	0%	0%	0%	1%	2%	8%	0%	0%	0%	1%	1%	2%	0%	2%	63%	19%	100%
Conventional Parameters																		
Chloride	lb	0	184.7	36.46	909.9	5944	17662	144.7	0	0	347.8	409.9	2828	98.19	3028	124299	27909	183802
Sulfate	lb	0	410.1	87.21	1891	1131	10714	136.2	0	0	772.1	980.5	5876	50.94	4359	111079	22758	160245
Indicator Bacteria																		
Enterococcus	MPN	0	2.77E+12	8.69E+11	2.66E+13	2.17E+14	2.37E+15	6.03E+12	0	0	5.21E+12	9.77E+12	8.25E+13	1.90E+12	1.29E+14	9.31E+15	1.24E+15	1.34E+16
Fecal Coliform	MPN	0	2.27E+12	1.04E+12	2.63E+12	2.63E+14	1.12E+14	1.52E+12	0	0	4.27E+12	1.17E+13	8.17E+12	3.21E+12	2.33E+14	6.89E+15	4.13E+14	7.95E+15
Total Coliform	MPN	0	1.60E+13	3.47E+12	4.50E+13	8.56E+15	3.83E+15	8.08E+13	0	0	3.01E+13	3.90E+13	1.40E+14	1.09E+14	6.19E+14	2.68E+16	2.94E+15	4.32E+16
Total Metals																		
Aluminum	lb	0	0.7360	0.5280	0.3591	38.94	5.935	0.4792	0	0	1.386	5.936	1.116	0.3840	47.76	803.3	177.7	1085
Cadmium	lb	0	9.64E-05	2.73E-05	1.48E-04	0.0067	0.0030	1.26E-04	0	0	1.82E-04	3.07E-04	4.59E-04	7.13E-05	0.0042	0.0677	0.0164	0.0994
Copper	lb	0	0.0387	0.0077	0.0323	2.366	0.4365	0.0182	0	0	0.0729	0.0864	0.1003	0.0137	0.4582	12.29	9.183	25.10
Iron	lb	0	1.160	0.7244	1.497	51.77	31.68	1.287	0	0	2.183	8.144	4.653	0.4677	77.13	1215	271.6	1667
Lead	lb	0	0.0022	5.62E-04	0.0016	0.1653	0.0323	7.97E-04	0	0	0.0042	0.0063	0.0050	0.0014	0.0674	1.393	0.3421	2.022
Manganese	lb	0	0.0689	0.0364	0.1128	2.624	2.291	0.0534	0	0	0.1296	0.4096	0.3505	0.0184	6.201	58.48	12.85	83.62
Mercury	lb	0	1.36E-05	7.65E-06	3.03E-05	5.73E-04	6.85E-04	2.30E-05	0	0	2.55E-05	8.60E-05	9.43E-05	8.18E-06	9.28E-04	0.0178	0.0038	0.0240
Zinc	lb	0	0.0506	0.0170	0.0565	10.48	3.469	0.0526	0	0	0.0953	0.1913	0.1757	0.0901	2.060	35.22	29.24	81.21
Dissolved Metals																		
Aluminum	lb	0	0.0051	0.0022	0.0027	1.122	0.1588	0.0651	0	0	0.0095	0.0249	0.0084	0.0224	1.037	11.36	9.369	23.19
Iron	lb	0	0.0502	0.0520	0.0083	1.978	0.5447	0.3664	0	0	0.0945	0.5851	0.0257	0.0291	39.26	57.72	31.93	132.6
Manganese	lb	0	0.0053	0.0027	0.0021	1.076	0.1653	0.0235	0	0	0.0100	0.0298	0.0066	0.0071	1.894	8.023	7.140	18.39
Mercury	lb	0	9.80E-08	2.96E-08	1.33E-06	3.66E-04	1.40E-04	1.22E-05	0	0	1.84E-07	3.32E-07	4.12E-06	6.78E-06	4.50E-04	0.0071	0.0066	0.0147
Nutrients																		
Nitrate as N	lb	0	5.356	1.625	19.47	20.53	107.7	0.8639	0	0	10.08	18.27	60.51	1.280	104.7	1712	305.0	2368
Nitrite as N	lb	0	0.3591	0.0692	0.5482	1.939	3.064	0.0225	0	0	0.6761	0.7785	1.704	0.0795	2.536	65.30	13.14	90.21
TKN	lb	0	3.106	0.9735	5.905	128.0	110.2	1.522	0	0	5.848	10.95	18.35	1.600	105.2	1663	379.8	2435
Total Nitrogen	lb	0	13.50	3.064	27.61	94.64	144.5	1.497	0	0	25.42	34.45	85.81	6.199	223.0	5022	688.7	6370
Dissolved Phosphorus as P	lb	0	0.1339	0.0294	0.5845	6.893	18.45	0.1137	0	0	0.2520	0.3302	1.816	0.1697	1.366	203.0	87.19	320.4
Total Phosphorus as P	lb	0	0.3341	0.1244	0.9456	11.74	34.08	0.1935	0	0	0.6289	1.399	2.939	0.2627	25.19	280.8	139.4	498.0
Solid Parameters																		
TDS	lb	0	1811	334.1	8812	7452	50815	390.7	0	0	3409	3756	27387	372.5	17594	502741	108343	733218
Synthetic Organics																		
Pentachlorophenol	lb	0	0.0010	5.72E-04	0.0074	0.0166	0.0381	5.17E-04	0	0	0.0018	0.0064	0.0231	1.84E-04	0.2180	0.2501	0.0564	0.6202

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-8
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of Poway HSA 905.22

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	57,262	17,554	158,487	374,436	1,590,995	28,453	0	0	107,805	197,354	492,532	14,609	513,170	13,034,995	3,975,645	20,563,298
% Contribution	%	0%	0%	0%	1%	2%	8%	0%	0%	0%	1%	1%	2%	0%	2%	63%	19%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	1%	1%	4%	0%	0%	0%	0%	0%	2%	0%	3%	77%	12%	100%
Sulfate	%	0%	0%	0%	1%	0%	4%	0%	0%	0%	0%	1%	2%	0%	4%	78%	11%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	93%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	2%	88%	1%	100%
Total Coliform	%	0%	0%	0%	0%	52%	0%	1%	0%	0%	0%	0%	0%	1%	0%	46%	1%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	0%	4%	2%	0%	0%	0%	0%	0%	0%	0%	3%	75%	16%	100%
Cadmium	%	0%	0%	0%	0%	33%	0%	0%	0%	0%	0%	0%	0%	0%	0%	49%	17%	100%
Copper	%	0%	0%	0%	0%	11%	2%	0%	0%	0%	0%	0%	0%	0%	1%	53%	32%	100%
Iron	%	0%	0%	0%	0%	4%	2%	0%	0%	0%	0%	0%	0%	0%	4%	74%	16%	100%
Lead	%	0%	0%	0%	0%	13%	2%	0%	0%	0%	0%	0%	0%	0%	3%	66%	16%	100%
Manganese	%	0%	0%	0%	0%	5%	3%	0%	0%	0%	0%	0%	0%	0%	4%	72%	16%	100%
Mercury	%	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	1%	0%	0%	71%	19%	100%
Zinc	%	0%	0%	0%	0%	19%	5%	0%	0%	0%	0%	0%	0%	0%	0%	45%	30%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	5%	2%	1%	0%	0%	0%	0%	0%	0%	0%	48%	43%	100%
Iron	%	0%	0%	0%	0%	8%	2%	1%	0%	0%	0%	0%	0%	0%	0%	46%	42%	100%
Manganese	%	0%	0%	0%	0%	8%	2%	0%	0%	0%	0%	0%	0%	0%	1%	46%	43%	100%
Mercury	%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	46%	49%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	0%	1%	3%	0%	0%	0%	0%	0%	2%	0%	5%	79%	10%	100%
Nitrite as N	%	0%	0%	0%	1%	1%	4%	0%	0%	0%	0%	0%	2%	0%	2%	77%	12%	100%
TKN	%	0%	0%	0%	0%	6%	5%	0%	0%	0%	0%	0%	1%	0%	3%	68%	16%	100%
Total Nitrogen	%	0%	0%	0%	1%	1%	3%	0%	0%	0%	0%	0%	2%	0%	4%	78%	11%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	0%	2%	6%	0%	0%	0%	0%	0%	1%	0%	0%	64%	27%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	2%	8%	0%	0%	0%	0%	0%	1%	0%	5%	57%	27%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	1%	1%	4%	0%	0%	0%	0%	0%	2%	0%	3%	77%	11%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	1%	0%	0%	4%	0%	0%	0%	0%	1%	2%	1%	0%	57%	30%	4%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-9
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of San Diego HSA 905.11

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	154,704	184,381	0	2,148,198	4,029,946	1,192,349	939,300	0	698,952	302,786	60,622	16,119,434	434,007	128,260	10,217,603	7,850,098	44,460,640
% Contribution	%	0%	0%	0%	5%	9%	3%	2%	0%	2%	1%	0%	36%	1%	0%	23%	18%	100%
Conventional Parameters																		
Chloride	lb	404.8	520.1	0	12318	56868	13237	3095	0	2162	868.2	124.7	91854	2917	756.9	95631	53996	334752
Sulfate	lb	898.6	1154.6	0	25598	10824	8030	2913	0	4800	1927	298.4	190891	1513	1089	85460	44029	379426
Indicator Bacteria																		
Enterococcus	MPN	6.06E+12	7.79E+12	0	3.59E+14	2.07E+15	1.78E+15	1.29E+14	0	3.24E+13	1.30E+13	2.97E+12	2.68E+15	5.63E+13	3.23E+13	7.16E+15	2.40E+15	1.67E+16
Fecal Coliform	MPN	4.97E+12	6.39E+12	0	3.56E+13	2.51E+15	8.40E+13	3.24E+13	0	2.65E+13	1.07E+13	3.56E+12	2.65E+14	9.54E+13	5.81E+13	5.30E+15	7.99E+14	9.24E+15
Total Coliform	MPN	3.50E+13	4.50E+13	0	6.09E+14	8.19E+16	2.87E+15	1.73E+15	0	1.87E+14	7.51E+13	1.19E+13	4.54E+15	3.25E+15	1.55E+14	2.06E+16	5.69E+15	1.22E+17
Total Metals																		
Aluminum	lb	1.613	2.072	0	4.861	372.5	4.448	10.25	0	8.613	3.459	1.806	36.25	11.41	11.94	618.0	343.9	1431
Cadmium	lb	2.11E-04	2.71E-04	0	0.0020	0.0641	0.0023	0.0027	0	0.0011	4.53E-04	9.34E-05	0.0149	0.0021	0.0010	0.0521	0.0317	0.1751
Copper	lb	0.0848	0.1090	0	0.4371	22.63	0.3271	0.3889	0	0.4532	0.1820	0.0263	3.259	0.4074	0.1145	9.454	17.77	55.64
Iron	lb	2.541	3.265	0	20.27	495.3	23.74	27.52	0	13.57	5.450	2.478	151.2	13.89	19.28	934.4	525.5	2238
Lead	lb	0.0048	0.0062	0	0.0216	1.582	0.0242	0.0170	0	0.0259	0.0104	0.0019	0.1608	0.0429	0.0169	1.072	0.6619	3.648
Manganese	lb	0.1509	0.1938	0	1.527	25.11	1.717	1.141	0	0.8057	0.3236	0.1246	11.39	0.5475	1.550	44.99	24.85	114.4
Mercury	lb	2.97E-05	3.82E-05	0	4.11E-04	0.0055	5.13E-04	4.93E-04	0	1.59E-04	6.37E-05	2.62E-05	0.0031	2.43E-04	2.32E-04	0.0137	0.0073	0.0317
Zinc	lb	0.1109	0.1424	0	0.7655	100.3	2.600	1.125	0	0.5921	0.2378	0.0582	5.708	2.677	0.5150	27.10	56.58	198.5
Dissolved Metals																		
Aluminum	lb	0.0111	0.0143	0	0.0367	10.73	0.1190	1.392	0	0.0593	0.0238	0.0076	0.2739	0.6661	0.2591	8.739	18.13	40.46
Iron	lb	0.1100	0.1413	0	0.1120	18.92	0.4082	7.837	0	0.5876	0.2360	0.1781	0.8349	0.8649	9.813	44.41	61.78	146.2
Manganese	lb	0.0116	0.0149	0	0.0286	10.29	0.1239	0.5029	0	0.0619	0.0248	0.0091	0.2134	0.2115	0.4733	6.172	13.81	31.96
Mercury	lb	2.15E-07	2.76E-07	0	1.80E-05	0.0035	1.05E-04	2.60E-04	0	1.15E-06	4.60E-07	1.01E-07	1.34E-04	2.01E-04	1.13E-04	0.0055	0.0128	0.0226
Nutrients																		
Nitrate as N	lb	11.74	15.08	0	263.6	196.4	80.69	18.47	0	62.68	25.17	5.559	1966	38.02	26.17	1317	590.1	4617
Nitrite as N	lb	0.7869	1.011	0	7.421	18.55	2.296	0.4820	0	4.203	1.688	0.2369	55.34	2.363	0.6338	50.24	25.42	170.7
TKN	lb	6.806	8.744	0	79.93	1225	82.60	32.56	0	36.35	14.60	3.331	596.1	47.54	26.28	1280	734.9	4174
Total Nitrogen	lb	29.59	38.02	0	373.8	905.49	108.3	32.01	0	158.0	63.46	10.48	2788	184.2	55.74	3864	1332	9943
Dissolved Phosphorus as P	lb	0.2933	0.3768	0	7.912	65.95	13.83	2.432	0	1.567	0.6291	0.1005	59.00	5.042	0.3415	156.2	168.7	482.4
Total Phosphorus as P	lb	0.7320	0.9405	0	12.80	112.3	25.54	4.138	0	3.909	1.570	0.4257	95.46	7.805	6.297	216.0	269.7	757.7
Solid Parameters																		
TDS	lb	3967	5097	0	119302	71299	38083	8356	0	21190	8510	1143	889649	11068	4397	386789	209612	1778464
Synthetic Organics																		
Pentachlorophenol	lb	0.0021	0.0027	0	0.1007	0.1592	0.0286	0.0111	0	0.0111	0.0045	0.0020	0.7507	0.0055	0.0545	0.1924	0.1091	1.4339

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-10
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of San Diego HSA 905.11

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	154,704	184,381	0	2,148,198	4,029,946	1,192,349	939,300	0	698,952	302,786	60,622	16,119,434	434,007	128,260	10,217,603	7,850,098	44,460,640
% Contribution	%	0%	0%	0%	5%	9%	3%	2%	0%	2%	1%	0%	36%	1%	0%	23%	18%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	5%	5%	2%	0%	0%	1%	0%	0%	40%	1%	0%	32%	12%	100%
Sulfate	%	0%	0%	0%	5%	2%	2%	1%	0%	1%	0%	0%	39%	1%	1%	36%	12%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	34%	1%	5%	0%	0%	0%	0%	2%	1%	0%	55%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	56%	0%	1%	0%	0%	0%	0%	0%	2%	0%	40%	1%	100%
Total Coliform	%	0%	0%	0%	0%	88%	0%	3%	0%	0%	0%	0%	0%	3%	0%	6%	0%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	1%	26%	1%	2%	0%	0%	0%	0%	5%	1%	0%	40%	22%	100%
Cadmium	%	0%	0%	0%	0%	80%	0%	0%	0%	0%	0%	0%	0%	3%	0%	9%	8%	100%
Copper	%	0%	0%	0%	1%	48%	0%	2%	0%	0%	0%	0%	6%	1%	0%	16%	25%	100%
Iron	%	0%	0%	0%	1%	28%	1%	3%	0%	1%	0%	0%	5%	1%	1%	39%	21%	100%
Lead	%	0%	0%	0%	0%	57%	0%	2%	0%	0%	0%	0%	3%	1%	0%	22%	13%	100%
Manganese	%	0%	0%	0%	1%	31%	1%	3%	0%	1%	0%	0%	7%	1%	1%	35%	19%	100%
Mercury	%	0%	0%	0%	3%	4%	5%	0%	0%	0%	0%	0%	22%	0%	0%	40%	27%	100%
Zinc	%	0%	0%	0%	0%	65%	1%	1%	0%	0%	0%	0%	2%	1%	0%	11%	18%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	27%	1%	9%	0%	0%	0%	0%	2%	1%	0%	18%	41%	100%
Iron	%	0%	0%	0%	0%	35%	1%	14%	0%	0%	0%	0%	1%	2%	0%	14%	32%	100%
Manganese	%	0%	0%	0%	0%	40%	1%	5%	0%	0%	0%	0%	1%	1%	0%	16%	37%	100%
Mercury	%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	3%	0%	0%	25%	68%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	4%	4%	1%	0%	0%	1%	0%	0%	33%	1%	1%	41%	13%	100%
Nitrite as N	%	0%	0%	0%	5%	8%	2%	0%	0%	1%	0%	0%	36%	2%	0%	33%	13%	100%
TKN	%	0%	0%	0%	2%	33%	2%	2%	0%	1%	0%	0%	14%	1%	0%	28%	16%	100%
Total Nitrogen	%	0%	0%	0%	4%	8%	1%	1%	0%	1%	1%	0%	32%	2%	1%	36%	12%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	2%	13%	3%	1%	0%	0%	0%	0%	12%	1%	0%	33%	35%	100%
Total Phosphorus as P	%	0%	0%	0%	2%	16%	4%	1%	0%	0%	0%	0%	12%	1%	1%	28%	34%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	5%	4%	2%	1%	0%	1%	0%	0%	39%	1%	0%	34%	12%	100%
Synthetic Organics																		
Pentachlorophenol	%	1%	1%	0%	2%	32%	0%	4%	0%	5%	2%	0%	16%	1%	11%	17%	6%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-11
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of San Diego HSA 905.12

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	13,651	342,623	2,988,313	1,647,463	247,120	0	0	74,766	126,953	15,743,572	634,188	0	4,541,223	4,438,939	30,798,811
% Contribution	%	0%	0%	0%	1%	10%	5%	1%	0%	0%	0%	0%	51%	2%	0%	15%	14%	100%
Conventional Parameters																		
Chloride	lb	0	0	28.35	1967	47436	18289	757.7	0	0	241.2	263.7	90383	4263	0	43304	31162	238094
Sulfate	lb	0	0	67.82	4088	9028	11095	713.2	0	0	535.5	630.7	187833	2211	0	38698	25410	280311
Indicator Bacteria																		
Enterococcus	MPN	0	0	6.76E+11	5.74E+13	1.73E+15	2.46E+15	3.16E+13	0	0	3.61E+12	6.28E+12	2.64E+15	8.23E+13	0	3.24E+15	1.38E+15	1.16E+16
Fecal Coliform	MPN	0	0	8.08E+11	5.68E+12	2.10E+15	1.16E+14	7.93E+12	0	0	2.96E+12	7.52E+12	2.61E+14	1.39E+14	0	2.40E+15	4.61E+14	5.50E+15
Total Coliform	MPN	0	0	2.70E+12	9.72E+13	6.83E+16	3.97E+15	4.23E+14	0	0	2.09E+13	2.51E+13	4.47E+15	4.75E+15	0	9.33E+15	3.28E+15	9.47E+16
Total Metals																		
Aluminum	lb	0	0	0.4106	0.7763	310.7	6.146	2.509	0	0	0.9610	3.819	35.67	16.67	0	279.9	198.5	856.0
Cadmium	lb	0	0	2.12E-05	3.19E-04	0.0535	0.0031	6.62E-04	0	0	1.26E-04	1.98E-04	0.0147	0.0031	0	0.0236	0.0183	0.1176
Copper	lb	0	0	0.0060	0.0698	18.88	0.4520	0.0952	0	0	0.0506	0.0556	3.207	0.5953	0	4.281	10.25	37.94
Iron	lb	0	0	0.5633	3.237	413.2	32.80	6.736	0	0	1.514	5.239	148.7	20.30	0	423.1	303.3	1359
Lead	lb	0	0	4.37E-04	0.0034	1.320	0.0335	0.0042	0	0	0.0029	0.0041	0.1582	0.0628	0	0.4852	0.3820	2.456
Manganese	lb	0	0	0.0283	0.2438	20.94	2.372	0.2794	0	0	0.0899	0.2635	11.20	0.8000	0	20.37	14.34	70.94
Mercury	lb	0	0	5.95E-06	6.56E-05	0.0046	7.09E-04	1.21E-04	0	0	1.77E-05	5.53E-05	0.0030	3.55E-04	0	0.0062	0.0042	0.0193
Zinc	lb	0	0	0.0132	0.1222	83.63	3.593	0.2754	0	0	0.0661	0.1231	5.617	3.912	0	12.27	32.65	142.3
Dissolved Metals																		
Aluminum	lb	0	0	0.0017	0.0059	8.954	0.1644	0.3407	0	0	0.0066	0.0160	0.2695	0.9733	0	3.957	10.46	25.15
Iron	lb	0	0	0.0405	0.0179	15.78	0.5641	1.919	0	0	0.0656	0.3764	0.8215	1.264	0	20.11	35.65	76.61
Manganese	lb	0	0	0.0021	0.0046	8.586	0.1712	0.1231	0	0	0.0069	0.0192	0.2100	0.3091	0	2.795	7.972	20.20
Mercury	lb	0	0	2.30E-08	2.87E-06	0.0029	1.45E-04	6.37E-05	0	0	1.28E-07	2.14E-07	1.32E-04	2.94E-04	0	0.0025	0.0074	0.0134
Nutrients																		
Nitrate as N	lb	0	0	1.264	42.10	163.8	111.5	4.523	0	0	6.994	11.75	1934	55.55	0	596.5	340.6	3269
Nitrite as N	lb	0	0	0.0539	1.185	15.47	3.173	0.1180	0	0	0.4689	0.5008	54.45	3.453	0	22.7	14.67	116.3
TKN	lb	0	0	0.7571	12.76	1022	114.1	7.971	0	0	4.056	7.041	586.5	69.46	0	579.5	424.1	2828
Total Nitrogen	lb	0	0	2.383	59.69	755.3	149.6	7.837	0	0	17.63	22.16	2743	269.1	0	1750	768.9	6545
Dissolved Phosphorus as P	lb	0	0	0.0228	1.263	55.01	19.11	0.5954	0	0	0.1748	0.2124	58.06	7.368	0	70.74	97.35	309.9
Total Phosphorus as P	lb	0	0	0.0968	2.044	93.71	35.29	1.013	0	0	0.4362	0.8999	93.93	11.40	0	97.81	155.7	492.3
Solid Parameters																		
TDS	lb	0	0	259.8	19051	59473	52619	2046	0	0	2364	2416	875400	16173	0	175148	120969	1325920
Synthetic Organics																		
Pentachlorophenol	lb	0	0	4.44E-04	0.0161	0.1328	0.0395	0.0027	0	0	0.0012	0.0041	0.7386	0.0080	0	0.0871	0.0630	1.094

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-12
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of San Diego HSA 905.12

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	13,651	342,623	2,988,313	1,647,463	247,120	0	0	74,766	126,953	15,743,572	634,188	0	4,541,223	4,438,939	30,798,811
% Contribution	%	0%	0%	0%	1%	10%	5%	1%	0%	0%	0%	0%	51%	2%	0%	15%	14%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	1%	6%	3%	0%	0%	0%	0%	0%	56%	3%	0%	21%	10%	100%
Sulfate	%	0%	0%	0%	1%	2%	3%	0%	0%	0%	0%	0%	57%	1%	0%	24%	10%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	45%	1%	3%	0%	0%	0%	0%	3%	2%	0%	43%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	66%	0%	1%	0%	0%	0%	0%	0%	4%	0%	28%	1%	100%
Total Coliform	%	0%	0%	0%	0%	89%	0%	1%	0%	0%	0%	0%	0%	6%	0%	3%	0%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	0%	33%	2%	1%	0%	0%	0%	0%	9%	1%	0%	31%	22%	100%
Cadmium	%	0%	0%	0%	0%	83%	0%	0%	0%	0%	0%	0%	0%	5%	0%	5%	6%	100%
Copper	%	0%	0%	0%	0%	54%	1%	1%	0%	0%	0%	0%	9%	2%	0%	11%	22%	100%
Iron	%	0%	0%	0%	0%	35%	2%	2%	0%	0%	0%	0%	8%	2%	0%	30%	20%	100%
Lead	%	0%	0%	0%	0%	64%	1%	1%	0%	0%	0%	0%	4%	3%	0%	15%	11%	100%
Manganese	%	0%	0%	0%	0%	38%	3%	1%	0%	0%	0%	0%	12%	2%	0%	26%	18%	100%
Mercury	%	0%	0%	0%	1%	4%	10%	0%	0%	0%	0%	0%	33%	0%	0%	28%	24%	100%
Zinc	%	0%	0%	0%	0%	69%	2%	0%	0%	0%	0%	0%	3%	3%	0%	7%	15%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	35%	2%	4%	0%	0%	0%	0%	3%	3%	0%	14%	40%	100%
Iron	%	0%	0%	0%	0%	44%	1%	6%	0%	0%	0%	0%	2%	4%	0%	11%	31%	100%
Manganese	%	0%	0%	0%	0%	48%	1%	2%	0%	0%	0%	0%	2%	2%	0%	11%	34%	100%
Mercury	%	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	6%	0%	0%	20%	68%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	1%	5%	3%	0%	0%	0%	0%	0%	49%	2%	0%	28%	11%	100%
Nitrite as N	%	0%	0%	0%	1%	9%	3%	0%	0%	0%	0%	0%	51%	3%	0%	21%	11%	100%
TKN	%	0%	0%	0%	0%	38%	4%	1%	0%	0%	0%	0%	21%	3%	0%	19%	14%	100%
Total Nitrogen	%	0%	0%	0%	1%	9%	3%	0%	0%	0%	0%	0%	47%	4%	0%	24%	11%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	0%	15%	6%	0%	0%	0%	0%	0%	19%	2%	0%	23%	32%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	19%	8%	1%	0%	0%	0%	0%	19%	3%	0%	20%	30%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	1%	4%	3%	0%	0%	0%	0%	0%	56%	2%	0%	22%	10%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	0%	0%	1%	43%	0%	2%	0%	0%	1%	1%	28%	3%	0%	14%	6%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-13
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of San Diego HSA 905.21

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	19,782	354,940	32,800	191,852	1,367,834	257,938	613,826	0	23,962	605,518	545,280	5,795,402	557,499	0	7,436,484	3,792,178	21,595,296
% Contribution	%	0%	2%	0%	1%	6%	1%	3%	0%	0%	3%	3%	27%	3%	0%	34%	18%	100%
Conventional Parameters																		
Chloride	lb	63.82	1145	68.13	1101	21713	2863	1278	0	77.31	1954	1133	33271	3747	0	70913	26616	165943
Sulfate	lb	141.7	2542	163.0	2289	4133	1737	1203	0	171.6	4337	2709	69143	1944	0	63371	21703	175587
Indicator Bacteria																		
Enterococcus	MPN	9.56E+11	1.71E+13	1.62E+12	3.21E+13	7.92E+14	3.85E+14	5.33E+13	0	1.16E+12	2.93E+13	2.70E+13	9.71E+14	7.24E+13	0	5.31E+15	1.18E+15	8.88E+15
Fecal Coliform	MPN	7.84E+11	1.41E+13	1.94E+12	3.18E+12	9.60E+14	1.82E+13	1.34E+13	0	9.49E+11	2.40E+13	3.23E+13	9.61E+13	1.23E+14	0	3.93E+15	3.94E+14	5.61E+15
Total Coliform	MPN	5.52E+12	9.90E+13	6.49E+12	5.44E+13	3.13E+16	6.22E+14	7.14E+14	0	6.68E+12	1.69E+14	1.08E+14	1.64E+15	4.18E+15	0	1.53E+16	2.80E+15	5.69E+16
Total Metals																		
Aluminum	lb	0.2543	4.562	0.9866	0.4347	142.2	0.9622	4.231	0	0.3080	7.783	16.40	13.13	14.66	0	458.3	169.5	833.7
Cadmium	lb	3.33E-05	5.98E-04	5.10E-05	1.79E-04	0.0245	4.92E-04	0.0011	0	4.03E-05	0.0010	8.48E-04	0.0054	0.0027	0	0.0386	0.0156	0.0912
Copper	lb	0.0134	0.2401	0.0144	0.0391	8.642	0.0708	0.1605	0	0.0162	0.4095	0.2388	1.181	0.5233	0	7.010	8.757	27.32
Iron	lb	0.4007	7.189	1.353	1.813	189.1	5.136	11.36	0	0.4853	12.26	22.50	54.75	17.85	0	692.9	259.1	1276
Lead	lb	0.0008	0.0137	0.0010	0.0019	0.6040	0.0052	0.0070	0	0.0009	0.0234	0.0174	0.0583	0.0552	0	0.7946	0.3263	1.910
Manganese	lb	0.0238	0.4268	0.0681	0.1365	9.587	0.3714	0.4712	0	0.0288	0.7281	1.132	4.125	0.7033	0	33.36	12.25	63.41
Mercury	lb	4.68E-06	8.40E-05	1.43E-05	3.67E-05	0.0021	1.11E-04	2.03E-04	0	5.67E-06	1.43E-04	2.38E-04	0.0011	3.12E-04	0	0.0102	0.0036	0.0181
Zinc	lb	0.0175	0.3136	0.0318	0.0684	38.28	0.5625	0.4645	0	0.0212	0.5351	0.5286	2.068	3.439	0	20.09	27.89	94.32
Dissolved Metals																		
Aluminum	lb	0.0018	0.0314	0.0041	0.0033	4.098	0.0257	0.5745	0	0.0021	0.0536	0.0687	0.0992	0.8556	0	6.480	8.935	21.23
Iron	lb	0.0173	0.3112	0.0972	0.0100	7.225	0.0883	3.236	0	0.0210	0.5310	1.617	0.3024	1.111	0	32.93	30.45	77.95
Manganese	lb	0.0018	0.0328	0.0050	0.0026	3.930	0.0268	0.2076	0	0.0022	0.0559	0.0824	0.0773	0.2717	0	4.577	6.810	16.08
Mercury	lb	3.38E-08	6.07E-07	5.53E-08	1.61E-06	0.0013	2.27E-05	1.07E-04	0	4.10E-08	1.04E-06	9.19E-07	4.85E-05	2.59E-04	0	0.0041	0.0063	0.0122
Nutrients																		
Nitrate as N	lb	1.850	33.20	3.036	23.57	74.98	17.46	7.628	0	2.241	56.64	50.47	712.0	48.84	0	976.8	290.9	2300
Nitrite as N	lb	0.1241	2.226	0.1294	0.6636	7.083	0.4968	0.1990	0	0.1503	3.798	2.151	20.05	3.035	0	37.25	12.53	89.88
TKN	lb	1.073	19.25	1.819	7.148	467.7	17.87	13.44	0	1.300	32.85	30.24	215.9	61.06	0	949.0	362.2	2181
Total Nitrogen	lb	4.665	83.71	5.725	33.43	345.7	23.42	13.22	0	5.651	142.8	95.17	1010	236.6	0	2865	656.8	5522
Dissolved Phosphorus as P	lb	0.0462	0.8298	0.0549	0.7075	25.18	2.992	1.004	0	0.0560	1.416	0.9123	21.37	6.477	0	115.8	83.15	260.0
Total Phosphorus as P	lb	0.1154	2.071	0.2325	1.145	42.89	5.525	1.709	0	0.1398	3.533	3.865	34.58	10.03	0	160.2	132.9	398.9
Solid Parameters																		
TDS	lb	625.6	11224	624.3	10668	27223	8238	3450	0	757.8	19149	10379	322244	14217	0	286814	103323	818937
Synthetic Organics																		
Pentachlorophenol	lb	3.29E-04	0.0059	0.0011	0.0090	0.0608	0.0062	0.0046	0	3.98E-04	0.0101	0.0178	0.2719	0.0070	0	0.1427	0.0538	0.5914

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-14
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of San Diego HSA 905.21

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	19,782	354,940	32,800	191,852	1,367,834	257,938	613,826	0	23,962	605,518	545,280	5,795,402	557,499	0	7,436,484	3,792,178	21,595,296
% Contribution	%	0%	2%	0%	1%	6%	1%	3%	0%	0%	3%	3%	27%	3%	0%	34%	18%	100%
Conventional Parameters																		
Chloride	%	0%	1%	0%	1%	4%	1%	1%	0%	0%	1%	1%	28%	4%	0%	47%	12%	100%
Sulfate	%	0%	1%	0%	1%	1%	1%	1%	0%	0%	2%	2%	27%	2%	0%	51%	12%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	20%	0%	6%	0%	0%	0%	0%	1%	2%	0%	68%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	37%	0%	2%	0%	0%	0%	0%	0%	4%	0%	56%	1%	100%
Total Coliform	%	0%	0%	0%	0%	75%	0%	5%	0%	0%	0%	0%	0%	9%	0%	10%	0%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	0%	16%	0%	3%	0%	0%	1%	1%	3%	1%	0%	54%	19%	100%
Cadmium	%	0%	0%	0%	0%	66%	0%	0%	0%	0%	1%	0%	0%	8%	0%	15%	9%	100%
Copper	%	0%	1%	0%	0%	35%	0%	2%	0%	0%	1%	1%	5%	2%	0%	26%	26%	100%
Iron	%	0%	0%	0%	0%	17%	0%	4%	0%	0%	1%	1%	3%	1%	0%	52%	18%	100%
Lead	%	0%	0%	0%	0%	41%	0%	2%	0%	0%	1%	1%	2%	4%	0%	34%	14%	100%
Manganese	%	0%	1%	0%	0%	20%	1%	4%	0%	0%	1%	1%	5%	2%	0%	49%	18%	100%
Mercury	%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%	0%	15%	0%	0%	56%	25%	100%
Zinc	%	0%	0%	0%	0%	52%	1%	2%	0%	0%	0%	0%	2%	4%	0%	19%	21%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	18%	0%	12%	0%	0%	0%	0%	1%	3%	0%	26%	39%	100%
Iron	%	0%	0%	0%	0%	24%	0%	18%	0%	0%	0%	0%	1%	4%	0%	20%	31%	100%
Manganese	%	0%	0%	0%	0%	28%	0%	7%	0%	0%	0%	0%	1%	2%	0%	24%	37%	100%
Mercury	%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	2%	0%	0%	35%	62%	100%
Nutrients																		
Nitrate as N	%	0%	1%	0%	1%	3%	1%	1%	0%	0%	2%	1%	22%	2%	0%	56%	11%	100%
Nitrite as N	%	0%	1%	0%	1%	6%	1%	0%	0%	0%	2%	1%	25%	4%	0%	47%	12%	100%
TKN	%	0%	1%	0%	0%	23%	1%	2%	0%	0%	1%	1%	10%	4%	0%	41%	16%	100%
Total Nitrogen	%	0%	1%	0%	1%	5%	1%	1%	0%	0%	2%	2%	22%	4%	0%	50%	11%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	0%	8%	1%	1%	0%	0%	0%	0%	8%	2%	0%	45%	32%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	11%	2%	2%	0%	0%	1%	0%	8%	3%	0%	41%	32%	100%
Solid Parameters																		
TDS	%	0%	1%	0%	1%	3%	1%	1%	0%	0%	2%	1%	28%	3%	0%	49%	12%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	6%	0%	0%	23%	0%	5%	0%	0%	10%	7%	12%	3%	0%	27%	6%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-15
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of San Diego HSA 905.22

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	225,691	38,876	1,159,340	2,374,764	0	184,166	0	0	14,752	13,745	804,392	537,401	0	9,423,396	6,018,834	20,795,356
% Contribution	%	0%	1%	0%	6%	11%	0%	1%	0%	0%	0%	0%	4%	3%	0%	45%	29%	100%
Conventional Parameters																		
Chloride	lb	0	728.2	80.74	6656	37233	0	64.88	0	0	47.60	28.55	4618	3612	0	89860	42100	185029
Sulfate	lb	0	1617	193.1	13832	7087	0	61.07	0	0	105.7	68.29	9597	1874	0	80302	34329	149066
Indicator Bacteria																		
Enterococcus	MPN	0	1.09E+13	1.92E+12	1.94E+14	1.36E+15	0	2.71E+12	0	0	7.13E+11	6.80E+11	1.35E+14	6.97E+13	0	6.73E+15	1.87E+15	1.04E+16
Fecal Coliform	MPN	0	8.94E+12	2.30E+12	1.92E+13	1.65E+15	0	6.79E+11	0	0	5.84E+11	8.14E+11	1.33E+13	1.18E+14	0	4.98E+15	6.23E+14	7.41E+15
Total Coliform	MPN	0	6.29E+13	7.69E+12	3.29E+14	5.36E+16	0	3.62E+13	0	0	4.11E+12	2.72E+12	2.28E+14	4.03E+15	0	1.94E+16	4.43E+15	8.21E+16
Total Metals																		
Aluminum	lb	0	2.901	1.169	2.627	243.9	0	0.2149	0	0	0.1896	0.4134	1.823	14.13	0	580.7	268.1	1116
Cadmium	lb	0	3.80E-04	6.05E-05	0.0011	0.0420	0	5.67E-05	0	0	2.48E-05	2.14E-05	7.50E-04	0.0026	0	0.0489	0.0247	0.1206
Copper	lb	0	0.1526	0.0170	0.2362	14.82	0	0.0082	0	0	0.0100	0.0060	0.1639	0.5045	0	8.883	13.85	38.65
Iron	lb	0	4.571	1.604	10.95	324.3	0	0.5769	0	0	0.2988	0.5672	7.600	17.20	0	878.0	409.8	1655
Lead	lb	0	0.0087	0.0012	0.0117	1.036	0	3.57E-04	0	0	5.69E-04	4.40E-04	0.0081	0.0532	0	1.007	0.5161	2.643
Manganese	lb	0	0.2714	0.0807	0.8251	16.44	0	0.0239	0	0	0.0177	0.0285	0.5725	0.6779	0	42.28	19.38	80.59
Mercury	lb	0	5.34E-05	1.69E-05	2.22E-04	0.0036	0	1.03E-05	0	0	3.49E-06	5.99E-06	1.54E-04	3.01E-04	0	0.0129	0.0057	0.0229
Zinc	lb	0	0.1994	0.0377	0.4136	65.65	0	0.0236	0	0	0.0130	0.0133	0.2870	3.315	0	25.46	44.11	139.5
Dissolved Metals																		
Aluminum	lb	0	0.0200	0.0049	0.0198	7.028	0	0.0292	0	0	0.0013	0.0017	0.0138	0.8247	0	8.212	14.13	30.29
Iron	lb	0	0.1979	0.1153	0.0605	12.39	0	0.1643	0	0	0.0129	0.0407	0.0420	1.071	0	41.73	48.17	104.0
Manganese	lb	0	0.0208	0.0059	0.0155	6.739	0	0.0105	0	0	0.0014	0.0021	0.0107	0.2619	0	5.800	10.77	23.64
Mercury	lb	0	3.86E-07	6.55E-08	9.70E-06	0.0023	0	5.46E-06	0	0	2.52E-08	2.32E-08	6.73E-06	2.49E-04	0	0.0052	0.0100	0.0177
Nutrients																		
Nitrate as N	lb	0	21.11	3.599	142.4	128.6	0	0.3873	0	0	1.380	1.272	98.83	47.08	0	1238	460.1	2143
Nitrite as N	lb	0	1.416	0.1534	4.010	12.15	0	0.0101	0	0	0.0925	0.0542	2.782	2.926	0	47.21	19.82	90.61
TKN	lb	0	12.24	2.156	43.19	802.0	0	0.6826	0	0	0.8002	0.7623	30.0	58.86	0	1203	573.0	2726
Total Nitrogen	lb	0	53.23	6.785	202.0	592.8	0	0.6711	0	0	3.479	2.399	140.15	228.0	0	3631	1039	5899
Dissolved Phosphorus as P	lb	0	0.5276	0.0650	4.275	43.18	0	0.0510	0	0	0.0345	0.0230	2.966	6.243	0	146.8	131.5	335.7
Total Phosphorus as P	lb	0	1.317	0.2756	6.917	73.55	0	0.0868	0	0	0.0861	0.0974	4.799	9.664	0	203.0	210.3	510.1
Solid Parameters																		
TDS	lb	0	7137	740.0	64464	46682	0	175.2	0	0	466.5	261.6	44727	13705	0	363447	163432	705236
Synthetic Organics																		
Pentachlorophenol	lb	0	0.0038	0.0013	0.0544	0.1042	0	2.32E-04	0	0	2.45E-04	4.48E-04	0.0377	0.0068	0	0.1808	0.0851	0.4749

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-16
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of San Diego HSA 905.22

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	225,691	38,876	1,159,340	2,374,764	0	184,166	0	0	14,752	13,745	804,392	537,401	0	9,423,396	6,018,834	20,795,356
% Contribution	%	0%	1%	0%	6%	11%	0%	1%	0%	0%	0%	0%	4%	3%	0%	45%	29%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	6%	6%	0%	0%	0%	0%	0%	0%	4%	4%	0%	60%	19%	100%
Sulfate	%	0%	1%	0%	6%	3%	0%	0%	0%	0%	0%	0%	4%	2%	0%	66%	19%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	27%	0%	1%	0%	0%	0%	0%	0%	2%	0%	67%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	3%	0%	50%	1%	100%
Total Coliform	%	0%	0%	0%	0%	84%	0%	1%	0%	0%	0%	0%	0%	6%	0%	8%	0%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	1%	21%	0%	1%	0%	0%	0%	0%	0%	1%	0%	52%	24%	100%
Cadmium	%	0%	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	5%	0%	13%	9%	100%
Copper	%	0%	0%	0%	1%	43%	0%	1%	0%	0%	0%	0%	0%	2%	0%	23%	30%	100%
Iron	%	0%	0%	0%	1%	23%	0%	1%	0%	0%	0%	0%	0%	1%	0%	51%	23%	100%
Lead	%	0%	0%	0%	0%	51%	0%	1%	0%	0%	0%	0%	0%	3%	0%	30%	15%	100%
Manganese	%	0%	0%	0%	1%	27%	0%	1%	0%	0%	0%	0%	1%	1%	0%	48%	22%	100%
Mercury	%	0%	0%	0%	2%	3%	0%	0%	0%	0%	0%	0%	2%	0%	0%	59%	33%	100%
Zinc	%	0%	0%	0%	0%	59%	0%	0%	0%	0%	0%	0%	0%	3%	0%	16%	22%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	24%	0%	3%	0%	0%	0%	0%	0%	2%	0%	25%	46%	100%
Iron	%	0%	0%	0%	0%	32%	0%	4%	0%	0%	0%	0%	0%	3%	0%	21%	39%	100%
Manganese	%	0%	0%	0%	0%	34%	0%	2%	0%	0%	0%	0%	0%	2%	0%	21%	41%	100%
Mercury	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	31%	69%	100%
Nutrients																		
Nitrate as N	%	0%	1%	0%	4%	4%	0%	0%	0%	0%	0%	0%	3%	2%	0%	68%	17%	100%
Nitrite as N	%	0%	1%	0%	5%	10%	0%	0%	0%	0%	0%	0%	3%	4%	0%	58%	19%	100%
TKN	%	0%	0%	0%	2%	32%	0%	1%	0%	0%	0%	0%	1%	3%	0%	41%	20%	100%
Total Nitrogen	%	0%	1%	0%	4%	9%	0%	0%	0%	0%	0%	0%	3%	4%	0%	61%	17%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	1%	11%	0%	0%	0%	0%	0%	0%	1%	2%	0%	45%	40%	100%
Total Phosphorus as P	%	0%	0%	0%	1%	15%	0%	0%	0%	0%	0%	0%	1%	2%	0%	40%	40%	100%
Solid Parameters																		
TDS	%	0%	1%	0%	6%	5%	0%	0%	0%	0%	0%	0%	4%	3%	0%	63%	19%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	4%	1%	2%	41%	0%	2%	0%	0%	0%	0%	2%	3%	0%	35%	10%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-17
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of San Diego HSA 905.31

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	11,554	77,393	8,702	217,502	0	0	94,769	0	22,133	36,010	16,556	196,489	0	0	0	5,103	686,212
% Contribution	%	2%	11%	1%	32%	0%	0%	14%	0%	3%	5%	2%	29%	0%	0%	0%	1%	100%
Conventional Parameters																		
Chloride	lb	37.28	249.7	18.07	1249	0	0	482.0	0	71.41	116.2	34.39	1128	0	0	0	35.83	3422
Sulfate	lb	82.76	554.3	43.23	2595	0	0	453.7	0	158.5	257.9	82.25	2344	0	0	0	29.21	6601
Indicator Bacteria																		
Enterococcus	MPN	5.58E+11	3.74E+12	4.31E+11	3.64E+13	0	0	2.01E+13	0	1.07E+12	1.74E+12	8.19E+11	3.29E+13	0	0	0	1.59E+12	9.94E+13
Fecal Coliform	MPN	4.58E+11	3.07E+12	5.15E+11	3.61E+12	0	0	5.05E+12	0	8.77E+11	1.43E+12	9.80E+11	3.26E+12	0	0	0	5.30E+11	1.98E+13
Total Coliform	MPN	3.22E+12	2.16E+13	1.72E+12	6.17E+13	0	0	2.69E+14	0	6.17E+12	1.00E+13	3.28E+12	5.57E+13	0	0	0	3.77E+12	4.36E+14
Total Metals																		
Aluminum	lb	0.1485	0.9948	0.2618	0.4928	0	0	1.596	0	0.2845	0.4629	0.4980	0.4452	0	0	0	0.2282	5.413
Cadmium	lb	1.95E-05	1.30E-04	1.35E-05	2.03E-04	0	0	4.21E-04	0	3.73E-05	6.06E-05	2.58E-05	1.83E-04	0	0	0	2.11E-05	0.0011
Copper	lb	0.0078	0.0523	0.0038	0.0443	0	0	0.0606	0	0.0150	0.0244	0.0073	0.0400	0	0	0	0.0118	0.2672
Iron	lb	0.2340	1.568	0.3591	2.055	0	0	4.285	0	0.4483	0.7293	0.6832	1.856	0	0	0	0.3487	12.57
Lead	lb	4.46E-04	0.0030	2.78E-04	0.0022	0	0	0.0027	0	8.54E-04	0.0014	5.30E-04	0.0020	0	0	0	4.39E-04	0.0137
Manganese	lb	0.0139	0.0931	0.0181	0.1548	0	0	0.1778	0	0.0266	0.0433	0.0344	0.1398	0	0	0	0.0165	0.7182
Mercury	lb	2.74E-06	1.83E-05	3.79E-06	4.16E-05	0	0	7.67E-05	0	5.24E-06	8.52E-06	7.21E-06	3.76E-05	0	0	0	4.83E-06	2.07E-04
Zinc	lb	0.0102	0.0684	0.0084	0.0776	0	0	0.1752	0	0.0196	0.0318	0.0161	0.0701	0	0	0	0.0375	0.5149
Dissolved Metals																		
Aluminum	lb	0.0010	0.0068	0.0011	0.0037	0	0	0.2167	0	0.0020	0.0032	0.0021	0.0034	0	0	0	0.0120	0.2520
Iron	lb	0.0101	0.0679	0.0258	0.0113	0	0	1.220	0	0.0194	0.0316	0.0491	0.0103	0	0	0	0.0410	1.487
Manganese	lb	0.0011	0.0071	0.0013	0.0029	0	0	0.0783	0	0.0020	0.0033	0.0025	0.0026	0	0	0	0.0092	0.1104
Mercury	lb	1.98E-08	1.32E-07	1.47E-08	1.82E-06	0	0	4.05E-05	0	3.79E-08	6.16E-08	2.79E-08	1.64E-06	0	0	0	8.48E-06	5.28E-05
Nutrients																		
Nitrate as N	lb	1.081	7.240	0.8056	26.72	0	0	2.877	0	2.070	3.368	1.533	24.14	0	0	0	0.3916	70.23
Nitrite as N	lb	0.0725	0.4854	0.0343	0.7523	0	0	0.0751	0	0.1388	0.2259	0.0653	0.6796	0	0	0	0.0169	2.5460
TKN	lb	0.6268	4.198	0.4826	8.103	0	0	5.071	0	1.201	1.953	0.9182	7.320	0	0	0	0.4876	30.36
Total Nitrogen	lb	2.725	18.25	1.519	37.89	0	0	4.986	0	5.220	8.492	2.890	34.23	0	0	0	0.8840	117.1
Dissolved Phosphorus as P	lb	0.0270	0.1809	0.0146	0.8021	0	0	0.3788	0	0.0517	0.0842	0.0277	0.7246	0	0	0	0.1119	2.403
Total Phosphorus as P	lb	0.0674	0.4515	0.0617	1.298	0	0	0.6445	0	0.1291	0.2101	0.1174	1.172	0	0	0	0.1790	4.331
Solid Parameters																		
TDS	lb	365.4	2447	165.6	12094	0	0	1301	0	699.9	1139	315.1	10926	0	0	0	139.1	29592
Synthetic Organics																		
Pentachlorophenol	lb	1.92E-04	0.0013	2.83E-04	0.0102	0	0	0.0017	0	3.68E-04	5.98E-04	5.39E-04	0.0092	0	0	0	7.24E-05	0.0245

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-18
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of San Diego HSA 905.31

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	11,554	77,393	8,702	217,502	0	0	94,769	0	22,133	36,010	16,556	196,489	0	0	0	5,103	686,212
% Contribution	%	2%	11%	1%	32%	0%	0%	14%	0%	3%	5%	2%	29%	0%	0%	0%	1%	100%
Conventional Parameters																		
Chloride	%	1%	6%	1%	43%	0%	0%	3%	0%	2%	3%	1%	39%	0%	0%	0%	1%	100%
Sulfate	%	1%	9%	1%	38%	0%	0%	7%	0%	3%	4%	2%	35%	0%	0%	0%	1%	100%
Indicator Bacteria																		
Enterococcus	%	0%	1%	0%	3%	0%	0%	91%	0%	0%	1%	0%	3%	0%	0%	0%	0%	100%
Fecal Coliform	%	0%	2%	0%	1%	0%	0%	92%	0%	1%	1%	0%	1%	0%	0%	0%	0%	100%
Total Coliform	%	0%	1%	0%	1%	0%	0%	96%	0%	0%	1%	0%	1%	0%	0%	0%	0%	100%
Total Metals																		
Aluminum	%	1%	9%	2%	13%	0%	0%	47%	0%	3%	4%	5%	12%	0%	0%	0%	3%	100%
Cadmium	%	7%	45%	2%	0%	0%	0%	0%	0%	13%	21%	4%	0%	0%	0%	0%	8%	100%
Copper	%	2%	11%	1%	18%	0%	0%	38%	0%	3%	5%	2%	16%	0%	0%	0%	4%	100%
Iron	%	1%	9%	2%	11%	0%	0%	54%	0%	3%	4%	4%	10%	0%	0%	0%	2%	100%
Lead	%	2%	14%	1%	11%	0%	0%	47%	0%	4%	6%	2%	10%	0%	0%	0%	2%	100%
Manganese	%	1%	9%	1%	15%	0%	0%	50%	0%	2%	4%	2%	13%	0%	0%	0%	2%	100%
Mercury	%	0%	1%	0%	50%	0%	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	3%	100%
Zinc	%	1%	6%	0%	14%	0%	0%	54%	0%	2%	3%	1%	13%	0%	0%	0%	6%	100%
Dissolved Metals																		
Aluminum	%	0%	2%	0%	2%	0%	0%	89%	0%	1%	1%	0%	2%	0%	0%	0%	3%	100%
Iron	%	0%	2%	0%	1%	0%	0%	92%	0%	1%	1%	0%	1%	0%	0%	0%	1%	100%
Manganese	%	0%	2%	0%	2%	0%	0%	87%	0%	1%	1%	0%	2%	0%	0%	0%	4%	100%
Mercury	%	0%	0%	0%	34%	0%	0%	0%	0%	0%	0%	0%	31%	0%	0%	0%	35%	100%
Nutrients																		
Nitrate as N	%	1%	9%	1%	39%	0%	0%	4%	0%	3%	4%	2%	35%	0%	0%	0%	1%	100%
Nitrite as N	%	1%	8%	1%	41%	0%	0%	3%	0%	2%	4%	2%	37%	0%	0%	0%	1%	100%
TKN	%	1%	10%	1%	27%	0%	0%	25%	0%	3%	5%	2%	24%	0%	0%	0%	1%	100%
Total Nitrogen	%	2%	11%	1%	37%	0%	0%	5%	0%	3%	5%	2%	33%	0%	0%	0%	1%	100%
Dissolved Phosphorus as P	%	1%	6%	1%	34%	0%	0%	18%	0%	2%	3%	1%	31%	0%	0%	0%	5%	100%
Total Phosphorus as P	%	1%	7%	1%	29%	0%	0%	25%	0%	2%	3%	1%	26%	0%	0%	0%	4%	100%
Solid Parameters																		
TDS	%	1%	8%	1%	41%	0%	0%	5%	0%	2%	4%	2%	37%	0%	0%	0%	1%	100%
Synthetic Organics																		
Pentachlorophenol	%	4%	28%	3%	10%	0%	0%	19%	0%	8%	13%	5%	9%	0%	0%	0%	0%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-19
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of San Diego HSA 905.32

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	482,853	2,101,682	659,289	609,830	5,772,100	571,984	14,107	0	400,557	688,501	2,739,090	5,638,085	29,885	46,094	0	1,829,215	21,583,274
% Contribution	%	2%	10%	3%	3%	27%	3%	0%	0%	2%	3%	13%	26%	0%	0%	0%	8%	100%
Conventional Parameters																		
Chloride	lb	1558	6780	1369	3501	91625	6350	72	0	1292	2217	5684	32368	200.9	272.0	0	4834	158123
Sulfate	lb	3459	15052	3275	7276	17439	3852	68	0	2869	4922	13596	67267	104.2	391.5	0	3942	143512
Indicator Bacteria																		
Enterococcus	MPN	2.33E+13	1.02E+14	3.26E+13	1.02E+14	3.34E+15	8.54E+14	2.99E+12	0	1.94E+13	3.32E+13	1.35E+14	9.45E+14	3.88E+12	1.16E+13	0	2.15E+14	5.82E+15
Fecal Coliform	MPN	1.91E+13	8.32E+13	3.90E+13	1.01E+13	4.05E+15	4.03E+13	7.51E+11	0	1.59E+13	2.72E+13	1.62E+14	9.35E+13	6.57E+12	2.09E+13	0	7.16E+13	4.64E+15
Total Coliform	MPN	1.35E+14	5.86E+14	1.30E+14	1.73E+14	1.32E+17	1.38E+15	4.01E+13	0	1.12E+14	1.92E+14	5.41E+14	1.60E+15	2.24E+14	5.56E+13	0	5.09E+14	1.38E+17
Total Metals																		
Aluminum	lb	6.2066	27.01	19.83	1.382	600.2	2.134	0.2376	0	5.149	8.833	82.32	12.77	0.7856	4.290	0	30.78	802.0
Cadmium	lb	8.13E-04	0.0035	0.0010	5.68E-04	0.1033	0.0011	6.27E-05	0	6.74E-04	0.0012	0.0043	0.0053	1.46E-04	3.76E-04	0	0.0028	0.1251
Copper	lb	0.3266	1.421	0.2887	0.1242	36.47	0.1569	0.0090	0	0.2709	0.4647	1.199	1.148	0.0281	0.0412	0	1.590	43.54
Iron	lb	9.780	42.56	27.20	5.762	798.0	11.39	0.6379	0	8.113	13.92	112.9	53.27	0.9567	6.928	0	47.05	1139
Lead	lb	0.0186	0.0811	0.0211	0.0061	2.549	0.0116	3.95E-04	0	0.0155	0.0265	0.0876	0.0567	0.0030	0.0061	0	0.0593	2.942
Manganese	lb	0.5806	2.527	1.368	0.4340	40.45	0.8235	0.0265	0	0.4816	0.8263	5.679	4.013	0.0377	0.5570	0	2.2247	60.03
Mercury	lb	1.14E-04	4.97E-04	2.87E-04	1.17E-04	0.0088	2.46E-04	1.14E-05	0	9.48E-05	1.63E-04	0.0012	0.0011	1.67E-05	8.34E-05	0	6.52E-04	0.0134
Zinc	lb	0.4267	1.857	0.6392	0.2176	161.5	1.247	0.0261	0	0.3540	0.6072	2.653	2.012	0.1844	0.1851	0	5.065	177.0
Dissolved Metals																		
Aluminum	lb	0.0427	0.1859	0.0831	0.0104	17.29	0.0571	0.0323	0	0.0354	0.0608	0.3448	0.0965	0.0459	0.0931	0	1.623	20.00
Iron	lb	0.4234	1.843	1.955	0.0318	30.49	0.1958	0.1817	0	0.3512	0.6025	8.114	0.2942	0.0596	3.527	0	5.531	53.60
Manganese	lb	0.0446	0.1940	0.0997	0.0081	16.58	0.0594	0.0117	0	0.0370	0.0634	0.4137	0.0752	0.0146	0.1701	0	1.237	19.01
Mercury	lb	8.26E-07	3.60E-06	1.11E-06	5.10E-06	0.0056	5.04E-05	6.03E-06	0	6.85E-07	1.18E-06	4.61E-06	4.72E-05	1.39E-05	4.04E-05	0	0.0011	0.0070
Nutrients																		
Nitrate as N	lb	45.17	196.6	61.03	74.92	316.4	38.71	0.4283	0	37.47	64.28	253.3	692.7	2.618	9.405	0	52.83	1846
Nitrite as N	lb	3.028	13.18	2.601	2.109	29.89	1.102	0.0112	0	2.512	4.310	10.80	19.50	0.1627	0.2278	0	2.275	91.7
TKN	lb	26.19	114.0	36.56	22.72	1974	39.62	0.7548	0	21.73	37.28	151.8	210.1	3.273	9.446	0	65.79	2713
Total Nitrogen	lb	113.9	495.6	115.1	106.2	1459	51.95	0.7421	0	94.47	162.1	477.7	982.3	12.68	20.03	0	119.3	4211
Dissolved Phosphorus as P	lb	1.129	4.913	1.103	2.249	106.3	6.634	0.0564	0	0.936	1.606	4.579	20.79	0.3472	0.1227	0	15.10	165.8
Total Phosphorus as P	lb	2.817	12.26	4.673	3.638	181.0	12.25	0.0959	0	2.337	4.009	19.40	33.64	0.5374	2.263	0	24.14	303.1
Solid Parameters																		
TDS	lb	15269	66457	12549	33909	114876	18269	193.7	0	12667	21731	52090	313498	762.1	1580	0	18765	682616
Synthetic Organics																		
Pentachlorophenol	lb	0.0080	0.0349	0.0215	0.0286	0.2565	0.0137	2.56E-04	0	0.0067	0.0114	0.0891	0.2645	3.77E-04	0.0196	0	0.0098	0.7649

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-20
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of San Diego HSA 905.32

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	482,853	2,101,682	659,289	609,830	5,772,100	571,984	14,107	0	400,557	688,501	2,739,090	5,638,085	29,885	46,094	0	1,829,215	21,583,274
% Contribution	%	2%	10%	3%	3%	27%	3%	0%	0%	2%	3%	13%	26%	0%	0%	0%	8%	100%
Conventional Parameters																		
Chloride	%	1%	6%	2%	4%	23%	2%	0%	0%	1%	2%	7%	41%	0%	0%	0%	9%	100%
Sulfate	%	2%	10%	3%	4%	9%	2%	0%	0%	2%	3%	13%	41%	0%	1%	0%	9%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	96%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	100%
Fecal Coliform	%	0%	0%	0%	0%	99%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Total Coliform	%	0%	0%	0%	0%	99%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Total Metals																		
Aluminum	%	1%	2%	2%	0%	71%	1%	0%	0%	0%	1%	8%	4%	0%	0%	0%	10%	100%
Cadmium	%	0%	1%	0%	0%	97%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	100%
Copper	%	0%	2%	0%	0%	84%	0%	0%	0%	0%	1%	2%	3%	0%	0%	0%	7%	100%
Iron	%	1%	3%	2%	0%	72%	1%	0%	0%	1%	1%	7%	3%	0%	0%	0%	9%	100%
Lead	%	0%	2%	0%	0%	90%	0%	0%	0%	0%	0%	2%	1%	0%	0%	0%	3%	100%
Manganese	%	1%	3%	1%	0%	75%	1%	0%	0%	1%	1%	5%	4%	0%	0%	0%	8%	100%
Mercury	%	0%	0%	0%	4%	22%	10%	0%	0%	0%	0%	1%	34%	0%	0%	0%	28%	100%
Zinc	%	0%	0%	0%	0%	93%	1%	0%	0%	0%	0%	0%	1%	0%	0%	0%	4%	100%
Dissolved Metals																		
Aluminum	%	0%	1%	0%	0%	76%	1%	0%	0%	0%	0%	1%	1%	0%	0%	0%	18%	100%
Iron	%	0%	1%	0%	0%	82%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	12%	100%
Manganese	%	0%	1%	0%	0%	84%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	13%	100%
Mercury	%	0%	0%	0%	1%	0%	7%	0%	0%	0%	0%	0%	6%	0%	0%	0%	86%	100%
Nutrients																		
Nitrate as N	%	2%	9%	3%	4%	19%	2%	0%	0%	2%	3%	11%	36%	0%	1%	0%	9%	100%
Nitrite as N	%	2%	7%	2%	4%	32%	2%	0%	0%	1%	2%	8%	33%	0%	0%	0%	8%	100%
TKN	%	1%	3%	1%	1%	74%	1%	0%	0%	1%	1%	3%	8%	0%	0%	0%	6%	100%
Total Nitrogen	%	2%	9%	2%	3%	31%	2%	0%	0%	2%	3%	10%	28%	0%	1%	0%	7%	100%
Dissolved Phosphorus as P	%	1%	2%	1%	1%	52%	4%	0%	0%	0%	1%	2%	12%	0%	0%	0%	23%	100%
Total Phosphorus as P	%	1%	3%	1%	1%	57%	4%	0%	0%	0%	1%	3%	10%	0%	1%	0%	19%	100%
Solid Parameters																		
TDS	%	2%	8%	2%	4%	17%	2%	0%	0%	2%	3%	10%	41%	0%	0%	0%	9%	100%
Synthetic Organics																		
Pentachlorophenol	%	%	3%	15%	4%	1%	43%	0%	0%	0%	3%	5%	16%	5%	0%	4%	0%	1%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-21
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: City of Solana Beach HSA 905.11

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	69,516	0	1,307	355,319	1,693,542	1,244,947	195,430	0	17,916	19,340	8,778	195,052	824,393	11,018	5,127,660	3,165,624	12,929,841
% Contribution	%	1%	0%	0%	3%	13%	10%	2%	0%	0%	0%	0%	2%	6%	0%	40%	24%	100%
Conventional Parameters																		
Chloride	lb	221.0	0	2.715	1883	20480	13806	265.9	0	57.80	30.12	17.48	1018	3733	65.02	45735	16974	104289
Sulfate	lb	490.6	0	6.495	3913	3898	8375	250.3	0	128.3	66.86	41.80	2116	1936	93.58	40871	13841	76027
Indicator Bacteria																		
Enterococcus	MPN	3.31E+12	0	6.47E+10	5.49E+13	7.47E+14	1.86E+15	1.11E+13	0	8.66E+11	4.51E+11	4.16E+11	2.97E+13	7.21E+13	2.78E+12	3.43E+15	7.54E+14	6.96E+15
Fecal Coliform	MPN	2.71E+12	0	7.74E+10	5.44E+12	9.05E+14	8.76E+13	2.78E+12	0	7.10E+11	3.70E+11	4.98E+11	2.94E+12	1.22E+14	4.99E+12	2.54E+15	2.51E+14	3.92E+15
Total Coliform	MPN	1.91E+13	0	2.59E+11	9.30E+13	2.95E+16	3.00E+15	1.48E+14	0	5.00E+12	2.60E+12	1.66E+12	5.03E+13	4.16E+15	1.33E+13	9.85E+15	1.79E+15	4.86E+16
Total Metals																		
Aluminum	lb	0.8804	0	0.0393	0.7430	134.2	4.639	0.8806	0	0.2303	0.1200	0.2531	0.4018	14.60	1.025	295.6	108.1	561.6
Cadmium	lb	1.15E-04	0	2.03E-06	3.06E-04	0.0231	0.0024	2.32E-04	0	3.02E-05	1.57E-05	1.31E-05	1.65E-04	0.0027	8.99E-05	0.0249	0.0100	0.0640
Copper	lb	0.0463	0	5.73E-04	0.0668	8.151	0.3412	0.0334	0	0.0121	0.0063	0.0037	0.0361	0.5213	0.0098	4.521	5.585	19.33
Iron	lb	1.387	0	0.0539	3.098	178.4	24.76	2.364	0	0.3629	0.1891	0.3472	1.675	17.78	1.656	446.9	165.2	844.1
Lead	lb	0.0026	0	4.18E-05	0.0033	0.5697	0.0253	0.0015	0	6.91E-04	3.60E-04	2.69E-04	0.0018	0.0549	0.0014	0.5124	0.2081	1.382
Manganese	lb	0.0824	0	0.0027	0.2334	9.042	1.791	0.0981	0	0.0215	0.0112	0.0175	0.1262	0.7005	0.1331	21.52	7.812	41.59
Mercury	lb	1.62E-05	0	5.70E-07	6.28E-05	0.0020	5.35E-04	4.23E-05	0	4.24E-06	2.21E-06	3.67E-06	3.39E-05	3.11E-04	1.99E-05	0.0066	0.0023	0.0118
Zinc	lb	0.0605	0	0.0013	0.1170	36.11	2.712	0.0967	0	0.0158	0.0082	0.0082	0.0633	3.426	0.0442	12.96	17.79	73.41
Dissolved Metals																		
Aluminum	lb	0.0061	0	1.65E-04	0.0056	3.866	0.1241	0.1196	0	0.0016	0.0008	0.0011	0.0030	0.8522	0.0223	4.180	5.698	14.88
Iron	lb	0.0601	0	0.0039	0.0171	6.815	0.4258	0.6734	0	0.0157	0.0082	0.0249	0.0093	1.107	0.8429	21.24	19.42	50.66
Manganese	lb	0.0063	0	1.98E-04	0.0044	3.707	0.1292	0.0432	0	0.0017	8.62E-04	0.0013	0.0024	0.2707	0.0407	2.952	4.343	11.50
Mercury	lb	1.17E-07	0	2.20E-09	2.74E-06	0.0013	1.09E-04	2.24E-05	0	3.07E-08	1.60E-08	1.42E-08	1.48E-06	2.58E-04	9.67E-06	0.0026	0.0040	0.0083
Nutrients																		
Nitrate as N	lb	6.407	0	0.1210	40.29	70.72	84.16	1.587	0	1.676	0.8732	0.7789	21.79	48.65	2.248	630.0	185.5	1095
Nitrite as N	lb	0.4296	0	0.0052	1.134	6.681	2.395	0.0414	0	0.1124	0.0585	0.0332	0.6133	3.023	0.0544	24.03	7.990	46.60
TKN	lb	3.715	0	0.0725	12.22	441.2	86.15	2.798	0	0.9719	0.5064	0.4666	6.606	60.82	2.258	612.0	231.0	1461
Total Nitrogen	lb	16.15	0	0.2282	57.14	326.1	112.9	2.751	0	4.225	2.201	1.469	30.90	235.6	4.788	1848	418.8	3061
Dissolved Phosphorus as P	lb	0.1601	0	0.0022	1.209	23.75	14.42	0.2090	0	0.0419	0.0218	0.0141	0.6539	6.452	0.0293	74.71	53.03	174.7
Total Phosphorus as P	lb	0.3996	0	0.0093	1.957	40.46	26.64	0.3556	0	0.1045	0.0545	0.0596	1.058	9.986	0.5409	103.3	84.79	269.7
Solid Parameters																		
TDS	lb	2166	0	24.88	18235	25677	39721	718.0	0	566.6	295.2	160.1	9860	14162	377.7	184980	65892	362836
Synthetic Organics																		
Pentachlorophenol	lb	0.0011	0	4.26E-05	0.0154	0.0573	0.0298	9.50E-04	0	2.98E-04	1.55E-04	2.74E-04	0.0083	0.0070	0.0047	0.0920	0.0343	0.2517

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-22
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: City of Solana Beach HSA 905.11

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	69,516	0	1,307	355,319	1,693,542	1,244,947	195,430	0	17,916	19,340	8,778	195,052	824,393	11,018	5,127,660	3,165,624	12,929,841
% Contribution	%	1%	0%	0%	3%	13%	10%	2%	0%	0%	0%	0%	2%	6%	0%	40%	24%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	3%	8%	6%	0%	0%	0%	0%	0%	2%	9%	0%	55%	17%	100%
Sulfate	%	0%	0%	0%	3%	3%	6%	1%	0%	0%	0%	0%	2%	4%	0%	63%	17%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	31%	1%	2%	0%	0%	0%	0%	0%	4%	0%	59%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	50%	0%	1%	0%	0%	0%	0%	0%	7%	0%	42%	1%	100%
Total Coliform	%	0%	0%	0%	0%	80%	0%	1%	0%	0%	0%	0%	0%	12%	0%	6%	0%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	0%	25%	2%	1%	0%	0%	0%	0%	0%	3%	0%	47%	21%	100%
Cadmium	%	0%	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	11%	0%	10%	7%	100%
Copper	%	0%	0%	0%	0%	49%	1%	1%	0%	0%	0%	0%	0%	4%	0%	20%	24%	100%
Iron	%	0%	0%	0%	0%	27%	2%	2%	0%	0%	0%	0%	0%	3%	0%	46%	20%	100%
Lead	%	0%	0%	0%	0%	55%	1%	1%	0%	0%	0%	0%	0%	6%	0%	25%	12%	100%
Manganese	%	0%	0%	0%	0%	31%	3%	2%	0%	0%	0%	0%	0%	3%	0%	42%	18%	100%
Mercury	%	0%	0%	0%	1%	4%	12%	0%	0%	0%	0%	0%	1%	0%	0%	53%	29%	100%
Zinc	%	0%	0%	0%	0%	62%	3%	1%	0%	0%	0%	0%	0%	6%	0%	12%	17%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	27%	2%	4%	0%	0%	0%	0%	0%	6%	0%	22%	39%	100%
Iron	%	0%	0%	0%	0%	35%	1%	7%	0%	0%	0%	0%	0%	7%	0%	17%	31%	100%
Manganese	%	0%	0%	0%	0%	39%	1%	3%	0%	0%	0%	0%	0%	4%	0%	18%	35%	100%
Mercury	%	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	29%	64%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	2%	5%	4%	0%	0%	0%	0%	0%	1%	5%	0%	64%	16%	100%
Nitrite as N	%	0%	0%	0%	3%	11%	5%	0%	0%	0%	0%	0%	1%	10%	0%	53%	16%	100%
TKN	%	0%	0%	0%	1%	35%	5%	1%	0%	0%	0%	0%	0%	7%	0%	35%	16%	100%
Total Nitrogen	%	0%	0%	0%	2%	11%	4%	0%	0%	0%	0%	0%	1%	11%	0%	55%	15%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	1%	13%	7%	0%	0%	0%	0%	0%	0%	4%	0%	40%	34%	100%
Total Phosphorus as P	%	0%	0%	0%	1%	16%	9%	1%	0%	0%	0%	0%	0%	5%	0%	34%	33%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	3%	6%	6%	0%	0%	0%	0%	0%	2%	7%	0%	59%	17%	100%
Synthetic Organics																		
Pentachlorophenol	%	2%	0%	0%	1%	45%	0%	3%	0%	0%	1%	0%	1%	7%	3%	29%	8%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-23
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: County of San Diego HSA 905.11

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	520,240	78,055	5,813	4,335,434	3,985,414	1,068,818	526,543	0	193,206	107,710	176,205	24,221,026	544,229	4,369,283	23,446,002	11,717,554	75,295,531
% Contribution	%	1%	0%	0%	6%	5%	1%	1%	0%	0%	0%	0%	32%	1%	6%	31%	16%	100%
Conventional Parameters																		
Chloride	lb	1678	251.8	12.07	24805	63069	11865	2678	0	537.5	347.5	331.0	136242	3658	24432	223240	80649	573797
Sulfate	lb	3726	559.1	28.88	51550	12004	7198	2520	0	1193	771.5	791.7	283137	1898	35164	199497	65763	665802
Indicator Bacteria																		
Enterococcus	MPN	2.51E+13	3.77E+12	2.88E+11	7.24E+14	2.30E+15	1.60E+15	1.12E+14	0	8.05E+12	5.20E+12	7.89E+12	3.98E+15	7.06E+13	1.04E+15	1.67E+16	3.58E+15	3.02E+16
Fecal Coliform	MPN	2.06E+13	3.09E+12	3.44E+11	7.17E+13	2.79E+15	7.53E+13	2.80E+13	0	6.60E+12	4.27E+12	9.44E+12	3.94E+14	1.20E+14	1.88E+15	1.24E+16	1.19E+15	1.90E+16
Total Coliform	MPN	1.45E+14	2.18E+13	1.15E+12	1.23E+15	9.08E+16	2.58E+15	1.50E+15	0	4.65E+13	3.00E+13	3.15E+13	6.73E+15	4.08E+15	4.99E+15	4.81E+16	8.49E+15	1.69E+17
Total Metals																		
Aluminum	lb	6.6871	1.003	0.1749	9.790	413.2	3.987	8.867	0	2.141	1.384	4.793	53.77	14.31	385.3	1443	513.6	2862
Cadmium	lb	8.76E-04	1.31E-04	9.04E-06	0.0040	0.0711	0.0020	0.0023	0	2.81E-04	1.81E-04	2.48E-04	0.0221	0.0027	0.0338	0.1216	0.0474	0.3088
Copper	lb	0.3518	0.0528	0.0025	0.8801	25.10	0.2932	0.3364	0	0.1127	0.0728	0.0698	4.834	0.5108	3.697	22.07	26.54	84.92
Iron	lb	10.54	1.581	0.2399	40.82	549.3	21.28	23.81	0	3.374	2.182	6.575	224.2	17.42	622.2	2181	785.0	4490
Lead	lb	0.0201	0.0030	1.86E-04	0.0434	1.754	0.0217	0.0147	0	0.0064	0.0042	0.0051	0.2385	0.0538	0.5441	2.501	0.9886	6.200
Manganese	lb	0.6256	0.0939	0.0121	3.075	27.85	1.539	0.9875	0	0.2003	0.1295	0.3307	16.89	0.6865	50.03	105.0	37.12	244.6
Mercury	lb	1.23E-04	1.85E-05	2.53E-06	8.27E-04	0.0061	4.60E-04	4.26E-04	0	3.94E-05	2.55E-05	6.94E-05	0.0045	3.05E-04	0.0075	0.0320	0.0109	0.0633
Zinc	lb	0.4597	0.0690	0.0056	1.542	111.2	2.331	0.9733	0	0.1472	0.0952	0.1545	8.467	3.357	16.62	63.26	84.51	293.2
Dissolved Metals																		
Aluminum	lb	0.0460	0.0069	7.32E-04	0.0740	11.90	0.1067	1.204	0	0.0147	0.0095	0.0201	0.4062	0.8352	8.363	20.40	27.07	70.47
Iron	lb	0.4562	0.0684	0.0172	0.2255	20.99	0.3659	6.780	0	0.1461	0.0944	0.4724	1.238	1.085	316.8	103.7	92.28	544.6
Manganese	lb	0.0480	0.0072	8.79E-04	0.0576	11.42	0.1111	0.4351	0	0.0154	0.0099	0.0241	0.3166	0.2652	15.28	14.41	20.63	63.03
Mercury	lb	8.90E-07	1.34E-07	9.79E-09	3.62E-05	0.0039	9.41E-05	2.25E-04	0	2.85E-07	1.84E-07	2.68E-07	1.99E-04	2.53E-04	0.0036	0.0128	0.0191	0.0402
Nutrients																		
Nitrate as N	lb	48.66	7.301	0.5381	530.9	217.8	72.33	15.98	0	15.58	10.08	14.75	2916	47.67	844.8	3075	881.5	8698
Nitrite as N	lb	3.263	0.4896	0.0229	14.94	20.57	2.058	0.4170	0	1.045	0.6755	0.6286	82.08	2.963	20.46	117.3	37.96	304.9
TKN	lb	28.22	4.234	0.3224	161.0	1359	74.04	28.17	0	9.037	5.843	8.837	884.1	59.60	848.4	2987	1098	7556
Total Nitrogen	lb	122.7	18.41	1.015	752.8	1004	97.07	27.70	0	39.29	25.40	27.81	4135	230.9	1799	9020	1990	19291
Dissolved Phosphorus as P	lb	1.216	0.1825	0.0097	15.93	73.14	12.40	2.104	0	0.3895	0.2518	0.2666	87.52	6.322	11.02	364.7	251.9	827.4
Total Phosphorus as P	lb	3.035	0.4554	0.0412	25.78	124.6	22.90	3.581	0	0.9720	0.6284	1.130	141.6	9.786	203.3	504.2	402.8	1445
Solid Parameters																		
TDS	lb	16452	2468	110.6	240250	79074	34137	7230	0	5268	3406	3033	1319567	13878	141944	902919	313079	3082816
Synthetic Organics																		
Pentachlorophenol	lb	0.0086	0.0013	1.89E-04	0.2027	0.1765	0.0256	0.0096	0	0.0028	0.0018	0.0052	1.113	0.0069	1.758	0.4492	0.1630	3.925

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-24
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: County of San Diego HSA 905.11

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	520,240	78,055	5,813	4,335,434	3,985,414	1,068,818	526,543	0	193,206	107,710	176,205	24,221,026	544,229	4,369,283	23,446,002	11,717,554	75,295,531
% Contribution	%	1%	0%	0%	6%	5%	1%	1%	0%	0%	0%	0%	32%	1%	6%	31%	16%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	6%	3%	1%	0%	0%	0%	0%	0%	32%	1%	7%	40%	10%	100%
Sulfate	%	0%	0%	0%	5%	1%	1%	0%	0%	0%	0%	0%	30%	0%	10%	42%	9%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	20%	0%	2%	0%	0%	0%	0%	1%	1%	1%	73%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	34%	0%	0%	0%	0%	0%	0%	0%	1%	6%	57%	1%	100%
Total Coliform	%	0%	0%	0%	0%	82%	0%	2%	0%	0%	0%	0%	0%	3%	0%	12%	0%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	1%	14%	0%	1%	0%	0%	0%	0%	4%	0%	9%	52%	18%	100%
Cadmium	%	0%	0%	0%	0%	69%	0%	0%	0%	0%	0%	0%	0%	3%	0%	18%	10%	100%
Copper	%	0%	0%	0%	1%	34%	0%	1%	0%	0%	0%	0%	7%	1%	2%	27%	27%	100%
Iron	%	0%	0%	0%	1%	15%	0%	1%	0%	0%	0%	0%	4%	0%	11%	49%	17%	100%
Lead	%	0%	0%	0%	1%	39%	0%	1%	0%	0%	0%	0%	3%	1%	8%	34%	14%	100%
Manganese	%	0%	0%	0%	1%	17%	1%	1%	0%	0%	0%	0%	6%	0%	12%	45%	16%	100%
Mercury	%	0%	0%	0%	3%	2%	2%	0%	0%	0%	0%	0%	18%	0%	0%	52%	23%	100%
Zinc	%	0%	0%	0%	0%	51%	1%	1%	0%	0%	0%	0%	3%	1%	1%	20%	22%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	19%	1%	4%	0%	0%	0%	0%	2%	1%	1%	29%	43%	100%
Iron	%	0%	0%	0%	0%	27%	0%	6%	0%	0%	0%	0%	2%	2%	0%	25%	38%	100%
Manganese	%	0%	0%	0%	0%	28%	0%	2%	0%	0%	0%	0%	1%	1%	1%	26%	40%	100%
Mercury	%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	3%	0%	0%	34%	61%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	4%	2%	1%	0%	0%	0%	0%	0%	23%	1%	14%	45%	9%	100%
Nitrite as N	%	0%	0%	0%	5%	5%	1%	0%	0%	0%	0%	0%	30%	1%	6%	41%	11%	100%
TKN	%	0%	0%	0%	2%	20%	1%	1%	0%	0%	0%	0%	13%	1%	7%	39%	15%	100%
Total Nitrogen	%	0%	0%	0%	4%	4%	1%	0%	0%	0%	0%	0%	25%	1%	11%	43%	10%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	2%	8%	2%	0%	0%	0%	0%	0%	11%	1%	1%	44%	31%	100%
Total Phosphorus as P	%	0%	0%	0%	2%	9%	2%	0%	0%	0%	0%	0%	10%	1%	14%	35%	27%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	6%	2%	1%	0%	0%	0%	0%	0%	31%	1%	8%	41%	10%	100%
Synthetic Organics																		
Pentachlorophenol	%	1%	0%	0%	1%	6%	0%	0%	0%	0%	0%	0%	5%	0%	75%	8%	2%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-25
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: County of San Diego HSA 905.12

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	0	118,397	22,439	1,108,180	19,833	0	16,972	18,151	55,443	5,188,533	26,395	181,507	2,234,690	1,688,145	10,678,685
% Contribution	%	0%	0%	0%	1%	0%	10%	0%	0%	0%	0%	1%	49%	0%	2%	21%	16%	100%
Conventional Parameters																		
Chloride	lb	0	0	0	679.7	356.2	12302	100.9	0	54.8	58.6	115.2	29787	177.4	1071	21310	11851	77864
Sulfate	lb	0	0	0	1413	67.79	7463	95.0	0	121.6	130.0	275.4	61903	92.04	1542	19043	9663	101809
Indicator Bacteria																		
Enterococcus	MPN	0	0	0	1.98E+13	1.30E+13	1.65E+15	4.21E+12	0	8.20E+11	8.77E+11	2.74E+12	8.69E+14	3.43E+12	4.58E+13	1.60E+15	5.27E+14	4.74E+15
Fecal Coliform	MPN	0	0	0	1.96E+12	1.57E+13	7.81E+13	1.06E+12	0	6.72E+11	7.19E+11	3.28E+12	8.61E+13	5.80E+12	8.22E+13	1.18E+15	1.75E+14	1.63E+15
Total Coliform	MPN	0	0	0	3.36E+13	5.13E+14	2.67E+15	5.63E+13	0	4.73E+12	5.06E+12	1.10E+13	1.47E+15	1.98E+14	2.19E+14	4.59E+15	1.25E+15	1.10E+16
Total Metals																		
Aluminum	lb	0	0	0	0.2683	2.333	4.134	0.3340	0	0.2182	0.2333	1.668	11.76	0.6939	16.89	137.7	75.47	251.7
Cadmium	lb	0	0	0	1.10E-04	4.02E-04	0.0021	8.81E-05	0	2.86E-05	3.06E-05	8.63E-05	0.0048	1.29E-04	0.0015	0.0116	0.0070	0.0279
Copper	lb	0	0	0	0.0241	0.1418	0.3040	0.0127	0	0.0115	0.0123	0.0243	1.057	0.0248	0.1621	2.107	3.899	7.780
Iron	lb	0	0	0	1.119	3.102	22.07	0.8968	0	0.3437	0.3676	2.288	49.02	0.8450	27.28	208.2	115.3	430.9
Lead	lb	0	0	0	0.0012	0.0099	0.0225	5.55E-04	0	6.55E-04	7.00E-04	0.0018	0.0522	0.0026	0.0239	0.2388	0.1453	0.4999
Manganese	lb	0	0	0	0.0843	0.1573	1.596	0.0372	0	0.0204	0.0218	0.1151	3.693	0.0333	2.193	10.03	5.454	23.43
Mercury	lb	0	0	0	2.27E-05	3.43E-05	4.77E-04	1.61E-05	0	4.02E-06	4.30E-06	2.42E-05	0.0010	1.48E-05	3.28E-04	0.0031	0.0016	0.0066
Zinc	lb	0	0	0	0.0422	0.6280	2.417	0.0367	0	0.0150	0.0160	0.0538	1.851	0.1628	0.7287	6.039	12.42	24.41
Dissolved Metals																		
Aluminum	lb	0	0	0	0.0020	0.0672	0.1106	0.0454	0	0.0015	0.0016	0.0070	0.0888	0.0405	0.3666	1.947	3.978	6.657
Iron	lb	0	0	0	0.0062	0.1185	0.3794	0.2554	0	0.0149	0.0159	0.1644	0.2707	0.0526	13.89	9.895	13.56	38.62
Manganese	lb	0	0	0	0.0016	0.0645	0.1152	0.0164	0	0.0016	0.0017	0.0084	0.0692	0.0129	0.6698	1.375	3.032	5.369
Mercury	lb	0	0	0	9.91E-07	2.19E-05	9.76E-05	8.48E-06	0	2.90E-08	3.11E-08	9.34E-08	4.34E-05	1.22E-05	1.59E-04	0.0012	0.0028	0.0044
Nutrients																		
Nitrate as N	lb	0	0	0	14.55	1.230	75.00	0.6022	0	1.588	1.698	5.132	637.5	2.312	37.03	293.5	129.5	1200
Nitrite as N	lb	0	0	0	0.4095	0.1162	2.134	0.0157	0	0.1064	0.1138	0.2187	17.95	0.1437	0.8970	11.19	5.578	38.87
TKN	lb	0	0	0	4.411	7.673	76.77	1.061	0	0.9206	0.9846	3.075	193.3	2.891	37.19	285.2	161.3	774.7
Total Nitrogen	lb	0	0	0	20.63	5.671	100.6	1.043	0	4.003	4.281	9.677	904.0	11.20	78.87	861.0	292.4	2293
Dissolved Phosphorus as P	lb	0	0	0	0.4366	0.4131	12.85	0.0793	0	0.0397	0.0424	0.0928	19.13	0.3067	0.4833	34.81	37.02	105.7
Total Phosphorus as P	lb	0	0	0	0.7064	0.7036	23.74	0.1349	0	0.0990	0.1059	0.3930	30.96	0.4747	8.911	48.13	59.20	173.6
Solid Parameters																		
TDS	lb	0	0	0	6583	446.6	35395	272.4	0	536.7	574.0	1055	288502	673.1	6223	86189	46005	472454
Synthetic Organics																		
Pentachlorophenol	lb	0	0	0	0.0056	0.0010	0.0266	3.60E-04	0	2.82E-04	3.02E-04	0.0018	0.2434	3.33E-04	0.0771	0.0429	0.0239	0.4235

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-26
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: County of San Diego HSA 905.12

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	0	0	118,397	22,439	1,108,180	19,833	0	16,972	18,151	55,443	5,188,533	26,395	181,507	2,234,690	1,688,145	10,678,685
% Contribution	%	0%	0%	0%	1%	0%	10%	0%	0%	0%	0%	1%	49%	0%	2%	21%	16%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	1%	0%	6%	0%	0%	0%	0%	0%	51%	0%	2%	28%	11%	100%
Sulfate	%	0%	0%	0%	1%	0%	6%	0%	0%	0%	0%	0%	49%	0%	3%	30%	10%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	1%	3%	1%	0%	0%	0%	0%	4%	0%	0%	86%	4%	100%
Fecal Coliform	%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	1%	1%	4%	89%	2%	100%
Total Coliform	%	0%	0%	0%	0%	23%	1%	3%	0%	0%	0%	0%	2%	8%	1%	59%	3%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	0%	1%	5%	0%	0%	0%	0%	0%	10%	0%	4%	52%	28%	100%
Cadmium	%	0%	0%	0%	0%	11%	0%	0%	0%	0%	0%	0%	0%	4%	0%	45%	40%	100%
Copper	%	0%	0%	0%	0%	2%	4%	0%	0%	0%	0%	0%	17%	0%	1%	30%	45%	100%
Iron	%	0%	0%	0%	0%	1%	4%	0%	0%	0%	0%	0%	10%	0%	5%	52%	27%	100%
Lead	%	0%	0%	0%	0%	3%	5%	0%	0%	0%	0%	0%	10%	1%	5%	48%	28%	100%
Manganese	%	0%	0%	0%	0%	1%	7%	0%	0%	0%	0%	0%	14%	0%	5%	46%	25%	100%
Mercury	%	0%	0%	0%	1%	0%	16%	0%	0%	0%	0%	0%	27%	0%	0%	34%	22%	100%
Zinc	%	0%	0%	0%	0%	4%	12%	0%	0%	0%	0%	0%	8%	1%	0%	28%	45%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	1%	6%	1%	0%	0%	0%	0%	3%	1%	1%	27%	60%	100%
Iron	%	0%	0%	0%	0%	2%	4%	3%	0%	0%	0%	0%	4%	1%	0%	26%	60%	100%
Manganese	%	0%	0%	0%	0%	2%	4%	1%	0%	0%	0%	0%	2%	0%	1%	27%	62%	100%
Mercury	%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	4%	0%	0%	23%	62%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	1%	0%	5%	0%	0%	0%	0%	0%	42%	0%	5%	36%	11%	100%
Nitrite as N	%	0%	0%	0%	1%	0%	6%	0%	0%	0%	0%	0%	48%	0%	2%	30%	12%	100%
TKN	%	0%	0%	0%	1%	1%	11%	0%	0%	0%	0%	0%	27%	1%	3%	36%	21%	100%
Total Nitrogen	%	0%	0%	0%	1%	0%	5%	0%	0%	0%	0%	0%	44%	0%	4%	34%	11%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	0%	0%	12%	0%	0%	0%	0%	0%	18%	0%	0%	33%	35%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	0%	15%	0%	0%	0%	0%	0%	17%	0%	5%	28%	33%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	1%	0%	6%	0%	0%	0%	0%	0%	50%	0%	3%	30%	10%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	0%	0%	0%	1%	0%	0%	0%	0%	1%	1%	19%	0%	57%	14%	5%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-27
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: County of San Diego HSA 905.21

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	131,515	701,673	304,637	335,572	0	144,484	0	11,674	172,664	2,013,537	15,300,697	0	2,951,468	5,754,342	2,994,462	30,816,725
% Contribution	%	0%	0%	2%	1%	1%	0%	0%	0%	0%	1%	7%	50%	0%	10%	19%	10%	100%
Conventional Parameters																		
Chloride	lb	0	424.3	1457	1749	5137	0	82.66	0	37.66	556.9	3959	87306	0	17340	54821	20659	193530
Sulfate	lb	0	942.0	3486	3635	977.8	0	77.80	0	83.62	1236	9470	181437	0	24958	48990	16846	292140
Indicator Bacteria																		
Enterococcus	MPN	0	6.35E+12	3.47E+13	5.10E+13	1.87E+14	0	3.45E+12	0	5.64E+11	8.34E+12	9.43E+13	2.55E+15	0	7.41E+14	4.11E+15	9.18E+14	8.70E+15
Fecal Coliform	MPN	0	5.21E+12	4.16E+13	5.05E+12	2.27E+14	0	8.66E+11	0	4.62E+11	6.84E+12	1.13E+14	2.52E+14	0	1.33E+15	3.04E+15	3.06E+14	5.33E+15
Total Coliform	MPN	0	3.67E+13	1.39E+14	8.64E+13	7.40E+15	0	4.62E+13	0	3.26E+12	4.81E+13	3.77E+14	4.31E+15	0	3.54E+15	1.18E+16	2.18E+15	3.00E+16
Total Metals																		
Aluminum	lb	0	1.6905	21.11	0.6902	33.65	0	0.2737	0	0.1501	2.219	57.34	34.46	0	273.5	354.3	131.6	910.9
Cadmium	lb	0	2.21E-04	0.0011	2.84E-04	0.0058	0	7.22E-05	0	1.97E-05	2.91E-04	0.0030	0.0142	0	0.0240	0.0299	0.0121	0.0909
Copper	lb	0	0.0889	0.3073	0.0621	2.045	0	0.0104	0	0.0079	0.1167	0.8349	3.098	0	2.624	5.419	6.797	21.41
Iron	lb	0	2.664	28.95	2.878	44.74	0	0.7349	0	0.2364	3.496	78.66	143.7	0	441.6	535.6	201.1	1484
Lead	lb	0	0.0051	0.0225	0.0031	0.1429	0	4.55E-04	0	4.51E-04	0.0067	0.0610	0.1529	0	0.3862	0.6143	0.2533	1.649
Manganese	lb	0	0.1581	1.456	0.2168	2.268	0	0.0305	0	0.0140	0.2075	3.956	10.82	0	35.51	25.79	9.508	89.94
Mercury	lb	0	3.11E-05	3.06E-04	5.83E-05	4.95E-04	0	1.32E-05	0	2.76E-06	4.09E-05	8.31E-04	0.0029	0	0.0053	0.0079	0.0028	0.0206
Zinc	lb	0	0.1162	0.6803	0.1087	9.057	0	0.0300	0	0.0103	0.1525	1.848	5.426	0	11.80	15.53	21.65	66.41
Dissolved Metals																		
Aluminum	lb	0	0.0116	0.0884	0.0052	0.9696	0	0.0372	0	0.0010	0.0153	0.2401	0.2603	0	5.936	5.010	6.935	19.51
Iron	lb	0	0.1153	2.080	0.0159	1.709	0	0.2093	0	0.0102	0.1513	5.652	0.7935	0	224.8	25.46	23.64	284.6
Manganese	lb	0	0.0121	0.1061	0.0041	0.9298	0	0.0134	0	0.0011	0.0159	0.2882	0.2029	0	10.84	3.538	5.286	21.24
Mercury	lb	0	2.25E-07	1.18E-06	2.55E-06	3.16E-04	0	6.95E-06	0	2.00E-08	2.95E-07	3.21E-06	1.27E-04	0	0.0026	0.0031	0.0049	0.0111
Nutrients																		
Nitrate as N	lb	0	12.30	64.95	37.43	17.74	0	0.4934	0	1.092	16.15	176.5	1868	0	599.6	755.1	225.8	3775
Nitrite as N	lb	0	0.8248	2.768	1.054	1.676	0	0.0129	0	0.0732	1.083	7.520	52.60	0	14.52	28.80	9.725	120.7
TKN	lb	0	7.134	38.91	11.35	110.7	0	0.8696	0	0.6333	9.363	105.7	566.6	0	602.1	733.6	281.2	2468
Total Nitrogen	lb	0	31.02	122.5	53.08	81.80	0	0.8550	0	2.753	40.71	332.7	2650	0	1277	2215	509.8	7317
Dissolved Phosphorus as P	lb	0	0.3075	1.174	1.123	5.958	0	0.0650	0	0.0273	0.4035	3.189	56.08	0	7.824	89.55	64.54	230.2
Total Phosphorus as P	lb	0	0.7673	4.974	1.818	10.15	0	0.1105	0	0.0681	1.007	13.51	90.73	0	144.3	123.8	103.2	494.4
Solid Parameters																		
TDS	lb	0	4159	13356	16939	6441	0	223.2	0	369.2	5458	36283	845592	0	100743	221730	80200	1331493
Synthetic Organics																		
Pentachlorophenol	lb	0	0.0022	0.0228	0.0143	0.0144	0	2.95E-04	0	1.94E-04	0.0029	0.0621	0.7135	0	1.248	0.1103	0.0417	2.233

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-28
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: County of San Diego HSA 905.21

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	131,515	701,673	304,637	335,572	0	144,484	0	11,674	172,664	2,013,537	15,300,697	0	2,951,468	5,754,342	2,994,462	30,816,725
% Contribution	%	0%	0%	2%	1%	1%	0%	0%	0%	0%	1%	7%	50%	0%	10%	19%	10%	100%
Conventional Parameters																		
Chloride	%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	2%	52%	0%	11%	25%	6%	100%
Sulfate	%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	4%	46%	0%	16%	25%	6%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	8%	0%	2%	0%	0%	0%	0%	4%	0%	2%	81%	2%	100%
Fecal Coliform	%	0%	0%	0%	0%	14%	0%	1%	0%	0%	0%	0%	0%	0%	19%	65%	1%	100%
Total Coliform	%	0%	0%	0%	0%	63%	0%	4%	0%	0%	0%	1%	1%	0%	2%	27%	1%	100%
Total Metals																		
Aluminum	%	0%	0%	2%	0%	4%	0%	1%	0%	0%	0%	6%	9%	0%	19%	43%	16%	100%
Cadmium	%	0%	0%	1%	0%	44%	0%	0%	0%	0%	0%	2%	0%	0%	0%	33%	20%	100%
Copper	%	0%	0%	1%	0%	12%	0%	1%	0%	0%	0%	3%	18%	0%	6%	28%	29%	100%
Iron	%	0%	0%	2%	0%	4%	0%	1%	0%	0%	0%	5%	9%	0%	25%	40%	14%	100%
Lead	%	0%	0%	1%	0%	14%	0%	1%	0%	0%	0%	3%	8%	0%	22%	36%	15%	100%
Manganese	%	0%	0%	1%	0%	5%	0%	1%	0%	0%	0%	4%	13%	0%	27%	36%	13%	100%
Mercury	%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	37%	0%	0%	42%	19%	100%
Zinc	%	0%	0%	0%	0%	25%	0%	1%	0%	0%	0%	1%	10%	0%	3%	28%	32%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	7%	0%	4%	0%	0%	0%	1%	5%	0%	4%	31%	47%	100%
Iron	%	0%	0%	1%	0%	10%	0%	8%	0%	0%	0%	2%	5%	0%	1%	28%	44%	100%
Manganese	%	0%	0%	0%	0%	11%	0%	3%	0%	0%	0%	1%	3%	0%	4%	30%	47%	100%
Mercury	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	33%	60%	100%
Nutrients																		
Nitrate as N	%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	3%	37%	0%	24%	27%	6%	100%
Nitrite as N	%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	3%	49%	0%	10%	27%	7%	100%
TKN	%	0%	0%	1%	1%	6%	0%	1%	0%	0%	0%	3%	27%	0%	16%	32%	13%	100%
Total Nitrogen	%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	4%	40%	0%	18%	27%	6%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	1%	25%	0%	3%	39%	28%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	1%	19%	0%	29%	26%	21%	100%
Solid Parameters																		
TDS	%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	3%	48%	0%	14%	25%	6%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	4%	5%	0%	83%	3%	1%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-29
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: County of San Diego HSA 905.23

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	9,086	5,367	78,173	11,098	0	59,170	0	0	79,047	18,000	130,658	0	111,726	4,431,129	795,482	5,728,936
% Contribution	%	0%	0%	0%	1%	0%	0%	1%	0%	0%	1%	0%	2%	0%	2%	77%	14%	100%
Conventional Parameters																		
Chloride	lb	0	29.32	11.15	448.8	176.2	0	0	0	0	255.0	37.38	750.1	0	658.7	42177	5431	49975
Sulfate	lb	0	65.08	26.67	932.7	33.53	0	0	0	0	566.2	89.42	1559	0	948.0	37691	4428	46340
Indicator Bacteria																		
Enterococcus	MPN	0	4.39E+11	2.66E+11	1.31E+13	6.42E+12	0	0	0	0	3.82E+12	8.91E+11	2.19E+13	0	2.81E+13	3.16E+15	2.41E+14	3.48E+15
Fecal Coliform	MPN	0	3.60E+11	3.18E+11	1.30E+12	7.79E+12	0	0	0	0	3.13E+12	1.07E+12	2.17E+12	0	5.06E+13	2.34E+15	8.04E+13	2.49E+15
Total Coliform	MPN	0	2.53E+12	1.06E+12	2.22E+13	2.54E+14	0	0	0	0	2.20E+13	3.56E+12	3.71E+13	0	1.35E+14	9.08E+15	5.72E+14	1.01E+16
Total Metals																		
Aluminum	lb	0	0.1168	0.1614	0.1771	1.154	0	0	0	0	1.016	0.5414	0.2960	0	10.39	272.6	34.59	321.0
Cadmium	lb	0	1.53E-05	8.35E-06	7.29E-05	1.99E-04	0	0	0	0	1.33E-04	2.80E-05	1.22E-04	0	9.11E-04	0.0230	0.0032	0.0276
Copper	lb	0	0.0061	0.0024	0.0159	0.0701	0	0	0	0	0.0535	0.0079	0.0266	0	0.0997	4.169	1.787	6.238
Iron	lb	0	0.1840	0.2215	0.7386	1.534	0	0	0	0	1.601	0.7427	1.234	0	16.78	412.1	52.86	488.0
Lead	lb	0	3.51E-04	1.72E-04	7.86E-04	0.0049	0	0	0	0	0.0031	5.76E-04	0.0013	0	0.0147	0.4726	0.0666	0.5650
Manganese	lb	0	0.0109	0.0111	0.0556	0.0778	0	0	0	0	0.0950	0.0374	0.0930	0	1.349	19.84	2.500	24.07
Mercury	lb	0	2.15E-06	2.34E-06	1.50E-05	1.70E-05	0	0	0	0	1.87E-05	7.84E-06	2.50E-05	0	2.02E-04	0.0060	7.33E-04	0.0071
Zinc	lb	0	0.0080	0.0052	0.0279	0.3106	0	0	0	0	0.0699	0.0175	0.0466	0	0.4481	11.95	5.691	18.58
Dissolved Metals																		
Aluminum	lb	0	8.04E-04	6.76E-04	0.0013	0.0333	0	0	0	0	0.0070	0.0023	0.0022	0	0.2255	3.854	1.823	5.95
Iron	lb	0	0.0080	0.0159	0.0041	0.0586	0	0	0	0	0.0693	0.0534	0.0068	0	8.540	19.58	6.214	34.55
Manganese	lb	0	8.39E-04	8.11E-04	0.0010	0.0319	0	0	0	0	0.0073	0.0027	0.0017	0	0.4119	2.722	1.389	4.570
Mercury	lb	0	1.55E-08	9.04E-09	6.54E-07	1.08E-05	0	0	0	0	1.35E-07	3.03E-08	1.09E-06	0	9.79E-05	0.0024	0.0013	0.0038
Nutrients																		
Nitrate as N	lb	0	0.8499	0.4968	9.604	0.6083	0	0	0	0	7.394	1.666	16.05	0	22.77	581.0	59.36	699.8
Nitrite as N	lb	0	0.0570	0.0212	0.2704	0.0575	0	0	0	0	0.4958	0.0710	0.4519	0	0.5516	22.16	2.556	26.69
TKN	lb	0	0.4929	0.2977	2.912	3.795	0	0	0	0	4.288	0.9982	4.868	0	22.87	564.4	73.91	678.9
Total Nitrogen	lb	0	2.143	0.9368	13.62	2.805	0	0	0	0	18.64	3.142	22.76	0	48.50	1704	134.0	1951
Dissolved Phosphorus as P	lb	0	0.0212	0.0090	0.2883	0.2043	0	0	0	0	0.1848	0.0301	0.4818	0	0.2972	68.90	16.97	87.38
Total Phosphorus as P	lb	0	0.0530	0.0380	0.4664	0.3480	0	0	0	0	0.4612	0.1276	0.7795	0	5.480	95.26	27.13	130.1
Solid Parameters																		
TDS	lb	0	287.3	102.2	4347	220.9	0	0	0	0	2500	342.6	7265	0	3827	170590	21083	210564
Synthetic Organics																		
Pentachlorophenol	lb	0	1.51E-04	1.75E-04	0.0037	4.93E-04	0	0	0	0	0.0013	5.86E-04	0.0061	0	0.0474	0.0849	0.0110	0.1558

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-30
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: County of San Diego HSA 905.23

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	0	9,086	5,367	78,173	11,098	0	59,170	0	0	79,047	18,000	130,658	0	111,726	4,431,129	795,482	5,728,936
% Contribution	%	0%	0%	0%	1%	0%	0%	1%	0%	0%	1%	0%	2%	0%	2%	77%	14%	100%
Conventional Parameters																		
Chloride	%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	2%	0%	2%	86%	8%	100%
Sulfate	%	0%	0%	0%	1%	0%	0%	0%	0%	0%	1%	0%	2%	0%	3%	86%	7%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	97%	1%	100%
Fecal Coliform	%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	97%	1%	100%
Total Coliform	%	0%	0%	0%	0%	8%	0%	6%	0%	0%	0%	0%	0%	0%	0%	84%	1%	100%
Total Metals																		
Aluminum	%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	2%	85%	11%	100%
Cadmium	%	0%	0%	0%	0%	5%	0%	0%	0%	0%	1%	0%	0%	0%	0%	78%	16%	100%
Copper	%	0%	0%	0%	0%	1%	0%	1%	0%	0%	1%	0%	0%	0%	1%	70%	25%	100%
Iron	%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	3%	85%	10%	100%
Lead	%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	2%	82%	12%	100%
Manganese	%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	3%	84%	11%	100%
Mercury	%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	85%	13%	100%
Zinc	%	0%	0%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%	0%	0%	69%	27%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	0%	1%	0%	4%	0%	0%	0%	0%	0%	0%	0%	62%	32%	100%
Iron	%	0%	0%	0%	0%	1%	0%	9%	0%	0%	0%	0%	0%	0%	0%	59%	31%	100%
Manganese	%	0%	0%	0%	0%	1%	0%	3%	0%	0%	0%	0%	0%	0%	0%	62%	34%	100%
Mercury	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	61%	39%	100%
Nutrients																		
Nitrate as N	%	0%	0%	0%	1%	0%	0%	0%	0%	0%	1%	0%	1%	0%	4%	87%	6%	100%
Nitrite as N	%	0%	0%	0%	1%	0%	0%	0%	0%	0%	1%	0%	2%	0%	2%	87%	8%	100%
TKN	%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	1%	0%	2%	83%	11%	100%
Total Nitrogen	%	0%	0%	0%	1%	0%	0%	0%	0%	0%	1%	0%	1%	0%	3%	87%	7%	100%
Dissolved Phosphorus as P	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	78%	20%	100%
Total Phosphorus as P	%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	1%	0%	4%	74%	20%	100%
Solid Parameters																		
TDS	%	0%	0%	0%	1%	0%	0%	0%	0%	0%	1%	0%	2%	0%	2%	86%	7%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	0%	0%	0%	0%	0%	1%	0%	0%	3%	1%	1%	0%	49%	40%	3%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-31
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: County of San Diego HSA 905.32

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	69,782	804,447	1,576,329	1,687,188	32,768	0	36,638	0	77,802	1,036,236	10,500,111	8,638,037	323,398	4,192,513	633,537	1,572,425	31,181,211
% Contribution	%	0%	3%	5%	5%	0%	0%	0%	0%	0%	3%	34%	28%	1%	13%	2%	5%	100%
Conventional Parameters																		
Chloride	lb	225.1	2595	3274	9686	520.2	0	186.3	0	251.0	3343	21442	49562	2174	24740	6041	8075	132114
Sulfate	lb	499.8	5761	7831	20130	99.00	0	175.4	0	557.3	7422	51289	102999	1128	35608	5399	6584	245481
Indicator Bacteria																		
Enterococcus	MPN	3.37E+12	3.89E+13	7.80E+13	2.83E+14	1.90E+13	0	7.77E+12	0	3.76E+12	5.01E+13	5.11E+14	1.45E+15	4.20E+13	1.06E+15	4.53E+14	3.59E+14	4.35E+15
Fecal Coliform	MPN	2.76E+12	3.19E+13	9.34E+13	2.80E+13	2.30E+13	0	1.95E+12	0	3.08E+12	4.10E+13	6.11E+14	1.43E+14	7.11E+13	1.90E+15	3.35E+14	1.20E+14	3.40E+15
Total Coliform	MPN	1.95E+13	2.24E+14	3.12E+14	4.79E+14	7.49E+14	0	1.04E+14	0	2.17E+13	2.89E+14	2.04E+15	2.45E+15	2.42E+15	5.06E+15	1.30E+15	8.50E+14	1.63E+16
Total Metals																		
Aluminum	lb	0.8970	10.34	47.41	3.823	3.408	0	0.6170	0	1.000	13.32	310.5	19.56	8.501	390.1	39.04	51.42	900.0
Cadmium	lb	1.17E-04	0.0014	0.0025	0.0016	5.86E-04	0	1.63E-04	0	1.31E-04	0.0017	0.0161	0.0080	0.0016	0.0342	0.0033	0.0047	0.0761
Copper	lb	0.0472	0.5440	0.6903	0.3437	0.2070	0	0.0234	0	0.0526	0.7008	4.521	1.759	0.3036	3.743	0.5972	2.657	16.19
Iron	lb	1.413	16.29	65.04	15.94	4.530	0	1.657	0	1.576	20.99	426.0	81.56	10.35	630.1	59.03	78.59	1413
Lead	lb	0.0027	0.0310	0.0504	0.0170	0.0145	0	0.0010	0	0.0030	0.0400	0.3304	0.0868	0.0320	0.5510	0.0677	0.0990	1.326
Manganese	lb	0.0839	0.9672	3.271	1.201	0.2297	0	0.0687	0	0.0936	1.246	21.42	6.144	0.4080	50.66	2.842	3.716	92.36
Mercury	lb	1.65E-05	1.90E-04	6.87E-04	3.23E-04	5.02E-05	0	2.97E-05	0	1.84E-05	2.45E-04	0.0045	0.0017	1.81E-04	0.0076	8.66E-04	0.0011	0.0174
Zinc	lb	0.0617	0.7108	1.528	0.6020	0.9171	0	0.0677	0	0.0688	0.9157	10.01	3.080	1.995	16.83	1.712	8.461	46.96
Dissolved Metals																		
Aluminum	lb	0.0062	0.0712	0.1986	0.0289	0.0982	0	0.0838	0	0.0069	0.0917	1.301	0.1478	0.4963	8.469	0.5521	2.711	14.26
Iron	lb	0.0612	0.7053	4.673	0.0880	0.1731	0	0.4718	0	0.0682	0.9086	30.61	0.4505	0.6445	320.7	2.805	9.239	371.6
Manganese	lb	0.0064	0.0743	0.2383	0.0225	0.0941	0	0.0303	0	0.0072	0.0957	1.561	0.1152	0.1576	15.47	0.3899	2.066	20.33
Mercury	lb	1.19E-07	1.38E-06	2.66E-06	1.41E-05	3.20E-05	0	1.57E-05	0	1.33E-07	1.77E-06	1.74E-05	7.22E-05	1.50E-04	0.0037	0.0003	0.0019	0.0062
Nutrients																		
Nitrate as N	lb	6.528	75.24	145.9	207.3	1.796	0	1.112	0	7.278	96.93	955.6	1061	28.33	855.4	83.21	88.25	3614
Nitrite as N	lb	0.4377	5.045	6.218	5.836	0.1697	0	0.0290	0	0.4880	6.499	40.72	29.86	1.761	20.72	3.174	3.801	124.8
TKN	lb	3.785	43.63	87.42	62.86	11.20	0	1.960	0	4.220	56.21	572.5	321.6	35.42	859.1	80.85	109.9	2251
Total Nitrogen	lb	16.46	189.7	275.1	294.0	8.282	0	1.927	0	18.35	244.4	1802	1504	137.2	1822	244.1	199.2	6757
Dissolved Phosphorus as P	lb	0.1631	1.880	2.637	6.222	0.6032	0	0.1464	0	0.1819	2.423	17.27	31.84	3.757	11.16	9.868	25.22	113.4
Total Phosphorus as P	lb	0.4071	4.693	11.17	10.07	1.028	0	0.2492	0	0.4539	6.046	73.18	51.51	5.816	205.8	13.65	40.33	424.4
Solid Parameters																		
TDS	lb	2207	25436	30002	93814	652.2	0	503.1	0	2460	32769	196497	480029	8247	143733	24435	31345	1072130
Synthetic Organics																		
Pentachlorophenol	lb	0.0012	0.0134	0.0513	0.0792	0.0015	0	6.65E-04	0	0.0013	0.0172	0.3361	0.4050	0.0041	1.781	0.0122	0.0163	2.720

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-32
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: County of San Diego HSA 905.32

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	69,782	804,447	1,576,329	1,687,188	32,768	0	36,638	0	77,802	1,036,236	10,500,111	8,638,037	323,398	4,192,513	633,537	1,572,425	31,181,211
% Contribution	%	0%	3%	5%	5%	0%	0%	0%	0%	0%	3%	34%	28%	1%	13%	2%	5%	100%
Conventional Parameters																		
Chloride	%	0%	1%	3%	8%	0%	0%	0%	0%	0%	2%	17%	38%	2%	21%	4%	4%	100%
Sulfate	%	0%	2%	4%	6%	0%	0%	0%	0%	0%	2%	24%	29%	1%	25%	3%	3%	100%
Indicator Bacteria																		
Enterococcus	%	0%	1%	2%	2%	3%	0%	3%	0%	0%	1%	11%	10%	8%	13%	41%	5%	100%
Fecal Coliform	%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	3%	1%	9%	64%	17%	1%	100%
Total Coliform	%	0%	1%	2%	0%	16%	0%	3%	0%	0%	1%	10%	2%	48%	8%	8%	1%	100%
Total Metals																		
Aluminum	%	0%	1%	5%	1%	0%	0%	0%	0%	0%	1%	34%	6%	1%	33%	6%	10%	100%
Cadmium	%	0%	4%	3%	0%	9%	0%	0%	0%	0%	5%	23%	0%	27%	0%	7%	21%	100%
Copper	%	0%	2%	4%	3%	2%	0%	0%	0%	0%	3%	26%	15%	3%	13%	5%	23%	100%
Iron	%	0%	1%	5%	1%	0%	0%	0%	0%	0%	2%	31%	5%	1%	40%	5%	8%	100%
Lead	%	0%	2%	3%	1%	2%	0%	0%	0%	0%	3%	22%	6%	4%	41%	5%	10%	100%
Manganese	%	0%	1%	3%	2%	1%	0%	0%	0%	0%	2%	23%	8%	1%	45%	5%	8%	100%
Mercury	%	0%	0%	1%	10%	0%	0%	0%	0%	0%	0%	4%	50%	0%	0%	11%	24%	100%
Zinc	%	0%	1%	2%	2%	5%	0%	0%	0%	0%	2%	12%	12%	11%	10%	7%	36%	100%
Dissolved Metals																		
Aluminum	%	0%	1%	2%	1%	1%	0%	2%	0%	0%	2%	14%	5%	6%	10%	7%	49%	100%
Iron	%	0%	2%	3%	1%	2%	0%	4%	0%	0%	3%	22%	5%	8%	2%	6%	42%	100%
Manganese	%	0%	1%	1%	1%	2%	0%	1%	0%	0%	1%	10%	4%	5%	13%	7%	53%	100%
Mercury	%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	9%	79%	100%
Nutrients																		
Nitrate as N	%	0%	1%	3%	5%	0%	0%	0%	0%	0%	2%	19%	23%	1%	39%	3%	3%	100%
Nitrite as N	%	0%	2%	3%	7%	0%	0%	0%	0%	0%	2%	21%	35%	2%	18%	4%	5%	100%
TKN	%	0%	2%	3%	4%	1%	0%	0%	0%	0%	2%	22%	20%	3%	30%	4%	8%	100%
Total Nitrogen	%	0%	2%	3%	5%	0%	0%	0%	0%	0%	3%	23%	25%	2%	29%	3%	4%	100%
Dissolved Phosphorus as P	%	0%	1%	2%	5%	0%	0%	0%	0%	0%	2%	14%	27%	3%	9%	8%	29%	100%
Total Phosphorus as P	%	0%	1%	1%	3%	0%	0%	0%	0%	0%	1%	9%	13%	2%	52%	4%	14%	100%
Solid Parameters																		
TDS	%	0%	2%	3%	6%	0%	0%	0%	0%	0%	2%	21%	33%	1%	24%	3%	4%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	1%	2%	0%	0%	0%	0%	0%	0%	2%	14%	2%	0%	77%	0%	0%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-33
San Dieguito River WMA Wet Season Flow Volume and Pollutant Loads: County of San Diego HSA 905.41

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	68,546	2,329,972	1,213,866	11,143,666	2,825,077	3,368,701	1,057,335	0	72,387	2,620,101	2,227,554	23,448,501	854,343	16,395,385	6,657,410	10,929,649	85,212,492
% Contribution	%	0%	3%	1%	13%	3%	4%	1%	0%	0%	3%	3%	28%	1%	19%	8%	13%	100%
Conventional Parameters																		
Chloride	lb	221.2	7509	2520	63874	42814	37397	5377	0	233.5	8425	4371	121040	5574	95820	63484	61992	520652
Sulfate	lb	491.0	16671	6029	132743	8149	22686	5062	0	518.5	18703	10455	251545	2892	137912	56732	50549	721136
Indicator Bacteria																		
Enterococcus	MPN	3.31E+12	1.12E+14	6.00E+13	1.86E+15	1.56E+15	5.03E+15	2.24E+14	0	3.50E+12	1.26E+14	1.04E+14	3.53E+15	1.08E+14	4.09E+15	4.76E+15	2.75E+15	2.43E+16
Fecal Coliform	MPN	2.72E+12	9.22E+13	7.19E+13	1.85E+14	1.89E+15	2.37E+14	5.63E+13	0	2.87E+12	1.03E+14	1.25E+14	3.50E+14	1.82E+14	7.36E+15	3.52E+15	9.18E+14	1.51E+16
Total Coliform	MPN	1.91E+13	6.49E+14	2.40E+14	3.16E+15	6.16E+16	8.12E+15	3.00E+15	0	2.02E+13	7.28E+14	4.16E+14	5.98E+15	6.21E+15	1.96E+16	1.37E+16	6.53E+15	1.30E+17
Total Metals																		
Aluminum	lb	0.8811	29.92	36.50	25.21	280.5	12.57	17.81	0	0.9305	33.56	63.30	47.77	21.80	1511	410.3	394.8	2886.9
Cadmium	lb	1.15E-04	0.0039	0.0019	0.0104	0.0483	0.0064	0.0047	0	1.22E-04	0.0044	0.0033	0.0197	0.0040	0.1325	0.0346	0.0364	0.3107
Copper	lb	0.0464	1.574	0.5315	2.266	17.04	0.9242	0.6757	0	0.0490	1.766	0.9217	4.295	0.7785	14.50	6.276	20.40	72.04
Iron	lb	1.388	47.14	50.07	105.1	372.9	67.08	47.81	0	1.466	52.89	86.84	199.2	26.55	2440.4	620.3	603.4	4722
Lead	lb	0.0026	0.0898	0.0388	0.1118	1.191	0.0684	0.0296	0	0.0028	0.1008	0.0673	0.2119	0.0821	2.134	0.7113	0.7599	5.602
Manganese	lb	0.0824	2.799	2.518	7.919	18.90	4.850	1.983	0	0.0870	3.140	4.367	15.01	1.046	196.2	29.87	28.53	317.3
Mercury	lb	1.62E-05	5.51E-04	5.29E-04	0.0021	0.0041	0.0015	8.56E-04	0	1.71E-05	6.18E-04	9.17E-04	0.0040	4.64E-04	0.0294	0.0091	0.0084	0.0625
Zinc	lb	0.0606	2.0567	1.176	3.970	75.49	7.346	1.955	0	0.0640	2.307	2.040	7.522	5.116	65.19	17.99	64.96	257.2
Dissolved Metals																		
Aluminum	lb	0.0061	0.2059	0.1529	0.1904	8.081	0.3362	2.418	0	0.0064	0.2310	0.2651	0.3609	1.273	32.80	5.801	20.81	72.94
Iron	lb	0.0601	2.041	3.598	0.5806	14.25	1.153	13.62	0	0.0635	2.290	6.239	1.100	1.653	1242.3	29.48	70.93	1389
Manganese	lb	0.0063	0.2149	0.1834	0.1484	7.749	0.3501	0.8738	0	0.0067	0.2411	0.3181	0.2813	0.4042	59.92	4.098	15.86	90.66
Mercury	lb	1.17E-07	3.98E-06	2.04E-06	9.31E-05	0.0026	2.97E-04	4.52E-04	0	1.24E-07	4.47E-06	3.54E-06	1.76E-04	3.85E-04	0.0142	0.0036	0.0147	0.0366
Nutrients																		
Nitrate as N	lb	6.412	217.7	112.3	1367	147.8	228.0	32.10	0	6.771	244.3	194.8	2590	72.64	3313	874.4	677.5	10085
Nitrite as N	lb	0.4299	14.60	4.787	38.48	13.97	6.488	0.8375	0	0.4540	16.38	8.301	72.92	4.515	80.24	33.35	29.18	324.9
TKN	lb	3.718	126.3	67.30	414.5	922.3	233.4	56.58	0	3.927	141.6	116.7	785.5	90.83	3327	849.6	843.7	7983
Total Nitrogen	lb	16.17	548.9	211.8	1938	681.7	305.9	55.62	0	17.07	615.8	367.3	3673	351.9	7056	2565	1530	19935
Dissolved Phosphorus as P	lb	0.1602	5.441	2.030	41.03	49.65	39.07	4.226	0	0.1692	6.104	3.521	77.75	9.634	43.23	103.7	193.7	579.4
Total Phosphorus as P	lb	0.3999	13.58	8.602	66.38	84.58	72.16	7.191	0	0.4223	15.23	14.92	125.8	14.91	797.2	143.4	309.7	1674
Solid Parameters																		
TDS	lb	2168	73602	23097	618650	53679	107594	14520	0	2289	82575	40055	1172328	21148	556697	256767	240652	3265820
Synthetic Organics																		
Pentachlorophenol	lb	0.0011	0.0387	0.0395	0.5220	0.1198	0.0808	0.0192	0	0.0012	0.0434	0.0685	0.9892	0.0105	6.8963	0.1277	0.1253	9.083

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Table E.4-34
San Dieguito River WMA Wet Season Flow Volume and Percent Pollutant Loads: County of San Diego HSA 905.41

Analyte	Units	Ag-A	Ag-B	Ag-C	Ag-D	Com	Edu	Ind	Mix Use	Open-A	Open-B	Open-C	Open-D	Res-MF	Res-Rur	Res-SF	Trans	Total
Wet Season Flow Volume	cf	68,546	2,329,972	1,213,866	11,143,666	2,825,077	3,368,701	1,057,335	0	72,387	2,620,101	2,227,554	23,448,501	854,343	16,395,385	6,657,410	10,929,649	85,212,492
% Contribution	%	0%	3%	1%	13%	3%	4%	1%	0%	0%	3%	3%	28%	1%	19%	8%	13%	100%
Conventional Parameters																		
Chloride	%	0%	1%	1%	15%	2%	3%	0%	0%	0%	1%	1%	31%	1%	24%	11%	9%	100%
Sulfate	%	0%	2%	1%	12%	1%	2%	0%	0%	0%	2%	2%	26%	1%	33%	11%	8%	100%
Indicator Bacteria																		
Enterococcus	%	0%	0%	0%	1%	30%	2%	8%	0%	0%	0%	0%	3%	2%	5%	44%	4%	100%
Fecal Coliform	%	0%	0%	0%	0%	36%	0%	1%	0%	0%	0%	0%	0%	3%	34%	24%	1%	100%
Total Coliform	%	0%	0%	0%	0%	80%	0%	4%	0%	0%	0%	0%	0%	8%	2%	5%	1%	100%
Total Metals																		
Aluminum	%	0%	1%	1%	2%	11%	2%	2%	0%	0%	1%	2%	5%	1%	36%	17%	19%	100%
Cadmium	%	0%	1%	0%	0%	70%	0%	0%	0%	0%	1%	0%	0%	6%	0%	7%	13%	100%
Copper	%	0%	1%	1%	4%	29%	1%	2%	0%	0%	2%	1%	8%	2%	10%	9%	31%	100%
Iron	%	0%	1%	1%	2%	11%	1%	2%	0%	0%	1%	2%	4%	1%	43%	14%	16%	100%
Lead	%	0%	1%	0%	2%	30%	1%	1%	0%	0%	1%	1%	3%	2%	32%	11%	14%	100%
Manganese	%	0%	1%	1%	3%	12%	2%	2%	0%	0%	1%	1%	6%	1%	44%	13%	15%	100%
Mercury	%	0%	0%	0%	12%	2%	10%	0%	0%	0%	0%	0%	25%	0%	0%	21%	30%	100%
Zinc	%	0%	0%	0%	2%	48%	3%	1%	0%	0%	0%	0%	3%	3%	4%	8%	27%	100%
Dissolved Metals																		
Aluminum	%	0%	0%	0%	1%	17%	2%	9%	0%	0%	1%	0%	2%	2%	6%	10%	49%	100%
Iron	%	0%	1%	0%	1%	23%	1%	15%	0%	0%	1%	1%	2%	3%	1%	9%	42%	100%
Manganese	%	0%	0%	0%	1%	25%	1%	5%	0%	0%	0%	0%	1%	2%	7%	9%	47%	100%
Mercury	%	0%	0%	0%	2%	0%	6%	0%	0%	0%	0%	0%	4%	0%	0%	13%	76%	100%
Nutrients																		
Nitrate as N	%	0%	1%	1%	9%	1%	1%	0%	0%	0%	1%	1%	19%	1%	46%	11%	7%	100%
Nitrite as N	%	0%	2%	1%	14%	3%	2%	0%	0%	0%	2%	1%	29%	2%	22%	12%	10%	100%
TKN	%	0%	1%	1%	6%	15%	3%	1%	0%	0%	2%	1%	13%	2%	29%	12%	14%	100%
Total Nitrogen	%	0%	2%	1%	10%	3%	2%	0%	0%	0%	2%	2%	22%	2%	36%	11%	8%	100%
Dissolved Phosphorus as P	%	0%	1%	0%	7%	7%	6%	1%	0%	0%	1%	1%	14%	1%	7%	17%	38%	100%
Total Phosphorus as P	%	0%	1%	0%	4%	5%	5%	1%	0%	0%	1%	0%	8%	1%	45%	8%	22%	100%
Solid Parameters																		
TDS	%	0%	1%	1%	13%	1%	2%	0%	0%	0%	2%	1%	28%	1%	29%	11%	8%	100%
Synthetic Organics																		
Pentachlorophenol	%	0%	1%	1%	1%	1%	0%	0%	0%	0%	1%	1%	2%	0%	91%	1%	1%	100%

Ag = Agriculture; Com = Commercial; cf = cubic feet; Edu = Education; in = inches; Ind = Industrial; lb = pounds; MF = Multi-Family; MPN = most probable number; N = nitrogen; Open = Open Space; P = phosphorus; Res = Residential; Rur = Rural; SF = Single Family; TDS = total dissolved solids; TKN = total Kjeldahl nitrogen; Trans = Transportation

Attachment F – Special Study Tech Memo

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DRAFT Memorandum

DATE:	September 23, 2016
TO:	San Dieguito Watershed Management Area Responsible Agencies
Cc:	Kristina Hysler, AMEC Foster Wheeler Chris Minton, Larry Walker Associates Dustin Bambic, Paradigm Environmental
FROM:	Paul Hartman, Larry Walker Associates
SUBJECT:	San Dieguito Special Study Technical Memorandum #2 Summary of Bacteria Source Identification Methods, Results, and Prioritization

Primary Author

LARRY WALKER ASSOCIATES

Paul Hartman
Elizabeth Yin
Hope Taylor, PhD

785 Grand Avenue, Suite 200
Carlsbad, CA 92008
760.730.9446

In Conjunction With

amec foster wheeler

Introduction

BACKGROUND

The San Diego Regional Municipal Separate Storm Sewer System (MS4) Permit (Order R9-2013-0001 as amended by Order Nos. R9-2015-0001 and R9-2015-0100) requires the San Dieguito Watershed Management Area (WMA) to perform two special studies. These special studies are designed to address pollutant data gaps and to develop the information necessary to more effectively address the highest priority water quality conditions within the WMA as identified in the Water Quality Improvement Plan. Through the development and acceptance of the recent Water Quality Improvement Plan, the highest priority water quality conditions for the San Dieguito WMA were identified as:

- Potential impairment of contact water recreation beneficial use at the Pacific Ocean at the San Dieguito Lagoon Mouth due to indicator bacteria from the sub-watershed above Lake Hodges during wet weather when rainfall causes the Lake Hodges Dam to overflow, and

- Potential impairment of contact water recreation beneficial use at the Pacific Ocean at the San Dieguito Lagoon Mouth due to indicator bacteria during both wet and dry weather conditions.

The San Dieguito Water Quality Improvement Plan included development of a Bacteria Source Identification Special Study Plan (Study Plan) to identify data gaps with respect to five key metrics used to identify and prioritize bacteria sources within the WMA: human health risk, magnitude of the bacteria source, transport feasibility of the source, frequency of occurrence, and controllability of the source. The San Dieguito Special Study Technical Memorandum #1 Summary of Updated Literature Review, Geographic Information System (GIS) Data Call, and Data Gaps, included as **Appendix A**, provides an enhanced literature review to fill these data gaps.

PURPOSE

Based on the updated literature review and GIS data collection efforts, the goals of the source identification portion of the special study are to:

- Identify focus areas for intensive source identification efforts using water quality data collected from 2007–2015;
- Use GIS and other available data to perform an in-depth source identification exercise within each focus area; and
- Prioritize the identified sources within each focus area using the prioritization methods and matrix developed as part of a previous Regional Study. The prioritization process will be informed by the outcomes of the GIS work and the updated findings of the literature review.

The purpose of this technical memorandum is to provide the updated source identification methodology, the results of the prioritization exercise, and a prioritized list of bacteria sources for each focus area within the San Dieguito WMA. The prioritized list of bacteria sources will allow Responsible Agencies to review their WQIP strategies to determine whether existing practices address these sources or whether updates to these strategies are needed. Updates could include targeting public outreach efforts, working with other agencies to address bacteria sources, or reviewing stormwater inspection programs.

SOURCE INFORMATION

During the development of the Study Plan, a number of geospatial and water quality data gaps were noted. The first phase of the Study Plan implementation included gathering information to fill those data gaps and pull together the information into a concise database related to bacteria sources in the WMA. Data needed for the bacteria source identification that were collected as part of the Study Plan development and further refined during the study data call are presented in **Table 1**.

Table 1. Summary of Information Obtained from the Data Call

Data Type	GIS[1] Data Gaps	CSD[2]	CoSD[3]	DM[4]	ESC[5]	POW[6]	SB[7]
MS4	MS4 inventory from all jurisdictions in the WMA	a	a		a	a	a
MS4	Stormwater best management practices (BMPs)	a	-		a	a	a
Sewer	Sanitary sewer system inventory from all jurisdictions and special districts in the WMA	b	x		a	a	a
Sewer	Sanitary sewer condition assessments for each jurisdiction as available (2007-2015)	-	-		a	-	a
Sewer	Sanitary sewer overflows with locations, volumes, and whether flow reached receiving waters (2007-2015)	c	a		a	c	c
Sewer	Onsite Wastewater Treatment Systems (OWTS)	-	-		c	a	a
Inventory	Illicit connection/illicit discharge (ICID) data (2007-2015)	a	a		a	-	a
Inventory	Commercial inventories	a	a		a	b	b
Inventory	Industrial inventories	a	a		a	b	a
Inventory	Municipal inventories	a	a		a	-	a
Inventory	Homeless encampments	-	a		x	-	a
Recycled Water	Recycled water	-	x		a	a	a

[1] Geospatial data were analyzed in ArcGIS v. 10.2 in North American Datum 1983 (NAD 1983) with a projection in NAD 1983 California State Plane VI FIPS (US Feet). Water quality data was analyzed using Microsoft Excel.
[2] City of San Diego (CSD)
[3] County of San Diego (CoSD)
[4] The City of Del Mar (DM) conducted a separate data analysis and provided jurisdiction-specific information for this special study.
[5]City of Escondido (ESC)
[6] City of Poway (POW)
[2] City of Solana Beach (SB)
a) Denotes data that were obtained from or updated by the Responsible Agency
b) Denotes preexisting data from the Study Plan
c) Denotes data created from publicly available data
x) Denotes known unavailable data
-) Denotes data that were not provided or available

The data call was successful and able to complete or nearly complete inventories of the MS4, sanitary sewer system, and commercial, municipal, and industrial sites. Additionally, information regarding bacteria monitoring locations and general administrative boundaries of the study region were obtained in the data call. However, gaps in data continue for a few potential sources of bacteria for some jurisdictions, including the locations of Onsite Wastewater Treatment Systems (OWTS), homeless encampments, and recycled water systems.

The City of Del Mar conducted an individual jurisdictional data analysis for the special study. The City of Del Mar actively tracks and manages geospatial inventory data and conducts monthly patrols identify any potential issues and sources related to pollutants and urban runoff.

Through these methods in combination with other jurisdictional data sources, the City of Del Mar does not currently have identified data gaps for potential sources of bacteria.

Methods

WATER QUALITY DATA ANALYSIS AND IDENTIFICATION OF FOCUS AREAS

After the data call was completed, the existing bacteria-related water quality data within the San Dieguito WMA were compiled. Monitoring data containing the concentrations of total coliform, *Enterococcus*, and fecal coliform were gathered from several monitoring datasets:

- ***Responsible Agencies Dry Weather Monitoring Data* –** Includes data collected at various points within the MS4 or at MS4 outfalls as part of the Dry Weather Monitoring Programs developed to comply with Orders R9-2001-01 and R9-2007-0001. The data set spans approximately 2007-2013 and includes 110 sampling locations.
- ***MS4 Outfall Monitoring Data* –** Includes data collected at MS4 outfalls discharging to receiving waters within Responsible Agencies' jurisdictions. These data were collected under the targeted and random MS4 outfall programs developed to meeting permit requirements under Order R9-2007-0001. The data set spans approximately 2008–2012 and includes 81 sampling locations.
- ***Mass Loading Stations (MLSs)/Temporary Watershed Assessment Stations (TWASs)* –** Includes data collected in receiving waters at MLSs and TWASs. The MLS is located near the bottom of the WMA on the San Dieguito River upstream of the San Dieguito Lagoon Mouth. TWASs are located in receiving waters higher up in the watershed. The MLS data set spans approximately 2002–2012 at the single MLS. The two TWASs were monitored from 2007–2012.
- ***California Assembly Bill (AB) 411* –** Includes data collected in the Pacific Ocean as part of the County of San Diego's Beach Water Quality Monitoring Program mandated under AB 411. Data collected at this location span 2007–2012 and three locations 75 feet north and south of the San Dieguito Lagoon Mouth and directly in front of the lagoon. The City of Del Mar also used Coastal Storm Drain Monitoring data, spanning 2008–2012.

A total of 2,362 analyses were conducted for the three bacteria types across 187 sampling locations. Review of these data determined that certain areas in the WMA exhibited higher bacteria concentrations than others. This finding led to a modification in the special study design, where the bacteria source identification would be focused on the specific areas in the WMA exhibiting higher concentration of bacteria, rather than broadly assessing the whole WMA. The Responsible Agencies examined individual focus areas within their jurisdictions to be able to target future management efforts in those specific areas.

Partitioning of the water quality monitoring data was based on the season of data collection and the bacteria species. For the purposes of the special study, only dry weather samples for *Enterococcus* were used to identify focus areas. This combination of characteristics is assumed to identify the highest bacterial risk to the beneficial uses of the receiving waters. Dry weather flows can potentially generate high concentrations of bacteria when recreational beneficial uses are most likely to occur. Additionally *enterococcus* was selected for its qualification as an indicator of human health risk, as well as to retain consistency with the EPA's 2012 Recreational Water Quality Criteria, which recommends criteria for *E.coli* and *enterococci* and has removed criteria for fecal coliform.

The focus area for each Responsible Agency was determined on the basis of several considerations, as follows:

- ***Bacteria Concentration*s** – Outfall monitoring locations with the highest geometric mean (geomean) concentration and with at least three samples were selected first. Geomeans of the *Enterococcus* concentrations were calculated for each unique monitoring location. For some monitoring locations where three samples were not taken, the best available data were used to determine outfalls with high concentrations of *Enterococcus*.
- ***WMA Location*** – Focus areas were chosen on the basis of their location within the San Dieguito WMA. An emphasis on outfalls and their catchments downstream of Lake Hodges were selected to correspond with the extent of the high priority condition for the San Dieguito WMA during dry weather.
- ***Dry Weather Flows*** – Outfall monitoring locations with known persistent dry weather flows were then prioritized.
- ***Land Use*** – The land use break down was also considered; catchments that contained a greater number of land use classifications were prioritized. .

After appropriate outfalls were identified through the water quality data analysis considerations, the boundaries of each focus area were delineated and assessed through a geospatial exercise:

1. MS4 drainage area boundaries were obtained for each outfall.
2. Sewer infrastructure conduits were overlaid on the MS4 drainage area.
3. The MS4 drainage area boundary layer was expanded to include continuous portions of the sewer infrastructure than fell outside the boundary of the MS4 drainage area.
4. Topographic characteristics of the landscape were considered throughout the delineation process to ensure that assessment area boundaries followed hydrologic flow.
5. A final assessment area, known as a focus area, was developed for each outfall based on the delineation process, and all additional geospatial analyses were conducted within the boundaries of the final assessment area.

DESKTOP ANALYSIS OF SOURCES

Once geographic focus areas and their boundaries were identified, the source identification exercise detailed in the Study Plan was conducted. Only potential sources within the boundaries of the focus area were considered in the assessment. The geospatial information provided was used to develop an inventory of potential sources for the focus area. Using data collected through the initial Data Gaps/Literature Review analysis, spatial layers associated with potential bacteria sources were geospatially clipped to the boundaries of each focus area, examined, and cataloged, as follows:

- ***MS4 Infrastructure*** – Geospatial data for MS4 infrastructure varied for each Responsible Agency, but generally consisted of MS4 structures, such as catch basins, curb inlets, and manholes, best management practices (BMPs), and MS4 conduits, such as pipelines, and open or natural channels. Types of structures, lengths of pipeline (in miles), and composition of pipe within each focus area were recorded when available.
- ***Wastewater Infrastructure, Septic Systems, and Sanitary Sewer Overflows*** – Similar to the MS4 infrastructure data, available geospatial data for wastewater infrastructure varied among Responsible Agencies. In general, the layers consisted of wastewater structures, such as manholes and junctions, and wastewater conduits, such as force mains, gravity

mains, and lateral lines. The length and composition of pipeline within each focus area were examined and recorded when available. Wastewater infrastructure inspection records were available for the City of Solana Beach. Septic systems were assumed to be used in areas with no known or mapped wastewater infrastructure, unless otherwise determined by the Responsible Agency. Data regarding regional sanitary sewer overflows (SSOs) and private lateral sewer discharge (PLSDs) were obtained from the publically available State Water Resources Control Board database (California Integrated Water Quality System (CIWQS)) for incidents between 2007 and 2015.

- ***Land Use*** – The composition of land uses for each focus area was examined using the regional geospatial land use data set obtained from San Diego Association of Governments (SANDAG)[1]. The spatial data were clipped to the boundaries of the focus area. The area of each land use category was calculated, and based on the land use definition, the land uses were reclassified as residential, commercial, open space, roads, public land, crops, and utilities. The area of each land use was also calculated as a percentage of the entire focus area.
- ***Existing Development*** – Commercial properties and other existing developments were examined using the San Dieguito WMA business inventories developed during the Study Plan design, and updated commercial business inventories were provided by the Responsible Agencies, if available. The number and type of commercial establishments were tabulated for each focus area.
- ***Illicit Discharge Data*** **–** The availability of illicit discharge data varied for each Responsible Agency. For some focus areas, illicit discharge data were unavailable, or there were no incidents recorded within the focus area. The number of illicit discharges was recorded for each focus area, and the type of illicit discharge was recorded when available.

PRIORITIZATION OF POTENTIAL BACTERIA SOURCES

For this source identification project, the San Diego County Bacteria Source Prioritization Process (San Diego County MS4 Responsible Agencies, 2012) was adapted for use in the San Dieguito WMA. The prioritization process was originally developed by a workgroup of San Diego County Stormwater Responsible Agencies and was to be used for a WMA scale assessment. Based on conceptual models for the San Dieguito WMA developed as part of the source identification efforts, 50 potential bacteria sources were evaluated for each focus area and were included in a prioritization scoring sheet. During the scoring process, each potential source is considered separately in dry and wet weather conditions. Evaluation and scoring of the characteristics of the potential sources are based on the five key prioritization metrics:

- ***Human health risk*** refers to the nature and probability of adverse health effects for those who may be exposed to bacteria produced by a source. As part of the bacteria source prioritization process, the level of human health risk associated with various sources is given a relative score from 1 to 10, with 1 being a very low risk and 10 being an exceptionally high risk. As noted in the literature review in the Summary of Updated Literature Review, GIS Data Call, and Data Gaps located in **Appendix A**, research

[1] Land use data were obtained from the LANDUSE_CURRENT dataset located at the public data portal SANDAG/SANGIS Regional GIS Data Warehouse (www.sandag.org).

indicates that the origin of bacteria may affect the human health risk associated with recreational waters.

- ***Magnitude*** refers to the concentration or load of bacteria produced by a source. As part of the bacteria source prioritization process, the magnitude associated with various sources is given a relative score from 1 to 10, with 1 being a very low concentration or load and 10 being an exceptionally high concentration or load. Elevated concentrations, even with low flow, can result in high loads, potentially causing increased bacteria concentrations in receiving waters.
- ***Transport feasibility*** refers to the likelihood of stormwater or urban runoff containing bacteria from specific sources reaching receiving waters. Sources with a lower probability of reaching and influencing water quality in receiving waters are assigned a low score, while sources with a higher likelihood receive a higher score. Transport feasibility is largely affected by weather conditions (i.e., wet weather versus dry weather). The presence of structural BMPs should also be considered when evaluating transport feasibility.
- The ***frequency*** of a source refers to its presence or absence in the WMA. Where there are relatively lower numbers of a particular source, a lower score is assigned; where there are many numbers of a particular source in the WMA, a higher score is assigned accordingly.
- The ***controllability*** of a source refers to the ability of the Responsible Agency to control the source with respect to its influence on bacterial water quality. Low scores are deemed difficult to control, whereas higher scores are given to sources that are considered readily controllable.

With enhanced knowledge of potential bacteria sources within each focus area, a modified scoring system was designed for these smaller assessment areas. The prioritization scoring sheet was tailored for each Responsible Agency on the basis of the results of the source analysis. Potential sources that were listed in the original scoring sheet but were not present in the focus area analysis were removed. For example, landfills were not found in any of the focus areas, and thus were removed as a potential source. In addition, the range of scoring values attributed to the factor, "Frequency," was expanded from 1 to 5 points to 1 to 10 points, to clearly differentiate between the varied numbers of sources within the focus area locations.

The stormwater managers from the Responsible Agencies performed the prioritization assessment for potential bacteria sources in a collaborative workshop setting, as well as in internal consultations. For each focus area, the Responsible Agencies prioritized the potential bacteria sources using source information categorized and identified through the geospatial desktop analysis. For potential source characteristics where data were absent, such as the magnitude of leaky sewer pipes, the Responsible Agencies considered the information gathered through the literature review to help inform their decisions.

For each potential source, the Responsible Agencies ranked the five factors of human health risk, magnitude, frequency, transport feasibility, and controllability of each source of bacteria. The Responsible Agencies used a scoring system from 1 to 10 to evaluate human health risk, magnitude, and frequency, and ranked transport feasibility and controllability on a scale of 1 to 5. Scores were based not only on the results of the source analysis and literature review, but also on each Responsible Agency's local knowledge of the focus area. After evaluating each of the five factors, the scores were summed for each potential bacteria source, and then the sources were automatically ranked from highest to lowest based on the scoring spreadsheet. The prioritization assessment generated a unique, prioritized list of bacteria sources for each focus area and Responsible Agency.

Results

This section summarizes the results of the focus area selection, the desktop evaluation of potential sources, and the prioritization of the sources. Information is provided for each focus area.

FOCUS AREA SELECTION

Water quality samples collected during dry weather for *Enterococcus* analysis were the primary source of information used to determine the focus areas within the San Dieguito WMA. After filtering the region-wide bacteria data set for these conditions, a total of 38 MS4 outfall sampling locations were identified, representing 340 individual data points. After calculating the geomean for each MS4 outfall location and evaluating the location of the outfall within the WMA, the dry weather flow at the outfall, and the land use draining to the outfall, the focus area selection process identified six focus areas. A summary of the characteristics for each focus area outfall is in **Table 2**. A single, unique focus area was identified for the each participating Responsible Agency within the San Dieguito WMA, except for the City of Del Mar, and these are shown in **Figure 1**. One outfall, DW-619, drained a catchment that crossed the boundary between the jurisdictions of the City of Solana Beach and the City of San Diego. These two Responsible Agencies decided to evaluate potential bacteria sources in the shared focus area draining to DW-619.

Table 2. Summary Characteristics of Individual Focus Areas: *Enterococcus* Geomeans and Area

Responsible Agency	Outfall ID/Focus Area	Area of Focus Area (acres)	Geomean (MPN/100mL)	Sample Number (n)	Rationale
City of San Diego	DW-284	156	30,728	3	Elevated *Enterococcus* concentrations Lower watershed Persistent flow
County of San Diego	SDG-210	17	24,000	1	Elevated *Enterococcus* concentrations Lower watershed Persistent flow
City of Escondido	HDG-102	188	845	6	Elevated *Enterococcus* concentrations Existing high priority catchment Persistent flow
City of Poway	PO-132	723	1,709	3	Elevated *Enterococcus* concentration
City of Solana Beach	SB-12	74	10,197	2	Elevated *Enterococcus* concentrations Existing high priority catchment and source identification efforts Persistent flow
City of San Diego / Solana Beach	DW-619	60.42	38,620	3	Elevated *Enterococcus* concentrations Consistent flow Diverse land uses

ID = identification; MPN/100mL = most probable number per 100 milliliters

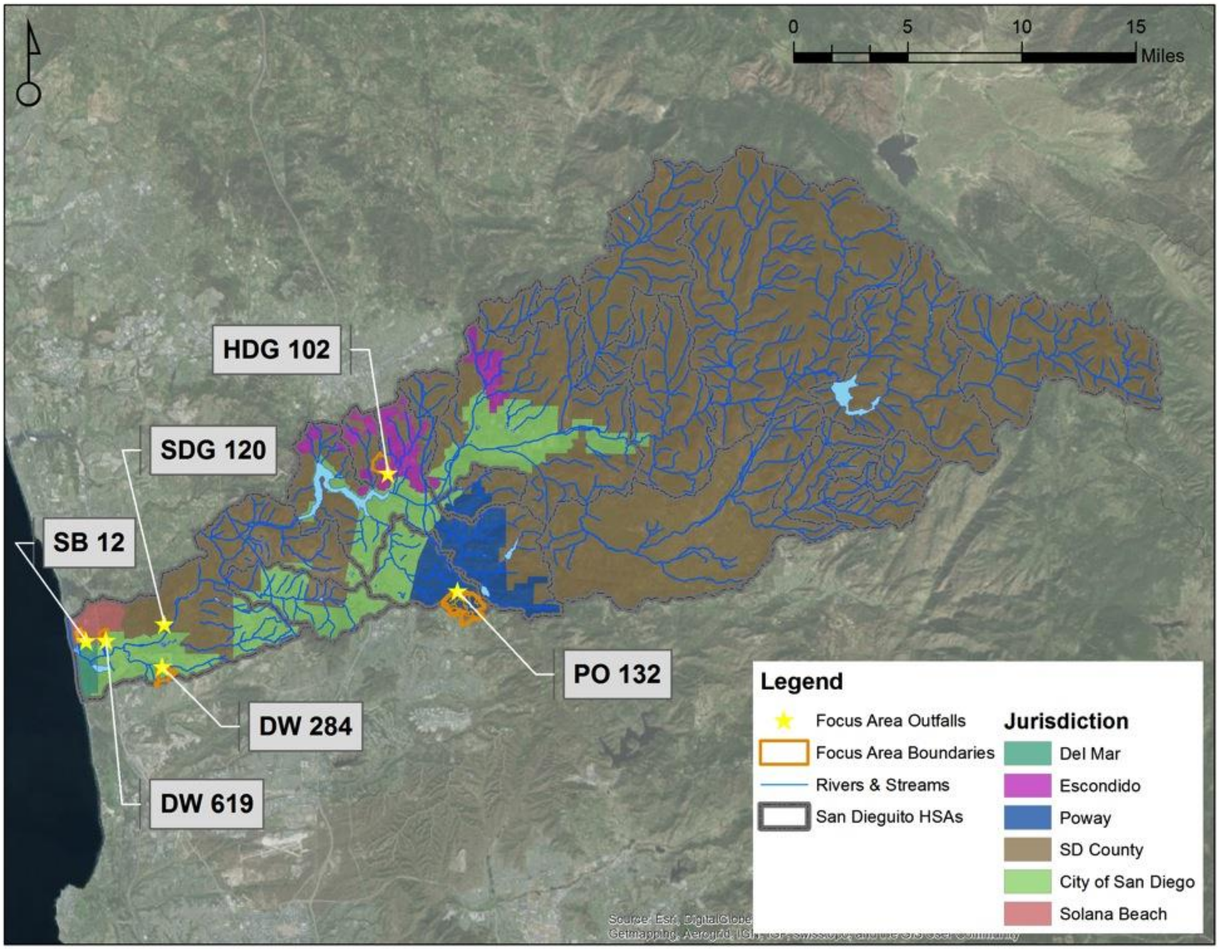

Figure 1. Locations of Focus Areas for the Bacteria Special Study Source Identification

Through the analysis of bacteria concentrations (geomeans of *Enterococcus* concentrations), MS4 outfall locations within the jurisdiction, and dry weather flow observations and information, the City of Del Mar does not currently have a focus area identified. The City of Del Mar does not have any persistently flowing major MS4 outfalls that drain to the San Dieguito River or Lagoon[2]. The City of Del Mar has one major MS4 outfall (S-14) and six minor MS4 outfalls (S-09, S-10, S-11, S-13, S-14, S-16, and S-21) that flow into the San Dieguito River or Lagoon (**Figure 2**). Based on the currently available data, no bacteria exceedances are recorded for these locations. In addition, since 2013, the City of Del Mar has performed visual outfall monitoring at every outfall, minor or major, on a monthly basis, and the seven MS4 outfalls identified above have never persistently flowed. An analysis of the monthly data from 2013 to present day shows that six of the seven MS4 outfalls are consistently dry and one outfall has had minor flow observed twice. The City of Del Mar will continue to conduct frequent City-wide patrols and assessment of data, and will determine whether specific focus areas will need to be established in the future. Any changes will be documented in applicable WQIP Annual Reports or updates.

[2] The City of Del Mar has only one persistently flowing major MS4 outfall, S-07, which drains to the Pacific Ocean south of the San Dieguito Lagoon mouth. 2008–2012 Coastal Storm Drain Monitoring Program data was used to calculate the geomean for this location (geomean = 92.08 MPN/100mL with a sample number of 69).

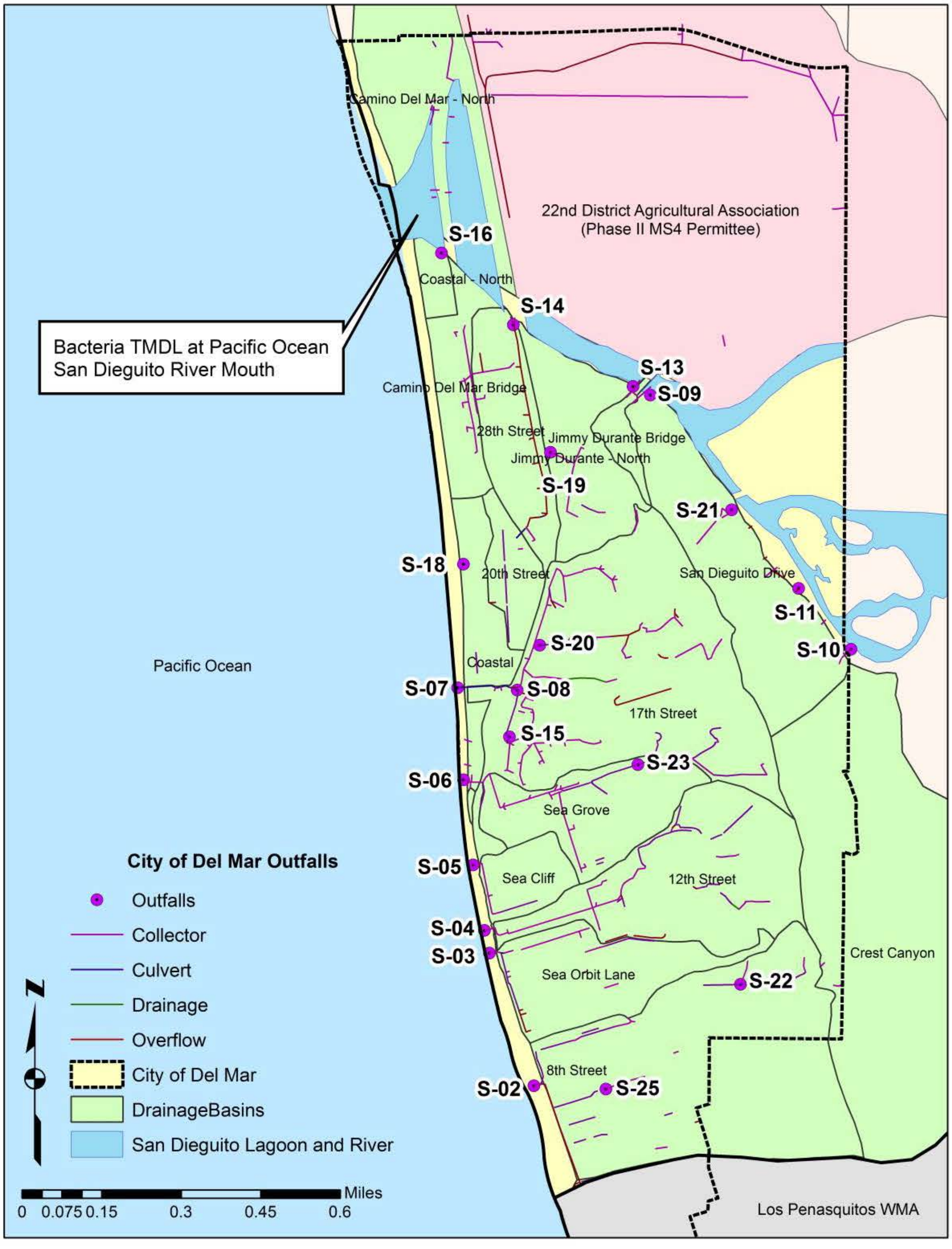

Figure 2. Minor and Major MS4 Outfall Locations in the City of Del Mar

POTENTIAL SOURCES

Potential sources of bacteria were initially identified in Section 3.0 of the San Dieguito WMA Water Quality Improvement Plan. Further desktop analyses characterized the potential sources and developed a catalog of detailed source information for each of focus areas described above. Based on information from the Responsible Agencies, sanitary sewer infrastructure was added to the list of potential sources in the Water Quality Improvement Plan. The enhanced literature search performed as part of the study, detailed in **Appendix A**, found that sanitary sewer infrastructure has the potential to impact bacteria concentrations in the MS4, particularly when SSOs occur and at locations of older infrastructure.

Based on the spatial analysis of sources in the focus area, Responsible Agencies were able to identify key sources of bacteria. They also were able to exclude sources not present within their focus areas. Each jurisdiction and focus area contained a unique catalog of potential sources. A summary of potential sources assessed within each focus area is described in **Table 3**, and a full characterization of these potential sources and their complete rankings is in **Appendix B**.

Table 3. Summary of Potential Bacteria Sources in Focus Areas Within the San Dieguito Watershed Management Area[3]

		ESC	POW	CSD	SB	CoSD	CSD/SB
Source[1]	**Priority[1]**	**HDG-102**	**PO-132**	**DW-284**	**SB-12**	**SDG-210**	**DW-619**
Residential Areas	High	✓	✓	✓	✓	✓	✓
Sanitary Sewer Overflows	High		✓		✓		✓
Sanitary Sewer Infrastructure	High	✓	✓	✓	✓	✓	✓
Septic Systems	High	✓	*	*	*	*	*
Animal Facilities	Medium						✓
Eating/Drinking Establishments	Medium	✓					✓
Nurseries/Greenhouses	Medium						✓
Agriculture	Medium	✓					
Roads/Streets/Parking	Medium	✓	✓	✓	✓	✓	✓
Mobile Landscaping	Medium	✓	✓	✓	✓	✓	✓

[3]The City of Del Mar maintains a City-wide geospatial inventory of potential sources.

Source[1]	Priority[1]	ESC HDG-102	POW PO-132	CSD DW-284	SB SB-12	CoSD SDG-210	CSD/SB DW-619
Wildlife (Secondary)	Medium	✓					
Transient Encampments	Low	*	*	*		*	*
Wildlife	Low	✓	✓	✓	✓	✓	✓
Bacteria Regrowth/Biofilms	Low	✓	✓	✓	✓	✓	✓

[1] Source and Priority Information based on Water Quality Improvement Plan Source Information
* Indicates data were not available
Blank cells indicate that sources are not present in the focus area

PRIORITIZATION RESULTS BY FOCUS AREA

The Responsible Agencies evaluated 50 potential bacteria sources within each focus area, and considered dry and wet weather conditions separately. Of the 50 sources, those that were identified as present within the focus area were then prioritized. The potential bacteria sources were grouped into three categories on the basis of bacterial origin: human waste, anthropogenic non-human sources, and non-anthropogenic sources. Within these three general categories, sources and subcategories are further identified.

Detailed results for the potential bacteria sources within each focus area are in **Appendix B**. In the tables below, the highest priority sources for each focus area are presented for dry and wet weather. These results consist of the highest potential bacteria sources based on the highest scores across the three bacteria origin categories. In some instances, the scores generated several ties, and results presented below include potential sources with the same score.

City of San Diego (DW-284)

The City of San Diego's primary focus area drains to the outfall site, DW-284, shown in **Figure 3**. The total area assessed is 156 acres, and consists of 49 percent (%) residential land uses, 34% open space, 16% road infrastructure, and 1% institutional land uses. With single family residential land uses and open space comprising over 80% of this focus area, the top two potential bacteria sources in both dry and wet weather are pets and manure/compost. Although six businesses are located within the focus area, none of the commercial businesses are food or eating and drinking establishments. The other potential sources are most highly associated with infrastructure and land use.

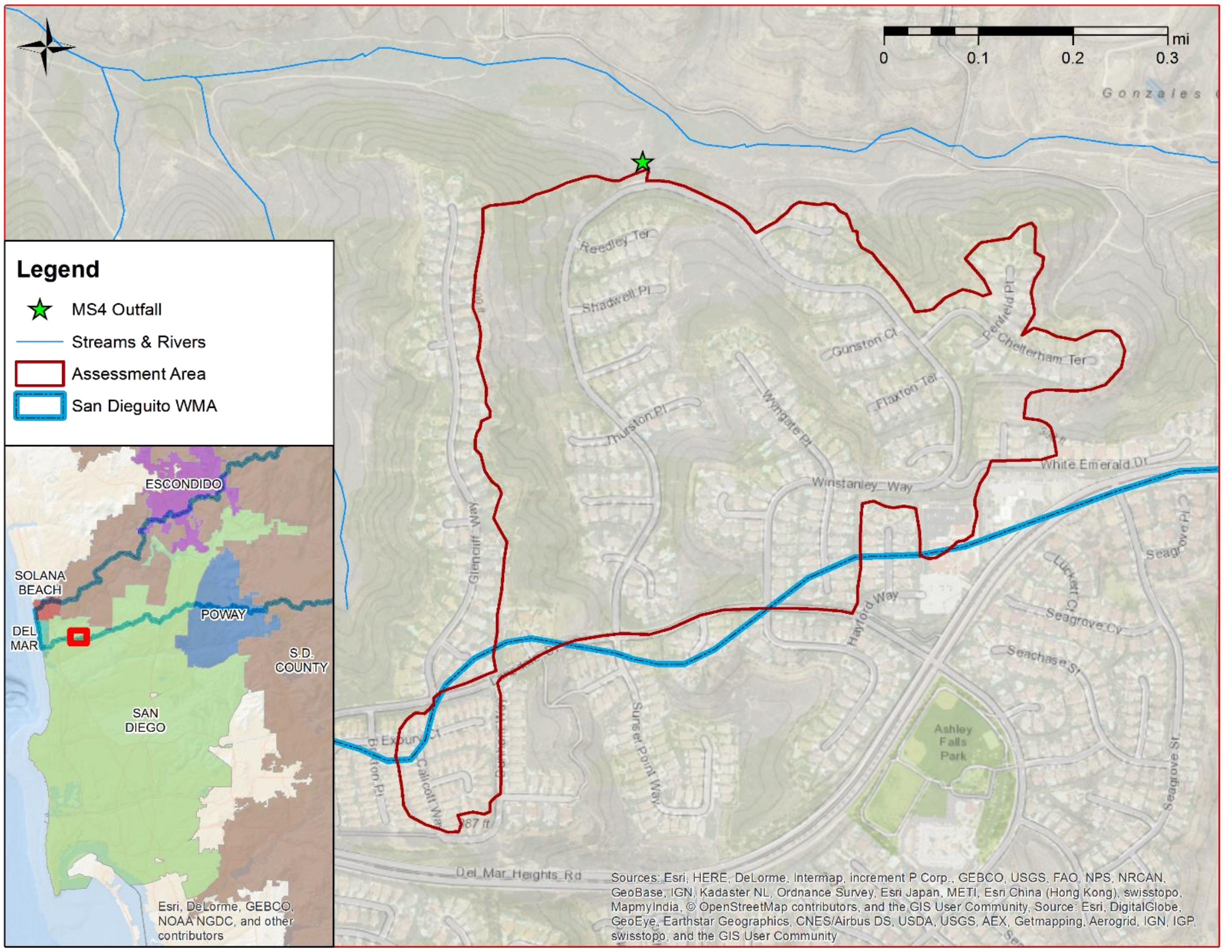

Figure 3. Focus Area for the City of San Diego: Outfall DW-284

The potential bacteria sources within the City of San Diego's focus area comprise a mixture of anthropogenic non-human and human waste bacteria origins. A summary of the top 10 sources is in **Table 4**, while the full list of prioritized sources is in **Appendix B.**

Table 4. Top 10 Potential Bacteria Sources within City of San Diego Focus Area: DW-284

Condition	Category	Source	Subcategory	Rank
Dry	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	4
	Human Waste	Illicit Connections	Other Wastewater	5
	Human Waste	RVs (Mobile)	Mobile Sources	6
	Human Waste	Illegal Discharges	Other Wastewater	7
	Human Waste	Porta-Potties	Other Wastewater	8
	Anthropogenic Non-Human	MS4 Infrastructure – Biofilm/Regrowth	MS4 Infrastructure – Biofilm/Regrowth	9
	Human Waste	Homeless Encampments	Mobile Sources	10
Wet	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	4
	Human Waste	RVs (Mobile)	Mobile Sources	5
	Anthropogenic Non-Human	MS4 Infrastructure – Biofilm/Regrowth	MS4 Infrastructure – Biofilm/Regrowth	6
	Human Waste	Illicit Connections	Other Wastewater	7
	Human Waste	Trash Cans	Sources related to Garbage	8
	Human Waste	Homeless Encampments	Mobile Sources	9
	Human Waste	Porta-Potties	Other Wastewater	10

County of San Diego (SDG-210)

The County of San Diego's primary focus area drains to the outfall site, SDG-210, shown in **Figure 4**. The total area assessed is 17 acres, and consists of 63% residential land uses, 18% open space, and 19% road infrastructure. The land uses are mainly single-family residential with associated open space. One of the residential areas has an active homeowners association and the focus area borders a golf course. Information regarding the sanitary sewer infrastructure for this focus area was unavailable. The potential bacteria sources in this focus area are associated with residential land uses, human activities, and any potential sources associated with open space and wildlife.

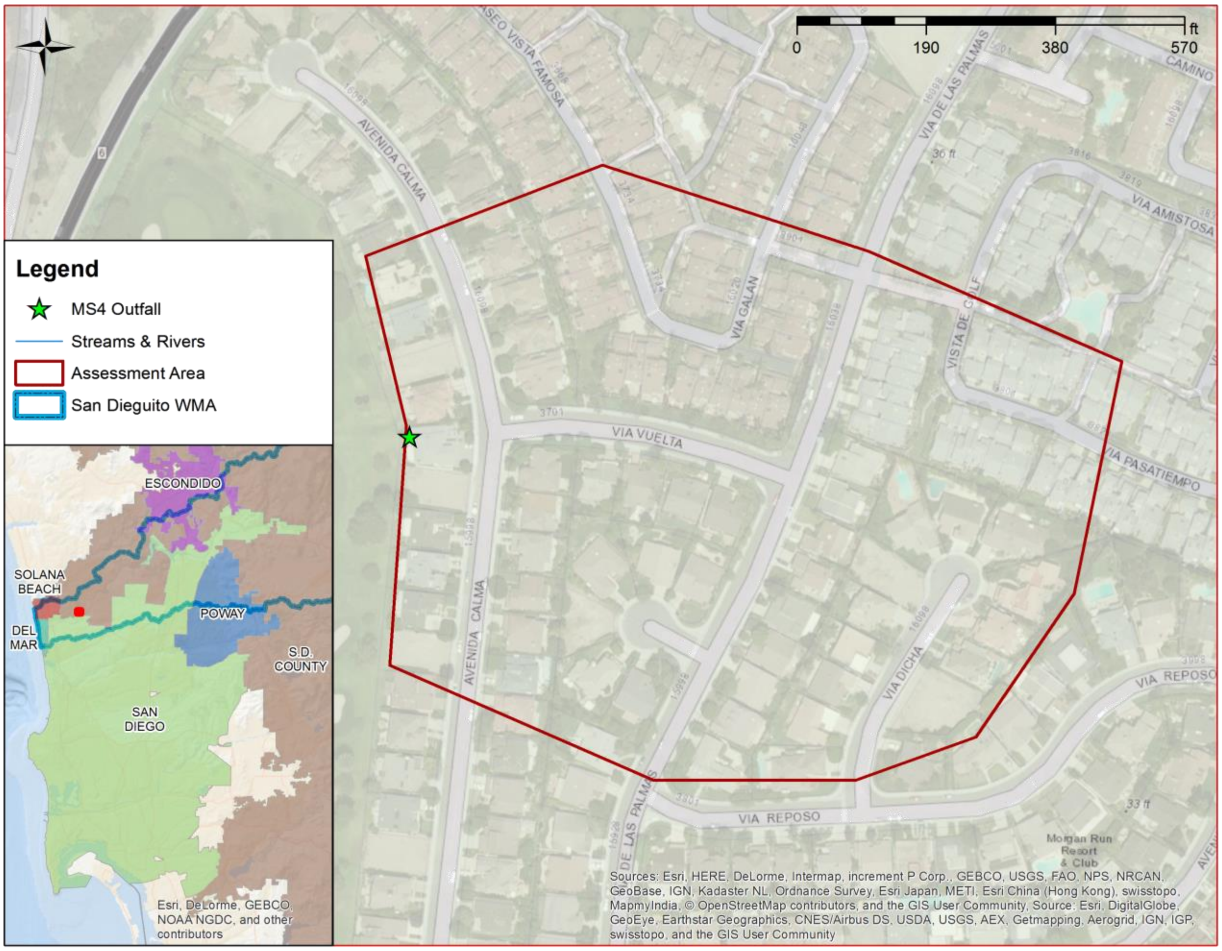

Figure 4. Focus Area for the County of San Diego: Outfall SDG-210

The potential bacteria sources within the County of San Diego's focus area comprise a mixture of anthropogenic non-human and bacteria related to human waste. A summary of the top 10 sources are in **Table 5**, and the complete prioritization results are in **Appendix B**.

Table 5. Top 10 Potential Bacteria Sources within County of San Diego Focus Area: SDG-210

Condition	Category	Source	Subcategory	Rank
Dry	Human Waste	Illegal Discharges	Other Wastewater	1
	Human Waste	Porta-Potties	Other Wastewater	2
	Anthropogenic Non-Human	Small Mammals (Mice, Rats, and Rabbits)	Secondary Wildlife	3
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	4
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	5
	Human Waste	Illicit Connections	Other Wastewater	6
	Human Waste	Trash Cans	Sources related to Garbage	7
	Human Waste	Pools	Non-Stormwater Discharges	8
	Anthropogenic Non-Human	Pets	Domestic Animals	9
	Anthropogenic Non-Human	Trash Cans	Solid/Liquid Waste	10
Wet	Human Waste	Illegal Discharges	Other Wastewater	1
	Human Waste	Illicit Connections	Other Wastewater	2
	Human Waste	Porta-Potties	Other Wastewater	3
	Human Waste	Dumpsters	Sources related to Garbage	4
	Anthropogenic Non-Human	Rodents (Mice, Rats, and Rabbits)	Secondary Wildlife	5
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	6
	Anthropogenic Non-Human	Trash Cans	Solid/Liquid Waste	7
	Human Waste	Pools	Non-Stormwater Discharges	8
	Anthropogenic Non-Human	Pets	Domestic Animals	9
	Anthropogenic Non-Human	Vectors	Solid/Liquid Waste	10

City of Escondido (HDG-102)

The City of Escondido's primary focus area drains to the outfall site, HDG-102, shown in **Figure 5**. This outfall was previously identified by the City of Escondido as an outfall of interest for additional investigation because it is the only major MS4 outfall with persistent flow, based on transitional MS4 visual outfall monitoring. The total area is 188 acres, and consists of 73% residential land uses, 5% open space, 1% commercial land uses, and 20% road infrastructure. Despite the fact that the focus area is mostly composed of residential land uses, the commercial inventory provided by the City of Escondido shows a neighborhood shopping center with several food service establishments in the southeastern portion of the assessment area. A total of 10 food service establishments are within the assessment area. The potential bacteria sources within this focus area represent residential and commercial activities associated with human waste, existing infrastructure, and other anthropogenic and non-human sources of bacteria.

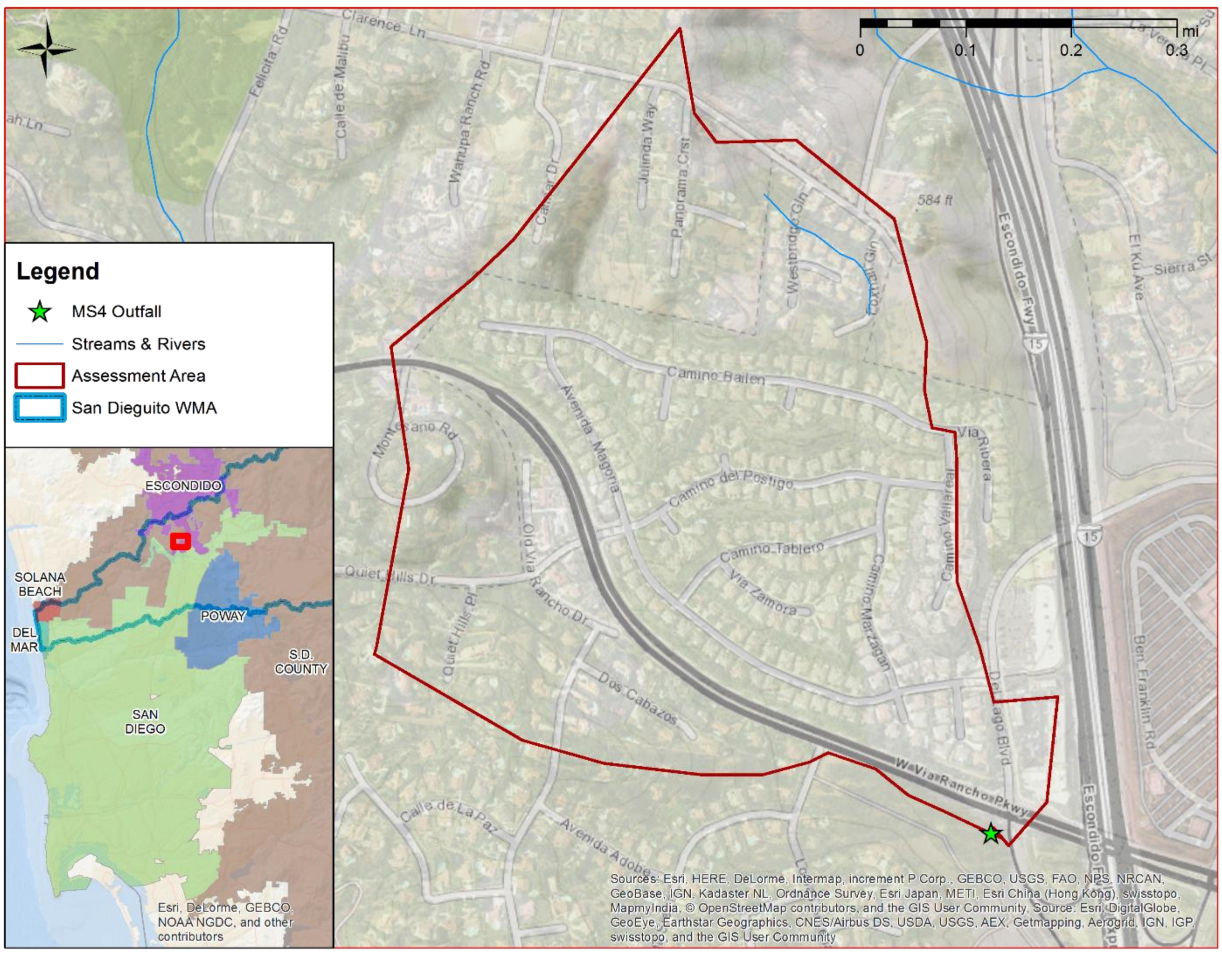

Figure 5. Focus Area for the City of Escondido: Outfall HDG-102

The potential bacteria sources within the City of Escondido's focus area comprise a mixture of anthropogenic non-human related to commercial activities and human waste bacteria origins. The potential bacteria sources related to human waste received higher ranking because of an evaluation of the human health risk in this focus area. Although sewer overflows and leaky sewer pipes received a high ranking as a potential bacteria source, the data used in this special study did not identify any SSOs. The sanitary sewer in the focus area is composed of polyvinyl chloride (PVC) pipes, which are not as likely as other pipe materials (such as vitrified clay pipe [VCP]) to leak. Additionally, the City of Escondido has a sewer system management plan to prevent SSOs and the City inspects all food service establishments one to two times per year (stormwater inspections are included in this inspection). A summary of the top 10 sources is in **Table 6**, and the complete prioritization results are in **Appendix B**.

Table 6. Top 10 Potential Bacteria Sources within City of Escondido Focus Area: HDG-102

Condition	Category	Source	Subcategory	Rank
Dry	Human Waste	Leaky Failing Septic Systems	Sewage Infrastructure	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Illegal Discharges	Other Wastewater	4
	Human Waste	Illicit Connections	Other Wastewater	4
	Human Waste	Porta-Potties	Other Wastewater	6
	Anthropogenic Non-Human	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	7
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	7
	Human Waste	RVs (Mobile)	Mobile Sources	9
	Anthropogenic Non-Human	Vectors	Solid/Liquid Waste	9
	Anthropogenic Non-Human	MS4 Infrastructure – Biofilm/Regrowth	MS4 Infrastructure – Biofilm/Regrowth	9
Wet	Human Waste	Leaky Failing Septic Systems	Sewage Infrastructure	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Illegal Discharges	Other Wastewater	4
	Human Waste	Illicit Connections	Other Wastewater	4
	Human Waste	Porta-Potties	Other Wastewater	4
	Anthropogenic Non-Human	Rodents (Mice, Rats, and Rabbits)	Secondary Wildlife	7
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	7
	Human Waste	RVs (mobile)	Mobile Sources	9
	Anthropogenic Non-Human	Washwater	Solid/Liquid Waste	9
	Anthropogenic Non-Human	MS4 Infrastructure – Biofilm/Regrowth	MS4 Infrastructure – Biofilm/Regrowth	9

City of Poway (PO-132)

The City of Poway's primary focus area drains to the outfall site, PO-132, shown in **Figure 6**. The total area is 723 acres, and consists of 74% residential land uses, 9% open space, 7% public land, and 1% crops, and 9% road infrastructure. The City of Poway's focus area comprises over 80% single-family residential and open space land uses. The area includes a high school and a few in-home businesses. The bacteria source priorities are mainly associated with wildlife (both non-anthropogenic and anthropogenic). Other potential sources include leaky infrastructure, sources related to garbage, and other wastewater sources.

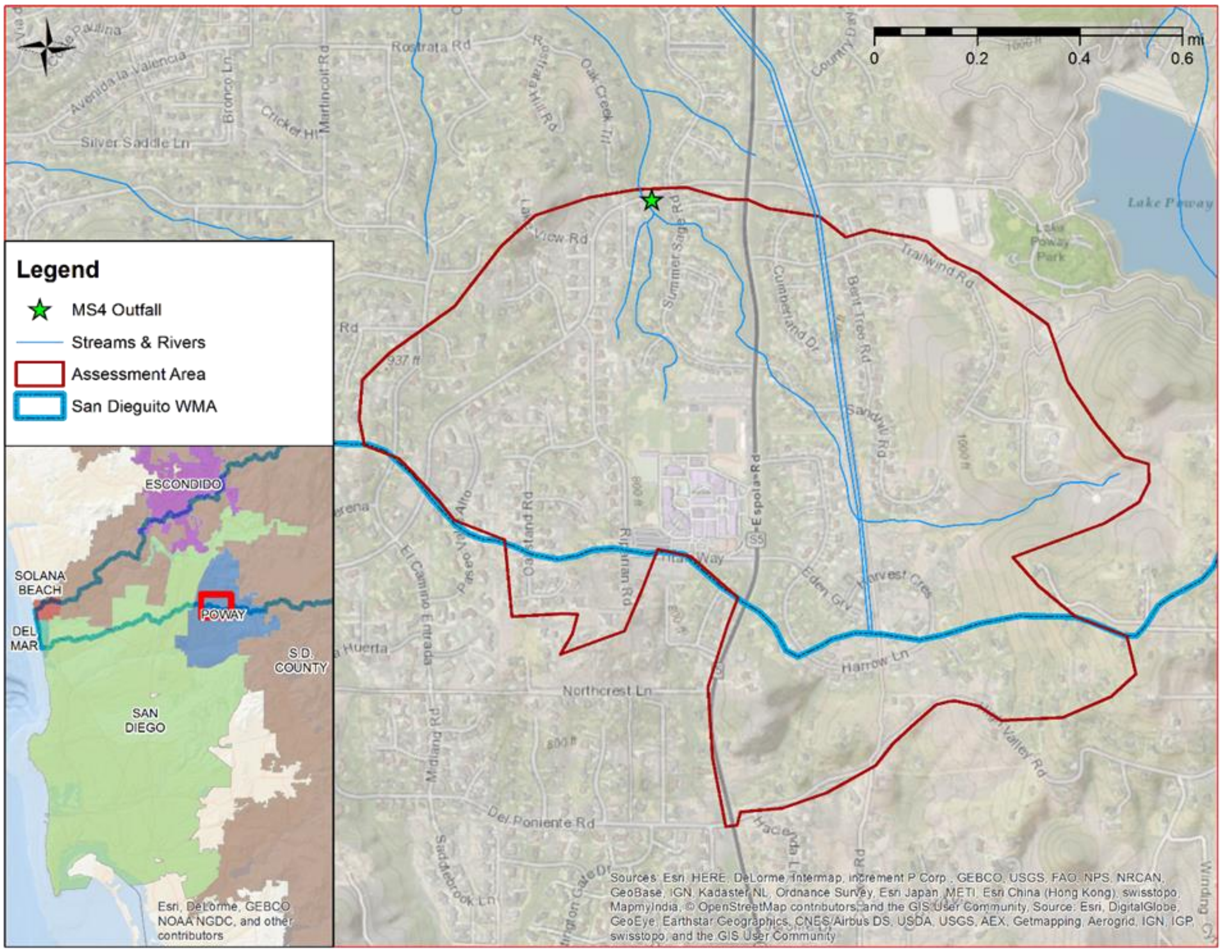

Figure 6. Focus Area for the City of Poway: Outfall PO-132

The potential bacteria sources within the City of Poway's focus area comprise a mixture of non-anthropogenic, anthropogenic non-human, and human waste bacteria origins. A summary of the top 10 sources is in **Table 7**, and the complete prioritization results are in **Appendix B**.

Table 7. Top 10 Potential Bacteria Sources within City of Poway Focus Area: PO-132

Condition	Category	Source	Subcategory	Rank
Dry	Non-Anthropogenic	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	3
	Anthropogenic Non-Human	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	4
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	5
	Human Waste	Trash Cans	Sources Related to Garbage	6
	Human Waste	Illegal Discharges	Other Wastewater	7
	Anthropogenic Non-Human	Pets	Domestic Animals	8
	Anthropogenic Non-Human	Manure/Compost	Landscaping	9
	Non-Anthropogenic	Soil	Soil	10
Wet	Non-Anthropogenic	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	3
	Anthropogenic Non-Human	Rodents (Mice, Rats, and Rabbits)	Secondary Wildlife	4
	Non-Anthropogenic	Soil	Soil	5
	Non-Anthropogenic	Plants	Plants	6
	Non-Anthropogenic	Algae	Algae	7
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	8
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	9
	Human Waste	Illegal Discharges	Other Wastewater	10

City of Solana Beach (SB-12)

The City of Solana Beach's primary focus area drains to the outfall site, SB-12, shown in **Figure 7**. The total area is 74 acres, and consists of 72% residential land uses, 7% open space, 1% institutional land use, and 20% road infrastructure. In addition, the majority of the residential parcels contain multi-family residential units. While commercial businesses are rare within the boundaries of the focus area, multi-family residential units may have similar features that are commonly associated with business activities, such as large dumpsters. The potential bacteria sources within this focus area represent both residential and commercial activities associated with human waste, as well as some infrastructure. This focus area was previously identified as an area of interest for the City of Solana Beach because it drains to the San Dieguito River and ultimately the San Dieguito Lagoon Mouth.

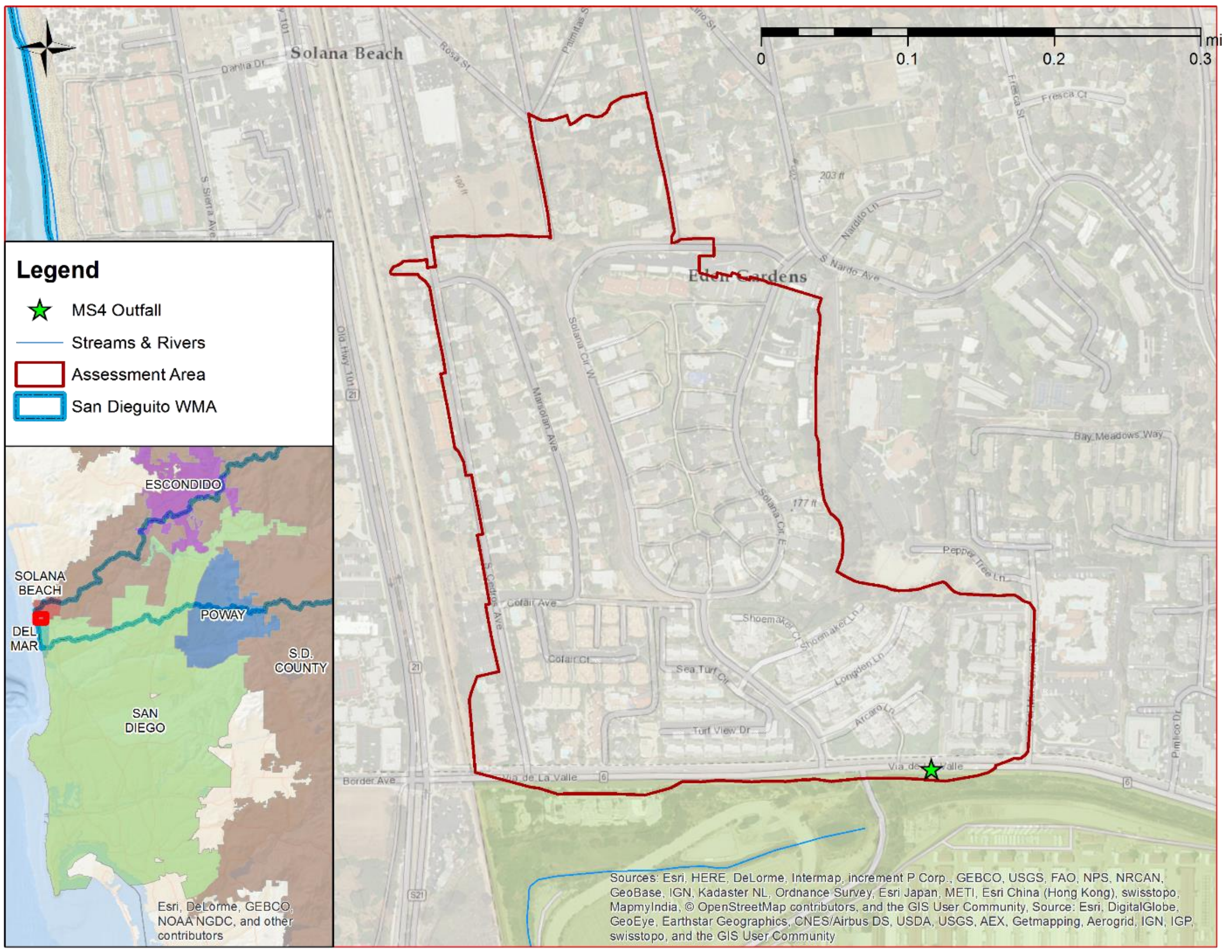

Figure 7. Focus Area for the City of Solana Beach: Outfall SB-12

The potential bacteria sources within the City of Solana Beach's focus area comprise a mixture of anthropogenic non-human and human waste bacteria origins. A summary of the top 10 sources is in **Table 8**, and the complete prioritization results are in **Appendix B**.

Table 8. Top 10 Potential Bacteria Sources within City of Solana Beach Focus Area: SB-12

Condition	Category	Source	Subcategory	Rank
Dry	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Illegal Discharges	Other Wastewater	4
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	5
	Human Waste	Porta-Potties	Other Wastewater	6
	Human Waste	RVs (Mobile)	Mobile Sources	7
	Anthropogenic Non-Human	MS4 Infrastructure – Biofilm/Regrowth	MS4 Infrastructure – Biofilm/Regrowth	8
	Human Waste	Illicit Connections	Other Wastewater	9
	Anthropogenic Non-Human	Litter	Solid/Liquid Waste	10
Wet	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Illegal Discharges	Other Wastewater	4
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	5
	Human Waste	Porta-Potties	Other Wastewater	6
	Human Waste	RVs (Mobile)	Mobile Sources	7
	Anthropogenic Non-Human	MS4 Infrastructure – Biofilm/Regrowth	MS4 Infrastructure – Biofilm/Regrowth	8
	Human Waste	Illicit Connections	Other Wastewater	9
	Anthropogenic Non-Human	Litter	Solid/Liquid Waste	10

City of San Diego/City of Solana Beach – Shared Focus Area (DW-619)

The Cities of San Diego and Solana Beach assessed and prioritized bacteria sources within a focus area that drains through an outfall in the City of San Diego's jurisdiction but includes drainage areas serving both the Cities of San Diego and Solana Beach, shown in **Figure 8**. In this focus area, identified by outfall DW-619, the total area is 60.42 acres, with 17.91 acres in the City of San Diego and 42.51 acres in the City of Solana Beach. For the area within the City of San Diego, 46% of the land use consists of commercial parcels, while the remaining portions are composed mostly of roads and rights of way. In particular, the City of San Diego's infrastructure drains a large neighborhood shopping center. The potential bacteria sources within this focus area represent these land uses and activities, including the potential for secondary wildlife associated with these activities.

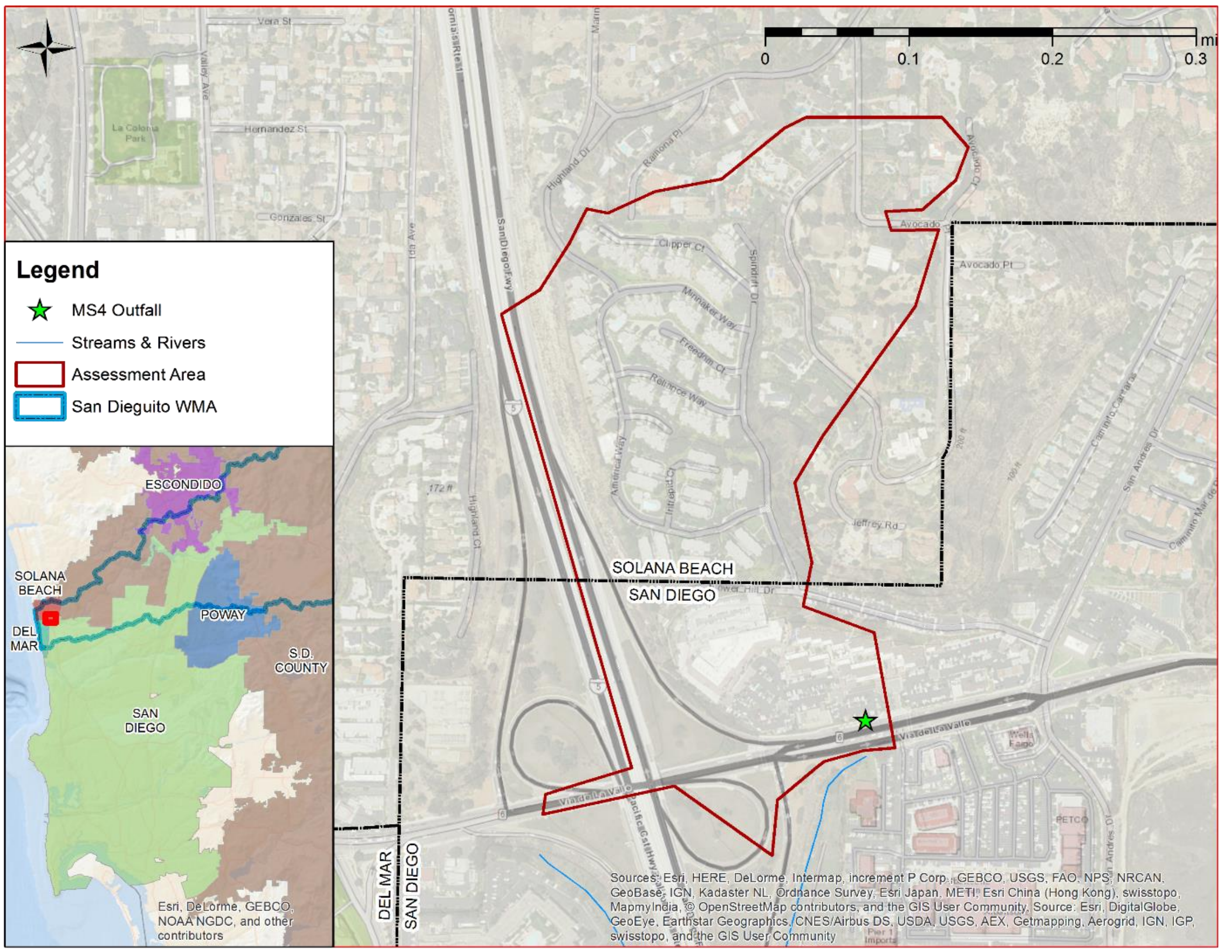

Figure 8. Focus Area within the Cities of Solana Beach and San Diego: Outfall DW619

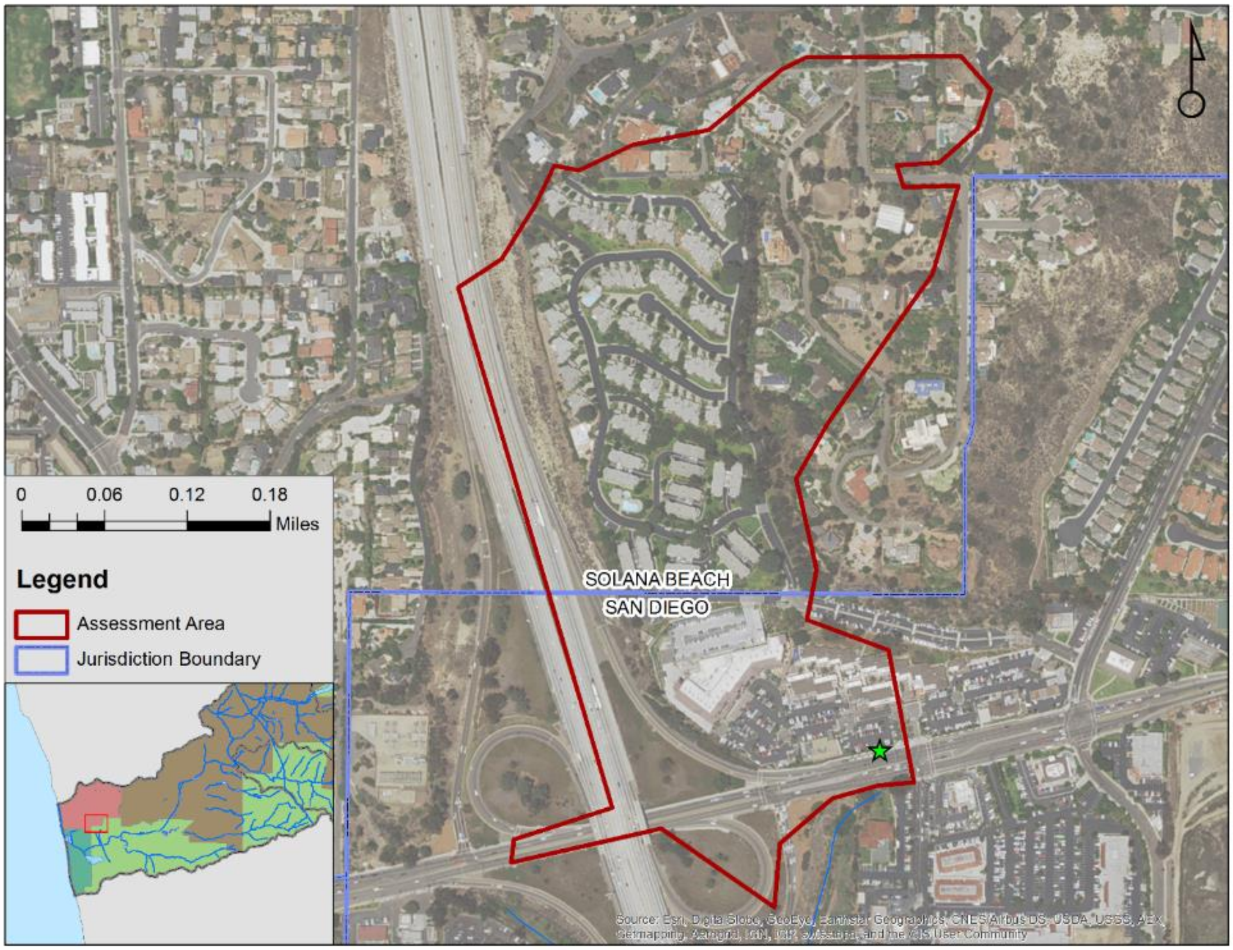

Figure 8. Focus Area Within the Cities of Solana Beach and San Diego: Outfall DW-619

The potential bacteria sources within the City of San Diego's portion of the focus area comprise a mixture of human waste and anthropogenic non-human bacteria origins. A summary of the top 10 sources is in **Table 9**, and the complete prioritization results are in **Appendix B**.

Table 9. Top 10 Potential Bacteria Sources within City of San Diego's Shared Focus Area With Solana Beach: DW-619

Condition	Category	Source	Subcategory	Rank
Dry	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Human Waste	Illicit Connections	Other Wastewater	3
	Anthropogenic Non-Human	Pets	Domestic Animals	4
	Anthropogenic Non-Human	Manure/Compost	Landscaping	5
	Human Waste	Illegal Discharges	Other Wastewater	6
	Anthropogenic Non-Human	Washwater	Solid/Liquid Waste	7
	Human Waste	RVs (Mobile)	Mobile Sources	8
	Human Waste	Porta-Potties	Other Wastewater	9
	Human Waste	Dumpsters	Sources related to Garbage	10
Wet	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Anthropogenic Non-Human	Pets	Domestic Animals	3
	Anthropogenic Non-Human	Manure/Compost	Landscaping	4
	Human Waste	Illicit Connections	Other Wastewater	5
	Human Waste	Porta-Potties	Other Wastewater	6
	Human Waste	RVs (Mobile)	Mobile Sources	7
	Human Waste	Dumpsters	Sources related to Garbage	8
	Anthropogenic Non-Human	MS4 Infrastructure – Biofilm/Regrowth	MS4 Infrastructure – Biofilm/Regrowth	9
	Anthropogenic Non-Human	Dumpsters	Solid/Liquid Waste	10

The land uses within the City of Solana Beach's jurisdiction comprise 83% multi-family and single-family residential homes. The remaining portion of land use consists of road infrastructure. The potential bacteria sources within this focus area represent the activities and sources more commonly associated with residential land use. The residential parcels are split between single-family residential and multi-family residential land uses. The potential bacteria sources within the City of Solana Beach's portion of the focus area comprise a mixture of human waste and anthropogenic non-human bacteria origins. A summary of the top ten sources is in **Table 10**, and the complete prioritization results are in **Appendix B**.

Table 10. Top 10 Potential Bacteria Sources Within City of Solana Beach's Shared Focus Area With the City of San Diego: DW-619

Condition	Category	Source	Subcategory	Rank
Dry	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	4
	Human Waste	Illegal Discharges	Other Wastewater	5
	Human Waste	Porta-Potties	Other Wastewater	6
	Human Waste	RVs (mobile)	Mobile Sources	7
	Human Waste	Illicit Connections	Other Wastewater	8
	Anthropogenic Non-Human	MS4 Infrastructure – Biofilm/Regrowth	MS4 Infrastructure – Biofilm/Regrowth	9
	Anthropogenic Non-Human	Litter	Solid/Liquid Waste	10
Wet	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	4
	Human Waste	Porta-Potties	Other Wastewater	5
	Human Waste	Illegal Discharges	Other Wastewater	6
	Human Waste	RVs (mobile)	Mobile Sources	7
	Anthropogenic Non-Human	MS4 Infrastructure – Biofilm/Regrowth	MS4 Infrastructure – Biofilm/Regrowth	8
	Human Waste	Illicit Connections	Other Wastewater	9
	Anthropogenic Non-Human	Litter	Solid/Liquid Waste	10

COMMON SOURCES IN SAN DIEGUITO FOCUS AREAS

The bacteria source prioritization results for the San Dieguito WMA focus areas show many similarities across the region, summarized in

Table 11. The table illustrates the number of times a particular source was prioritized in the top 10 results for each Responsible Agency and drainage area analyzed, separated by the frequency of occurrence in the top five ranked results versus bottom five ranked results. Prioritized sources were occasionally ranked within the top 10 potential sources for all seven combinations of Responsible Agencies and focus areas, such as SSOs during dry weather. However, given the variation in each focus area's source analysis, potential sources and their prioritizations vary from one focus area to the next, as well as between wet and dry weather conditions. Although SSOs were ranked as one of the top five potential sources in all Responsible Agency and focus area combinations during dry weather conditions, in wet weather conditions, the potential source was ranked in the top 10 for only 6 of the 7 possible combinations of Responsible Agency and focus area: five Responsible Agencies ranked SSOs in the top 5 of 10 sources, one Responsible Agency ranked SSOs in the bottom 5 of 10 sources, while another Responsible Agency did not have SSOs ranked within the top 10 potential bacteria sources during wet weather conditions. Results are presented for wet and dry weather. The results often corroborated several of the key findings of the literature review.

Table 11. Frequency of Prioritized Source Occurrences in Dry and Wet Weather Conditions for All Focus Areas

Source	Category	Subcategory	Dry Weather Frequency[1]		Wet Weather Frequency[1]	
			Top 5	Bottom 5	Top 5	Bottom 5
Pets	Anthropogenic Non-Human	Domestic Animals	4	2	4	1
Leaky Sewer Pipes (Exfiltration)	Human Waste	Sewage Infrastructure	6	0	5	1
Sanitary Sewer Overflows	Human Waste	Sewage Infrastructure	7	0	5	1
Illegal Discharges	Human Waste	Other Wastewater	4	3	3	2
Illicit Connections	Human Waste	Other Wastewater	3	3	3	3
Porta-Potties	Human Waste	Other Wastewater	1	5	3	3
Manure/Compost	Anthropogenic Non-Human	Landscaping	4	1	5	--
MS4 Infrastructure – Biofilm/Regrowth	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	--	4	--	5
RVs (Mobile)	Human Waste	Mobile Sources	--	5	1	4
Birds (Gulls, Pigeons, etc.)	Anthropogenic Non-Human	Secondary Wildlife	2	1	1	2
Rodents (Mice, Rats, and Rabbits)	Anthropogenic Non-Human	Secondary Wildlife	2	1	2	1
Dumpsters	Human Waste	Sources related to Garbage	--	1	1	2
Trash Cans	Human Waste	Sources related to Garbage	--	1	--	--
Vectors	Anthropogenic Non-Human	Solid/Liquid Waste	--	1	--	1
Litter	Anthropogenic Non-Human	Solid/Liquid Waste	--	2	--	3
Dumpsters	Anthropogenic Non-Human	Solid/Liquid Waste	--	1	--	1
Pools	Human Waste	Non-Stormwater Discharges	--	1	--	--
Wildlife (Birds and Others)	Non-Anthropogenic	Wildlife (Birds and Others)	1	--	1	--
Washwater	Anthropogenic Non-Human	Solid/Liquid Waste	--	1	--	1
Plants	Non-Anthropogenic	Plants	--	--	--	1
Algae	Non-Anthropogenic	Algae	--	--	--	1
Soil	Non-Anthropogenic	Soil	--	1	1	--
Homeless Encampments	Human Waste	Mobile Sources	1	1	1	1

1. *The number of times a particular source was prioritized in the top 10 results for each agency and drainage area analyzed, separated by the frequency of occurrence in the top 5 versus e bottom 5 ranked results.*

For the majority of the focus areas, the land use characteristics were a key factor driving the prioritization and prevalence of bacteria sources. The focus areas were predominantly characterized by residential land uses, and the bacteria sources identified were most often associated with residential activities. Pet waste, compost, manure, irrigation runoff, and porta-potties associated with construction were common potential bacteria sources associated with residential land uses throughout the region. Over-irrigation has the potential to be a key transport mechanism for bacteria. It is also considered an illegal discharge. Over-irrigation occurs mainly in residential areas, but can occur in commercial and industrial land uses as well. The correlation between residential land uses in areas with discharges containing relatively high geomeans of *Enterococcus* is corroborated by findings in the literature review. In particular, Reeves et al. (2004) found that the concentration of fecal indicator bacteria is extraordinarily high in sources of urban runoff, particularly residential runoff.

The sanitary sewer infrastructure was also identified as a potential priority bacteria source across the six focus areas. In the literature review, the sanitary sewer/wastewater has been shown to be a prevalent source of human-derived bacteria from storm drainage systems, particularly during dry weather flows (Field et al., 1994; Sauer et al., 2011; Sercu et al., 2009, 2011). Sercu et al. (2011) determined that sewage can be transmitted directly from leaking sanitary sewers to storm drains, suggesting that chronic sanitary sewer leakage can contribute to downstream fecal contamination of coastal beaches. Marsalek and Rochfort (2004) noted that levels of *E. coli* in urban runoff greater than 10^5/100 milliliters (mL) suggest the presence of cross-connections with sanitary sewers. In addition to cross-connections, leaking sanitary sewers can contribute bacteria to groundwater (Paul et al., 2004), which can then infiltrate into the MS4 system or impact surface waters directly. Wastewater exfiltration and subsequent infiltration was quantified by Guérineaua et al. (2014) to be 0.6-15.7 cubic meters per day per kilometer (m^3/d per km) in dry weather and 1.1 to 19.5 m^3/d per km in wet weather. The geomeans measured during dry weather at outfalls in the San Dieguito WMA were not as high as the value in the literature. It is possible that exfiltration from the sanitary sewer may influence bacteria concentrations within several of the focus areas in the study, but its true impact cannot be known without field investigations. Based on data from CIWQS, sanitary sewer overflows and private lateral sewer discharges appear to be relatively rare occurrences in the San Dieguito WMA focus areas.

The literature review suggests that natural bacteria sources likely contributed high numbers of *Enterococci*, including regrowth on the walls of the MS4 system (Weston Solutions, 2010). The high flows generated during wet weather were found to cause significant biofilm sloughing, potentially impacting wet weather loads. Sediments and biofilms the Tecolote Creek and MS4 system were found to be significant reservoirs (Weston Solutions, 2010). While biofilm within the MS4 infrastructure may be a priority bacteria source in some of the focus areas, these sources are very difficult for managers to control.

The Responsible Agencies also identified and prioritized dumpsters/trash-related activities as a potential bacteria source within their focus areas. This conclusion is supported by the literature review, particularly regarding trash bacteria sources in commercial land uses. Urban areas may contain bacteria from leaking trash dumpsters or restaurants that hose food waste into storm drains. Stormwater system inspections in Dyes Inlet, Washington identified 7 of 207 properties (dumpster, restaurant cleaning areas, and food compactor areas) that discharged food waste to the storm drain system (Kitsap County Public Works, 2009). Secondary bacteria sources, such urban wildlife, may also contribute bacteria to the stormwater system as the animals are in search of food waste associated with dumpsters and trash.

WET/DRY WEATHER CONSIDERATIONS

For the purposes of this study, focus areas were identified and developed from an initial water quality monitoring data set for three bacteria types: total coliform, fecal coliform, and *Enterococcus.* The Responsible Agencies decided that the approach for determining focus areas should utilize *Enterococcus* monitoring data from MS4 outfalls during dry weather conditions. It was determined that the set of dry weather monitoring data was more robust than the available wet weather monitoring data set, and that dry weather conditions are more directly related to recreational beneficial use within the San Dieguito WMA.

The prioritization process then examined all potential sources within each focus area, irrespective of wet or dry weather conditions, and prioritized those sources under each condition. The findings appear to show similarities in potential bacteria sources between wet and dry weather conditions. Based on these similarities, if the Responsible Agencies were to develop programs to address the priority bacteria sources, they would likely see benefits to water quality under both conditions.

However, the differences between wet weather and dry weather may not be adequately investigated in this study, as the underlying assumption for identifying bacteria sources was predicated on the designation of a focus area by a geomean of dry weather sampling results. As more wet weather MS4 data are collected, Responsible Agencies may build upon the results of this study by examining geomeans of bacteria concentrations during wet weather, and developing an additional source identification prioritization effort for focus areas identified for wet weather conditions.

Conclusions

The Bacteria Special Study in the San Dieguito WMA was successful in identifying and prioritizing potential bacteria sources for each Responsible Agency in the watershed. The methodology applied in this study provides the Responsible Agencies with several tools with which to focus efforts to reduce bacteria loadings to the lower San Dieguito River. The highest potential bacteria sources ranged from residential sources (pet waste, compost, manure, irrigation runoff, and porta-potties associated with construction) to sources related to sewage infrastructure (leaking sewage infrastructure and sanitary sewer overflows). This process can serve as a framework for the Responsible Agencies to review bacteria sources at MS4 outfalls where water quality-based effluent limitation (WQBEL) exceedances occur without implementing costly source identification studies, and to potentially modify or enhance WQIP strategies in these focus areas.

The City of Del Mar used the Bacteria Special Study as a mechanism to analyze information and determine whether program implementation revisions were needed to effectively address the sources that cause or contribute to indicator bacteria, which is the highest priority water quality condition identified for the City of Del Mar in the San Dieguito WMA WQIP. Through jurisdiction-specific data analysis and review of the results of the Bacteria Special Study, the City of Del Mar determined that no program implementation revisions are needed at this time. Because a high priority focus area was not identified for the City of Del Mar, the City of Del Mar will continue to conduct frequent City-wide patrols as an effective method to identify and address potential bacteria sources.

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Appendix A

San Dieguito WMA Special Study

Technical Memorandum #1 (Draft)

Draft Memorandum

DATE:	February 5, 2016
TO:	San Dieguito Watershed Management Area Responsible Agencies
CC:	Kristina Hysler, AMEC Foster Wheeler Chris Minton, Larry Walker Associates Dustin Bambic, Paradigm Environmental
SUBJECT:	San Dieguito Special Study Technical Memorandum #1 Summary of Updated Literature Review, GIS Data Call, and Data Gaps

LARRY WALKER ASSOCIATES

Paul Hartman
Hope Taylor, PhD
Elizabeth Yin

785 Grand Avenue, Suite 200
Carlsbad, CA 92008
760.730.9446

1 Introduction

BACKGROUND

The San Diego Regional MS4 Permit (Order R9-2013-0001 as amended by Order Nos. R9-2015-0001 and R9-2015-0100) requires each watershed management area (WMA) to perform two special studies within the permit term to address pollutant and/or stressor data gaps and/or develop information necessary to more effectively address the pollutants and/or stressors that cause or contribute to the highest priority water quality conditions (HPWQC) within the WMA as identified within the Water Quality Improvement Plan (WQIP).[1] The San Dieguito WQIP identified bacteria as the HPWQC for the WMA and included the development of a Bacteria Source Identification Special Study Plan (Study Plan) outlining one of the special studies to be implemented within the WMA to satisfy permit requirements. The Study Plan identified data gaps with respect to information that would be helpful in the identification and prioritization of bacteria sources within the watershed. The data gaps were focused on five key metrics used to identify and prioritize bacteria sources in the WMA: human health risk, magnitude, transport feasibility, frequency, and controllability.

[1] Provision D.3, Order R9-2013-0001 as amended by Order Nos. R9-2015-0001 and R9-2015-0100

PURPOSE

To address these data gaps, an expanded literature review was performed to better understand the latest science related to bacteria sources and source tracking. In addition, an in depth data call was issued to the Responsible Agencies in the watershed to collected the necessary GIS information to further support the prioritization of bacteria sources within the WMA. The purpose of this technical memorandum is to summarize the results of the literature review and data collection process and identifies any remaining data gaps. The literature review and GIS information collected to date will provide the foundation for the remainder of the Special Study.

2 Updated Literature review

2.1 BACKGROUND

The San Dieguito River Watershed Management Area Bacteria Source Identification Special Study Plan (Study Plan) included a literature review to provide an overview of the methods used in microbial source tracking (MST) studies to identify the host origin of fecal indicator bacteria (FIB), as well as a summary of the pertinent studies involving bacteria source identification and the application of MST methods within urban areas. To inform the source prioritization process, studies were reviewed that characterized relative loadings and contributions from specific host sources to the extent that relevant information was available. The relative human health risk from different pathogen sources is also important for prioritization, and studies related to health risk were also summarized.

The Study Plan (Section 4.6 Summary of Data Gaps) identified data gaps from the literature review, which are summarized in **Table 1**. The Study Plan identified data gaps associated with sources from human origins as the highest priority, followed by anthropogenic non-human, and non-anthropogenic. However, considering the availability of data, local knowledge, and other factors such as the frequency of predominant sources, the Copermittees' priorities for filling the data gaps will vary by source type.

Table 1. Study Plan Data Gap Summary

Bacterial Origin	Data Gap Identified in Study Plan
Human Origin	Magnitude: Data related to the magnitude (i.e., concentration or loads) associated with FIB from human origins could be accessed through an expanded literature review and/or contacting local POTWs.
Anthropogenic Non-human Origin	Human health risk: Most of the data collected in source tracking studies to date provides insight into the potential sources of bacteria, but does not provide information related to health risk. The majority of the epidemiology studies performed focus on health effects related to human sources of FIB. Magnitude: Data related to the magnitude of bacteria concentrations associated with anthropogenic non-human sources is also lacking.
Non-anthropogenic Origin	Data gaps related to bacteria influenced by non-anthropogenic activities are primarily focused on frequency and there were no data gaps identified to be addressed through the literature review. Non-anthropogenic sources of bacteria have been identified through various studies and appear to be ubiquitous in the environment. However, additional data could be compiled if

	new or expanded information is found through the update to the literature review.

2.2 LITERATURE REVIEW

The updated literature review is focused on filling in the data gaps identified in the Study Plan, and on providing a more comprehensive review of studies identifying bacterial sources within urban watersheds, along with the human health risks associated with human and non-human sources. An expanded literature search was performed to inform the updated literature review, focusing on recently published studies and on filling data gaps. The additional literature utilized in this updated review are listed, along with a brief summary of key findings, in **Attachment A**. A list of literature sources that are specific to sanitary sewer and septic systems as sources of bacteria is provided in **Attachment B**. The sections below build upon the literature review provided in the Study Plan, with additional information included from the expanded literature search.

Traditional source identification studies have been performed in a number of urban areas, but quantitative data on specific watershed sources (activities, locations, or areas) is sparse. MST studies have predominantly focused on species-level bacteria identification using analytical methods to characterize the host organisms as human or other non-human species, from which indicator the bacteria likely originated. At this time, there has been very little bacteria source identification research that has focused on tracing the specific physical origin of bacteria to determine the relative magnitude of source contributions within a watershed.

2.2.1 Microbial Source Tracking Methods

Recent research on MST has focused on species-specific techniques that target bacteria of the order *Bacteroidales*, which are anaerobic bacteria that are highly abundant in feces, animal rumen, and other cavities of humans and animals (Paster et al., 1994), often in greater abundance than traditionally-used coliform bacteria (Menaia et al., 1998). Their anaerobic nature is desirable because they are only contributed to the environment from feces, and are likely unable to grow or survive for long periods outside of the original host. Their environmental persistence is thought to be much less than aerobic microbes (e.g., fecal coliform) which can persist for months or years, and perhaps even re-grow in the environment. *Bacteroidales* were shown to be the most reliable human marker in comparison studies of microbial source tracking methods by the Southern California Coastal Waters Research Program (SCCWRP; Griffith et al., 2003; SCCWRP, 2013). In addition, USEPA utilized *Bacteroidales* during epidemiological studies (Wade et al., 2006), and found a positive correlation between *Bacteroidales* concentrations and gastrointestinal illness in swimmers.

The basis of *Bacteroidales* source tracking methods is the fact that *Bacteroidales* in different hosts (humans, horses, birds, etc.) often contain unique DNA sequences due to differences in animals' diets and lifestyles, which can be detected and used to target fecal pollution from that host. *Bacteroidales* were first proposed as an indicator of fecal pollution over two decades ago (Allsop and Stickler, 1985; Fiksdal et al., 1985). A decade later, PCR-based assays were used to detect *Bacteroidales* species and thereby monitor human fecal pollution in water (Kreader, 1995). The work of Kate Field and colleagues at Oregon State University has since led to the popularization of *Bacteroidales* as a source tracking tool, and fostered development of assays to detect general fecal pollution (from all warm blooded animals, called "universal"; Dick and

Field, 2004), humans (Bernhard and Field, 2000), pigs and horses (Dick et al., 2005), dogs (Kildare et al., 2007), cows (Layton et al., 2006), and elk (Dick et al., 2005).

Bacteroidales marker assays have been used in many applications both in the United States and globally. There has been much recent interest in the practical applications of microbial source tracking. However, while *Bacteroidales* methods represent the latest state of the science with respect to the microbial source tracking (Santo Domingo et al., 2007; Stewart et al., 2013), they are still non-standard and subject to continued refinement and testing.

2.2.2 Applications of Source Identification and Tracking

There have been numerous studies conducted in recent years to apply source identification and microbial source tracking techniques to investigate sources of bacteria in California waterbodies. An extensive literature search conducted to inform the San Dieguito Watershed Management Area Source Prioritization process identified many studies that characterized the relative contribution of bacteria from different host species, with most studies focusing on ambient water or storm drain characterizations. While the studies did not point toward specific relative contributions from source types (e.g., dumpsters, livestock operations, parks), some studies did identify host-specific contributions that can be linked to land use. The most relevant studies are briefly summarized below, organized by major finding.

2.2.2.1 Regrowth and non-human sources potentially contribute to high bacteria concentrations in storm drain systems and street gutters.

The contribution of non-human sources of bacteria was quantified at coastal reference beaches in southern California that receive runoff from undeveloped (>97% open space) watersheds. Results suggested that natural non-human sources were predominant, resulting in bacterial concentrations exceeding water quality objectives (Schiff et al., 2005). A dry weather monitoring study conducted in San Diego County found that enterococci in storm drain systems came from predominantly natural sources and include strains that are capable of growing on drain pipe surfaces (Griffith and Ferguson, 2011). Regrowth in street gutters was found to be the likely source of bacteria in residential sidewalk wash-off in another study conducted in Orange County (Skinner et al., 2010).

2.2.2.2 Indicator bacteria loading during wet weather may be attributed to erosion of contaminated sediments.

A study by Rowney and Stewart (2012) indicated that seasonal dry-weather loading patterns were dwarfed by storm event loading. This study indicated that FIB do not follow loading profiles of a first flush model, but appear to uniformly partition into runoff over the course of storm events, suggesting influence by environmental reservoirs of FIB.

Sercu et al. (2011) found that increased fecal indicator bacteria numbers during wet weather were likely associated with terrestrial sources, instead of human waste sources that dominated during dry weather flow. During wet weather flow, FIB numbers increased and were more similar across locations and between watersheds. Association with terrestrial bacteria suggests that “naturalized” sources may be important. Wet weather non-point sources in this study may be considered less threatening to public health compared to the dry weather point sources containing human waste.

Similarly, Reeves et al. (2004) found that FIB loads scale as a power law of runoff volume, consistent with a theoretical model that assumes FIB in storm runoff originate from erosion of contaminated sediments. Erosion of sediments containing FIB may drive loading of FIB from urban watersheds to beaches.

2.2.2.3 Human sources may be prevalent in urban areas.

Dry weather monitoring in urbanized Santa Barbara indicated that human sources were prevalent in storm drains. Human waste markers were present and relatively concentrated throughout each of three storm drain systems, and were entering the creeks from storm drains discharging flow continuously during dry weather (Sercu et al., 2009).

The sanitary sewer/wastewater has been shown to be a prevalent source of human-derived bacteria from storm drainage systems, particularly during dry weather flows (Field et al. 1994; Sauer et al., 2011; Sercu et al. 2009, 2011). Sercu et al. (2011) determined that sewage is transmitted directly from leaking sanitary sewers to storm drains, suggesting that chronic sanitary sewer leakage contributes to downstream fecal contamination of coastal beaches. Marsalek and Rochfort (2004) noted that levels of *E. coli* in urban runoff greater than 10^5/100 mL suggest the presence of cross-connections with sanitary sewers. In addition to cross-connections, leaking sanitary sewers can contribute bacteria to groundwater (Paul et al., 2004), which can then infiltrate into the MS4 system or impact surface waters directly. Wastewater exfiltration and subsequent infiltration was quantified by Guérineaua et al. (2014) to be 0.6-15.7 m^3/d per km in dry weather; 1.1-19.5 m^3/d per km in wet weather.

Homeless encampments are recognized as a potential source of human-derived bacteria to urban waterways. The City of Los Angeles (1997) has measured concentrations of 10^6 MPN/100 mL E. coli in storm drains that discharge to the Los Angeles River, resulting from defecation of homeless encampments. A study in Santa Barbara attributed FIB in urban streams to multiple sources, including contamination from a transient homeless population (Izbicki et al., 2009). Another study in Santa Barbara examined sources of human fecal contamination to Arroyo Burro Beach, and found a homeless encampment along a creek was a source of elevated human-associated markers (Ervin et al., 2013). The researchers noted that, in the upper Arroyo Burro watershed, it will be necessary to continuously and vigilantly monitor and remove homeless encampments near the creeks as fecal inputs from only a few individuals can have a large impact on creek water quality.

2.2.2.4 Land usage and management practices can inform the potential for bacteria loading.

A study in Tecolote Creek watershed indicated that wet weather bacteria loads did not differ substantially between different land uses, but that higher loads may be attributable to transportation corridors, commercial areas, and industrial land uses. Dry weather loads were higher in residential and commercial areas with specific activities identified as including poorly maintained dumpsters leaking high concentrations of indicator bacteria. A key transport mechanism found especially in commercial and industrial areas was over-irrigation. Natural bacteria sources likely contributed high numbers of enterococci, including regrowth on the walls of the MS4 system. The high flows generated during wet weather were found to cause significant biofilm sloughing, impacting wet weather loads. Sediments and biofilms within the creek and MS4 system were found to be significant reservoirs (Weston Solutions, 2010).

Commercial sites were identified as sources of bacteria in several studies (Malin et al., 2016; Kitsap County Public Works, 2009; Griffith et al., 2013). Urban areas may contain bacteria from leaking trash dumpsters or restaurants that hose food waste into storm drains. Stormwater system inspections in Dyes Inlet, WA identified that 7 of 207 properties (dumpster, restaurant cleaning areas and food compactor areas) discharged food waste to the storm drain system (Kitsap County Public Works, 2009). Food waste is a potential bacteria source from urban wildlife concentrated around stormwater systems.

A study of 10 coastal dairies and ranches evaluated fecal coliform concentration and loading to surface water during storm events from manure management systems, gutters, storm drains, pastures, and corrals and lots. Fecal coliform loads from management units of concentrated animals and manure were significantly higher than units such as pastures, though storm flow amounts were significantly lower (Lewis et al., 2005).

A study by Rowney and Stewart (2012) showed that more developed watersheds were associated with higher concentrations of FIB.

Reeves et al. (2004) found that the concentration of fecal indicator bacteria is extraordinarily high in sources of urban runoff, particularly residential runoff.

Numerous studies indicated that septic tanks or onsite wastewater treatment systems (OWTS) in rural areas may contribute indicator bacteria of human origin to surface waters (Graves et al., 2001; Carroll et al., 2005; Sokolova et al., 2012, 2013; Virani, 2014). Bacteria from septic systems can migrate to groundwater (Hagedorn, 1984; Kneirim, 2015; Yates, 1995) and potentially travel greater than 400m through groundwater, with impacts to surface waters or MS4 pipes (Hagedorn, 1984). Septic tank density can impact water quality (Anderson, 2010). Verhougstraetea et al. (2015) found a direct and significant correlation between estimated number of septic systems and a human-specific marker (*Bacteroides thetaiotaomicron; B. theta*) in water. In particular, watersheds with more than 1,621 septic systems had significantly higher *B. theta* concentrations.

2.2.3 Source Tracking Guidance

SCCWRP recently released a guidance document for conducting microbial source tracking at beaches, which presents a six-tiered approach combining traditional (i.e., smoke and dye testing) and *Bacteroidales* methods (SCCWRP, 2013). The six steps include:

1. Characterize the watershed using maps, interviewing relevant local experts, and conducting physical inspections to identify potential sources.
2. Examine monitoring data to identify conditions resulting in with high concentrations of indicator bacteria, and examine linkages to the greatest potential sources.
3. Investigate potential leakages from sanitary systems using traditional tools such as smoke testing, dye testing, or camera inspection.
4. Where human sources are a potential contributor, test ambient waters using human source-specific genetic markers. Place a high priority on identifying human sources.

5. Where human sources have been accounted for and the relative human loadings are better understood, and/or a likely animal fecal pollution source has been identified, test ambient waters using animal source-specific genetic markers.
6. Consider testing ambient waters using genetic community analysis methods if specific genetic markers have not been developed for the potential sources. This approach can be used in combination with traditional chemical testing methods.

The Special Study effectively incorporates steps 1–3 above from the SCCWRP MST guidance document.

2.2.4 Health Risks from Human versus Non-human Sources

The EPA considered differential health risks from human versus nonhuman sources in developing its 2012 Recreational Water Quality Criteria. Research indicates that the source of contamination may affect the human health risk associated with recreational waters, and that the potential health risks due to human and nonhuman sources can vary considerably. The health risk associated with a particular indicator density from human sources may be variable. Studies of the risk associated with various human sources have shown that the risk levels for a particular *enterococci* density can vary, depending on the indicator source and assay method used to detect *enterococci* (Schoen et al., 2011). For example, *enterococci* assayed by culture was contributed mostly by untreated sewage or non-pathogenic fecal indicator sources. Whereas, *enterococci* estimated by qPCR were contributed by secondary-treated disinfected municipal wastewater effluent or non-pathogenic fecal indicator sources.

The differences in health risks between human versus non-human sources are complex, and may be due to differing infectious agents present in human and nonhuman fecal contamination. For instance, many studies have indicated that viruses are likely the cause of illnesses resulting from exposure to wastewater treatment plant effluent (Soller et al., 2010a; WERF, 2011), and human viruses are less likely to occur in animal feces.

However, other human pathogens are present in animal fecal matter, and research on the relative risk of animal sources relative to human sources suggests that certain non-human sources may have lower risk to human health than human sources, while other sources have similar risk. Studies indicate that certain nonhuman sources, such as cattle, potentially have similar risks as human sources (Soller et al., 2010b, USEPA, 2010). The study by Soller et al. (2010b) considered cases of direct contamination to surface waters (feces deposited directly to surface waters, rather than transported over land through storm runoff). In the case of direct contamination, the risks from cattle-impacted waters appeared clearly higher than those from pig or chicken-impacted waters. Similarly, a study by McBride et al. (1998) compared human-impacted waters in New Zealand with waters impacted by animal wastes (cattle and sheep in rural areas), and reported similar potential for illness risks, with both higher than non-impacted waters.

Other studies indicated a lower potential health risk due to other nonhuman sources (WERF, 2011; Schoen and Ashbolt, 2010; Soller et al., 2010b). The study by Soller et al. (2010b), in particular, noted substantially lower risks associated with gull, chicken, and pig fecal sources. Due to the mixed findings of epidemiological studies, and the potential for comparable risks, the EPA did not develop separate national criteria for waterbodies with primarily nonhuman sources.

In developing the 2012 Criteria, the EPA convened a workgroup of experts in 2011 to evaluate the human health risks due to avian and wildlife sources of fecal pollution. The workgroup considered results from quantitative microbial risk assessment (QMRA) studies of recreation in poultry, livestock, and waterfowl-impacted water, where different pathogen composition within fecal material from different sources accounted for the risk variation among sources. For instance, cow feces contained numerous different types of pathogens, while avian feces had fewer different types of pathogens (USEPA, 2011).

A recent study by Soller et al. (2015) examined the risk levels of agricultural animal sources of fecal material transported indirectly to surface waters (manure mobilized by rainfall events), and determined that the risks associated were at least an order of magnitude lower than the 2012 recreational water quality criteria benchmarks based on contamination from human sewage sources. However, if human sources are present along with non-human sources, there can still be a substantial human health risk. Soller et al. (2014) found that human health risks are influenced by the nature and magnitude of the fecal contamination sources. Risks for mixtures with moderate or higher human source proportions are not substantially reduced, despite the contribution of non-human sources to the total indicator bacteria concentration. Risks from mixed sources are driven predominantly by the proportion of the contamination source with the greatest ability to cause human infection (potency), not necessarily the greatest source(s) of FIB.

In summary, research suggests that it makes sense to prioritize human sources as the highest priorities, but that cow sources may pose a comparable health threat and also should be prioritized highly. Epidemiological and QMRA research support a lower prioritization for other nonhuman sources such as birds or pigs, based on a lower human health risk.

2.2.5 Magnitude of Impacts

The updated literature search identified several references containing data for the magnitude of indicator bacteria from various sources. Reported data for concentrations, or relative amounts, of indicator bacteria for human and non-human sources are summarized in **Table 2**.

Table 2. Concentrations or Relative Magnitude of FIB for Human and Non-human Sources

Bacterial Origin	Source	Concentration (Fecal coliform density/gm) or Relative Magnitude	Unit Discharge (lbs/day)	Reference
Human Origin	Human	1.3×10^7	0.35	CWP, 1999
	Raw sewage	6.4×10^6 MPN/100 mL		CWP, 1999
	Failed septic system	10^4-10^6 MPN/100 mL		CWP, 1999
	Homeless encampments	10^6 MPN/100 mL *E. coli*		City of Los Angeles, 1997
	Human bathers	6.0×10^5 CFU/100 mL enterococci		Elmir et al., 2007
Anthropogenic Non-human Origin	Cattle	Each cow contributes a waste output equivalent to seven humans.		McBride et al. 1998
	Cattle	2.3×10^5	15.4	CWP, 1999
	Cats	7.9×10^6	0.15	CWP, 1999
	Dogs	2.3×10^7	0.32	CWP, 1999
	Rats	1.6×10^5	0.08	CWP, 1999
Non-anthropogenic Origin	Ducks	3.3×10^7	0.15	CWP, 1999
	Waterfowl	3.3×10^7	0.18-0.35	CWP, 1999
	Forest runoff	10^1-10^2 MPN/100 mL		CWP, 1999

2.3 DATA GAPS ANALYSIS

A summary of the data gaps identified within the Study Plan and the results of the literature review are provided in **Table 3**.

Table 3. Data Gaps after Literature Review

Bacterial Origin	Data Gap Identified in Study Plan	Addressed in Expanded Literature Review?
Human Origin	Magnitude: Data related to the magnitude (i.e., concentration or loads) associated with FIB from human origins could be accessed through an expanded literature review and/or contacting local POTWs.	Yes
Anthropogenic Non-human Origin	Human health risk: Most of the data collected in source tracking studies to date provides insight into the potential sources of bacteria, but does not provide information related to health risk. The majority of the epidemiology studies performed focus on health effects related to human sources of FIB.	Yes
	Magnitude: Data related to the magnitude of bacteria concentrations associated with anthropogenic non-human sources is also lacking.	Magnitudes associated with anthropogenic animal sources were identified. Magnitude for commercial contributions is a remaining data gap.
Non-anthropogenic Origin	Data gaps related to bacteria influenced by non-anthropogenic activities are primarily focused on frequency, and there were no data gaps identified to be addressed through the literature review.	Additional information was added, but there were no data gaps to address.

3 GIS Data Gaps Update

The San Dieguito watershed consists of six (6) different jurisdictions. In assessing the 2014 Study Plan and current Bacteria Special Study needs, current and available GIS data was reviewed, assessed, and updated. GIS Layers previous compiled or created as part of the Study Plan were reassessed for relevance to the Bacteria Special Study. Some layers were removed due to jurisdictional irrelevance, while other layers were completely updated. Table 1 shows which of the original GIS data were omitted, retained, or updated during the 2015 Bacteria study reopener.

Table 4. 2014 GIS Layers Compiled or Created: Updated and Reassessed in 2015

File Name	Info Type	Data Type	2015 Data Gaps Analysis
hil30m_v1.sid	Hillshade	Background	Omitted
ortho_1-1_1n_s_ca073_2012_1.sid	Aerial imagery	Background	Omitted
San_Dieguito_Business_Sites	Business sites from SANDAG	Business Sites	Retained
SanDieguito_Waste_Facilities	Location of waste facilities	Business Sites	Retained
SanDieguito_MunBoundry	Jurisdictional boundaries	Jurisdictional Boundary	Retained
NPDES_PhaseII_Permit_sws	NPDES Phase II permit holders	Land Ownership	Omitted
SG_landownership_sws	Federal/State owned land and indian reservations	Land Ownership	Retained
Caltrans_row_sws	Caltrans right-of-way	Land Use	Omitted
Land Use Types	Land use types (ag, com., ind., res., open, etc)	Land Use	Retained
Land Use Types – Ag_Ind	Agricultural and industrial land use areas	Land Use	Updated
Land Use Types – MS4_Non-MS4	MS4 and non-MS4 designated areas	Land Use	Updated
nlcd2006_sd	Percent impervious	Land Use	Updated
SANDAG_landuse_MS4	MS4 Urban, MS4 open space, Vacant/undeveloped land use	Land Use	Omitted
Vegetation Types	Types of vegetation cover (bog/marsh, dune, forest, grassland, scrub/chaparral, etc)	Land Use	Updated
Receiving Water Stations	MLS/TWAS Sites	Monitoring Site	Retained

File Name	Info Type	Data Type	2015 Data Gaps Analysis
San_Dieguito_Data_Sites	Sites where water quality data were compiled under Task 1 (AB 411, MLS/TWAS, Cst Keeper, MS4/Copermittee)	Monitoring Site	Retained
CityofSanDiego_Outfalls_AllWatersheds	City of San Diego outfalls	MS4	Updated
Del_Mar_StormwaterJunctions_LP_SD	City of Del Mar outfalls	MS4	Omitted
Escondido_ChannelOutfalls_SanDieguito	City of Escondido outfalls	MS4	Updated
Outfalls	County of San Diego outfalls	MS4	Updated
persistent_flow_sites_WQIP	City of San Diego outfalls with peristent flow	MS4	Updated
Poway_Outfalls_SanDieguito	City of Poway outfalls	MS4	Updated
SanDieguito_DrnConveyance	City of San Diego MS4 conveyances	MS4	Retained
SanDieguito_DrnStrctre	City of San Diego MS4 structures (inlets, outlets, cleanouts, headwall, etc)	MS4	Retained
SDG_MS4_FC_Channels_DRAFT	County of San Diego channels and culverts	MS4	Retained
SDG_MS4_FC_Lines_DRAFT	Portions of MS4 system	MS4	Retained
SDG_MS4_RF_Channels_DRAFT	MS4 channels	MS4	Retained
SDG_MS4_RF_Culverts_DRAFT	Culverts of the MS4 system	MS4	Retained
SolanaBeach_Outfalls	City of Solana Beach outfalls	MS4	Updated
SanDieguito_Sewer_Main_SD	Sewer system for City of San Diego	Sewer	Retained
SanDieguito_Sewer_Manhole_SD	Manhole locations for City of San Diego sewer system	Sewer	Retained
WQIP__Waterbodies	Water bodies	Waterbodies	Retained
WQIP_303d_Streams	303(d) listed streams	Waterbodies	Retained
WQIP_303d_Waterbodies	303(d) listed water bodies	Waterbodies	Retained
WQIP_NHD_Streams	Streams/rivers	Waterbodies	Retained

File Name	Info Type	Data Type	2015 Data Gaps Analysis
Hodges HA	HA boundary	Watersheds	Retained
San Pasqual HA	HA boundary	Watersheds	Retained
SanDieguito_HSA	HSA boundaries	Watersheds	Retained
Santa Maria Valley HA	HA boundary	Watersheds	Retained
Santa Ysabel HA	HA boundary	Watersheds	Retained
Solana Beach HA	HA boundary	Watersheds	Retained
WQIP_subwatersheds	WQIP subwatersheds (above Lake Hodges, above Sutherland Res., below Lake Hodges)	Watersheds	Retained
WQIP_Watersheds	San Dieguito River WMA	Watersheds	Retained

In addition to reviewing and assessing current available GIS data, a significant data call was performed to update and obtain and include GIS data previously described as a data gap. A data call was put out for the following information:

- A complete MS4 inventory from all jurisdictions in the watershed.
    - Data pertaining to flow at MS4 outfalls (i.e., persistent, transient, none).
    - Locations of permanent BMPs within the watershed (e.g., dry weather diversions, retention/detention basins).
- A complete Sanitary Sewer System inventory from all jurisdictions in the watershed.
    - Sanitary sewer condition assessments for each jurisdiction as available.
    - Sanitary sewer overflows with locations, volumes, and whether flow reached receiving waters.
    - Locations of known OWTS.
- Commercial, industrial, municipal inventories containing latitude and longitude coordinates for all jurisdictions in the watershed.
- Locations of known homeless encampments.
- ICID data with locations of incidents and pollutants discharged.
- Locations of recycled water distribution systems and users within the watershed.

All six jurisdictions were asked to participate in the data gaps data call. Five jurisdictions, including the City of San Diego (CSD), the County of San Diego (CoSD), Escondido (ESC), Poway (POW), and Solana Beach (SB) participated in the data gaps data call by updating and providing GIS information. Del Mar was the only jurisdiction to opt out of the Bacteria Special

Study, and did not provide any additional GIS data for the data call. A summary of the information obtained from or updated in the data gaps data call can be found in the table below.

Table 5 Summary of Data Gaps Data Call

Data Type	GIS Data Gaps	City of San Diego	County of San Diego	Del Mar	Escon-dido	Poway	Solana Beach
MS4	MS4 inventory from all jurisdictions in the watershed.	a	a		a	a	a
MS4	Stormwater BMPS	a	-		a	a	-
MS4	Dry Weather Flow Data	a	a		a	-	-
Sewer	Sanitary Sewer System inventory from all jurisdictions and special districts in the watershed.	b	x		a	a	a
Sewer	Sanitary sewer condition assessments for each jurisdiction as available. (2007-2015)	-	-		a	-	-
Sewer	Sanitary sewer overflows with locations, volumes, and whether flow reached receiving waters. (2007-2015)	c	a		a	c	c
Sewer	Onsite Wastewater Treatment Systems (OWTS)	-	-		x	a	-
Inventory	ICID data (2007-2015)	a	a		a	-	-
Inventory	Commercial inventories	a	a		a	-	-
Inventory	Industrial inventories	a	a		a	-	-
Inventory	Municipal inventories	a	a		a	-	-
Inventory	Homeless encampments	-	a		x	-	-
Recycled Water	Recycled Water	-	x		a	a	-

a) denotes data that was obtained from or updated by the Copermittee
b) denotes preexisting data from the Study Plan
c) denotes data created from publicly available data
x) denotes known unavailable data

A few data types were easier to update and obtain than others. From both previous data and updated information provided by the jurisdictions, a full MS4 inventory was gathered from the five participating jurisdictions. A complete MS4 inventory consisted of many different layers of data, including not only gravity mains and lateral lines, but also MS4 structures, junctions, and outfalls. Drainage areas were only available for the City of San Diego, County of San Diego, and Solana Beach. Although stormwater BMPs are an important part of the MS4 inventory, GIS data was provided by three of the five jurisdictions: City of San Diego, Escondido, and Poway.

A full sanitary sewer system inventory was also updated and acquired in the data gaps data call. The complete inventory included gravity mains, lateral lines, as well as fittings, structures, and wastewater treatment plans. While the structural inventory was complete, Escondido was the only jurisdiction able to provide a sanitary sewer condition assessment for the Study. Sanitary

Sewer Overflows (SSOs) were provided directly by Escondido, and the County of San Diego. However, public records of SSO were obtained and digitized from the State Board's CIWQS reporting system for the San Dieguito Watershed.

The location of Onsite Wastewater Treatment Systems remains a critical and continued data gap. Although Poway was able to provide the locations of known OWTS, and Escondido does not have any known OWTS within the San Dieguito Watershed, there is very little information regarding the locations of OWTS in other jurisdictions. Obtaining this type of data is critical for the Bacteria Study, as OWTS have the potential to be a significant source of bacteria in the watershed.

The data gaps data call was successful in receiving ICID data and commercial, municipal, and industrial inventory and inspections from the City of San Diego, the County of San Diego, and Escondido. However, ICID and inventory data for Poway and Solana Beach are still outstanding.

Recycled water data, including the locations of recycled water distribution systems and users within the watershed, as well as the location of known homeless encampments are two types of data that were much more difficult to obtain. Only two jurisdictions, Escondido and Poway, were able to provide information regarding recycled water. The County of San Diego was the only copermittee that provided the location of known homeless encampments, while Escondido determined that none of its known homeless encampments were within the San Dieguito Watershed. Recycled water and homeless encampments continue to have the potential to be bacteria sources, and the lack of data makes it difficult to determine their relative contributions to the watershed.

Overall, the data gaps data call was successful in obtaining complete or near complete inventories of the MS4, sanitary sewer system, and commercial, municipal, and industrial sites. However, there remain some significant gaps in data for a few potential sources of bacteria. The locations of OWTS and known homeless encampments have the potential to be significant sources of bacteria, and remain areas of uncertainty in the Bacteria Special Study.

4 Conclusions and Recommendations

Based on the updated literature review and GIS data collection efforts, the next steps of the study are recommended as follows:

- Use water quality data collected from 2007-2015 to identify focus areas for further source identification.
- Upon selection of focus areas, GIS data will be used to perform an in depth source identification within those areas.
- The identified sources will then be prioritized within the focus areas using the prioritization methods and matrix developed as part of the previous Regional Study. The prioritization will rely on the outcomes of the GIS work combined with the updated findings of the literature review.
- Once sources have been prioritized, the Copermittees may use the prioritization to examine existing strategies or to develop new strategies to address the highest priority sources within the focus areas if appropriate.
- Using these strategies and identified focus areas, the monitoring program will then be evaluated as part of the Special Study Assessment in the Annual WQIP Report to determine if that the monitoring program may need to be adjusted to assess related information for key strategies and focus areas.

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Attachment A: Expanded Literature Review on Sources of Indicator Bacteria

Reference	Key Points
Sercu, B., Van De Werfhorst, L., Murray, J., Holden P. 2011. Storm Drains are Sources of Fecal Pollution during Dry Weather in Three Urban Southern California Watersheds. Environ Sci. Technol. 43:293-298	• Increased fecal indicator bacteria numbers during wet weather were likely associated with terrestrial sources, instead of human waste sources that dominated during dry weather flow. • During wet weather flow, FIB numbers increased and were more similar across locations and between watersheds. Association with terrestrial bacteria suggests that “naturalized” sources may be important. Wet weather non-point sources in this study may be considered less threatening to public health compared to the dry weather point sources containing human waste.
Rowny, J. and Stewart, J. 2012. Characterization of nonpoint source microbial contamination in an urbanizing watershed serving as a municipal water supply. Water Research 46: 6143-6153	• More developed watersheds were associated with higher concentrations of FIB. • Seasonal dry-weather loading patterns were dwarfed by storm event loading. • FIB do not follow loading profiles of a first flush model. FIB appear to uniformly partition into runoff over the course of storm events, consistent with a mud-puddle hypothesis that suggests influence by environmental reservoirs of FIB. FIB do not follow loading profiles of a first flush model.
Reeves, R., Grant, S., Mrse, R., Copil Oancea, C. Sanders, B., Boehm, A. 2004. Scaling and Management of Fecal Indicator Bacteria in Runoff from a Coastal Urban Watershed in Southern California.Environ. Sci. Technol. 38: 2637–2648	• The concentration of fecal indicator bacteria is extraordinarily high in sources of urban runoff, particularly residential runoff. • FIB loads scale as a power law of runoff volume, consistent with a theoretical model that assumes FIB in storm runoff originate from erosion of contaminated sediments. Erosion of sediments containing FIB may be driving the loading of FIB from urban watersheds to beaches.
Lee, D., Lee, H., Trevors, J., Weir, S., Thomas, J., Habash, M. 2014. Characterization of sources and loadings of fecal pollutants using microbial source tracking assays in urban and rural areas of the Grand River Watershed, Southwestern Ontario. Water Research 53: 123-131.	• Found continuous inputs of human-originated fecal pollution from point sources (WWTP effluent) in the Grand River, Ontario, Canada, with no pattern of wet weather loading.

Reference	Key Points
Risk from Non-human Sources	
Soller, J., Bartrand, T., Ravenscroft, J., Molina, M. Whelan, G., Schoen, M. and Ashbolt, N. 2015. Estimated human health risks from recreational exposures to stormwater runoff containing animal faecal material. Environmental Modeling & Softwater 72: 21-32.	• Used QMRA to determine that risks associated with agricultural animal fecal sources would be at least an order of magnitude lower than the benchmark level of public health protection associated with current US recreational water quality criteria, which are based on contamination from human sewage sources. • This study considered indirect contamination, where FIB and pathogens from animal manure-applied land are mobilized into surface water via a rainfall event. • In cases of indirect contamination, risks from cattle-impacted water are similar to pig or chicken-impacted water.
Soller, J., Schoen, M., Varghese, A., Ichida, A., Boehm, A., Eftim, S., Ashbolt, N., Ravenscroft, J. 2014. Human health risk implications of multiple sources of faecal indicator bacteria in a recreational waterbody. Water Research 66:254-264.	• Human health risks are influenced by the nature and magnitude of the fecal contamination sources. This study examined fresh gull feces, fresh pig manure, fresh chicken manure, and aged pig manure as sources. • Alternative recreational water quality standards can be justified for some non-human sources. • Risks for mixtures with moderate or higher human source proportions are not substantially reduced. Risks from mixed sources are driven predominantly by the proportion of the contamination source with the greatest ability to cause human infection (potency), not necessarily the greatest source(s) of FIB.
McBride, G., Salmond, C., Bandaranayake, D., Turner, S., Lewis, G., Till, D. 1998. Health effects of marine bathing in New Zealand. Int. J. Environ. Health Res. 8: 173-189.	• Compared human-impacted waters in New Zealand with waters impacted by animal wastes, and reported similar potential for illness risks, with both higher than non-impacted waters.
Variable Risk from Human Sources	
Schoen, M., Soller, J., Ashbolt, N. 2011. Evaluating the importance of faecal sources in human-impacted waters. Water Research 45: 2670-2680	• Ingestion of human-impacted water with a faecal indicator density at the recreational water quality limit resulted in a range of GI risk using QMRA. • When GI risk was set at 0.03, secondary-treated disinfected municipal wastewater effluent was the major waterbody contaminant by volume. • Enterococci assayed by culture was contributed mostly by untreated sewage or non-pathogenic faecal indicator sources. Whereas, enterococci estimated by qPCR was contributed by secondary-treated disinfected municipal wastewater effluent or non-pathogenic faecal indicator sources. • *Norovirus* genome density and GI risk were contributed by a combination of untreated sewage and secondary-treated disinfected municipal wastewater effluent.

Reference	Key Points
Anthropogenic Non-Human	
Ervin, J., Van De Werfhorst, L., Murray, J., Holden, P. 2014. Microbial Source Tracking in a Coastal California Watershed Reveals Canines as Controllable Sources of Fecal Contamination. Environ. Sci Technol. 48: 9043-9052	• Microbial source tracking study in the Arroyo Burro watershed in Santa Barbara, CA. Fecal sources into the lagoon included upstream human sources and coastal birds, but canine sources were the most important. • Canine sources input from upstream creek water decreased after creek-side residences were educated about proper pet waste disposal. This study found that canine waste was an influential, yet controllable, fecal source to suburban coastal beaches. • 24 g/d of fresh dog feces would be enough to cause the elevated FIB levels observed in the creek.
Commercial Sites	
Malin, M., Turner, M., McIver, M., Toothman, B., Freeman, H. 2016. Significant Reduction of Fecal Bacteria and Suspended Solids Loading by Coastal Best Management Practices. Journal of Coastal Research, In press.	• The set of stormwater volume reduction and treatment BMPs in the municipal area caused fecal coliform bacteria and Enterococcus concentration reductions of 57% and 71%, respectively, 50% stormwater discharge reduction, 28–55% fecal bacteria load reductions, and 99% TSS load reduction. • The pollutant concentration and load decreases in the municipal area of Wrightsville Beach are particularly striking because the BMPs only capture about 50% of the runoff from the drainage area that enters the outfall into Lee's Cut.
Kitsap County Public Works. (2009?) Bacterial Pollution Reduction in an Urban Watershed. Kitsap County Public Works, Surface and Stormwater Management. Port Orchard, WA.	• Stormwater system inspections in Dyes Inlet, WA identified that 7 of 207 properties (dumpster, restaurant cleaning areas and food compactor areas) discharged food waste to the storm drain system. Food waste is a potential bacteria source from urban wildlife concentrated around stormwater systems.
Griffith, J., Layton, B., Boehm, A., Holden, P., Jay, J., Hagedorn, C., McGee, C., Weisberg, S. 2013. The California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources in Beaches. Southern California Coastal Water Research Project, Technical Report 804, December 2013.	• Urban areas may contain bacteria from leaking trash dumpsters or restaurants that hose food waste into storm drains.

Reference	Key Points
Homeless Encampment Sources	
City of Los Angeles. 1997. A study of pollutants entering storm drains from street and sidewalk washing operations in Los Angeles, CA. City of Los Angeles, Stormwater Management Division. Los Angeles, CA.	• City of LA has measured concentrations of 10^6 MPN/100 mL E. coli in storm drains that discharge to the Los Angeles River, resulting from defecation of homeless encampments.
Izbicki, J., Swarzenski, P., Reich, C., Rollins, C., Holden, P. 2009. Sources of Fecal Indicator Bacteria in Urban Streams and Ocean Beaches, Santa Barbara, California. Annals of Environmental Science 3: 139-178.	• During low flow, FIB were associated with point-source discharges. • During wet weather, FIB sources to near shore ocean water include surface discharges from urban streams, fecal material from sand birds, and beachfront kelp. • Groundwater discharge and leakage from a sewer line buried in the sand were not large sources of FIB contamination to near-shore waters. • FIB in urban streams may come from leaking sewer lines and laterals, discharges from urban baseflow, stormwater runoff, and contamination from a transient homeless population.
Elmir, S., Wright ME, Abdelzaher A, Solo-Gabriele HM, Fleming LE, Miller G, Rybolowik M, Peter Shih MT, Pillai SP, Cooper JA, Quaye EA. 2007. Quantitative evaluation of bacteria released by bathers in a marine water. Water Res. 41:3–10.	• Potential contributors to enterococci in recreational waters may include beach visitors themselves or as carriers of sand- borne bacteria during recreational activities • An individual bather might contribute as many as 6.0 x 10^5 CFU of enterococci through bathing, and that the enterococci contribution from sand particles adhered to the skin was minimal compared to the amount shed directly from the bodies of bathers.
Ervin, J., Van De Werfhorst, L., Holden, P. Arroyo Burro Beach Microbial Source Tracking Study. (2013?) Conducted by the University of California Santa Barbara (UCSB) as part of the Source Identification Protocol Project (SIPP).	• A source of human fecal contamination from a homeless encampment was discovered in upper Las Positas Creek. Quantifiable levels of both human-associated markers were detected at a site downstream of a homeless encampment, but markers did not persist at downstream sampling locations due to low creek flow. • For the upper AB watershed, it will be necessary to continuously and vigilantly monitor and remove homeless encampments near the creeks. Fecal inputs from only a few individuals can have a large impact on creek water quality • Improper management of pet waste from domestic dogs living along creeks upstream of the lagoon can be solved by homeowner education. Further, dog waste at the beach and lagoon can be controlled by increasing education of beachgoers regarding pet waste pickup. • Septic-served homes near the sampling were not a source of human markers to the surf zone.

Reference	Key Points
Sanitary Sewer Sources	
Field, R., Pitt, R., Lalor, M., Brown, M., Vilkelis, W., Phackston, E. 1994. Investigation of dry weather pollutant entries into storm drainage systems. J. Environ. Eng. 120, 1044–1066.	• The sanitary sewer/wastewater is one of the most significant sources of pollutant loadings from dry weather flows from storm-drainage systems.
Guérineaua, H., Dornerb, S. Carrièrea, A. McQuaida, N., Sauvéc, S., Aboulfadlc, K., Hajj-Mohamada, M, Prévosta, M. 2014 Source tracking of leaky sewers: A novel approach combining fecal indicators in water and sediments. Water Research, 58: 50–61.	• Sewage exfiltration from leaky sanitary sewer pipes contributes wastewater to an urban canal during wet and dry weather. • Identified and quantified wastewater exfiltration and subsequent infiltration (0.6-15.7 m^3/d per km in dry weather; 1.1-19.5 m^3/d per km in wet weather). Paired *E. coli* monitoring with detection of wastewater micropollutants (WWMPs) to measure gradients in water and sediment along an engineered canal in an urban area of Canada.
Marsalek, J., Rochfort, Q. 2004. Urban wet-weather flows: sources of fecal contamination impacting on recreational waters and threatening drinking-water sources. Journal of Toxicology and Environmental Health, Part A: Current Issues 67: 1765-1777	• Levels of E. coli greater than 10^5/100mL suggest presence of cross-connections with sanitary sewers. • Levels of E. coli in combined sewer overflows (CSOs) can be as high as 10^6/100mL.
Paul, M.; Wolf, L.; Fund, K.; Held, I.; Winter, J.; Elswirth, M.; Gallert, C.; Hotzl, H. 2004. Microbiological condition of urban groundwater in the vicinity of leaky sewer systems. Acta Hydrochim. Hydrobiol. 32, 351–360.	• Leaky sewer systems elevate fecal indicator concentrations in groundwater with associated potential health risk where such waters are used for potable water supply.
Sauer, E., VandeWalle, J., Bootsma, M., McLellan, S. 2011. Detection of the human specific Bacteroides genetic marker provides evidence of widespread sewage contamination of stormwater in the urban environment. Water Research 45: 4081-4091.	• Found urban stormwater systems that collect and convey runoff from impervious surfaces act as a conduit for sewage originating from breeches in sanitary sewer infrastructure.
Sercu et al. 2009. Storm drains are sources of human fecal pollution during dry weather in three urban Southern California watersheds. Environ. Sci. Technol. 43, 293–298.	• Exfiltrating sanitary sewers a possible source of human waste in storm drains. • Quantified human-specific *Bacteroides* marker in three urbanized watersheds in Santa Barbara over two summers, in creeks, urban storm drains that discharged to creeks, creek outlets to lagoons, and ocean.

Reference	Key Points
Sercu et al. 2011. Sewage Exfiltration As a Source of Storm Drain Contamination during Dry Weather in Urban Watersheds. Environ. Sci. Technol., 45 (17): 7151–7157.	• Determined that sewage is transmitted directly from leaking sanitary sewers to storm drains, suggesting that chronic sanitary sewer leakage contributes to downstream fecal contamination of coastal beaches. • Performed field experiments in three watersheds in Santa Barbara: Identified high risk areas, added dye pulses to sanitary sewers and tracked dye to storm drains, and confirmed sewage contamination using *Bacteroidales* markers.
Septic Tank/ Onsite Treatment System Sources	
Anderson, J. 2010. The Effects of High Density Septic Systems on Surface Water Quality in Gwinnett County, Georgia. Thesis, Georgia State University.	• Found that septic tank density impacted surface water (stream) quality in GA, with rainfall causing increases in fecal coliform, BOD, temperature, and metals.
Carroll, S. Hargreaves, M., Goonetilleke, A. 2005. Sourcing Fecal Pollution from Onsite Wastewater Treatment Systems in Surface Waters Using Antibiotic Resistance Analysis. Journal of Applied Microbiology 99(3): 471-482.	• Linked fecal contamination in surface waters in the Gold Coast region of Australia to presence of OWTS. • Contamination of ground and surface water resources by effluent discharged from OWTS is of critical concern due to health risks, and the degradation of recreational and drinking water resources due to nutrient inputs
Graves, A., Hagedorn, C., Teetor, A., Mahal, M., Booth, A., Reneau, R. 2001. Antibiotic Resistance Profiles to Determine Sources of Fecal Contamination in a Rural Virginia Watershed. Journal of Environmental Quality 31: 1300-1308.	• Found enterococci of human origin in a stream passing through a rural non-sewered community in VA, where stream samples exceed recreational standards for fecal coliform. There were no human isolates upstream of the community, and the number of human isolates declined downstream.
Hagedorn, C. 1984. Microbiological aspects of groundwater pollution due to septic tanks. In G. Bitton & C. Gerba (Eds.), *Groundwater pollution microbiology.* Brisbane: John Wiley and Sons, 191-195.	• Reported that bacteria from septic systems have travelled greater than 400m in aquifers.
Knierim, K., Hays, P., Bowman, D. 2015. Quantifying the variability in *Escherichia coli* (*E. coli*) throughout storm events at a karst spring in northwestern Arkansas, United States. Environmental Earth Sciences, 74: 4607-4623.	• Septic-tank effluent may be degrading the water quality of the karst spring based on the dominance of on-site septic tank usage in the recharge area, unsuitable topography and soil type for septic tank absorption fields, increased nitrate and chloride concentrations concomitant with increased urbanization, and increase of *E. coli* following storm events.

Reference	Key Points
Sokolova, E., Pettersson, T., Bergstedt, O., Hermansson, M. 2013. Hydrodynamic modelling of the microbial water quality in a drinking water source as input for risk reduction management. Journal of Hydrology 497: 15-23.	• Modeled *E. coli* source inputs to a drinking water intake in Lake Radasjon in Sweden, and found that discharges from on-site sewers were one of the main sources of fecal contamination at the water intake.
Sokolova, E., Pettersson, T., Bergstedt, O., Hermansson, M. 2012. Estimation of pathogen concentrations in a drinking water source using hydrodynamic modelling and microbial source tracking. Journal of Water and Health 10(3): 358-370.	• On-site sewers were the source that contributed the most norovirus to the water intake (at Lake Radasjon in Sweden). • A cattle grazing area was the main contributor to *Cryptosporidium* concentrations.
Verhougstraetea, M., Martin, S., Kendall, A., Hyndman, D., and Rose, J. 2015. Linking fecal bacteria in rivers to landscape, geochemical, and hydrologic factors and sources at the basin scale. PNAS 112: 10419–10424.	• Found a direct and significant correlation between estimated number of septic systems and the human-specific marker *B. theta* in water. • Sampled 64 rivers that drain 84% of Michigan's lower peninsula under base flow conditions for *E. coli, Bacteroides thetaiotaomicron* (*B. theta*). Particularly, watersheds with more than 1,621 septic systems had significantly higher B. theta concentrations.
Virani, A. 2014. Estimation of E. coli Concentrations from Failing On-Site Wastewater Treatment Facilities (OWTS) Using GIS. Thesis, Texas A&M University.	• Poorly designed and maintained OWTS are major contributors of bacteria to surface waters (streams) in the Dickinson Bayou watershed in TX.
Yates, M. 1985. Septic Tank Density and Ground-Water Contamination. Groundwater 23: 586-591.	• Septic tanks are the leading contributor of total volume of wastewater discharged directly to groundwater.

Reference	Key Points
Center for Watershed Protection (CWP). 1999. Microbes and Urban Watersheds: Concentrations, Sources, & Pathways. Watershed Protection Techniques 3(1): 554-565.	• Review summarizing sources and concentrations of indicator bacteria. • Raw sewage typically is about two to three orders of magnitude "stronger" than stormwater runoff in terms of coliform production, and is four to five orders of magnitude "stronger" than forest runoff that is influenced only by wildlife sources. As a general rule, human sources of sewage should be suspected when fecal coliform concentrations are consistently above 10^5

Table 5: Comparison of Bacterial Densities in Different Waste Streams (MPN/100 ml) (Pitt, 1998; Lim and Oliveri, 1982; Smith *et al.*, 1992, Horsely & Witten, Inc., 1995)

Waste stream	Total coliform	Fecal coliform	Fecal streptococci
Raw sewage	2.3×10^7	6.4×10^6	1.2×10^6
Combined sewer overflow	$10^4 - 10^7$	$10^4 - 10^6$	10^5
Failed septic systems	$10^4 - 10^7$	$10^4 - 10^6$	10^5
Urban stormwater runoff	$10^4 - 10^5$	2.0×10^4	$10^4 - 10^5$
Forest runoff	$10^2 - 10^3$	$10^1 - 10^2$	$10^2 - 10^3$

Table 6: Failure Rate for Septic Systems

Geographic location	Source	Failure rate (%)
Frederick County, MD	Tuthill, 1998	30+
Detroit, MI	Johnson, 1998	20
Wayne County, MI	Johnson, 1998	21
Oakland County, MI	Johnson, 1998	39
Florida	Hunter, 1998	5
Mason County, WA	Glasoe and Tompkins, 1996	12
Puget Sound, WA	Smayda et al., 1996	10 to 25

Reference	Key Points
	Table 7: Bacterial Densities in Warm-Blooded Animals Feces (Pitt, 1998; Godfrey, 1992; Geldrich *et al.*, 1962)

Waste stream	Fecal coliform *(Density/gm)*	Fecal streptococci	Unit discharge *(lbs/day)*
Human	1.3×10^7	3.0×10^6	0.35
Cats	7.9×10^6	2.7×10^7	0.15
Dogs	2.3×10^7	9.8×10^8	0.32
Rats	1.6×10^5	4.6×10^7	0.08
Cows	2.3×10^5	1.3×10^7	15.4
Ducks	3.3×10^7	5.4×10^7	0.15
Waterfowl	3.3×10^7	-	0.18 - 0.35

Attachment B: References specific to Sanitary Sewer and Onsite Wastewater Treatment System Information

Sanitary Sewer

Field, R., Pitt, R., Lalor, M., Brown, M., Vilkelis, W., Phackston, E. 1994. Investigation of dry weather pollutant entries into storm drainage systems. J. Environ. Eng. 120, 1044–1066.

Guérineaua, H., Dornerb, S. Carrièrea, A. McQuaida, N., Sauvéc, S., Aboulfadlc, K., Hajj-Mohamada, M, Prévosta, M. 2014 Source tracking of leaky sewers: A novel approach combining fecal indicators in water and sediments. Water Research, 58: 50–61.

Paul, M.; Wolf, L.; Fund, K.; Held, I.; Winter, J.; Elswirth, M.; Gallert, C.; Hotzl, H. 2004. Microbiological condition of urban groundwater in the vicinity of leaky sewer systems. Acta Hydrochim. Hydrobiol. 32, 351–360.

Sauer, E., VandeWalle, J., Bootsma, M., McLellan, S. 2011. Detection of the human specific Bacteroides genetic marker provides evidence of widespread sewage contamination of stormwater in the urban environment. Water Research 45: 4081-4091.

Sercu et al. 2009. Storm drains are sources of human fecal pollution during dry weather in three urban Southern California watersheds. Environ. Sci. Technol. 43, 293–298.

Sercu et al. 2011. Sewage Exfiltration As a Source of Storm Drain Contamination during Dry Weather in Urban Watersheds. Environ. Sci. Technol., 45 (17): 7151–7157.

Onsite Wastewater Treatment Systems

Anderson, J. 2010. The Effects of High Density Septic Systems on Surface Water Quality in Gwinnett County, Georgia. Thesis, Georgia State University.

Carroll, S. Hargreaves, M., Goonetilleke, A. 2005. Sourcing Fecal Pollution from Onsite Wastewater Treatment Systems in Surface Waters Using Antibiotic Resistance Analysis. Journal of Applied Microbiology 99(3): 471-482.

Graves, A., Hagedorn, C., Teetor, A., Mahal, M., Booth, A., Reneau, R. 2001. Antibiotic Resistance Profiles to Determine Sources of Fecal Contamination in a Rural Virginia Watershed. Journal of Environmental Quality 31: 1300-1308.

Hagedorn, C. 1984. Microbiological aspects of groundwater pollution due to septic tanks. In G. Bitton & C. Gerba (Eds.), *Groundwater pollution microbiology*. Brisbane: John Wiley and Sons, 191-195.

Knierim, K., Hays, P., Bowman, D. 2015. Quantifying the variability in *Escherichia coli* (*E. coli*) throughout storm events at a karst spring in northwestern Arkansas, United States. Environmental Earth Sciences, 74: 4607-4623.

Verhougstraetea, M., Martin, S., Kendall, A., Hyndman, D., and Rose, J. 2015.

Linking fecal bacteria in rivers to landscape, geochemical, and hydrologic factors and sources at the basin scale. PNAS 112: 10419–10424.

Virani, A. 2014. Estimation of E. coli Concentrations from Failing On-Site Wastewater Treatment Facilities (OWTS) Using GIS. Thesis, Texas A&M University.

Yates, M. 1985. Septic Tank Density and Ground-Water Contamination. Groundwater 23: 586-591.

Appendix B

San Dieguito WMA Special Study

Detailed Focus Area Prioritization Results

Appendix B. Potential Sources & Full Prioritization Results by Focus Area

PURPOSE

The purpose of this appendix is to document the characteristics and inventory of potential sources found within each focus area. The methods for determining the focus areas presented in **Figure 1** are discussed in detail in the Technical Memorandum accompanying this document. Potential bacteria sources in the watershed were drawn from the San Dieguito WMA Water Quality Improvement Plan and are summarized in **Table 1**. These and other sources were assessed based on five key metrics used to identify and prioritize bacteria sources within the WMA. These metrics include the human health risk, magnitude of the bacteria source, transport feasibility of the source, frequency of occurrence, and controllability of the source. This appendix presents a summary of the characteristics and potential bacteria sources of each focus area, along with the full list of prioritized potential sources and their rankings.

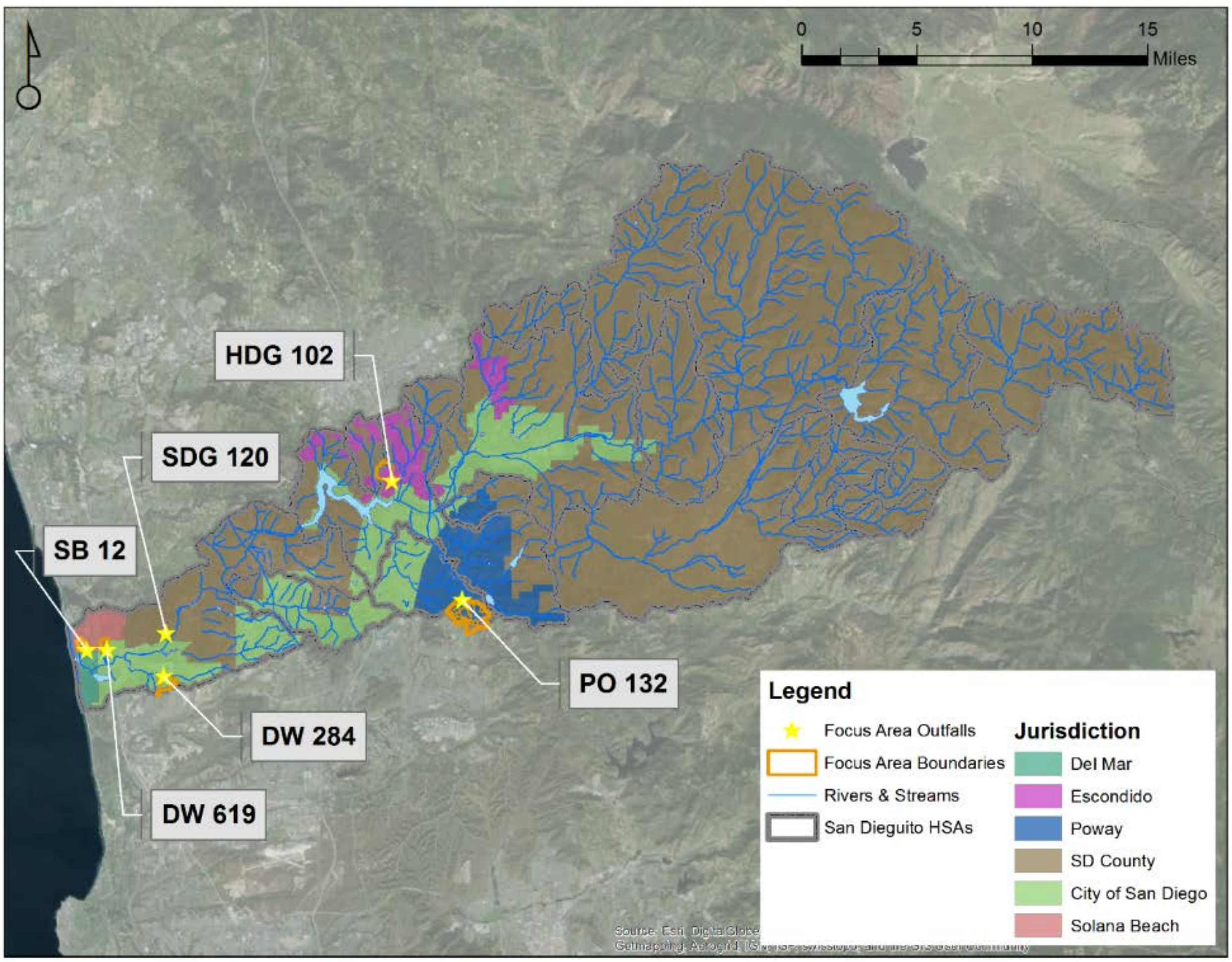

Figure 1. Locations of Focus Areas for the Bacteria Special Study Source Identification.

Table 1. Summary of Potential Bacteria Sources in Focus Areas within the San Dieguito Watershed Management Area

		ESC	POW	CSD	SB	COSD	CSD/SB
Source[1]	**Priority[1]**	**HDG-102**	**PO-132**	**DW-284**	**SB-12**	**SDG-210**	**DW-619**
Residential Areas	High	✓	✓	✓	✓	✓	✓
Sanitary Sewer Overflows	High		✓		✓		✓
Sanitary Sewer Infrastructure	High	✓	✓	✓	✓	✓	✓
Septic Systems	High	✓	*	*	*	*	*
Animal Facilities	Medium						✓
Eating/Drinking Establishments	Medium	✓					✓
Nurseries/Greenhouses	Medium						✓
Agriculture	Medium	✓					
Roads/Streets/Parking	Medium	✓	✓	✓	✓	✓	✓
Mobile Landscaping	Medium	✓	✓	✓	✓	✓	✓
Wildlife (Secondary)	Medium	✓					
Transient Encampments	Low	*	*	*	*	*	*
Wildlife	Low	✓	✓	✓	✓	✓	✓
Bacteria Regrowth/Biofilms	Low	✓	✓	✓	✓	✓	✓

[1] Source and priority information presented within the Water Quality Improvement Plan was used as a starting point for this Study.
* Indicates data was not available
Blank cells indicate potential sources not found in the focus area.

PRIORITIZATION RESULTS BY FOCUS AREA

City of San Diego

The City of San Diego's primary focus area drains to the outfall site: DW-284, shown in **Figure 2**. The total area assessed is 156 acres, and consists of 49% residential land uses, 34% open space, 16% road infrastructure, and 1% institutional land uses. With single family residential land uses and open space comprising of over 80% of this focus area, the top two potential bacteria sources in both dry and wet weather are pets and manure/compost. Although 6 businesses are found to be located within the focus area, none of the commercial businesses re food or eating and drinking establishments. The potential sources are most highly associated with infrastructure and land use.

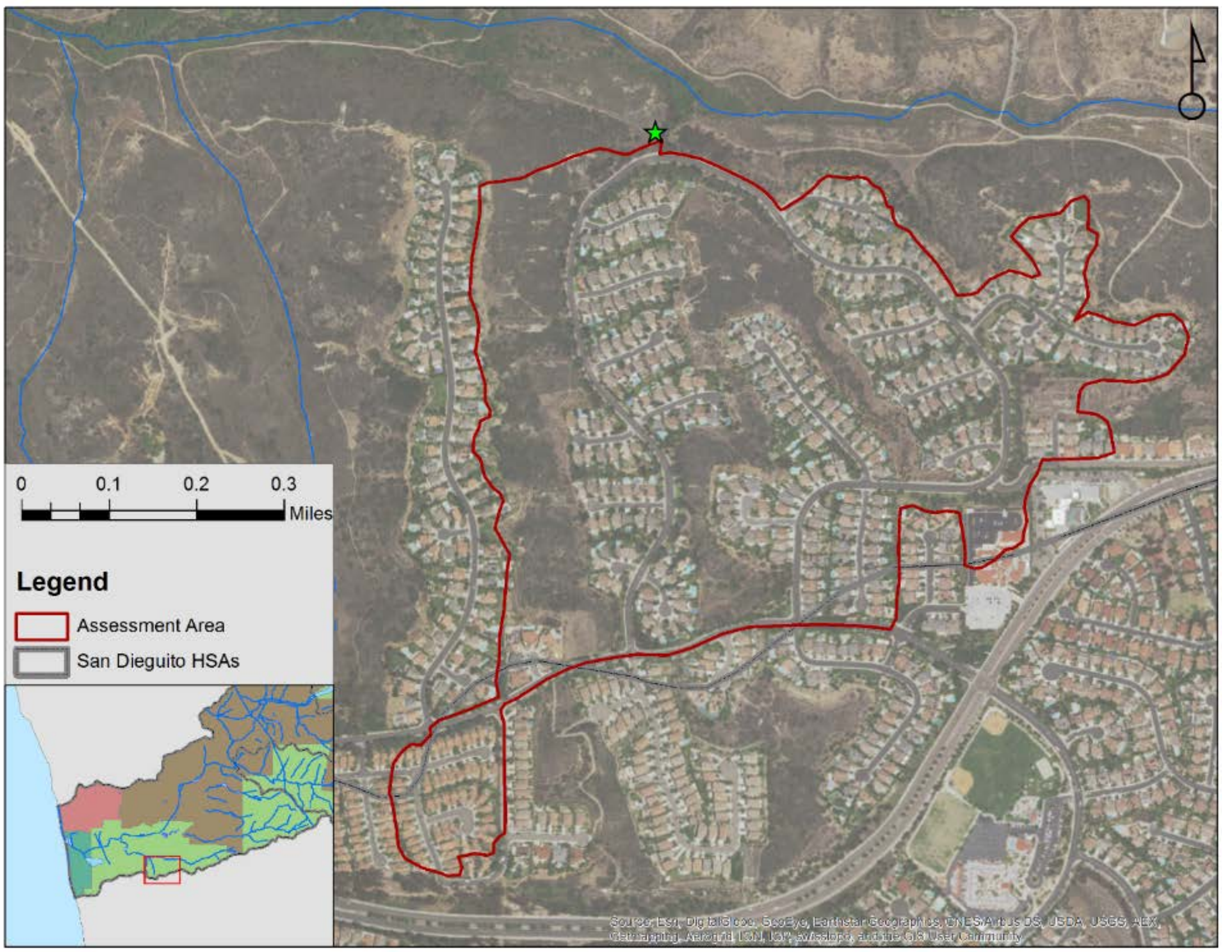

Figure 2. Focus area for the City of San Diego: Outfall DW-284

Table 2. Summary of Potential Bacteria Source Characteristics within DW-284

Source	Human Health Risk	Magnitude	Transport Feasibility	Frequency	Controllable?
Residential	Med	Med/High	Irrigation	48% (75 ac)	Yes
Sanitary Sewer Infrastructure	High	High	Low (PVC)	3 miles (100% PVC)	Yes
Roads/Streets/Parking	Med	Med	Irrigation	16% (26 ac)	Yes
Mobile Landscaping	Med	Med	Irrigation Washing	Residential/ Commercial	Yes
Wildlife	Low/Med	Med	None	Open space (34%, 53 ac)	No
Bacteria Regrowth/Biofilms	Low	Med	Irrigation	3.5 mi MS4 mostly RCP	Yes

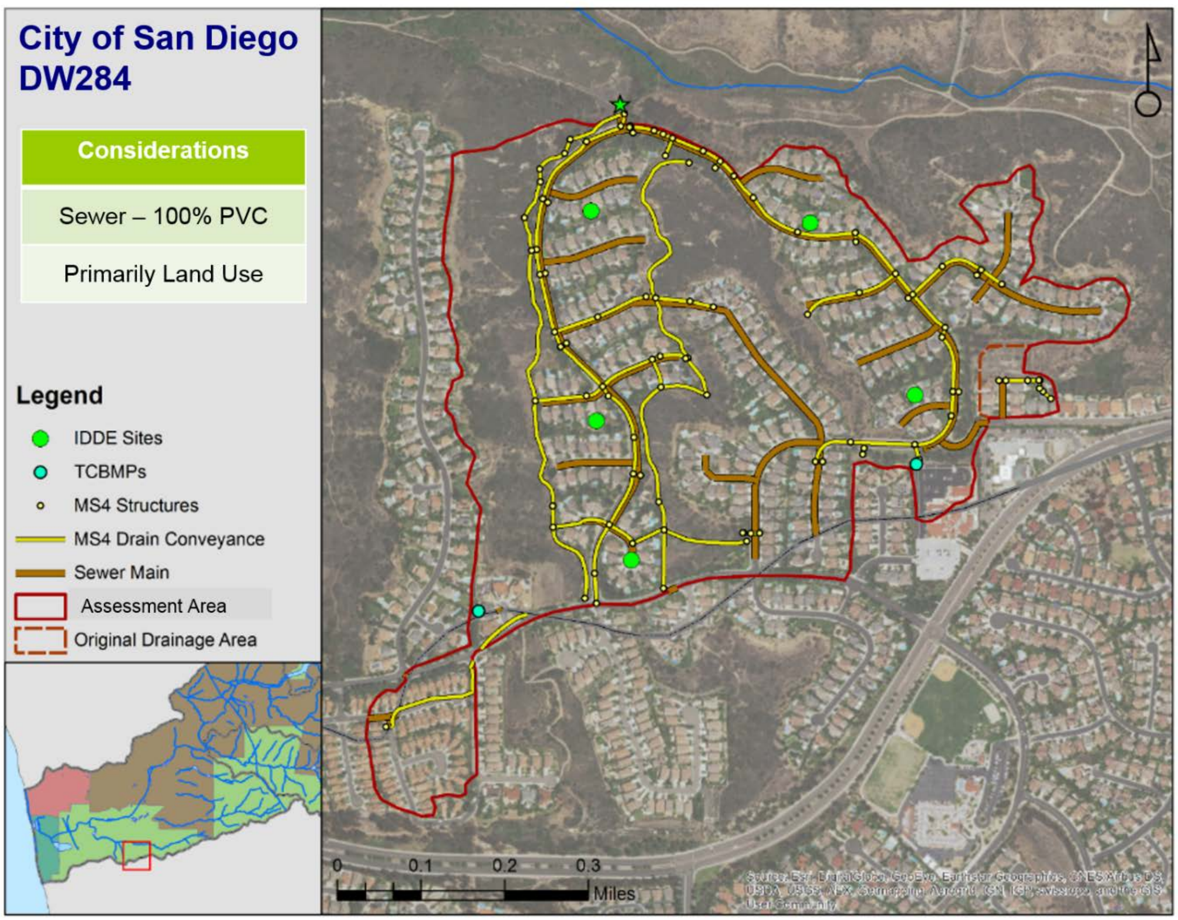

Figure 3. MS4 and Sanitary Sewer Infrastructure within the City of City of San Diego Focus Area: Outfall DW-284

The potential bacteria sources within the City of San Diego's focus area include of a mixture of anthropogenic non-human, as well as human waste bacteria origins. A summary of the top ten sources is presented in **Table 3** and the full list of prioritized sources is located in **Table 4**.

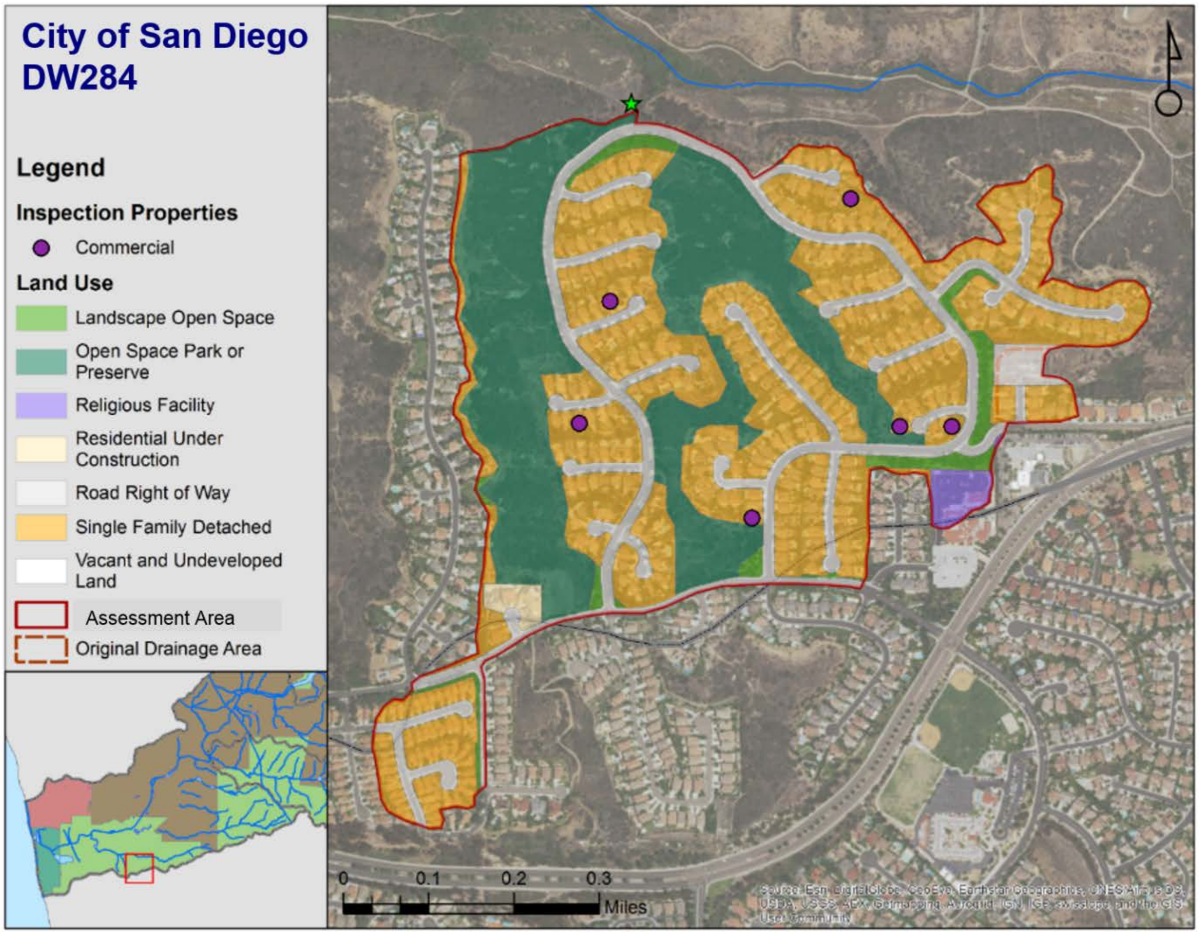

Figure 4. Land Use and Businesses within the City of City of San Diego Focus Area: Outfall DW-284

Table 3. Top Ten Potential Bacteria Sources within City of San Diego Focus Area: DW-284

Condition	Category	Source	Subcategory	Rank
Dry	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	4
	Human Waste	Illicit Connections	Other Wastewater	5
	Human Waste	RVs (mobile)	Mobile Sources	6
	Human Waste	Illegal Discharges	Other Wastewater	7
	Human Waste	Porta-Potties	Other Wastewater	8
	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	9
	Human Waste	Homeless Encampments	Mobile Sources	10
Wet	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	4
	Human Waste	RVs (mobile)	Mobile Sources	5
	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	6
	Human Waste	Illicit Connections	Other Wastewater	7
	Human Waste	Trash cans	Sources related to Garbage	8
	Human Waste	Homeless Encampments	Mobile Sources	9
	Human Waste	Porta-Potties	Other Wastewater	10

Table 4. Prioritization Rankings of Potential Bacteria Sources within DW-284

Rankings of Source Scores – Dry Weather			**Rankings of Source Scores – Wet Weather**		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
HUMAN WASTE			HUMAN WASTE		
1	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	1	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure
2	Sanitary Sewer Overflows	Sewage Infrastructure	2	Sanitary Sewer Overflows	Sewage Infrastructure
3	Illicit Connections	Other Wastewater	3	RVs (mobile)	Mobile Sources
4	RVs (mobile)	Mobile Sources	4	Illicit Connections	Other Wastewater
5	Illegal Discharges	Other Wastewater	5	Trash cans	Sources related to Garbage
6	Porta-Potties	Other Wastewater	6	Homeless Encampments	Mobile Sources
7	Homeless Encampments	Mobile Sources	7	Porta-Potties	Other Wastewater
8	Trash cans	Sources related to Garbage	8	Garbage trucks	Sources related to Garbage
9	Pools	Non-stormwater Discharges	9	Dumpsters	Sources related to Garbage
10	Garbage trucks	Sources related to Garbage	10	Illegal Discharges	Other Wastewater
11	Dumpsters	Sources related to Garbage	11	Pools	Non-stormwater Discharges
12	Hot Tubs	Non-stormwater Discharges	12	Illegal Dumping	Sources related to Garbage
13	Illegal Dumping	Sources related to Garbage	13	Hot Tubs	Non-stormwater Discharges
ANTHROPOGENIC NON-HUMAN			ANTHROPOGENIC NON-HUMAN		
1	Pets	Domestic Animals	1	Pets	Domestic Animals
2	Manure/Compost	Landscaping	2	Manure/Compost	Landscaping
3	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	3	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth
4	Vectors	Solid/Liquid Waste	4	Trash Cans	Solid/Liquid Waste
5	Washwater	Solid/Liquid Waste	5	Garbage Trucks	Solid/Liquid Waste
6	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	6	Dumpsters	Solid/Liquid Waste
7	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	7	Washwater	Solid/Liquid Waste
8	Trash Cans	Solid/Liquid Waste	8	Vectors	Solid/Liquid Waste
9	Garbage Trucks	Solid/Liquid Waste	9	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife

Rankings of Source Scores – Dry Weather			Rankings of Source Scores – Wet Weather		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
10	Litter	Solid/Liquid Waste	10	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife
11	Dumpsters	Solid/Liquid Waste	11	Litter	Solid/Liquid Waste
12	Green Waste	Landscaping	12	Green Waste	Landscaping
13	Soil	Landscaping	13	Soil	Landscaping
NON-ANTHROPOGENIC			NON-ANTHROPOGENIC		
1	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1	Plants	Plants
2	Plants	Plants	2	Soil	Soil
3	Algae	Algae	3	Wildlife (Birds and Others)	Wildlife (Birds and Others)
4	Soil	Soil	4	Algae	Algae

* Ranks are shown within each category (Human, Anthropogenic Non-Human, Non-Anthropogenic)

County of San Diego

The County of San Diego's primary focus area featured the outfall site, SDG-210, shown in **Figure 5**. The total area assessed is 17 acres, and consists of 63% residential land uses, 18% open space, and 19% road infrastructure. The land uses are mainly single family residential with associated open space. One of the residential areas has an active homeowners association and the focus area borders a golf course. The potential bacteria sources in this focus area are associated with residential land uses, human activities, and any potential sources associated with open space and wildlife.

Figure 5. Focus area for the County of San Diego: Outfall SDG-210

Although informative source information was available for this focus area, information regarding the sanitary sewer infrastructure was unavailable. A summary of available source data is provided in **Table 5**. The potential bacteria sources within the County of San Diego's focus area include of a mixture of anthropogenic non-human and human waste bacteria origins. A summary of the top ten sources is presented in **Table 6**, and the complete prioritization results are located in **Table 7**.

Table 5. Summary of Potential Bacteria Source Characteristics within SDG-210

Source	Human Health Risk	Magnitude	Transport Feasibility	Frequency	Controllable?
Residential	Med	Med/High	Irrigation	63% (11 ac)	Yes
Sanitary Sewer Infrastructure	High	High	Unknown	Unknown	Yes
Roads/Streets/Parking	Med	Med	Irrigation	19% (3 ac)	Yes
Mobile Landscaping	Med	Med	Irrigation Washing	Residential	Yes
Wildlife	Med/Low	Med	None	Open space (18%, 3 ac)	No
Bacteria Regrowth/Biofilms	Low	Med	Irrigation	0.25 mi	Yes

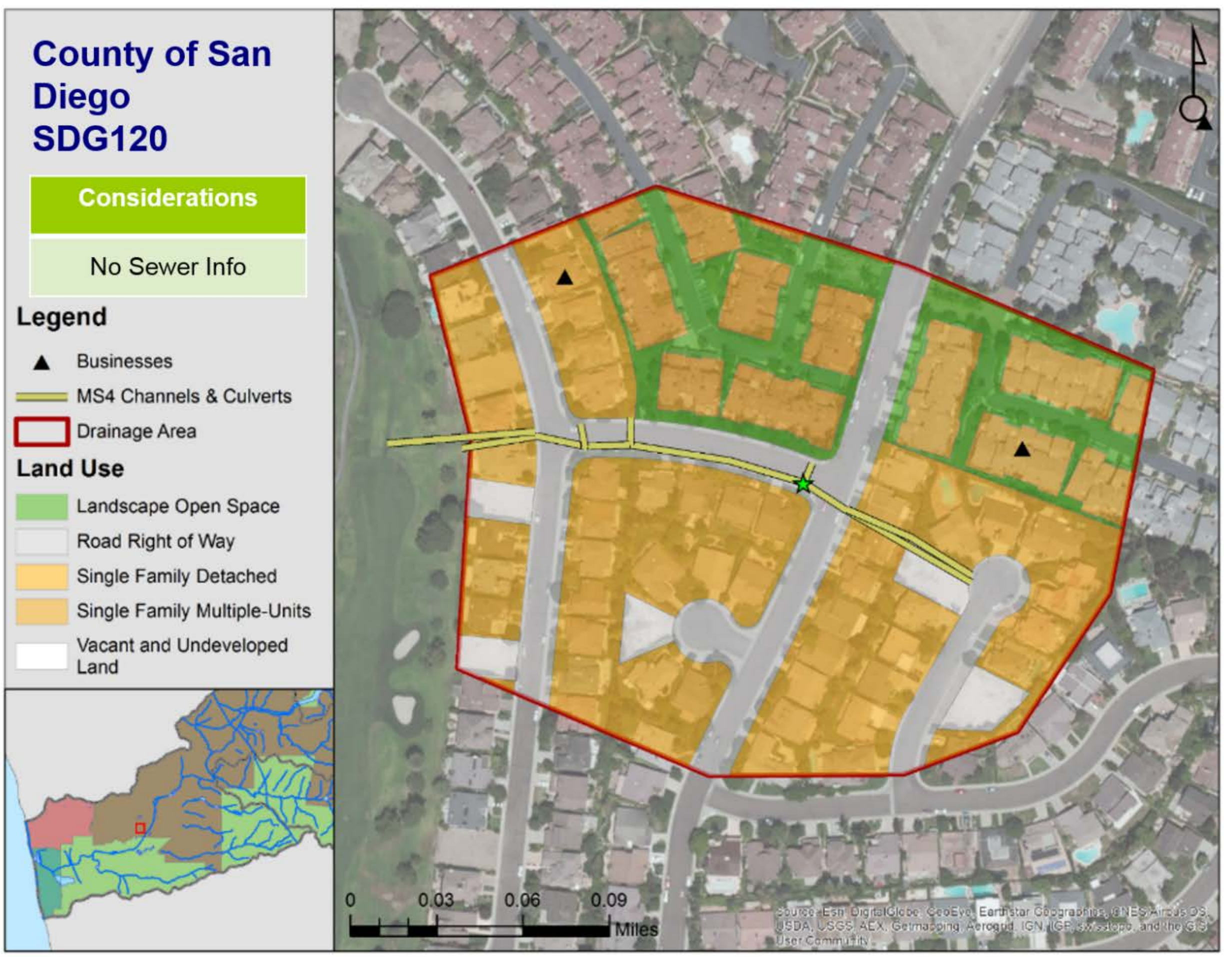

Figure 6. MS4 Infrastructure, Land Use, and Businesses in the County of San Diego's Focus Area: Outfall SDG-120

Table 6. Top Ten Potential Bacteria Sources within County of San Diego Focus Area: SDG-210

Condition	*Category*	*Source*	*Subcategory*	*Rank*
Dry	Human Waste	Illegal Discharges	Other Wastewater	1
	Human Waste	Porta-Potties	Other Wastewater	2
	Anthropogenic Non-Human	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	3
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	4
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	5
	Human Waste	Illicit Connections	Other Wastewater	6
	Human Waste	Trash cans	Sources related to Garbage	7
	Human Waste	Pools	Non-stormwater Discharges	8
	Anthropogenic Non-Human	Pets	Domestic Animals	9
	Anthropogenic Non-Human	Trash Cans	Solid/Liquid Waste	10
Wet	Human Waste	Illegal Discharges	Other Wastewater	1
	Human Waste	Illicit Connections	Other Wastewater	2
	Human Waste	Porta-Potties	Other Wastewater	3
	Human Waste	Dumpsters	Sources related to Garbage	4
	Anthropogenic Non-Human	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	5
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	6
	Anthropogenic Non-Human	Trash Cans	Solid/Liquid Waste	7
	Human Waste	Pools	Non-stormwater Discharges	8
	Anthropogenic Non-Human	Pets	Domestic Animals	9
	Anthropogenic Non-Human	Vectors	Solid/Liquid Waste	10

Table 7. Complete Prioritization Rankings of Potential Bacteria Sources within SDG-210

Rankings of Source Scores – Dry Weather			**Rankings of Source Scores – Wet Weather**		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
HUMAN WASTE			HUMAN WASTE		
1	Illegal Discharges	Other Wastewater	1	Illegal Discharges	Other Wastewater
2	Porta-Potties	Other Wastewater	2	Illicit Connections	Other Wastewater
3	Sanitary Sewer Overflows	Sewage Infrastructure	3	Porta-Potties	Other Wastewater
4	Illicit Connections	Other Wastewater	4	Sanitary Sewer Overflows	Sewage Infrastructure
5	Trash cans	Sources related to Garbage	5	Trash cans	Sources related to Garbage
6	Pools	Non-stormwater Discharges	6	Dumpsters	Sources related to Garbage
7	Dumpsters	Sources related to Garbage	7	Pools	Non-stormwater Discharges
8	Hot Tubs	Non-stormwater Discharges	8	Garbage trucks	Sources related to Garbage
9	Garbage trucks	Sources related to Garbage	9	Hot Tubs	Non-stormwater Discharges
10	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	10	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure
11	Illegal Dumping	Sources related to Garbage	11	Illegal Dumping	Sources related to Garbage
ANTHROPOGENIC NON-HUMAN			ANTHROPOGENIC NON-HUMAN		
1	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	1	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife
2	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	2	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife
3	Pets	Domestic Animals	3	Trash Cans	Solid/Liquid Waste
4	Trash Cans	Solid/Liquid Waste	4	Pets	Domestic Animals
5	Vectors	Solid/Liquid Waste	5	Vectors	Solid/Liquid Waste
6	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	6	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth
7	Dumpsters	Solid/Liquid Waste	7	Dumpsters	Solid/Liquid Waste
8	Garbage Trucks	Solid/Liquid Waste	8	Garbage Trucks	Solid/Liquid Waste
9	Litter	Solid/Liquid Waste	9	Litter	Solid/Liquid Waste
10	Manure/Compost	Landscaping	10	Manure/Compost	Landscaping

Rankings of Source Scores – Dry Weather			Rankings of Source Scores – Wet Weather		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
11	Green Waste	Landscaping	11	Green Waste	Landscaping
12	Soil	Landscaping	12	Soil	Landscaping
NON-ANTHROPOGENIC			NON-ANTHROPOGENIC		
1	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1	Wildlife (Birds and Others)	Wildlife (Birds and Others)
2	Plants	Plants	2	Plants	Plants
3	Algae	Algae	3	Algae	Algae
4	Soil	Soil	4	Soil	Soil

* Ranks are shown within each category (Human, Anthropogenic Non-Human, Non-Anthropogenic)

City of Escondido

The City of Escondido's primary focus area drains to the outfall site, HDG-102, shown in **Figure 7**. This outfall was previously identified by the City as an outfall of interest for additional investigation because it drains to the San Dieguito River. The total area is 188 acres and consists of 73% residential land uses, 5% open space, 1% commercial land uses, and 20% road infrastructure. Despite the fact that the focus area is comprised by a majority of residential land uses, the commercial inventory provided by the City shows a neighborhood shopping center with several food service establishments located in the southeast portion of the assessment area. There are a total of ten food service establishments within the assessment area. The potential bacteria sources within this focus area represent residential and commercial activities associated with human waste, existing infrastructure, and other anthropogenic and non-human sources of bacteria.

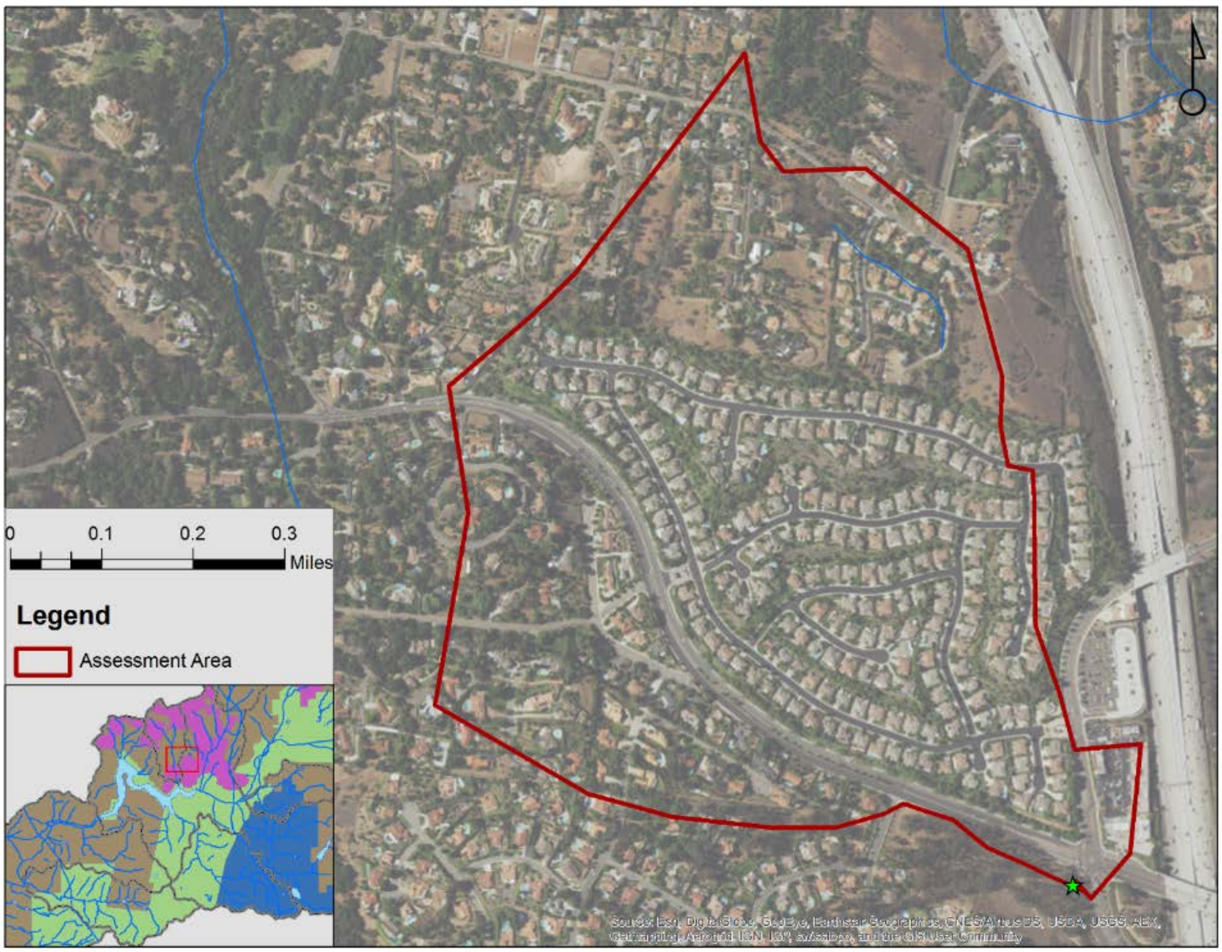

Figure 7. Focus Area for the City of Escondido: Outfall HDG-102

Table 8. Summary of Potential Bacteria Sources Characteristics within HDG-102

Source	Human Health Risk	Magnitude	Transport Feasibility	Frequency	Controllable?
Residential	Med	Med/High	Irrigation	73% (137 ac)	Yes
Sanitary Sewer Infrastructure	High	High	Low (PVC)	4.4 mi Mostly PVC	Yes
Septic Systems	High	High	Low	Some	Yes
Eating/Drinking Establishments	Med	Med/High	Irrigation Washing	10	Yes
Agriculture	Med	Med	Irrigation	0.06% (1 ac)	Yes
Roads/Streets/Parking	Med	Med	Irrigation	20% (38 ac)	Yes
Mobile Landscaping	Med	Med	Irrigation Washing	Residential/ Commercial	Yes
Wildlife (secondary)	Med	Med	Irrigation Washing	Commercial (1%, 2 ac)	Yes
Wildlife	Low/Med	Med	None	Open space (5%, 9 ac)	No
Bacteria Regrowth/Biofilms	Low	Med	Irrigation	2.7 mi of MS4 (RCP/CIPP)	Yes

The potential bacteria sources within the City of Escondido's focus area include a mixture of anthropogenic non-human and human waste bacteria origins. A summary of the top ten sources is presented in **Table 9**, and the complete prioritization results are located in **Table 10**.

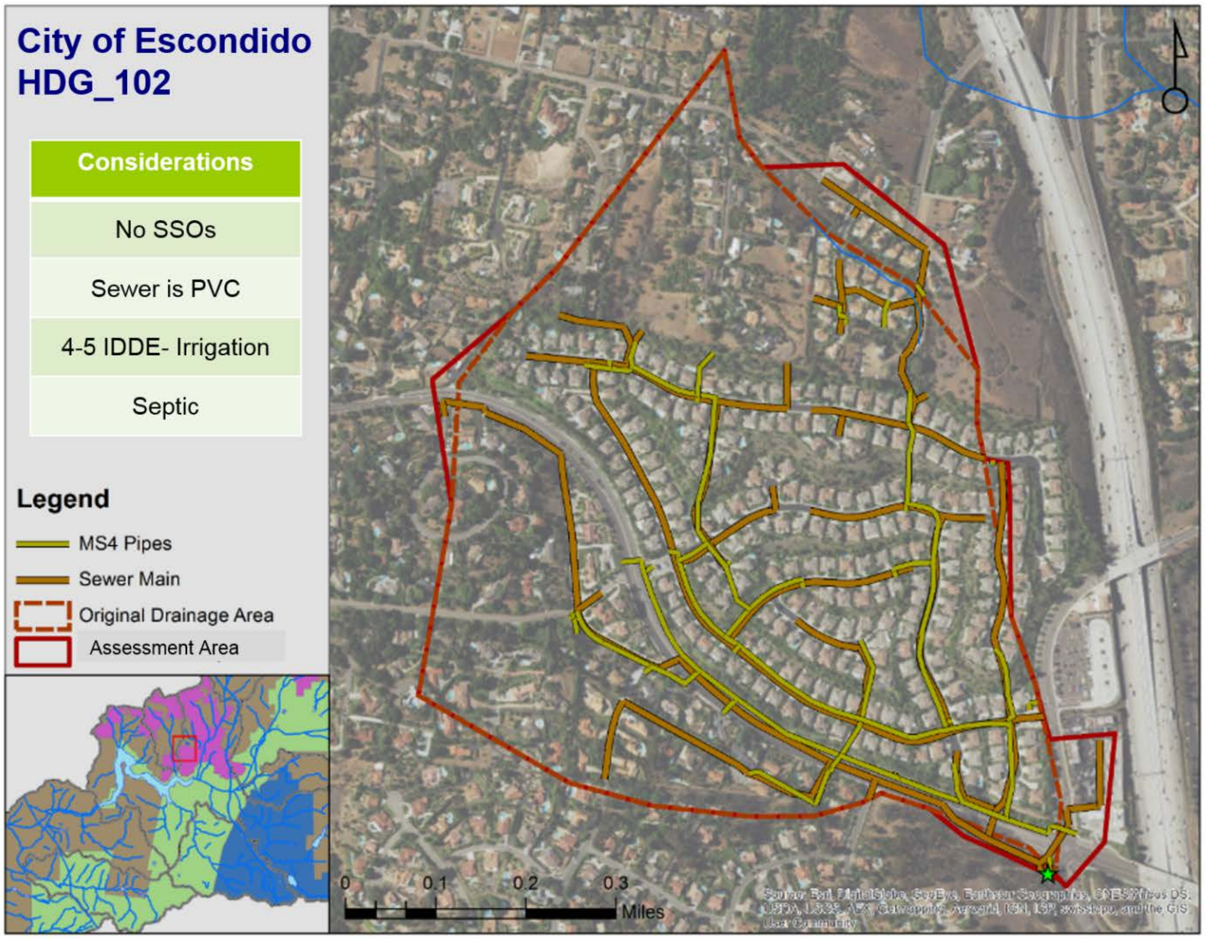

Figure 8. MS4 and Sanitary Sewer Infrastructure within the City of Escondido Focus Area: Outfall-HDG102

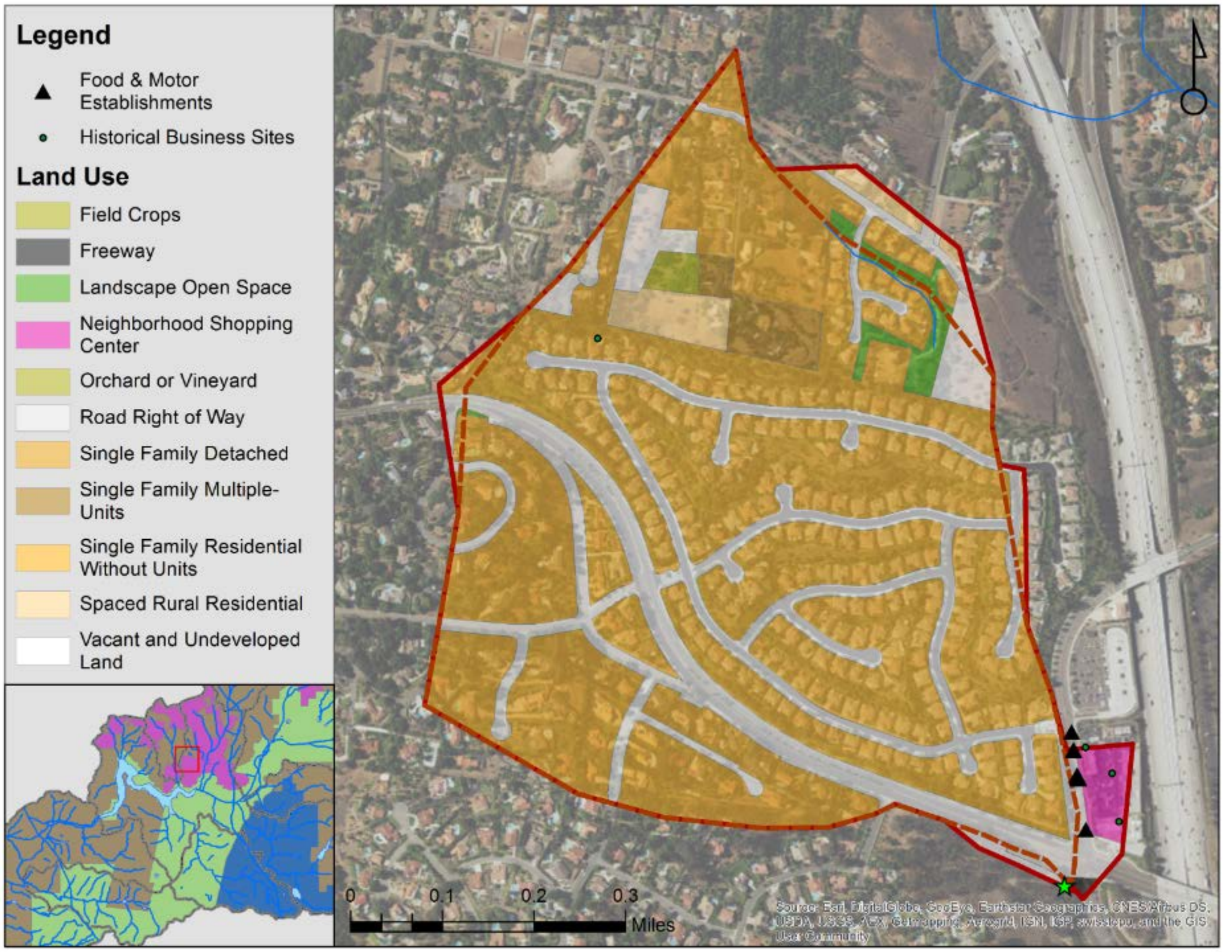

Figure 9. Land Use and Businesses within the City of Escondido Focus Area: Outfall HDG-102

Table 9. Top Ten Potential Bacteria Sources within City of Escondido Focus Area: HDG-102

Condition	*Category*	*Source*	*Subcategory*	*Rank*
Dry	Human Waste	Leaky Failing Septic Systems	Sewage Infrastructure	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Illegal Discharges	Other Wastewater	4
	Human Waste	Illicit Connections	Other Wastewater	4
	Human Waste	Porta-Potties	Other Wastewater	6
	Anthropogenic Non-Human	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	7
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	7
	Human Waste	RVs (mobile)	Mobile Sources	9
	Anthropogenic Non-Human	Vectors	Solid/Liquid Waste	9
	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	9
Wet	Human Waste	Leaky Failing Septic Systems	Sewage Infrastructure	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Illegal Discharges	Other Wastewater	4
	Human Waste	Illicit Connections	Other Wastewater	4
	Human Waste	Porta-Potties	Other Wastewater	4
	Anthropogenic Non-Human	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	7
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	7
	Human Waste	RVs (mobile)	Mobile Sources	9
	Anthropogenic Non-Human	Washwater	Solid/Liquid Waste	9
	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	9

Table 10. Complete Prioritization Rankings of Potential Bacteria Sources within HDG102

Rankings of Source Scores – Dry Weather			**Rankings of Source Scores – Wet Weather**		
Rank *	**Source**	**Subcategory**	**Rank***	**Source**	**Subcategory**
HUMAN WASTE			HUMAN WASTE		
1	Leaky Failing Septic Systems	Sewage Infrastructure	1	Leaky Failing Septic Systems	Sewage Infrastructure
2	Sanitary Sewer Overflows	Sewage Infrastructure	2	Sanitary Sewer Overflows	Sewage Infrastructure
3	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure
4	Illegal Discharges	Other Wastewater	4	Illegal Discharges	Other Wastewater
5	Illicit Connections	Other Wastewater	5	Illicit Connections	Other Wastewater
6	Porta-Potties	Other Wastewater	6	Porta-Potties	Other Wastewater
7	RVs (mobile)	Mobile Sources	7	RVs (mobile)	Mobile Sources
8	Garbage trucks	Sources related to Garbage	8	Dumpsters	Sources related to Garbage
9	Dumpsters	Sources related to Garbage	9	Garbage trucks	Sources related to Garbage
10	Trash cans	Sources related to Garbage	10	Trash cans	Sources related to Garbage
11	Illegal Dumping	Sources related to Garbage	11	Illegal Dumping	Sources related to Garbage
12	Pools	Non-stormwater Discharges	12	Pools	Non-stormwater Discharges
13	Hot Tubs	Non-stormwater Discharges	13	Hot Tubs	Non-stormwater Discharges
ANTHROPOGENIC NON-HUMAN			ANTHROPOGENIC NON-HUMAN		
1	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	1	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife
2	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	2	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife
3	Vectors	Solid/Liquid Waste	3	Washwater	Solid/Liquid Waste
4	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	4	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth
5	Pets	Domestic Animals	5	Vectors	Solid/Liquid Waste
6	Washwater	Solid/Liquid Waste	6	Pets	Domestic Animals
7	Outdoor Dining/ Fast Food	Commercial/ Industrial	7	Outdoor Dining/ Fast Food	Commercial/ Industrial
8	Garbage Trucks	Solid/Liquid Waste	8	Garbage Trucks	Solid/Liquid Waste
9	Trash Cans	Solid/Liquid Waste	9	Litter	Solid/Liquid Waste
10	Grease Bins	Solid/Liquid Waste	10	Grease Bins	Solid/Liquid Waste

Rankings of Source Scores – Dry Weather			**Rankings of Source Scores – Wet Weather**		
Rank *	**Source**	**Subcategory**	**Rank***	**Source**	**Subcategory**
11	Litter	Solid/Liquid Waste	11	Trash Cans	Solid/Liquid Waste
12	Dumpsters	Solid/Liquid Waste	12	Dumpsters	Solid/Liquid Waste
13	Manure/Compost	Landscaping	13	Manure/Compost	Landscaping
14	Green Waste	Landscaping	14	Soil	Landscaping
15	Soil	Landscaping	15	Green Waste	Landscaping
NON-ANTHROPOGENIC			NON-ANTHROPOGENIC		
1	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1	Soil	Soil
2	Plants	Plants	2	Wildlife (Birds and Others)	Wildlife (Birds and Others)
3	Algae	Algae	3	Plants	Plants
4	Soil	Soil	4	Algae	Algae

* Ranks are shown within each category (Human, Anthropogenic Non-Human, Non-Anthropogenic)

City of Poway

The City of Poway's primary focus area drains to the outfall site: POW132, illustrated in **Figure 10**. The total area is 723 acres, and consists of 74% residential land uses, 9% open space, 7% public land, and 1% crops, and 9% road infrastructure. As a result, the City of Poway's focus area is over 80% single family residential and open space land uses. The focus area includes a high school and a few in-home businesses. The bacteria source priorities are mainly associated with wild life (both non-anthropogenic and anthropogenic). Other potential sources include leaky infrastructure, sources related to garbage, and other waste water sources.

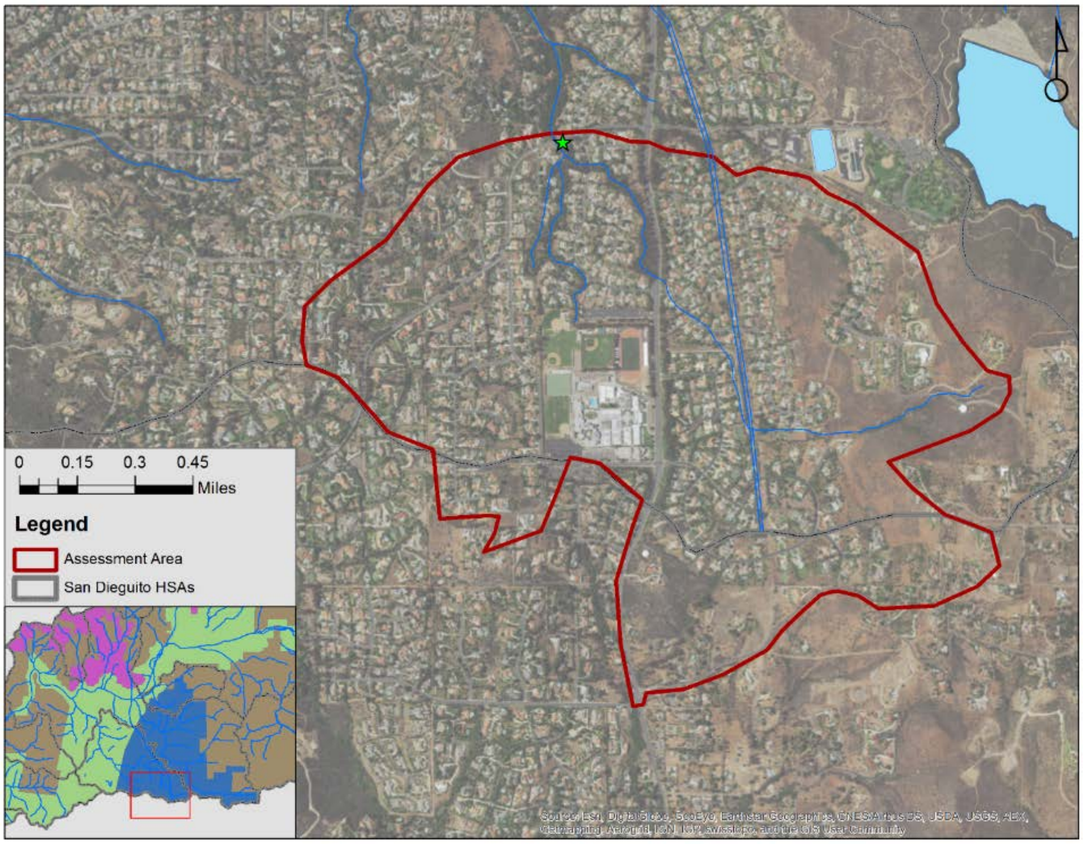

Figure 10. Focus Area for the City of Poway: Outfall POW-132

Table 11. Summary of Potential Bacteria Source Characteristics within the Focus Area POW-132

Source	Human Health Risk	Magnitude	Transport Feasibility	Frequency	Controllable?
Residential	Med	Med/High	Irrigation	74% (533 ac)	Yes
Sanitary Sewer Overflows	High	High	Overflow volume	1 SSO 1 PLSD	Yes
Sanitary Sewer Infrastructure	High	High	25% VCP	8.4 mi 25% VCP 75% PVC	Yes
Roads/Streets/Parking	Med	Med	Irrigation	8% (61 ac)	Yes
Mobile Landscaping	Med	Med	Irrigation Washing	Residential	Yes
Wildlife	Low/Med	Med	None	Open space (9%, 67 ac)	No
Bacteria Regrowth/Biofilms	Low	Med	Irrigation	3.5 mi MS4 2 mi open channel	Yes

The potential bacteria sources within the City of Poway's focus area include of a mixture of non-anthropogenic, anthropogenic non-human, and human waste bacteria origins. A summary of the top ten sources is presented in **Table 12**, and the complete prioritization results are located in **Table 13**.

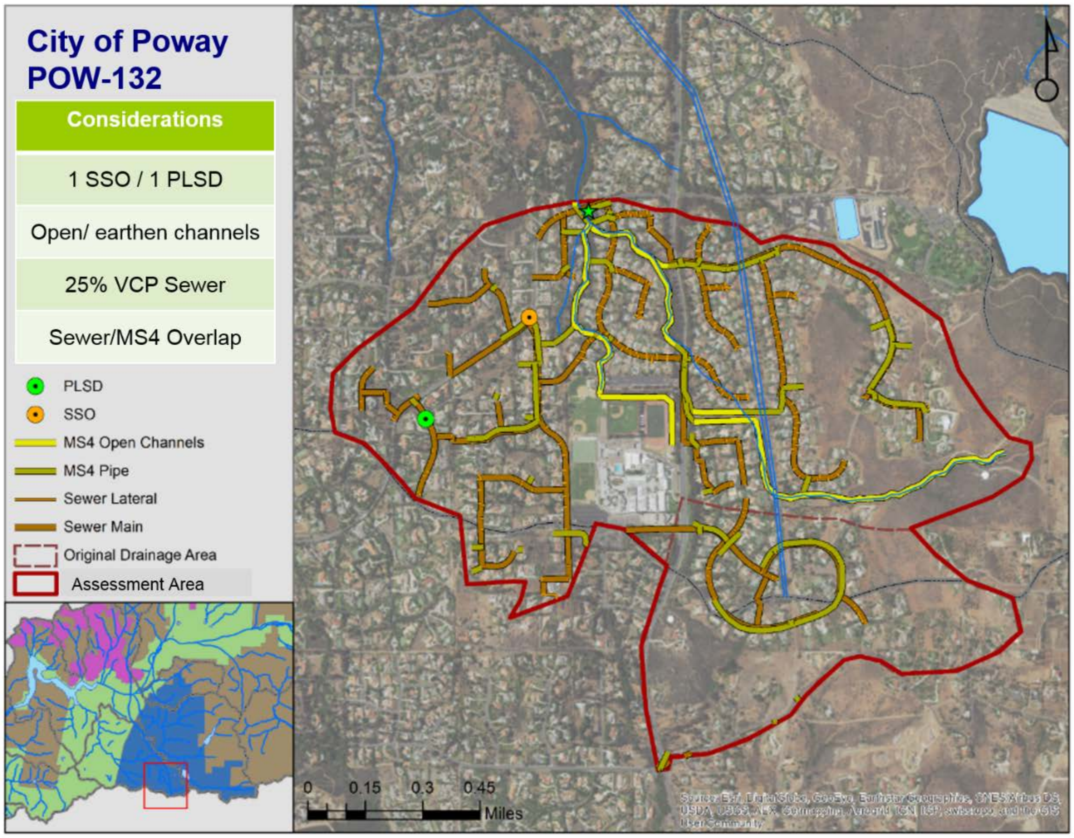

Figure 11. MS4 and Sanitary Sewer Infrastructure within the City of Poway Focus Area: Outfall POW-132

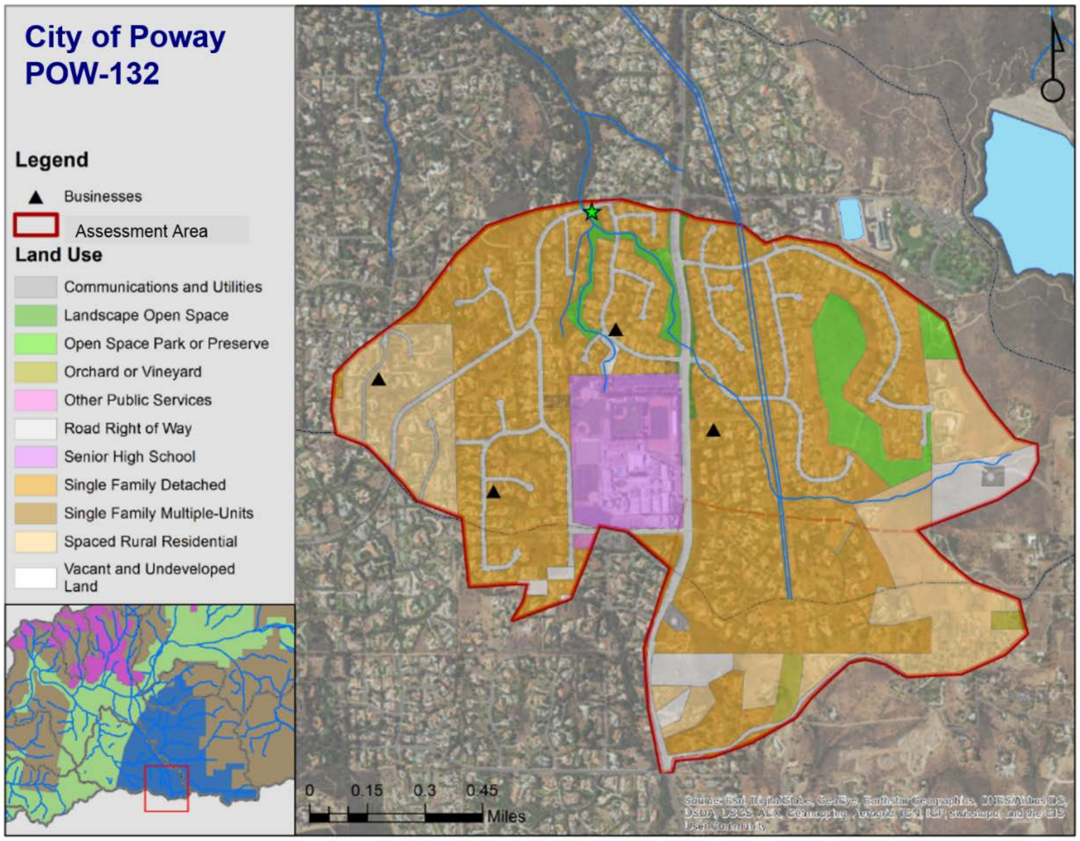

Figure 12. Land Use and Businesses within the City of Poway Focus Area: Outfall POW-132

Table 12. Top Ten Potential Bacteria Sources within City of Poway Focus Area: POW-132

Condition	*Category*	*Source*	*Subcategory*	*Rank*
Dry	Non-Anthropogenic	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	3
	Anthropogenic Non-Human	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	4
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	5
	Human Waste	Trash cans	Sources related to Garbage	6
	Human Waste	Illegal Discharges	Other Wastewater	7
	Anthropogenic Non-Human	Pets	Domestic Animals	8
	Anthropogenic Non-Human	Manure/Compost	Landscaping	9
	Non-Anthropogenic	Soil	Soil	10
Wet	Non-Anthropogenic	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Anthropogenic Non-Human	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	3
	Anthropogenic Non-Human	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	4
	Non-Anthropogenic	Soil	Soil	5
	Non-Anthropogenic	Plants	Plants	6
	Non-Anthropogenic	Algae	Algae	7
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	8
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	9
	Human Waste	Illegal Discharges	Other Wastewater	10

Table 13. Complete Prioritization Rankings of Potential Bacteria Sources within POW-132

Rankings of Source Scores – Dry Weather			**Rankings of Source Scores – Wet Weather**		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
HUMAN WASTE			HUMAN WASTE		
1	Sanitary Sewer Overflows	Sewage Infrastructure	1	Sanitary Sewer Overflows	Sewage Infrastructure
2	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	2	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure
3	Trash cans	Sources related to Garbage	3	Illegal Discharges	Other Wastewater
4	Illegal Discharges	Other Wastewater	4	Dumpsters	Sources related to Garbage
5	Dumpsters	Sources related to Garbage	5	Trash cans	Sources related to Garbage
6	Illicit Connections	Other Wastewater	6	Porta-Potties	Other Wastewater
7	Porta-Potties	Other Wastewater	7	RVs (mobile)	Mobile Sources
8	RVs (mobile)	Mobile Sources	8	Illicit Connections	Other Wastewater
9	Garbage trucks	Sources related to Garbage	9	Garbage trucks	Sources related to Garbage
10	Illegal Dumping	Sources related to Garbage	10	Homeless Encampments	Mobile Sources
11	Homeless Encampments	Mobile Sources	11	Illegal Dumping	Sources related to Garbage
12	Hot Tubs	Non-stormwater Discharges	12	Hot Tubs	Non-stormwater Discharges
13	Pools	Non-stormwater Discharges	13	Pools	Non-stormwater Discharges
ANTHROPOGENIC NON-HUMAN			ANTHROPOGENIC NON-HUMAN		
1	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	1	Manure/Compost	Landscaping
2	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	2	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife
3	Pets	Domestic Animals	3	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife
4	Manure/Compost	Landscaping	4	Dumpsters	Solid/Liquid Waste
5	Vectors	Solid/Liquid Waste	5	Pets	Domestic Animals
6	Garbage Trucks	Solid/Liquid Waste	6	Soil	Landscaping
7	Trash Cans	Solid/Liquid Waste	7	Trash Cans	Solid/Liquid Waste
8	Litter	Solid/Liquid Waste	8	Garbage Trucks	Solid/Liquid Waste

Rankings of Source Scores – Dry Weather			Rankings of Source Scores – Wet Weather		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
9	Dumpsters	Solid/Liquid Waste	9	Vectors	Solid/Liquid Waste
10	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	10	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth
11	Green Waste	Landscaping	11	Green Waste	Landscaping
12	Soil	Landscaping	12	Litter	Solid/Liquid Waste
NON-ANTHROPOGENIC			NON-ANTHROPOGENIC		
1	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1	Wildlife (Birds and Others)	Wildlife (Birds and Others)
2	Soil	Soil	2	Soil	Soil
3	Plants	Plants	3	Plants	Plants
4	Algae	Algae	4	Algae	Algae

* Ranks are shown within each category (Human, Anthropogenic Non-Human, Non-Anthropogenic)

City of Solana Beach

The City of Solana Beach's primary focus area drains to the outfall site: SB12, illustrated in **Figure 13**. The total area is 74 acres, and consists of 72% residential land uses, 7% open space, 1% institutional land use and 20% road infrastructure. In addition, the majority of the residential parcels contain multi-family residential units. While commercial businesses are rare within the boundaries of the focus area, multi-family residential units contain similar features that are commonly associated with business activities, such as large dumpsters. The potential bacteria sources within this focus area represent both residential and commercial activities associated with human waste, as well as some infrastructure. This focus area was previously identified as an area of interest for the City of Solana Beach.

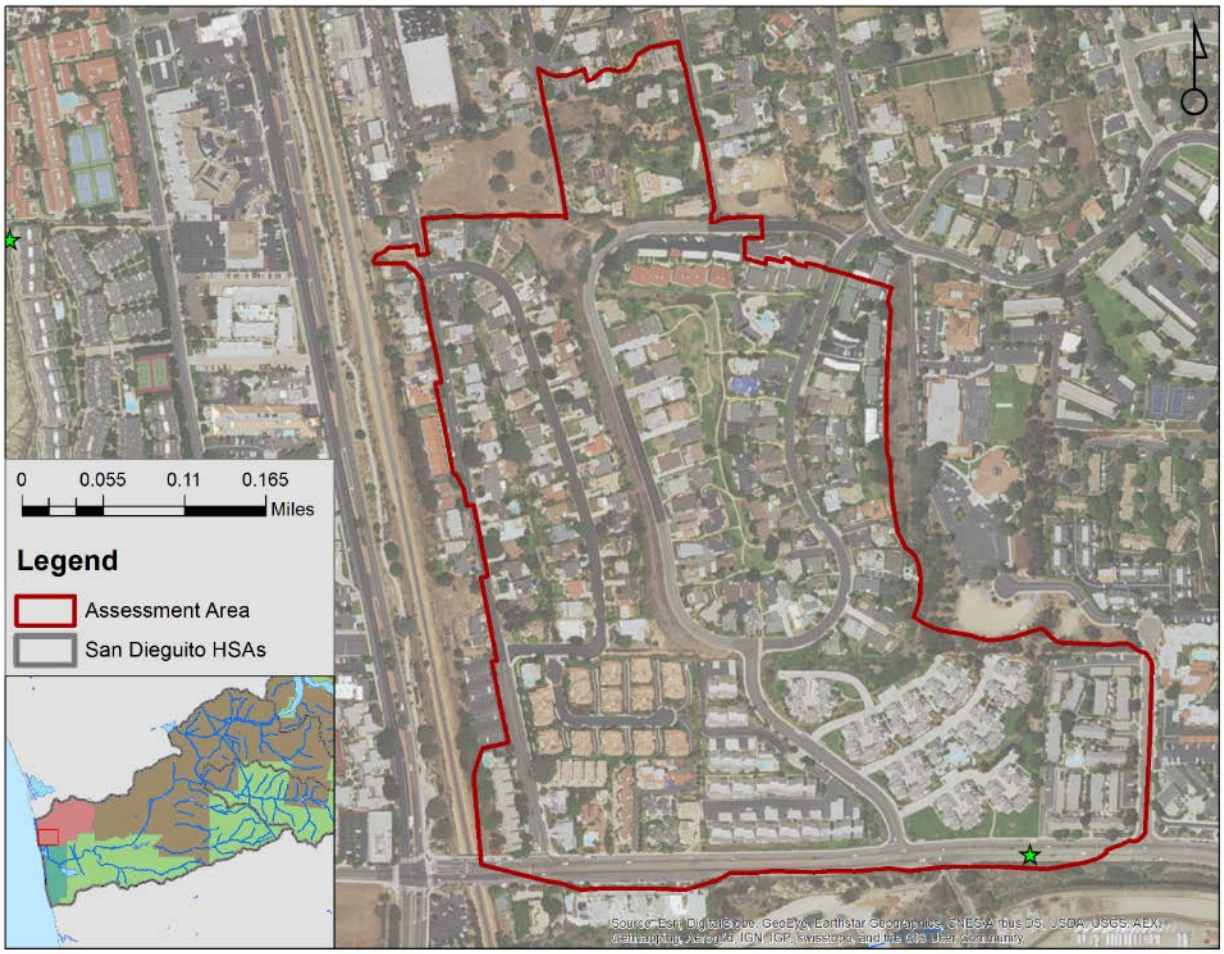

Figure 13. Focus area for the City of Solana Beach at Outfall SB-12

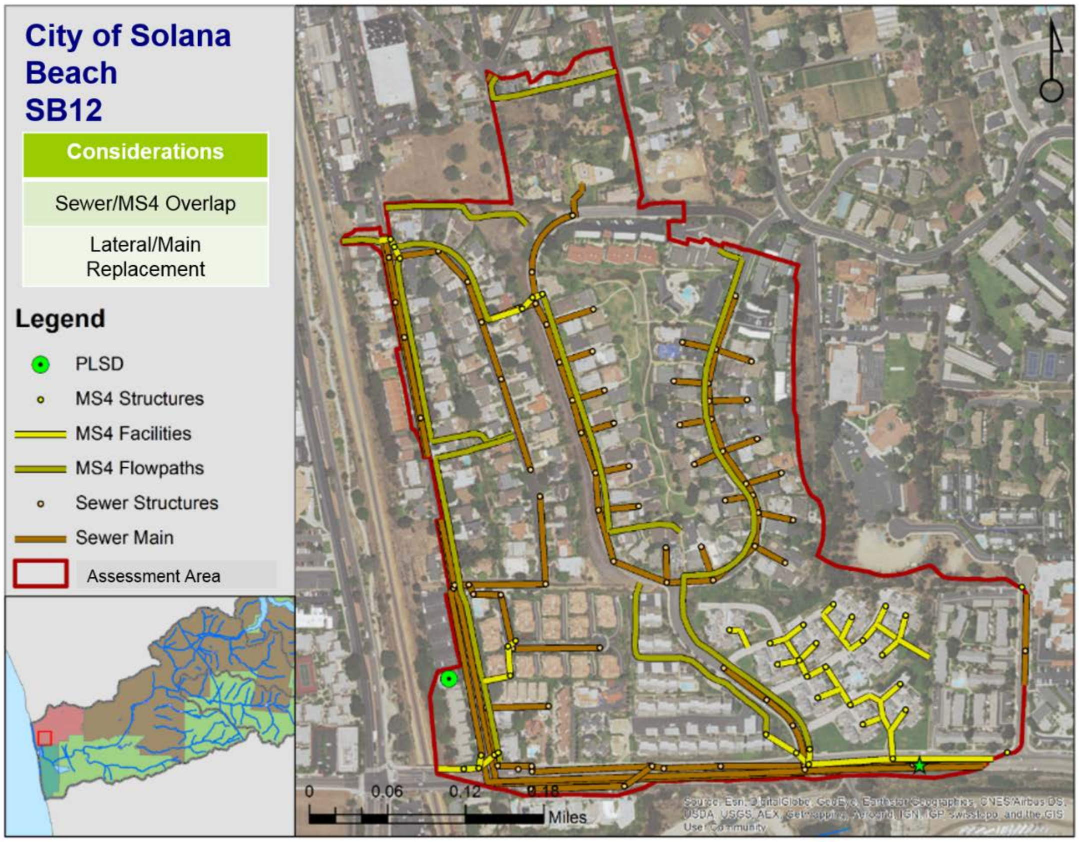

Figure 14. MS4 and Sanitary Sewer Infrastructure within the City of Solana Beach Focus Area: Outfall SB-12

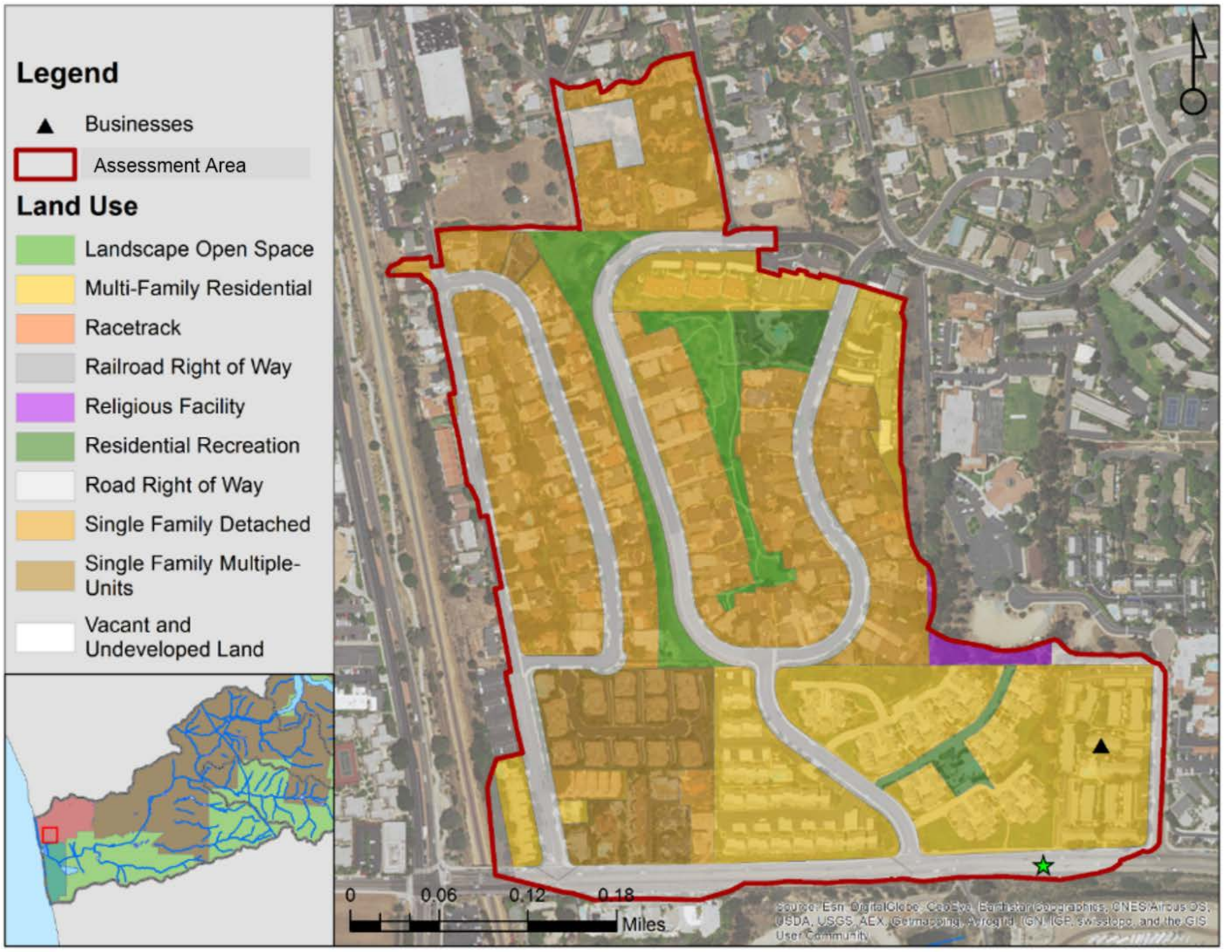

Figure 15. Land Use and Businesses within the City of Solana Beach Focus Area: Outfall SB-12

Table 14. Summary of Potential Bacteria Source Characteristics within SB-12

Source	Human Health Risk	Magnitude	Transport Feasibility	Frequency	Controllable?
Residential	Med	Med/High	Irrigation	70% (52 ac)	Yes
Sanitary Sewer Overflows	High	High	Overflow volume	1 PLSD	Yes
Sanitary Sewer Infrastructure	High	High	High (condition assessment)	3.3 mi	Yes
Roads/Streets/Parking	Med	Med	Irrigation	19% (14 ac)	Yes
Mobile Landscaping	Med	Med	Irrigation Washing	Residential	Yes
Wildlife	Low/Med	Med	None	Open space (7%, 5 ac)	No
Bacteria Regrowth/Biofilms	Low	Med	Irrigation	2.2 mi MS4	Yes

The potential bacteria sources within the City of Solana Beach's focus area include of a mixture of anthropogenic non-human and human waste bacteria origins. A summary of the top ten sources is presented in **Table 15** and the complete prioritization results are located in **Table 16**.

Table 15. Top Ten Potential Bacteria Sources within City of Solana Beach Focus Area: SB-12

Condition	*Category*	*Source*	*Subcategory*	*Rank*
Dry	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Illegal Discharges	Other Wastewater	4
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	5
	Human Waste	Porta-Potties	Other Wastewater	6
	Human Waste	RVs (mobile)	Mobile Sources	7
	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	8
	Human Waste	Illicit Connections	Other Wastewater	9
	Anthropogenic Non-Human	Litter	Solid/Liquid Waste	10
Wet	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Illegal Discharges	Other Wastewater	4
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	5
	Human Waste	Porta-Potties	Other Wastewater	6
	Human Waste	RVs (mobile)	Mobile Sources	7
	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	8
	Human Waste	Illicit Connections	Other Wastewater	9
	Anthropogenic Non-Human	Litter	Solid/Liquid Waste	10

Table 16. Complete Prioritization Rankings of Potential Bacteria Sources within SB-12

Rankings of Source Scores – Dry Weather			**Rankings of Source Scores – Wet Weather**		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
HUMAN WASTE			**HUMAN WASTE**		
1	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	1	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure
2	Illegal Discharges	Other Wastewater	2	Illegal Discharges	Other Wastewater
3	Sanitary Sewer Overflows	Sewage Infrastructure	3	Sanitary Sewer Overflows	Sewage Infrastructure
4	Porta-Potties	Other Wastewater	4	Porta-Potties	Other Wastewater
5	RVs (mobile)	Mobile Sources	5	RVs (mobile)	Mobile Sources
6	Illicit Connections	Other Wastewater	6	Illicit Connections	Other Wastewater
7	Dumpsters	Sources related to Garbage	7	Dumpsters	Sources related to Garbage
8	Trash cans	Sources related to Garbage	8	Trash cans	Sources related to Garbage
9	Garbage trucks	Sources related to Garbage	9	Garbage trucks	Sources related to Garbage
10	Illegal Dumping	Sources related to Garbage	10	Illegal Dumping	Sources related to Garbage
11	Pools	Non-stormwater Discharges	11	Pools	Non-stormwater Discharges
12	Hot Tubs	Non-stormwater Discharges	12	Hot Tubs	Non-stormwater Discharges
ANTHROPOGENIC NON-HUMAN			**ANTHROPOGENIC NON-HUMAN**		
1	Pets	Domestic Animals	1	Pets	Domestic Animals
2	Manure/Compost	Landscaping	2	Manure/Compost	Landscaping
3	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	3	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth
4	Litter	Solid/Liquid Waste	4	Litter	Solid/Liquid Waste
5	Dumpsters	Solid/Liquid Waste	5	Green Waste	Landscaping
6	Trash Cans	Solid/Liquid Waste	6	Dumpsters	Solid/Liquid Waste
7	Green Waste	Landscaping	7	Trash Cans	Solid/Liquid Waste
8	Garbage Trucks	Solid/Liquid Waste	8	Garbage Trucks	Solid/Liquid Waste
9	Vectors	Solid/Liquid Waste	9	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife
10	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	10	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife
11	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	11	Soil	Landscaping

Rankings of Source Scores – Dry Weather			Rankings of Source Scores – Wet Weather		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
12	Soil	Landscaping	12	Vectors	Solid/Liquid Waste
NON-ANTHROPOGENIC			**NON-ANTHROPOGENIC**		
1	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1	Wildlife (Birds and Others)	Wildlife (Birds and Others)
2	Plants	Plants	2	Plants	Plants
3	Algae	Algae	3	Algae	Algae
4	Soil	Soil	4	Soil	Soil

* Ranks are shown within each category (Human, Anthropogenic Non-Human, Non-Anthropogenic)

City of San Diego/City of Solana Beach – Shared Focus Area (DW-619)

The Cities of San Diego and Solana Beach assessed and prioritized bacteria sources within a focus area that drain through an outfall within the City of San Diego's jurisdiction but included areas draining the City of Solana Beach, shown in **Figure 16**. In this focus area, identified by outfall DW-619, the total area is 60.42 acres, with 17.91 acres within the City of San Diego and 42.51 acres within the City of Solana Beach. For the area within the City of San Diego, 46% of the land use consists of commercial parcels, while the remaining portion are comprised of mostly commercial land uses. In particular, the City's infrastructure drains a large neighborhood shopping center. The potential bacteria sources within this focus area represent these land uses and activities, including the potential for secondary wildlife associated with these activities.

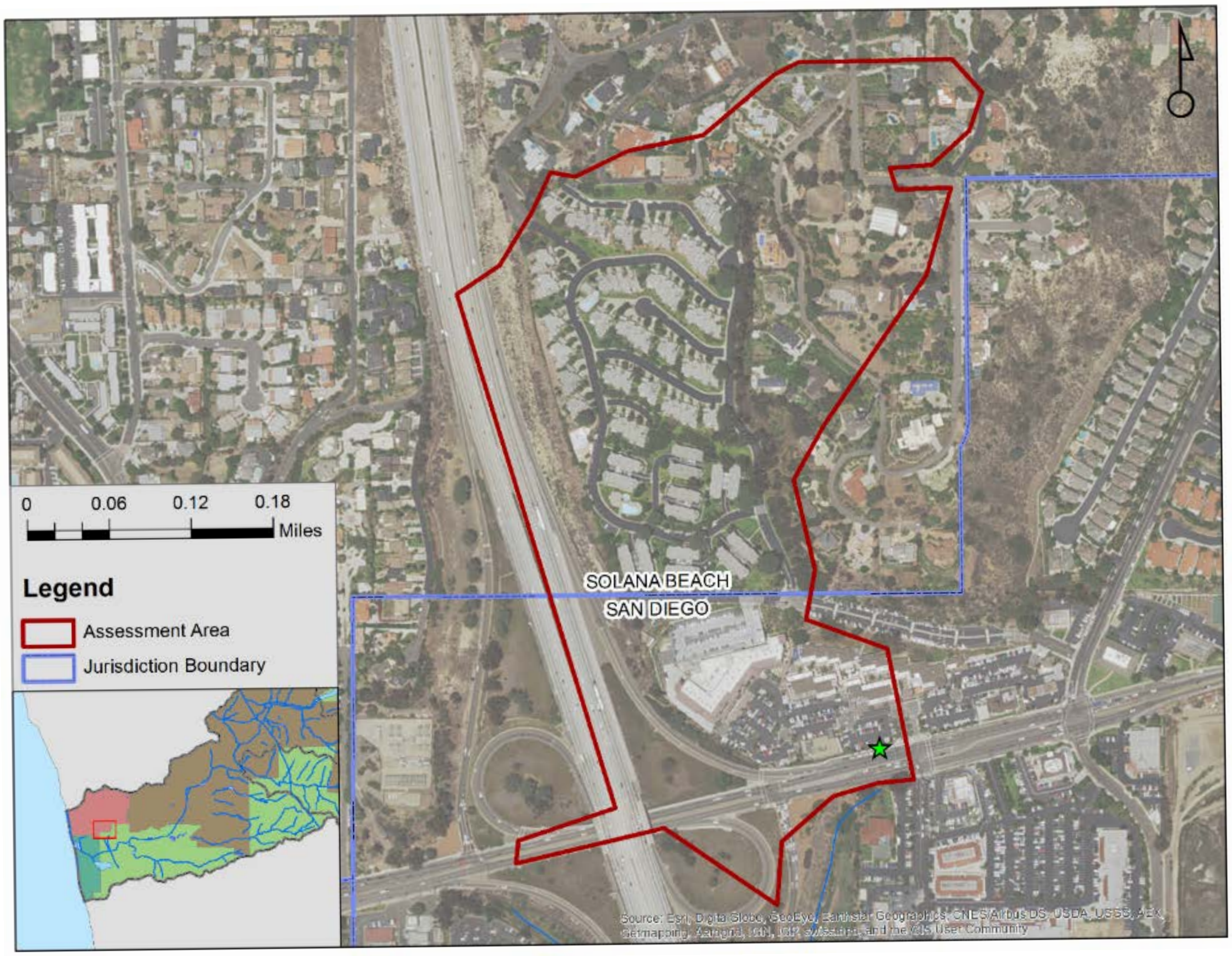

Figure 16. Shared Focus Area, Cities of Solana Beach and San Diego: Outfall DW-619

Table 17. Summary of Potential Bacteria Source Characteristics within the City of San Diego's portion of DW-619

Source	Human Health Risk	Magnitude	Transport Feasibility	Frequency	Controllable?
Residential	Med	Med/High	Irrigation	58% (35.36 acres)	Yes
Sanitary Sewer Infrastructure	High	High	Medium	0.10 mi (73%) VCP	Yes
Eating/Drinking Establishments	Med	Med/High	Irrigation Washing	10	Yes
Roads/Streets/Parking	Med	Med	Irrigation	28% (16.7 ac)	Yes
Mobile Landscaping	Med	Med	Irrigation Washing	Residential/ Commercial	Yes
Wildlife (secondary)	Med	Low/Med	Irrigation Washing	Commercial (14%, 8 ac)	Yes
Bacteria Regrowth/Biofilms	Low	Low	Irrigation	.20 mi of MS4 (RCP/CMP)	Yes

The potential bacteria sources within the City of San Diego's portion of the focus area include a mixture of human waste, and anthropogenic non-human bacteria origins. A summary of the top ten sources is presented in **Table 18**, and the complete prioritization results are located in **Table 19**.

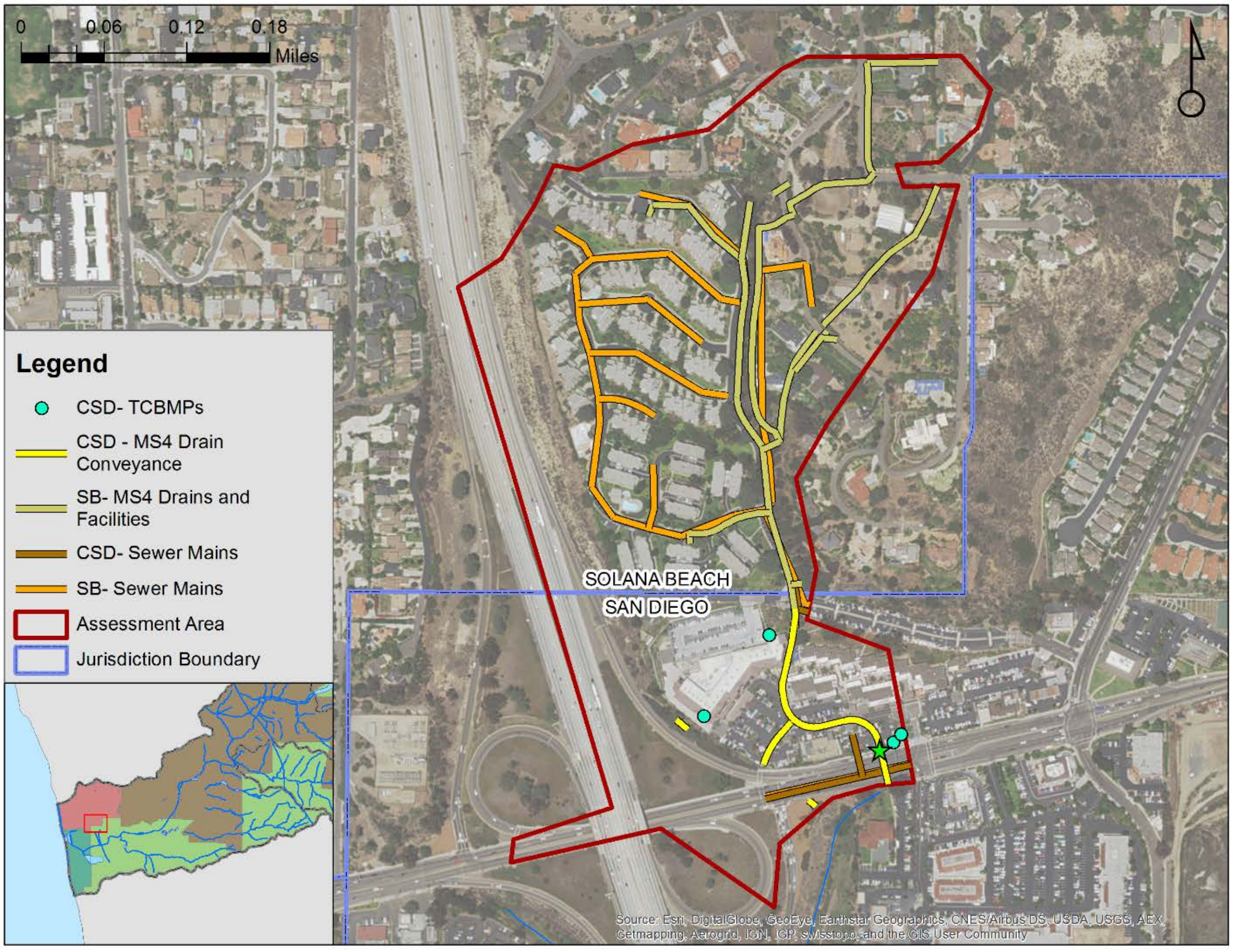

Figure 17. MS4 and Sewer System Infrastructure in the Shared Focus Area: Outfall DW-619

Table 18. Top Ten Potential Bacteria Sources within City of San Diego's Shared Focus Area with Solana Beach: Outfall DW-619

Condition	Category	Source	Subcategory	Rank
Dry	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Human Waste	Illicit Connections	Other Wastewater	3
	Anthropogenic Non-Human	Pets	Domestic Animals	4
	Anthropogenic Non-Human	Manure/Compost	Landscaping	5
	Human Waste	Illegal Discharges	Other Wastewater	6
	Anthropogenic Non-Human	Washwater	Solid/Liquid Waste	7
	Human Waste	RVs (mobile)	Mobile Sources	8
	Human Waste	Porta-Potties	Other Wastewater	9
	Human Waste	Dumpsters	Sources related to Garbage	10
Wet	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	1
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	2
	Anthropogenic Non-Human	Pets	Domestic Animals	3
	Anthropogenic Non-Human	Manure/Compost	Landscaping	4
	Human Waste	Illicit Connections	Other Wastewater	5
	Human Waste	Porta-Potties	Other Wastewater	6
	Human Waste	RVs (mobile)	Mobile Sources	7
	Human Waste	Dumpsters	Sources related to Garbage	8
	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	9
	Anthropogenic Non-Human	Dumpsters	Solid/Liquid Waste	10

Table 19. Complete Prioritization Rankings of Potential Bacteria Sources within the City of San Diego's portion of DW-619

Rankings of Source Scores – Dry Weather			Rankings of Source Scores – Wet Weather		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
HUMAN WASTE			HUMAN WASTE		
1	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	1	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure
2	Sanitary Sewer Overflows	Sewage Infrastructure	2	Sanitary Sewer Overflows	Sewage Infrastructure
3	Illicit Connections	Other Wastewater	3	Illicit Connections	Other Wastewater
4	Illegal Discharges	Other Wastewater	4	Porta-Potties	Other Wastewater
5	RVs (mobile)	Mobile Sources	5	RVs (mobile)	Mobile Sources
6	Porta-Potties	Other Wastewater	6	Dumpsters	Sources related to Garbage
7	Dumpsters	Sources related to Garbage	7	Garbage trucks	Sources related to Garbage
8	Garbage trucks	Sources related to Garbage	8	Illegal Discharges	Other Wastewater
9	Trash cans	Sources related to Garbage	9	Trash cans	Sources related to Garbage
10	Illegal Dumping	Sources related to Garbage	10	Illegal Dumping	Sources related to Garbage
ANTHROPOGENIC NON-HUMAN			ANTHROPOGENIC NON-HUMAN		
1	Pets	Domestic Animals	1	Pets	Domestic Animals
2	Manure/Compost	Landscaping	2	Manure/Compost	Landscaping
3	Washwater	Solid/Liquid Waste	3	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth
4	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	4	Dumpsters	Solid/Liquid Waste
5	Dumpsters	Solid/Liquid Waste	5	Garbage Trucks	Solid/Liquid Waste
6	Litter	Solid/Liquid Waste	6	Washwater	Solid/Liquid Waste
7	Vectors	Solid/Liquid Waste	7	Litter	Solid/Liquid Waste
8	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	8	Vectors	Solid/Liquid Waste
9	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	9	Trash Cans	Solid/Liquid Waste
10	Garbage Trucks	Solid/Liquid Waste	10	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife
11	Grease Bins	Solid/Liquid Waste	11	Grease Bins	Solid/Liquid Waste
12	Trash Cans	Solid/Liquid Waste	12	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife

Rankings of Source Scores – Dry Weather			Rankings of Source Scores – Wet Weather		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
13	Outdoor Dining/ Fast Food	Commercial/ Industrial	13	Outdoor Dining/ Fast Food	Commercial/ Industrial
14	Green Waste	Landscaping	14	Green Waste	Landscaping
15	Soil	Landscaping	15	Soil	Landscaping
NON-ANTHROPOGENIC			NON-ANTHROPOGENIC		
1	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1	Wildlife (Birds and Others)	Wildlife (Birds and Others)
2	Plants	Plants	2	Plants	Plants
3	Algae	Algae	3	Algae	Algae
4	Soil	Soil	4	Soil	Soil

* Ranks are shown within each category (Human, Anthropogenic Non-Human, Non-Anthropogenic)

The land uses within the City of Solana Beach's jurisdiction are comprised of 83% multi-family and single-family residential homes. The remaining portion of land use consists of road infrastructure. The potential bacteria sources within this focus area represent the activities and sources more commonly associated with residential land use. These residential parcels were split between single family residential and multi-unit residential land uses.

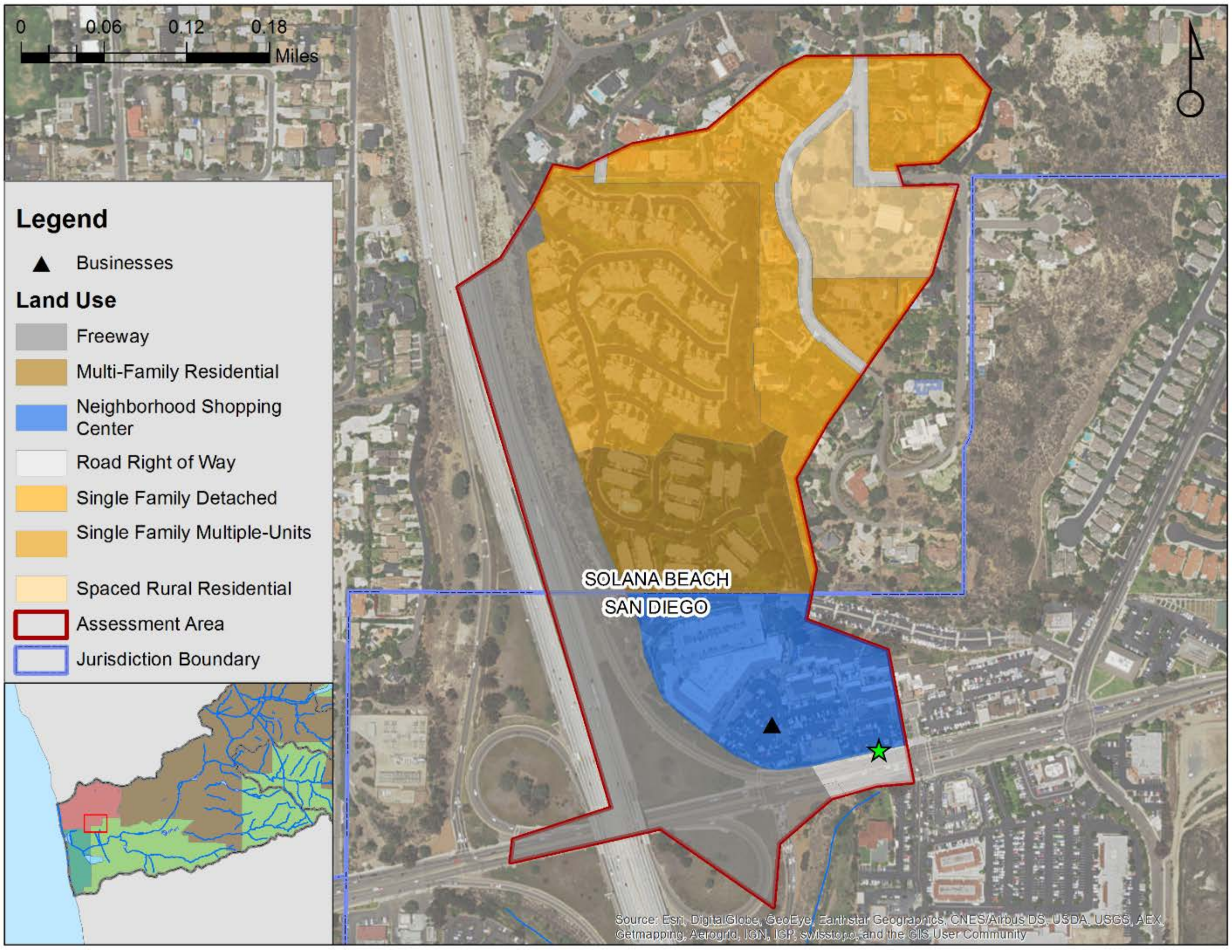

Figure 18. Land Use and Businesses in the City of Solana Beach's Portion of the Shared Focus Area: Outfall DW-619

Table 20. Summary of Potential Bacteria Source Characteristics for the City of Solana Beach's portion of DW-619

Source	Human Health Risk	Magnitude	Transport Feasibility	Frequency	Controllable?
Residential	Med	Med/High	Irrigation	58% (35.36 acres)	Yes
Sanitary Sewer Infrastructure	High	High	Medium	1.18 mi (100%) VCP	Yes
Roads/Streets/Parking	Med	Med	Irrigation	28% (16.7 ac)	Yes
Mobile Landscaping	Med	Med	Irrigation Washing	Residential/ Commercial	Yes
Bacteria Regrowth/Biofilms	Low	Low	Irrigation	1 mi of MS4 (RCP/CMP)	Yes

The potential bacteria sources within the City of Solana Beach's portion of the focus area include a mixture of human waste and anthropogenic non-human bacteria origins. A summary of the top ten sources is presented in **Table 21** and the complete prioritization results are located in **Table 22**.

Table 21. Top Ten Potential Bacteria Sources within City of Solana Beach's Portion of the Shared Focus Area: DW-619

Condition	*Category*	*Source*	*Subcategory*	*Rank*
Dry	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	4
	Human Waste	Illegal Discharges	Other Wastewater	5
	Human Waste	Porta-Potties	Other Wastewater	6
	Human Waste	RVs (mobile)	Mobile Sources	7
	Human Waste	Illicit Connections	Other Wastewater	8
	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	9
	Anthropogenic Non-Human	Litter	Solid/Liquid Waste	10
Wet	Anthropogenic Non-Human	Pets	Domestic Animals	1
	Anthropogenic Non-Human	Manure/Compost	Landscaping	2
	Human Waste	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	3
	Human Waste	Sanitary Sewer Overflows	Sewage Infrastructure	4
	Human Waste	Porta-Potties	Other Wastewater	5
	Human Waste	Illegal Discharges	Other Wastewater	6
	Human Waste	RVs (mobile)	Mobile Sources	7
	Anthropogenic Non-Human	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	8
	Human Waste	Illicit Connections	Other Wastewater	9
	Anthropogenic Non-Human	Litter	Solid/Liquid Waste	10

Table 22. Complete Prioritization Rankings of Potential Bacteria Sources within City of Solana Beach's Portion of DW-619

Rankings of Source Scores – Dry Weather			Rankings of Source Scores – Dry Weather		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
HUMAN WASTE			HUMAN WASTE		
1	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	1	Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure
2	Sanitary Sewer Overflows	Sewage Infrastructure	2	Sanitary Sewer Overflows	Sewage Infrastructure
3	Illegal Discharges	Other Wastewater	3	Porta-Potties	Other Wastewater
4	Porta-Potties	Other Wastewater	4	Illegal Discharges	Other Wastewater
5	RVs (mobile)	Mobile Sources	5	RVs (mobile)	Mobile Sources
6	Illicit Connections	Other Wastewater	6	Illicit Connections	Other Wastewater
7	Dumpsters	Sources related to Garbage	7	Dumpsters	Sources related to Garbage
8	Garbage trucks	Sources related to Garbage	8	Garbage trucks	Sources related to Garbage
9	Trash cans	Sources related to Garbage	9	Trash cans	Sources related to Garbage
10	Illegal Dumping	Sources related to Garbage	10	Illegal Dumping	Sources related to Garbage
11	Pools	Non-stormwater Discharges	11	Pools	Non-stormwater Discharges
12	Hot Tubs	Non-stormwater Discharges	12	Hot Tubs	Non-stormwater Discharges
ANTHROPOGENIC NON-HUMAN			ANTHROPOGENIC NON-HUMAN		
1	Pets	Domestic Animals	1	Pets	Domestic Animals
2	Manure/Compost	Landscaping	2	Manure/Compost	Landscaping
3	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth	3	MS4 Infrastructure - Biofilm/Regrowth	MS4 Infrastructure - Biofilm/Regrowth
4	Litter	Solid/Liquid Waste	4	Litter	Solid/Liquid Waste
5	Green Waste	Landscaping	5	Green Waste	Landscaping
6	Dumpsters	Solid/Liquid Waste	6	Dumpsters	Solid/Liquid Waste
7	Trash Cans	Solid/Liquid Waste	7	Trash Cans	Solid/Liquid Waste
8	Garbage Trucks	Solid/Liquid Waste	8	Garbage Trucks	Solid/Liquid Waste
9	Vectors	Solid/Liquid Waste	9	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife
10	Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	10	Soil	Landscaping
11	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	11	Vectors	Solid/Liquid Waste

Rankings of Source Scores – Dry Weather			Rankings of Source Scores – Dry Weather		
Rank *	**Source**	**Subcategory**	**Rank ***	**Source**	**Subcategory**
12	Soil	Landscaping	12	Birds (Gulls, Pigeons, etc.)	Secondary Wildlife
NON-ANTHROPOGENIC			NON-ANTHROPOGENIC		
1	Wildlife (Birds and Others)	Wildlife (Birds and Others)	1	Wildlife (Birds and Others)	Wildlife (Birds and Others)
2	Plants	Plants	2	Plants	Plants
3	Algae	Algae	3	Algae	Algae
4	Soil	Soil	4	Soil	Soil

* Ranks are shown within each category (Human, Anthropogenic Non-Human, Non-Anthropogenic)

Attachment G –CEDEN Certification Statements

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The files listed in Table G-1 were uploaded to CEDEN. Confirmation emails are included on the following pages.

Table G-1
San Dieguito River WMA CEDEN Files and Upload Dates

Monitoring Program	Copermittee	Results Type	File Name(s)	CEDEN Project Name Field Name "ProjectCode"	CEDEN Upload Date	Confirmation Email Attached?
Wet Weather MS4 Outfall	Cities of Del Mar, Escondido, Poway, San Diego, and Solana Beach	Chemistry Results	SanDieguito_WW_MS4_2015-2016-CHEM1.xls SanDieguito_WW_MS4_2015-2016-CHEM2.xls	MS4_WW_OFM	Data provided to State Water Resources Control Board. Upload pending.	Confirmation to be provided to Regional Board in separate correspondence.
	County of San Diego	Chemistry Results	County_SDG_WW_MS4_2015-2016.xls	MS4_WW_OFM	1/27/2017	Yes
	Cities of Del Mar, Escondido, Poway, San Diego, and Solana Beach; County of San Diego	Bacteria Results	SanDieguito_LosPen_WW_2015-2016-BACT.xls	MS4_WW_OFM	1/27/2017	Yes
	Cities of Del Mar, Escondido, Poway, San Diego, and Solana Beach; County of San Diego	Field Results	MS4-SDR-2016-FIELD SMJ.xls	MS4_WW_OFM	1/25/2017	Yes
Dry Weather MS4 Outfall	City of Del Mar	Chemistry Results	SDG_DelMar_CEDEN_Chem_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
		Field Results	SDG_DelMar_CEDEN_Field_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
	City of Escondido	Chemistry Results	SDG_Escondido_CEDEN_Chem_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
		Field Results	SDG_Escondido_CEDEN_Field_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
	City of Poway	Chemistry Results	SDG_Poway_CEDEN_Chem_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
		Field Results	SDG_Poway_CEDEN_Field_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
	City of San Diego	Chemistry Results	SDG CEDEN CSD Chem DW Template.xls	MS4_DW_OFSM	1/25/2017	Yes
		Field Results	SDG CEDEN CSD Field DW Template.xls	MS4_DW_OFSM	1/25/2017	Yes
	City of Solana Beach	Chemistry Results	SDG_SolanaBeach_CEDEN_Chem_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
		Field Results	SDG_SolanaBeach_CEDEN_Field_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
	County of San Diego	Chemistry Results	SDG_CountySD_CEDEN_Chem_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
		Field Results	SDG_CountySD_CEDEN_Field_Final.xls	MS4_DW_OFSM	1/25/2017	Yes
Bacteria TMDL	Cities of Del Mar, Escondido, Poway, San Diego, and Solana Beach; County of San Diego	Chemistry Results	CEDEN EDD_2015-16_ChemResults_SanDieguito.xlsx	SanDieguito_BacteriaTMDL	1/9/2017	Yes
		Field Results	CEDEN EDD_2015-16_FieldResults_SanDieguito.xlsx	SanDieguito_BacteriaTMDL	1/9/2017	Yes

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Hysler, Kristina

From: Bennett, Jarma@Waterboards <Jarma.Bennett@waterboards.ca.gov>
Sent: Monday, January 30, 2017 11:33 AM
To: Mitchell, Roger@Waterboards; Arias, Christina@Waterboards
Cc: Arthur, Thomas M; Hysler, Kristina
Subject: WQIP Annual Report Data Submittal to CEDEN

Hello Roger and Christina,

As the Water Boards' program manager for the California Environmental Data Exchange Network (CEDEN), I'm been working with Amec Foster Wheeler on submitting WQIP Annual Report data to the CEDEN database. They have been able to successfully submit many files to CEDEN, however, there are 16 files, listed below, for which certificates of submittal cannot be obtained at this time due to new vocabulary values (requested by Amec Foster Wheeler) that are not yet fully incorporated into the CEDEN database. Adding new controlled vocabulary to CEDEN requires a number of steps and some of the values requested got hung-up because of issues within the CEDEN process. I have accepted these files outside of the data checker process and as soon as the vocabulary request is active, we will upload the files and deliver the certificates to the Regional Board.

The affected files are:
Tijuana River WMA
–TJ MS4_CSD_DW_ChemResults_2015-2016
–TJ MS4 WW1_ChemResults_2015-2016
–TJ MS4 WW2_ChemResults_2015-2016
–TJ MS4 WW3_ChemResults_2015-2016
–TJ MS4 WW4_ChemResults_2015-2016
–TJ MS4 WW5_ChemResults_2015-2016
–TJ MS4 WW6_ChemResults_2015-2016

San Diego Bay WMA
–ChollasTMDL_CEDEN EDD_Chem Results_2015-16_TMDL_SS
–ChollasTMDL_CEDEN EDD_ToxResults_2015-16_TMDL_SS
–ChollasTMDL_CEDEN EDD_FieldResults_2015-16_TMDL_SS
–ShelterIsland_TMDL_ChemResults_2015-2016
–ShelterIsland_TMDL_FieldResults_2015-2016
–43rdLogan_ChemResults
–43rdLogan_FieldResults

San Dieguito WMA
–SanDieguito_WW_MS4_2015-2016-CHEM1
–SanDieguito_WW_MS4_2015-2016-CHEM2

Please let me know if you have any questions or if you would like to discuss the CEDEN process.

Thank you,

Jarma Bennett
CEDEN Program Manager
Office of Information Management and Analysis

State Water Resources Control Board
916-341-5532

Jeltema, Stephen

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Friday, January 27, 2017 3:29 PM
To: Jeltema, Stephen
Subject: Submittal confirmation for file County_SDG_WW_MS4_2015-2016.xls.

You have successfully submitted file County_SDG_WW_MS4_2015-2016.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Stephen Jeltema Amec Foster Wheeler
8585147756

Jeltema, Stephen

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Friday, January 27, 2017 3:42 PM
To: Jeltema, Stephen
Subject: Submittal confirmation for file SanDieguito_LosPen_WW_2015-2016-BACT.xls.

You have successfully submitted file SanDieguito_LosPen_WW_2015-2016-BACT.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Stephen Jeltema Amec Foster Wheeler
8585147756

Jeltema, Stephen

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 2:40 PM
To: Jeltema, Stephen
Subject: Submittal confirmation for file MS4-SDR-2016-FIELD SMJ.xls.

You have successfully submitted file MS4-SDR-2016-FIELD SMJ.xls to the WATER RDC for uploading into the CEDEN Database.

You supplied the following comment: Stephen Jeltema Amec Foster Wheeler
8585147756

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 1:08 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file SDG_DelMar_CEDEN_Chem_Final.xls.

You have successfully submitted file SDG_DelMar_CEDEN_Chem_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 1:11 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file SDG_DelMar_CEDEN_Field_Final.xls.

You have successfully submitted file SDG_DelMar_CEDEN_Field_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 1:14 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file SDG_Escondido_CEDEN_Chem_Final.xls.

You have successfully submitted file SDG_Escondido_CEDEN_Chem_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 1:14 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file SDG_Escondido_CEDEN_Field_Final.xls.

You have successfully submitted file SDG_Escondido_CEDEN_Field_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 1:28 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file SDG_Poway_CEDEN_Chem_Final.xls.

You have successfully submitted file SDG_Poway_CEDEN_Chem_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 1:30 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file SDG_Poway_CEDEN_Field_Final.xls.

You have successfully submitted file SDG_Poway_CEDEN_Field_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 1:01 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file SDG CEDEN CSD Chem DW Template.xls.

You have successfully submitted file SDG CEDEN CSD Chem DW Template.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 1:04 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file SDG CEDEN CSD Field DW Template.xls.

You have successfully submitted file SDG CEDEN CSD Field DW Template.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 1:18 PM
To: DeLaTorre, Luis
Subject: Submittal confirmation for file SDG_SolanaBeach_CEDEN_Chem_Final.xls.

You have successfully submitted file SDG_SolanaBeach_CEDEN_Chem_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

From:	CEDEN Checker <ceden@waterboards.ca.gov>
Sent:	Wednesday, January 25, 2017 1:19 PM
To:	DeLaTorre, Luis
Subject:	Submittal confirmation for file SDG_SolanaBeach_CEDEN_Field_Final.xls.

You have successfully submitted file SDG_SolanaBeach_CEDEN_Field_Final.xls to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Luis De La Torre Technical Professional Amec Foster Wheeler Direct +1 (858) 514 7752 Mobile +1 (626) 940 6935 Luis.DeLaTorre@amecfw.com

Arthur, Thomas M

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Wednesday, January 25, 2017 9:38 AM
To: Arthur, Thomas M
Subject: Submittal confirmation for file SDG_County_CEDEN_ChemResults_2015-16_Final.xlsx.

You have successfully submitted file SDG_County_CEDEN_ChemResults_2015-16_Final.xlsx to the WATER RDC for uploading into the CEDEN Database.

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Friday, January 13, 2017 5:31 PM
To: Arthur, Thomas M
Subject: Submittal confirmation for file SDG_County_CEDEN_FieldResults_2015-16_Final.xlsx.

You have successfully submitted file SDG_County_CEDEN_FieldResults_2015-16_Final.xlsx to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Uploaded by:
Thomas Arthur
Senior Scientist, Water Resources
Amec Foster Wheeler, Environment & Infrastructure, Inc.
9177 Sky Park Court, San Diego, CA 92123, USA D 858.514.7793 M 619.804.1422

Johnson, Claire (EI West US)

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Monday, January 09, 2017 2:31 PM
To: Ebentier, Darcy
Subject: Submittal confirmation for file CEDEN EDD_2015-16_ChemResults_SanDieguito.xlsx.

You have successfully submitted file CEDEN EDD_2015-16_ChemResults_SanDieguito.xlsx to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Darcy Ebentier darcy.ebentier@amecfw.com

Johnson, Claire (EI West US)

From: CEDEN Checker <ceden@waterboards.ca.gov>
Sent: Monday, January 09, 2017 2:35 PM
To: Ebentier, Darcy
Subject: Submittal confirmation for file CEDEN EDD_2015-16_FieldResults_SanDieguito.xlsx.

You have successfully submitted file CEDEN EDD_2015-16_FieldResults_SanDieguito.xlsx to the WATER RDC for uploading into the CEDEN Database.
You supplied the following comment: Darcy Ebentier darcy.ebentier@amecfw.com

Appendix D: Jurisdictional Runoff Management Program (JRMP) Annual Report Forms, Fiscal Analysis, Certifications, Updates to JRMPs, WQIP, and BMP Design Manuals (if applicable), and Jurisdictional Strategies

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Jurisdictional strategies are required as part of the Water Quality Improvement Plan (WQIP), under Provision B of the San Diego Regional Water Quality Control Board (Regional Board) National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region, Order Number R9-2013-0001 (MS4 Permit). The Responsible Agencies (RAs) identified water quality improvement strategies outlined in the WQIP and implemented those strategies in fiscal year (FY) 16, the first year of WQIP implementation, to address the highest priority water quality conditions (HPWQCs). The strategies were selected on the basis of their ability to effectively and efficiently eliminate non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the maximum extent practicable, and achieve the interim and final numeric goals identified in the San Dieguito River Watershed Management Area (WMA) WQIP.

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D.1 City of Del Mar

D.1.1 Annual Report Certifications

The City of Del Mar's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.1.2 Annual Report Form

Del Mar's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

City of Del Mar

STATEMENT OF CERTIFICATION

San Dieguito Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report

And

Legal Authority Establishment and Enforcement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (40 C.F.R. 122.22(d)).

Further, I certify under penalty of law that the City of Del Mar has taken necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in section E.1 of the San Diego Regional Water Quality Control Board Order No. R9-2013-0001 as amended by Order No. R9-2015-0100 (Municipal Permit). The Del Mar Municipal Code (DMMC), including the following provisions, provides the City with full legal authority as required by the Municipal Permit as well as authorizes judicial and administrative enforcement procedures to mandate compliance:

1. Stormwater Management and Discharge Control, DMMC Section 11.30
2. Clean Water Storm Drain Program – General, DMMC Section 11.32

Scott Huth
City Manager

1/13/2017
Date

1050 Camino Del Mar, Del Mar, California 92014-2698. Telephone: (858) 755-9313 Fax: (858) 755-2794
www.delmar.ca.us

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
CITY OF DEL MAR – ANNUAL REPORT FORM
FY 2015-2016

I. COPERMITTEE INFORMATION

Copermittee Name: **City of Del Mar – San Dieguito WMA**

Copermittee Primary Contact Name: **Mikhail Ogawa**

Copermittee Primary Contact Information:
Address: **1050 Camino Del Mar**
City: **Del Mar** County: **San Diego** State: **CA** Zip: **92014**
Telephone: **(858) 755-9313** Fax: **(858) 755-2794** Email: **Mikhail@mogawaeng.com**

II. LEGAL AUTHORITY

Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☒ ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES[1] NO	☒ ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☒ ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES[2] NO	☒ ☐

Number of non-storm water discharges reported by the public	18
Number of non-storm water discharges detected by Copermittee staff or contractors	22
Number of non-storm water discharges investigated by the Copermittee	40
Number of sources of non-storm water discharges identified	40
Number of non-storm water discharges eliminated	40
Number of sources of illicit discharges or connections identified	8
Number of illicit discharges or connections eliminated	8
Number of enforcement actions issued	6
Number of escalated enforcement actions issued	3

V. DEVELOPMENT PLANNING PROGRAM

Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	☒ ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☒ ☐

Number of proposed development projects in review	101
Number of Priority Development Projects in review	2
Number of Priority Development Projects approved	1
Number of approved Priority Development Projects exempt from any BMP requirements	1
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	0

Number of completed Priority Development Projects in inventory	2
Number of high priority Priority Development Project structural BMP inspections	22
Number of Priority Development Project structural BMP violations	0
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Number of construction sites in inventory	52
Number of active construction sites in inventory	41
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	11
Number of construction site inspections	408
Number of construction site violations	22
Number of enforcement actions issued	22
Number of escalated enforcement actions issued	1

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	24	81	0	37
Number of existing development inspections	264	891	0	407
Number of follow-up inspections	0	0	0	0
Number of violations	1	61	0	3
Number of enforcement actions issued	1	61	0	3
Number of escalated enforcement actions issued	0	2	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES ☒ NO ☐

X. CERTIFICATION

I ☒ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Scott L. Huth — Signature | 1/9/2017 — Date

Scott Huth — Print Name | City Manager — Title

858-755-9313 — Telephone Number | SHUTH@DELMAR.CA.US — Email

[1] The City of Del Mar was required to submit an updated JRMP with the WQIP and post it to the Regional Clearinghouse portal.
[2] The timeframe used for the Illicit Discharge Detection and Elimination component of this JRMP Annual Report matches the timeframe used in the WQIP Annual Report (10/1/15-9/30/16).

1. Fiscal Analysis

1.1 Jurisdictional Runoff Management Program Implementation

This section of the Jurisdictional Runoff Management Program (JRMP) Annual Report provides a fiscal analysis of the City's stormwater management programs. On May 8, 2013 the RWQCB adopted a revised Municipal Permit, Order No. R9-2013-0001, however, during this transitional period the City of Del Mar continued to develop its fiscal analysis according to Section G of the previous Municipal Permit, Order No. R9-2007-0001.

On January 29, 2009, the San Diego Municipal Copermittees adopted the "Standardized Fiscal Method and Format" which provides a model for the City of Del Mar and other Copermittees to perform the review and annual reporting as required in Order R9-2007-0001, Section G. This methodology and reporting format proved to be an effective model for reporting on City expenditures, and for consistency, the City of Del Mar will continue to use the format for this reporting period FY 2015-2016. The City, however, recognizes the additional elements required to be included in the fiscal analysis as specified in Order No. R9-2013-001 Section E.8, and has included those components in the year's report.

1.1.1 Clean Water Program Budget

The City of Del Mar's Clean Water Program is a multi-departmental program, funded as an enterprise fund in the City's Annual Budget. Enterprise funds account for operations that are financed and operated in a manner similar to private businesses, with the costs of providing the services recovered largely through user fees. Fund 55 ("The Clean Water Fund"), is one of three (3) enterprise funds in the City's budget, and was added to the City's budget in Fiscal Year 2004 to account for the mandated costs of the City's responsibilities in order to comply with the Municipal Permit. The budget for the City of Del Mar has the appropriate funds allocated to meet the requirements of Permit 2013-0001, including any development, implementation, and enforcement activities required.

The City of Del Mar Operating and Capital Improvement Budgets for Fiscal Years 2015-2016 and 2016-2017 were presented to the Del Mar City Council on June 1, 2015. The budget was formally adopted during the same meeting.

For the Fiscal Year 2015-2016 reporting period, the final amended budget for Fund 55 totaled $550,670. **Table 1-1** below provides a breakdown of program budget by major budget category for Fiscal Year 2015-2016.

Table 1-1: Budget Summary – Clean Water Fund 55

Fund Account		Adopted Budget Fiscal Year 2015-2016	Description/Comments
55-5530	Clean Water Planning	45,700	Active enforcement of clean water regulations including project plan review, permitting, construction monitoring and plan review of BMPs.
55-5536	Clean Water Code Enforcement	24,830	Active in-field enforcement of clean water regulations, including response to resident complaints.
55-5539	Clean Water Program Management	268,000	All clean water program management and reporting activities, fees to agencies, and interaction with regional and watershed Copermittee groups.
55-5840	Public Works (General)	212,140	Provides for administration and general support for all clean water programs for property and facilities, including supervision of maintenance staff.
Total Clean Water Program Budget – Fund 55		**$550,670**	–

1.1.2 Fiscal Analysis Methods

The City of Del Mar used the format and guidelines included in the Fiscal Analysis Method for reporting purposes; however, given the City's financial accounting methods, a few modifications were necessary. These adjustments are described below.

1.1.3 Fiscal Analysis Results

The City's Fiscal Year 2015-2016 jurisdictional, watershed, and regional projected expenditures for the implementation of the Municipal Permit requirements are summarized in **Table 1-2** below.

Table 1-2: Fiscal Year 2015-2016 Expenditure Summary by Program Component

Component Description	Fiscal Year 2015-2016 Projected Expenditures
Jurisdictional Component	
Administration	60,883
Development Planning	42,690
Construction	29,376
Municipal (Including Non-Emergency Fire Flows)	195,510
Industrial and Commercial	10,700
Residential, Education, and Public Participation	51,278
IDDE	37,066
Jurisdictional Total	**$427,503**
Watershed Component	
San Dieguito Watershed	47,975
Los Peñasquitos Watershed	37,275
Watershed Total	**$85,250**
Regional Component	
Total Copermittee Cost Share for Del Mar	37,918
Total Costs	**$550,670**

1.1.4 JRMP Expenditures

The City of Del Mar used the expenditure categories detailed in the Fiscal Analysis Method for jurisdictional reporting. However, due to the implementation overlap of some of the City's municipal permit components; it is difficult to separate out individual component costs. As a result, the expenditures for residential, education, and public participation are reported as one expenditure category. Additionally, since the City does not explicitly track expenditures by permit component for its budgeting purposes, in many cases estimated percentages were utilized to allocate expenditures into the appropriate municipal permit component categories.

A total of $550,670 was projected to be expended in Fiscal Year 2015-2016 for the implementation of JRMP activities. An overview of the expenditures reflected in JRMP activity component is described below.

Administration

Activities identified in this component represent labor and non-labor expenditures for materials, supplies, equipment, or tools that are not otherwise incorporated into other expenditure categories, general administrative functions (e.g., program planning, budgeting, staff supervision), and program assessment and reporting.

Development Planning

Activities identified in this component represent labor and non-labor expenditures related to issuance or oversight of permits or of plans (e.g., permit counter support, plan checks, permit or application processing), project planning and engineering (e.g. project design specifications, capital improvement projects).

Construction

Activities identified in this component represent labor and non-labor expenditures related to construction site inspections and enforcement.

Municipal

Activities identified in this component represent labor and non-labor expenditures related to maintenance inspections of streets, roads, catch basins and inlets, open channels, and the MS4, municipal facility inspections, street and parking lot sweeping, catch basins and inlets, open channels, and MS4 cleaning, and municipal BMP implementation. Since the City of Del Mar conducts all fire-fighting training outside of the City, and no non-emergency fire-fighting flows occurred during the reporting period, the City does not currently track expenditures relating to non-emergency fire-fighting flows. Any costs associated with preparing for these flows are included in the municipal component.

Industrial and Commercial

Activities identified in this component represent labor and non-labor expenditures related to evaluation and enforcement of program requirements at industrial and commercial sites or sources (e.g. routine inspections and complaint investigations).

Residential, Education, and Public Participation

Activities identified in these components represent labor and non-labor expenditures related to investigation and enforcement of residential areas or activities, staffing outreach events, development and production of outreach materials, and any expenditures associated with waste collection and recycling (e.g. household hazardous waste, used oil).

Illicit Discharge Detection and Elimination

Activities identified in this component represent labor and non-labor expenditures related to the identification and elimination of illicit discharges or connections, enforcing the City of Del Mar's storm water ordinance, and any expenditures related to monitoring programs (e.g. dry weather monitoring, coastal storm drain monitoring, special investigations, field or sampling equipment, materials and supplies).

1.1.5 Watershed Expenditures

The City of Del Mar used the expenditure categories (administration, watershed activities, cost share contribution, and other) detailed in the Fiscal Analysis Method for watershed reporting. The watershed expenditures included in this report only capture City of Del Mar expenditures and do not account for any expenditure disbursed by other Copermittees included in the watershed(s).

A total of $85,250 was projected to be expended in Fiscal Year 2015-2016 for the implementation of planned strategies for the San Dieguito and Los Peñasquitos Watersheds.

1.1.6 Regional Expenditures

The City of Del Mar utilized the expenditure categories (administration, cost share contribution, regional activities, and other) detailed in the Fiscal Analysis Method for regional reporting. The regional expenditures included in this report only capture City of Del Mar expenditures and do not account for any expenditure disbursed by other Copermittees in the region. A total of $37,918 was projected to be expended in Fiscal Year 2015-2016 for the implementation of regional activities and coordination.

1.1.7 Funding Sources

To ensure adequate funding for the Clean Water Program, the City uses a combination of user fees and general fund monies.

The City of Del Mar City Council created and adopted a user fee, called the Clean Water Fund Service Charge to offset the costs of the program. Initially, the rate was adopted to collect $100,000 of the estimated $300,000 for the program, with an escalator to achieve full cost recovery by 2009. Mid-way through the five-year schedule, on July 24, 2006, the California Supreme Court published a decision in the case of Bighorn-Desert View Water Agency v. Verjil (2006) 39 Cal. 4th 205, which held that consumption-based rates such as water and sewer rates are subject to the notice and hearing requirements of California Constitution, Article XIIID, Section 6 (commonly known as "Proposition 218"). Therefore, on January 22, 2007, and February 5, 2007, the Del Mar City Council held public hearings to receive written protests to comply with Proposition 218. No majority protest was received, and the Council ratified the previously approved five-year rate schedule, including the City's Clean Water Service Charge. However, the adopted rate increases did not account for the actual increases in the costs associated program requirements.

As an additional measure to obtain voter approval of the five-year rate schedule for the City's Clean Water Service Charge, the Council directed staff on April 2, 2007, to start the process to perform a mail ballot election procedure. During the process of researching the mail ballot election procedures and the current rates, it became apparent that the process would immediately need to be repeated to set the Fiscal Year 2010 rates and charges, since the current five-year rate schedule was due to expire in June of 2009. Due to the additional costs incurred in complying with the new requirements of the 2007 Permit, increases to the Clean Water Service Charge were proposed, including an annual rate escalator. All monies appropriated as part of the Clean Water Service Charge are directly identified for the Clean Water Program, and pursuant to law, may not be used by the City for any other purpose.

During the Fiscal Year 2009 reporting period, in compliance with Proposition 218, both the majority protest hearing and mail ballot process were conducted for the proposed increases. Both the ratification of the existing rate structure (required by Proposition 218), and the new rates, including the rate escalator, passed by more than 62%. As a result of the passage of the Clean Water Service Charge, the City will continue to have a secure funding source for the Clean Water Program, outside of general fund monies.

Based on current water allocations for the City of Del Mar, the projected revenues from the Clean Water Service Fee will be $482,700 (page 88 of city budget) for Fiscal Year 2015-2016.

D.1.3 City of Del Mar Strategies

City of Del Mar's strategies are detailed in Table D-1.

Table D-1
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
JRMP (E.2 – E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
DM-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to JRMP Section 5. As commercial/residential patrol inspections are conducted (see JRMP Section 7 – Existing Development), staff will both inspect and verify 100% of the structural BMPs within the City. These inspections occur a minimum of six times per year.	FY16	Continuous-Ongoing	Y	N	Y	Construction of the Del Mar Civic Center is currently ongoing. Project provides opportunity for LID and structural benefits
DM-2	Train staff on LID regulatory changes during annual storm water training.	Formal staff training implemented annually during storm water training.	FY16	Continuous – Ongoing	Y	N	Y	-
DM-3	Maintain existing floor area ratio requirements to limit impervious surface areas.	Incorporate into planning phase of Land Development program implementation.	FY16	Continuous – Ongoing	Y	N	Y	-
DM-4	Continue retention of native vegetation - New or redevelopment projects within the Lagoon Overlay Zone shall include the retention of the maximum amount of native vegetation on the site. Revegetation or landscaping of sites within the Lagoon Overlay Zone shall include the use of non-invasive, drought tolerant species native to the San Diego coastal region and which are compatible with adjacent wetland habitat species.	Retention of native vegetation is a requirement in the City's Municipal Code.	FY16	Continuous – Ongoing	Y	N	Y	-
Priority Development Projects (PDPs)								
DM-5	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to JRMP Section 5.	FY16	Continuous – Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	**Implemented as planned in current FY (FY16)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(ii)	**Modification for FY17 (If modified or canceled, provide rationale)** MS4 Permit Section: F.3.b.(3)(d)(iv))	**Plan to implement into next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
DM-6	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP Section 5.	FY15	Continuous – Ongoing	Y	N	Y	-
Construction Management								
DM-7	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Refer to JRMP Section 6; Construction site inventory updated monthly and inspections of prioritized sites are conducted biweekly year round.	FY16	Continuous-Ongoing	Y	N	Y	-
Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
DM-8	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP Section 7. All industrial, commercial, residential, and municipal areas are inspected at least once every two months. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-8.1	Update minimum BMPs for commercial, industrial, and municipal existing development and enforce. Includes BMPs for water-using mobile businesses.	Refer to JRMP Appendix A and Attachment 1 of this WQIP for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing; Updated as needed	Y	N	Y	-
DM-8.2	Provide BMP factsheet to water-using mobile businesses when business license is granted.	To ensure implementation of minimum BMPs for water -using mobile businesses, when a business license is granted for a water-using mobile business, a BMP factsheet is provided.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-8.3	Conduct property-based commercial, industrial, municipal, and residential inspections. Includes identification and addressing unmitigated incidents of power washing discharges.	Refer to JRMP Section 7. Inspections of commercial, industrial, municipal, and multifamily residential areas conducted a minimum of six times per year.	FY16	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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DM-8.4	Update municipal swimming pool discharge ordinance to ensure discharges from swimming pools meet permit requirements.	Municipal Code updated; Refer to JRMP Section 3.	FY15	Continuous-Ongoing	Y	N	Y	-
DM-9	Implement pet waste program.	Implement education and prevention program. Pet waste bag dispensers and trash bins provided in public areas. Pet waste removal occurs as part of Dog Beach maintenance.	FY15	Continuous-Ongoing	Y	N	Y	-
DM-10	Promote and encourage implementation of designated BMPs at residential areas.	Implement education and prevention program. Utilize over-irrigation door hangers for education and prevention.	FY15	Continuous-Ongoing	Y	N	Y	-
DM-11	Promote and encourage implementation of designated BMPs in commercial areas.	Implement education and prevention program through patrol-based program and contact with commercial area owners, tenants etc.	FY15	Continuous-Ongoing	Y	N	Y	-
MS4 Infrastructure								
DM-12	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	Refer to JRMP Section 7. The MS4 inventory is inspected by Public Works staff at least once per year. Based on the findings of the inspections, the City performs required cleanings and proper disposal of collected material. Removal of the collected trash and debris prevents the materials from being pushed through the system and into the receiving waters from runoff.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-12.1	Perform catch basin cleaning.	Inspect and clean catch basins annually.	FY16	Continuous-Ongoing	Y	N	Y	Approximately 101.5 cubic yards of material is removed as a result of catch basin cleaning in the City of Del Mar
DM-12.2	Repair and replace MS4 components as needed to provide source control from MS4 infrastructure.	In order to limit inflow of pollutants and reduce pollutant loads, the City will take proactive measures to improve, repair, and replace MS4 components.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-13	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers and identify sewer leaks and areas for sewer pipe replacement.	Refer to JRMP Section 4.7 and the City's Sanitary Sewer Management Plan. The conducts a variety of activities to effectively operate, maintain, repair and replace sewer mains, manholes, and pump stations.	FY15	Continuous - Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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Roads, Street, and Parking Lots								
DM-14	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP Section 7. The City implements the street sweeping schedule as follows: • Twice per month o Primary roads o Business district o Collection and bike lanes o Medians o Parking facilities • Twice per year o Residential areas	FY16	Continuous-Ongoing	Y	N	Y	882.92 total miles of streets are swept in the City of Del Mar on an annual basis
DM-14.1	Enhanced street sweeping by use of regenerative air vacuum sweepers.	Enhanced sweeping implemented by using regenerative air vacuum sweepers. Residential areas are swept 2x per year; primary roads (Camino Del Mar) and business district are swept 2x per month. Collection and bike lanes and medians are swept 2x per month.	FY16	Continuous-Ongoing	Y	N	Y	882.92 total miles of streets are swept in the City of Del Mar on an annual basis
DM-14.2	Perform sweeping of medians on high-volume arterial roadways.	Primary roads and business district medians are swept 2x per month.	FY16	Continuous-Ongoing	Y	N	Y	882.92 total miles of streets are swept in the City of Del Mar on an annual basis
Pesticide, Herbicides, and Fertilizer BMP Program								
DM-15	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP Section 7. The City of Del Mar is committed to the application of Integrated Pest Management (IPM) procedures and the use of updated BMPs to prevent or reduce the use of pesticides, fertilizers, and subsequently their discharge into the MS4.	FY16	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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Retrofit and Rehabilitation in Areas of Existing Development								
DM-16	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Refer to JRMP Section 8. The process for identifying retrofits will evaluate the following considerations: • Water Quality Improvement Plan (WQIP) Priority and Highest Priority Water Quality Conditions • Likely sources of pollutants generating pollutants related to WQIP conditions • Focus areas identified in WQIP • Vintage of geographic areas of the City – time period existing development was constructed • Public retrofit opportunities through Capital Improvement Program (CIP) projects • Areas of persistent discharges • Inspection/Illicit Discharge Detection and Elimination program findings • Identified areas of hydromodification or other stream impacts Using the considerations above, the City will identify areas where opportunities could provide water quality improvement benefits. Evaluation will include layering of the findings to determine where compounding factors overlap. The City will consider the locations where overlapping occurs and significance of the factors to prioritize areas suited for retrofits and rehabilitation projects. Once specific areas within the City have been identified and prioritized for retrofits and/or rehabilitation projects, the City will perform field verifications on an as-needed basis to substantiate the: • need for retrofits or rehabilitation projects • locations of potential retrofits or rehabilitation projects • appropriate type(s) of retrofit or rehabilitation project • appropriate responsible party to implement the retrofits or rehabilitation projects Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories.	FY18	Continuous-Ongoing	Y	N	Y	Project was slated to be implemented in FY18. However, project was implemented in FY16 and is ongoing

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	**Implemented as planned in current FY (FY16)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(ii)	**Modification for FY17 (If modified or canceled, provide rationale)** MS4 Permit Section: F.3.b.(3)(d)(iv))	**Plan to implement into next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
DM-17	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP Section 8. The process for identifying retrofits will evaluate the following considerations: • Water Quality Improvement Plan (WQIP) Priority and Highest Priority Water Quality Conditions • Likely sources of pollutants generating pollutants related to WQIP conditions • Focus areas identified in WQIP • Vintage of geographic areas of the City – time period existing development was constructed • Public retrofit opportunities through Capital Improvement Program (CIP) projects • Areas of persistent discharges • Inspection/Illicit Discharge Detection and Elimination program findings • Identified areas of hydromodification or other stream impacts Using the considerations above, the City will identify areas where opportunities could provide water quality improvement benefits. Evaluation will include layering of the findings to determine where compounding factors overlap. The City will consider the locations where overlapping occurs and significance of the factors to prioritize areas suited for retrofits and rehabilitation projects. Once specific areas within the City have been identified and prioritized for retrofits and/or rehabilitation projects, the City will perform field verifications on an as-needed basis to substantiate the: • need for retrofits or rehabilitation projects • locations of potential retrofits or rehabilitation projects • appropriate type(s) of retrofit or rehabilitation project appropriate responsible party to implement the retrofits or rehabilitation projects	FY18	Continuous-Ongoing	Y	N	Y	Project was slated to be implemented in FY18. However, project was implemented in FY16 and is ongoing

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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Illicit Discharge, Detection, and Elimination (IDDE) Program								
DM-18	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP Section 3.	FY16	Continuous-Ongoing	Y	N	Y	-
Public Education and Participation								
DM-19	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Section 10 and 11.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
DM-19.1	Continue outreach to property managers responsible for HOAs and Maintenance Districts.	As part of the patrol-based program for the residential existing development inventory, provide frequent education and contact to HOAs and maintenance districts targeting outdoor activities and trash areas.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
DM-19.2	Continue education and outreach to reduce over-irrigation through patrol program.	Once per year outside of business hours, patrol jurisdiction for incidents of over-irrigation and leave door-hangers identifying problem areas and appropriate corrective actions.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-19.3	Conduct trash cleanups through community-based organizations involving target audiences.	In partnership with I Love a Clean San Diego, host a site in Del Mar during two beach clean-ups per year.	FY16	Continuous-Ongoing	N	N	Y	1st clean up to take place 9/17/16
DM-19.4	Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions.	Update City Clean Water Program website with WQIP and JRMP information and highlight what the community can do for water quality.	FY16	Continuous-Ongoing	Y	N	Y	Currently being updated
DM-19.5	Collaborate with regional education and outreach efforts.	Participate in Regional Think Blue campaign and collaborate with other regional efforts to provide consistent message or efficiency in training for targeted audiences.	FY16	Continuous-Ongoing	Y	N	Y	Participated in various outreach events

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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Enforcement Response Plan								
DM-20	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP Section 9.	FY16	Continuous-Ongoing	Y	N	Y	-
Non-JRMP Strategies (Optional Strategies, B.3.b(1)(b))								
Additional Nonstructural Strategies								
DM-21	Promote and collaborate with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	Collaborate with MWD and promote their SoCal Water$mart rebates and products such as weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and turf removal. Collaborate with San Diego County Water Authority (SDCWA) and promote their Water Smart irrigation system checkups and turf replacement incentives.	FY16	Continuous – Ongoing	Y	N	Y	Information regarding rebate opportunities are listed on the City's webpage
DM-22	Continue program to address and capture trash and debris.	Properly maintain trash guards.	FY15	Continuous - Ongoing	Y	N	Y	-
DM-23	Continue participating in source reduction initiatives.	Continue implementation of cigarette ban on beaches, parks and in commercial areas.	FY15	Continuous - Ongoing	Y	N	Y	-
DM-24	Proactively monitor for erosion and complete minor repair and slope stabilization as needed.	Post-storm monitoring is conducted to identify slope and bluff erosion in priority areas. As-needed, repairs and slop stabilization are completed.	FY15	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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DM-25	Protect areas that are functioning naturally.	As feasible opportunities arise, the City will protect areas that are functioning naturally. This may include avoiding hardscape development and degradation in unpaved open space areas and creating permanent open space protections to undeveloped city-owned land. This strategy will be triggered on a case by case basis. The following resources, funds, and steps are needed to implement this strategy 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants if necessary (2 -18 months) 3) Obtain City Council approval	Must be Triggered	Continuous-Ongoing	N/A	N/A	N/A	Not triggered
DM-26	Collaborate with the 22nd District Agricultural Association (Del Mar Fairgrounds) on water quality-related issues.	The City will collaborate with the 22nd DAA on water-related issues as appropriate. The DAA is a Phase II NPDES discharger and is regulated under a separate stormwater permit. The 22nd DAA discharges directly to Steven's Creek and San Dieguito Lagoon and River.	Must be Triggered	As needed	N/A	N/A	N/A	Not triggered
DM-27	Implement a program to require septic system maintenance practices.	Require maintenance practices and provide education.	FY16	Continuous-Ongoing	Y	N	Y	-
DM-28	Conduct special studies	San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for “natural sources” to establish the concentrations or loads from streams in a minimally disturbed or “reference” condition. Refer to Section 5.1 for further details.	FY15	One Time	Y	N	Y	-
DM-29	Reference watershed study	Assess sources of bacteria in the watersheds using the San Diego Bacteria Source Identification and Prioritization Process developed in 2012 as part of the MS4 Permit Report of Waste Discharge process. Focus is on the beach/lagoon area of the San Dieguito River WMA, with inputs from the upper watershed also considered where relevant and necessary to identify sources of bacteria to the beach/lagoon. Refer to Section 5.1 for further details.	Optional	One Time	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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DM-30	Visually inspect all major and minor MS4 outfalls.	All major and minor MS4 outfalls are inspected a minimum of six times per year to assist in the identification of any illegal discharges, persistently flowing outfalls or any other issues that may be identified.	FY15	Continuous – Ongoing	Y	N	Y	-
Structural Strategies								
Green Infrastructure								
DM-31	If interim load reduction goals are not met, potential opportunities for green infrastructure will be considered.	Adaptive management process.	Must be Triggered	Continuous-Ongoing	N/A	N/A	N/A	Not triggered
Multiuse Treatment Areas								
Stream, Channel and Habitat Rehabilitation Projects								
DM-32	San Dieguito Wetland Restoration Project is a project that is already underway and near completion. This regional project with multi-jurisdictional involvement is discussed further in Section 4.2.5.	San Dieguito Wetland Restoration Project is a project that is already underway and near completion. This regional project with multi-jurisdictional involvement is discussed further in Section 4.2.5.	FY15	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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Dry Weather Flow Separation and Treatment Projects								
DM-33	If interim load reduction goals are not met, dry weather flow separation and treatment projects may be considered.	Construction of dry weather flow separation and treatment projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants (2 -18 months) 3) Obtain City Council approval 4) Initiate preliminary engineering, design and develop construction plans and cost estimates (6 months -2 Years) 5) Bid and Award process for construction phase (6 months) 6) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project). 7) Operation and maintenance will be in perpetuity.	Must be Triggered	Continuous-Ongoing	N/A	N/A	N/A	Not triggered
DM-34	Operate and maintain infiltration pits and low flow diverters in the northern coastal portion of the City.	The northern coastal portion of the City is relatively flat and nuisance ponding can occur easily. To address non-storm water nuisance ponding the City has installed infiltration pits which are intended to infiltrate waters into the sand beneath the streets, thereby preventing discharge to receiving waters. In another effort to address the relatively flat areas of the northern portion of the City, a low flow diverter was installed that pumps nuisance non-storm water discharges that are collected in a street basin to the sanitary sewer system for treatment and disposal.	FY15	Continuous – Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-1	San Dieguito Wetland Restoration Project	The Cities of San Diego and Del Mar are collaborating organizers of the San Dieguito River Park (SDRP) to restore the San Dieguito coastal wetlands and lagoon system. The 150-acre wetland restoration work has been primarily accomplished by Southern California Edison (SCE) and partner owners of the San Onofre Nuclear Generating Station (SONGS), including San Diego Gas & Electric (SDG&E), City of Riverside, and City of Anaheim. Construction began in fall 2006 and the $90-million Restoration Project was officially dedicated in 2011. The Restoration Project has enhanced southern California's unique coastal and marine environment as the restoration has provided adequate tidal flushing and circulation to support biologically diverse habitats. Beyond protecting endangered species and providing habitat to hundreds of bird species and fish, the restoration project has also added a coastal segment to the Coast to Crest Trail, allowing public enjoyment of the wetlands area while protecting sensitive habitat and vegetation. Funding for monitoring and managing the wetlands is ongoing.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
WMA-2	Collaborative Approach to Irrigation Reduction	Responsible Agencies are collaborating with water agencies to encourage implementation of water conservation efforts. Water conservation that attempts to reduce irrigation and minimize storm water runoff can also improve water quality of receiving waterbodies. MWD's SoCal Water$mart Program supports conservation efforts by offering incentives in the form of rebates for rain barrels, rotating sprinkler nozzles, weather-based irrigation controllers, soil moisture sensor systems, and turf replacement. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council or appropriate legislative body (i.e. Board).	Prior to FY16	Continuous-Ongoing	Y	N	Y	Information regarding rebate opportunities are listed on the City's webpage

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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WMA-3	Offsite Alternative Compliance Option (WMAA)	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015, jurisdictions can formally implement an optional Alternative Compliance Program by December 2015 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
WMA-4	Collaboration with the Regional Board.	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit, 2) enforcement of other non-MS4 dischargers, and 3) Bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-

Table D-1 (continued)
City of Del Mar Jurisdictional Strategies for San Dieguito River WMA

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WMA-5	Participation in Watershed Council	If a Watershed Council is re-established, the City of San Diego, County of San Diego and potentially other Responsible Agencies will participate. Watershed Councils are typically locally organized, voluntary, non-governmental organizations, and are intended to broadly represent various stakeholders in the WMA. Goals of Watershed Councils may vary, but they generally promote protecting the watershed and sustaining natural resources. This coordination could assist in selecting WMA projects, identifying potential funding opportunities, and promoting communication among community groups and regulated agencies. Resources necessary to implement this strategy include participating jurisdictional staff to coordinate with the regional effort and the development of an agreement (e.g. MOU, JPA) among participating entities. Projected funding needs may be met through grant funding, support from community groups or other institutions, or jurisdictional General Funds. General Funds are contingent on approval of the annual budget by City Council or appropriate legislative body. Participation is dependent on funding availability.	Must be Triggered	Continuous-Ongoing	N/A	N/A	N/A	Not triggered

D.1.4 Modifications to the BMP Design Manual

No modifications to the BMP Design Manual have been made since the WQIP was approved in fall 2015. The current Del Mar BMP Design Manual is posted on the Del Mar's website, and the link to this page is listed on Project Clean Water.

D.1.5 Modifications to the Jurisdictional Runoff Management Plan

No modifications to the Del Mar's JRMP have been made since the WQIP was approved in fall 2015. The current Del Mar JRMP is posted on the Del Mar's website, and the link to this page is listed on Project Clean Water.

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D.2 City of Escondido

D.2.1 Annual Report Certifications

The City of Escondido's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.2.2 Annual Report Form

Escondido's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

STATEMENT OF CERTIFICATION

San Dieguito Watershed Management Area Water Quality Improvement Plan

2015-2016 Annual Report

and

Legal Authority Establishment and Enforcement

I certify that this Water Quality Improvement Plan Annual Report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I also certify that the City of Escondido has taken necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in section E.1 of San Diego Regional Water Quality Control Board Order No. R9-2013-0001 as amended by Order No. R9-2015-0100. This includes entering into contracts, updating and enforcing the Escondido Municipal Code, and regularly reviewing and updating the policies and procedures described in the Jurisdictional Runoff Management Program and Water Quality Improvement Plans.

Christopher W. McKinney

Christopher W. McKinney
Director
Utilities Department

January 18, 2017
Date

FY 2015-2016

I. COPERMITTEE INFORMATION

Copermittee Name: City of Escondido – SAN DIEGUITO WATERSHED

Copermittee Primary Contact Name: Helen Davies

Copermittee Primary Contact Information:
Address: 201 North Broadway
City: Escondido County: San Diego State: CA Zip: 92025
Telephone: 760-839-6315 Fax: 760-839-4597 Email: hdavies@escondido.org

II. LEGAL AUTHORITY

Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES ☒	NO ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES ☒	NO ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES ☐	NO ☒
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES ☐	NO ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES ☒	NO ☐

Number of non-storm water discharges reported by the public	36
Number of non-storm water discharges detected by Copermittee staff or contractors	4
Number of non-storm water discharges investigated by the Copermittee	40
Number of sources of non-storm water discharges identified	40
Number of non-storm water discharges eliminated	40
Number of sources of illicit discharges or connections identified	40
Number of illicit discharges or connections eliminated	40
Number of enforcement actions issued	5
Number of escalated enforcement actions issued	0

V. DEVELOPMENT PLANNING PROGRAM

Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES ☒	NO ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES ☐	NO ☒
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES ☐	NO ☐

Number of proposed development projects in review	1
Number of Priority Development Projects in review	1
Number of Priority Development Projects approved	1
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	1

Number of completed Priority Development Projects in inventory	14
Number of high priority Priority Development Project structural BMP inspections	7
Number of Priority Development Project structural BMP violations	10
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

FY 2015-16

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

Number of construction sites in inventory	7
Number of active construction sites in inventory	3
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	4
Number of construction site inspections	50
Number of construction site violations	15
Number of enforcement actions issued	2
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

	Municipal#	Commercial	Industrial	Residential#
Number of facilities or areas in inventory	14	115	0	8
Number of existing development inspections	6	139	0	8
Number of follow-up inspections	5	68	0	0
Number of violations	2	71	0	4
Number of enforcement actions issued	2	57	0	0
Number of escalated enforcement actions issued	0	8	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Christopher W. McKinney
Signature

12·15·2016
Date

Christopher W. McKinney
Print Name

DIRECTOR OF UTILITIES
Title

(760) 839 - 4090
Telephone Number

cmckinney@Escondido.org
Email

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL FISCAL ANALYSIS
FY 2015-16
CITY OF ESCONDIDO

SAN DIEGUITO WATERSHED

Categories	Sub Categories	Costs
CAPITAL COSTS	None	$0
OPERATIONS AND MAINTENANCE	None	$295,241
OTHER EXPENDITURES	MONITORING PROGRAM	$7,886
	WATERSHED PROGRAM	$52,038
	REGIONAL PROGRAM	$20,349
STAFF RESOURCES	PROGRAM DEVELOPMENT	$11,934
	PROGRAM IMPLEMENTATION	$181,609
	ENFORCEMENT	$17,563
	Total	**$586,620**

Staff Resources

Necessary staff resources needed were allocated to meet municipal permit (R9-2013-0001)(Municipal Permit) requirements. Many of the permit requirements specific to various City departments (such as street sweeping, the responsibility of Public Works) continue to be implemented by the relevant staff with input, as needed, from Environmental Programs (Stormwater) personnel.

Funding Sources

Funds allocated through the City's Wastewater Fund provides funding for Municipal Permit compliance. The legal restrictions on the use of these funds are those associated with a municipal utility fee. Sufficient funds were made available for compliance with the Municipal Permit during fiscal year 2015-16 and sufficient funds have been budgeted for fiscal year 2016-17.

D.2.3 City of Escondido Strategies

City of Escondido’s strategies are detailed in Table D-2.

Table D-2
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
JRMP (E.2 – E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
ES-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, per BMP Manual requirements.	Refer to JRMP Chapter 4 and BMP Manual. All high priority development projects are inspected annually prior to the rainy season. 20% of all priority development projects are inspected annually. Maintenance inspections of PDPs include examination of structural BMPs to verify proper maintenance and function as designed, and compliance with applicable City ordinances and permits.	Prior to FY16	Continuous - Ongoing	Y	No	Y	All inventoried projects were inspected this year. The inventory was reviewed and updated to be consistent with JRMP prioritization criteria.
ES-1.1	Weekly meetings to facilitate communication and assess compliance across divisions/departments, including stormwater, for all development projects.	EP Div meets weekly with Engineering Land Development Dept. to discuss project compliance on project submittals. Separate weekly meeting with Planning, Fire, and Engineering for co-compliance for all development during the planning stage.	FY16	Continuous - Ongoing	Y	No	Y	Storm Water staff with relevant background (planning/engineering) typically attend.
ES-2	Amend municipal code and ordinances, including zoning ordinances, as needed to meet BMP Design Manual requirements and facilitate and encourage LID opportunities.	Implemented as needed. Update occurred FY14-15 for permit compliance. All updates to the municipal code and ordinances must be brought to City Council for consideration.	Prior to FY16	Continuous - As needed	Y	No	Y	No updates needed during the fiscal year.
ES-3	Train staff on BMP regulatory changes and BMP Design Manual.	Formal staff training implemented as needed based on changes, such as the revision of the BMP Design Manual or staff turnover. Informal training or assistance occurs continuously with communication between Environmental Programs staff and land development staff on a regular basis.	FY16	Continuous - As needed	Y	No	Y	Formal in house training; regional training as part of BMP Manual update.
Priority Development Projects (PDPs)								
ES-4	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification.	Refer to JRMP Chapter 4. Includes confirmation of design, construction, and maintenance of PDP structural BMPs. Follow-up inspections conducted on some properties. Enforcement as required.	FY16	Continuous - Ongoing	Y	No	Y	The City has undertaken a comprehensive review of this program and is transitioning it to an asset management program.

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
ES-4.1	Administer self-certification verification and enforcement program for treatment control BMP maintenance compliance.	BMP maintenance agreements required on all PDPs. Letters sent annually to remind property managers to self-certify. Follow-up inspections conducted on some properties. Enforcement as required.	FY16	Continuous - Ongoing	Y	No	Y	–
ES-5	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP Chapter 4. County Model BMP Design Manual was used and adapted for the City.	FY16	Continuous - As needed	Y	No	Y	The BMP Design Manual was updated per amended permit requirements.
E.4 Construction Management								
ES-6	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Refer to JRMP Chapter 5; Currently the inspection rate is dependent on time of year (dry versus wet season) and priority of site (based on threat to water quality). Most frequent inspection (high priority, wet weather) is once every 2 weeks, lowest is "as-needed." Per 2007 permit requirements.	FY16	Continuous - Ongoing	Y	No	Y	The coordinator for Environmental Programs now joins the engineering field inspectors during their weekly staff meetings.
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
ES-7	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP Chapter 7; Highest priority inspection of food establishments is performed at a frequency of at least once a year with expectations to reach twice per year by FY2018. Others inspected per permit requirements. Please see Attachment 1 for details on PDP related BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16 with full implementation by FY18	Continuous - Ongoing	Y	No	Y	A project transitioning inspections to an asset management system was completed during this fiscal year.
ES-7.1	Update minimum BMPs for existing residential, commercial, and industrial development and enforce them.	Refer to JRMP Chapter 7; minimum BMPs updated as part of JRMP update. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	As needed	Y	No	Y	Completed as part of program update during FY14-15.

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

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ES-7.2	Design, implement, and enforce property- based inspections in high priority focus areas	This inspection program involved annual drive-by inspections of focus drainage areas where major MS4 outfalls have persistent flows. At the time of WQIP development, only one MS4 outfall in this WMA has persistent flow, HDG_102. That drainage area includes mostly residential properties. Follow up and enforcement will be pursued as necessary to ensure compliance. Inspections will cover all visible outdoor areas and compliance with Stormwater Ordinance requirements. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous - Ongoing	Y	No	Y	–
ES-7.3	Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	Completed. Refer to BMP Manual and Escondido Municipal Ordinance Chapter 22.	FY16	Continuous - Ongoing	Y	No	Y	Completed as part of program update during FY14-15.
ES-7.4	Implement program to require retrofit of trash enclosures for certain permit applications.	All applicants seeking approval for a tenant improvement, improvements to buildings, or redevelopment, are assessed for their potential to generate pollutants through their trash enclosure. If the applicant has a pollutant-generating activity on-site, a retrofit of their trash enclosure to include a roof is required. For example, a restaurant would trigger this requirement. Costs are considered when determining if the applicant is required to implement the retrofit. The retrofit is generally not required if the improvement is less than the cost of the retrofit. Determination is made on a case-by-case basis. This measure is expected to reduce trash and associated pollutants, including bacteria, from leaving the enclosure site. See JRMP Chapter 7.	FY16	Continuous - Ongoing	Y	No	Y	–

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
ES-7.5	Water-using mobile business inspection and permitting.	Implement permitting program to ensure that water-using mobile businesses are using appropriate BMPs to prevent discharges to the storm drain drains. A permit is required for water-using mobile businesses including power-washers, mobile detailing, and organizations holding charity car washes. As part of the permit process, the applicant must schedule an inspection. The inspection requires applicants to set up their equipment and demonstrate how they will do the work. A permit is not issued until they have demonstrated that they have appropriate BMPs to manage the discharge.	FY16	Continuous - Ongoing	Y	No	Y	–
ES-7.6	Update and Implement Water Efficient Landscape Ordinance.	Refer to JRMP. Updates to landscape regulations encourage a reduction in the use of water for irrigation and reduce water waste in the form of runoff.	FY16	Continuous - Ongoing	Y	No	Y	–
ES-8	Promote and encourage implementation of designated BMPs at residential areas through residential inspection program.	Refer to JRMP Chapter 8 (Table 8-1). Also see Attachment 1 for details on residential BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous - Ongoing	Y	No	Y	–
ES-8.1	Promote and collaborate with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water.	The City of Escondido collaborates with MWD and promotes their SoCal WaterSmart rebates. Rebates include; weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and turf removal. The City also collaborates with the San Diego County Water Authority (SDCWA) to promote their WaterSmart Checkups and turf replacement incentives. City of Escondido provides funding for the WaterSmart Checkups.	FY16	Continuous - Ongoing	Y	No	Y	–
ES-9	Promote and encourage implementation of designated BMPs, including water conservation BMPs, in commercial, agricultural, residential, and industrial areas.	Collaborate with MWD and promote their SoCal Water$mart rebates and products such as weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and/or turf removal.	FY16	Continuous - Ongoing	Y	No	Y	–

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
MS4 Infrastructure								
ES-10	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	Refer to JRMP; Catch basins inspected annually and cleaned as needed based on observations. City is developing system for inspection and cleaning prioritization based on previous cleaning data.	FY16	Continuous - Ongoing	Y	No	Y	Review and reprioritization is underway.
ES-10.1	Implement open-channel cleaning and maintenance to reduce pollutant loads.	Implement annual channel cleaning based on priority locations and highest maintenance needs. Sites to be addressed each year will be established annually and may be prioritized based on potential for pollution reduction; implementation schedule subject to change pending prioritization. Some sites must have a biological monitor if maintained within the bird nesting season, which may limit certain work to September – January each year. BMPs are implemented as needed to reduce potential for discharge and in accordance with regulatory permits.	FY16	Continuous - Ongoing	Y	No	Y	Resource Agency permits to implement this work (401, 404, 1600) obtained August 2015. Implemented in accordance with requirements.
ES-11	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	Sewer infrastructure is cleaned annually. Televising of sewer infrastructure is completed to identify and prioritize areas in need of upgrade or slip lining. As areas for maintenance are identified, corrective action is taken. Refer to JRMP Chapter 6.	FY16	Continuous - Ongoing	Y	No	Y	-
Roads, Street, and Parking Lots								
ES-12	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways	Refer to JRMP Chapter 6.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-12.1	Perform street sweeping.	Refer to JRMP Chapter 6; High priority areas swept twice per month. Medium priority areas swept once per month. Low priority areas swept as needed.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-12.2	Perform sweeping of medians on high-volume arterial roadways.	Refer to JRMP Chapter 6; Medians swept according to priority area frequency. Medians in high priority areas swept twice per month; medium priority areas swept once per month; and in low priority areas swept as needed.	FY16	Continuous - Ongoing	Y	No	Y	-

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Pesticide, Herbicides, and Fertilizer BMP Program								
ES-13	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP. City does not have authority over application of pesticides, but will implement BMPs. Water conservation activities encourage residential and commercial area BMPs. Industrial and commercial inspections cover requirement. Parks and Recreation implement the municipal program.	FY16	Continuous - Ongoing	Y	No	Y	-
Retrofit and Rehabilitation in Areas of Existing Development								
ES-14	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Refer to JRMP Chapter 9. City currently conducting study to identify potential projects.	FY16	Continuous - Ongoing	Y	No	Y	Completed a hydraulic study in February 2016 that identifies potential locations for retrofit.
ES-15	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP Chapter 9. City currently conducting study to identify potential projects.	FY16	Continuous - Ongoing	Y	No	Y	A 4.44-acre habitat restoration project was completed in Kit Carson Park during FY16.
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
ES-16	Administer, implement, and enforce Illicit Discharge, Detection, and Elimination (IDDE) Program.	Refer to JRMP Chapter 3.Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-16.1	Implement "We Care" Program for employee reporting of potential illicit discharges.	Continue supporting the city-wide "We Care" program which encourages employees to report problems that they observe throughout the City. Reports of irrigation issues are currently included. In FY16, updates to specifically include and encourage reporting of other storm water related issues will be complete.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-16.2	Support "Report It" smartphone application to encourage residents to report potential illicit discharges or other storm water violations.	Continue supporting the city-wide "Report It" smart phone application which encourages the public to report problems that they observe throughout the City, including potential illicit discharges and other storm water related violations.	FY16	Continuous - Ongoing	Y	No	Y	-

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

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E.7 Public Education and Participation (B.3.b.(1)(a)(iii))								
ES-17	Implement pet waste education program.	Implement education and prevention program. Pet waste bag dispensers and supplies provided for neighborhood groups, dog parks, and other municipal parks.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-18	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Chapter 10.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-18.1	Expand outreach, training, and incentive programs to homeowners' associations (HOAs).	Investigate expansion of municipal outreach programs and collaboration with MWD and SDCWA to expand incentive programs targeting landscape practices and turf replacement programs.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-18.2	Conduct trash cleanups through community-based organizations involving target audiences.	Continue implementation of "We Clean Escondido" program targeting litter removal. "We Clean Escondido" programs encourage groups to adopt their neighborhood and conduct weekly litter removal events. Continue collaboration with "I Love a Clean San Diego" to host two Creek to Bay Cleanups at Dixon Lake, or other locations in Escondido. Litter removal reduces one source of bacteria to the MS4.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-18.3	Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions.	Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions.	FY16	Continuous - Ongoing	Y	No	Y	-

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

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ES-18.4	Continue partnership with MWD to provide rebates for water efficient products to large businesses and agricultural customers.	Continue partnership with MWD to provide rebates for water efficient products to large businesses and agricultural customers. Continue Water Savings Incentive Program and Conservation Programs through support for rebates such as rotating irrigation nozzles, residential smart controllers, rain barrels, soil moisture sensor systems and incentives such as turf replacement program, SoCal water smart turf removal program, WaterSmart checkups, California friendly landscape training classes, WaterSmart landscape makeover workshops, and garden friendly plant fairs.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-18.5	Continue school and recreation-based education and outreach	Partner with organizations such as the Escondido History Center, Humane Society, the Chamber of Commerce, and the Downtown Business Association to host education events targeting adults and children through the year. Continue with robust school outreach and summer camp education program. Program targets 6-12 yr olds.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-18.6	Collaborate with regional education and outreach efforts.	Participate in Regional Think Blue campaign and collaborate with other regional efforts to provide consistent message or efficiency in training for targeted audiences.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-19	Municipal staff training	Conduct mandatory training for all new City employees. Engage new employees with storm water jeopardy game reinforcing training on watersheds, the MS4, and MS4 permit requirements.	FY16	Continuous - Ongoing	Y	No	Y	-
ES-20	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	Provide outreach materials to the development community on the City's website, written material and in person education at the City's Development Services counter.	FY16	Continuous - Ongoing	Y	No	Y	-

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
E.6 Enforcement Response Plan								
ES-21	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP Chapter 2, Escondido Municipal Code Chapter 22, and Enforcement Response Plan.	FY16	Continuous - Ongoing	Y	No	Y	-
Non-JRMP Strategies (Optional Strategies, B.3.b.(1)(b))								
Nonstructural Strategies								
ES-22	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects). Refer to Section 4.2.5. and Appendix N for further details.	Refer to JRMP Chapter 4. The City of Escondido will develop a draft water quality credit system option consistent with Provision E.3(d) to place water quality improvement projects throughout Escondido, including Focus Areas. The resources required to complete this optional strategy include: staff time allocation, administrative plan and procedures for the program consistent with regional standards, and approval by the City Council and the Regional Water Quality Control Board. Furthermore, candidate projects must be identified, permitted, and funded. The cost for developing and implementing this program during the permit cycle is unknown, but funds have been secured for FY2016 for program development. The trigger for implementation of Alternative Compliance Program is: when resources have been secured and leadership consensus and community support has been achieved. Expected length of time for program development is two to five years.	Triggered	Continuous - Ongoing	Not applicable	Not applicable	Not applicable	City staff have participated in the development of water quality equivalency guidelines and will continue participating in other regional efforts. The City completed a hydraulic study in February 2016 to evaluate potential alternative compliance projects.
ES-23	Participated in Reference Watershed Study.	San Diego Regional Reference Stream Study (conducted by the Southern California Coastal Water Research Project). The study developed numeric targets that account for “natural sources” to establish the concentrations or loads from streams in a minimally disturbed or “reference” condition. Refer to Section 5.1 for further details. Occurred region-wide.	FY16	One time	Y	No	N	Study completed FY15-16.

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
ES-23.1	Participate in San Dieguito River WMA Bacteria Source Identification and Prioritization Process.	Assess sources of bacteria in the watersheds using the San Diego Bacteria Source Identification and Prioritization Process developed in 2012 as part of the MS4 Permit Report of Waste Discharge process. Focus is on the beach/lagoon area of the San Dieguito River WMA, with inputs from the upper watershed also considered where relevant and necessary to identify sources of bacteria to the beach/lagoon. Refer to Section 5.1 for further details. Funding and resources have been secured for FY2016. The study is not expected to extend beyond this year; if needed, future funding would need to be approved by City Council during the annual budget meeting.	FY16	One time	Y	No	Y	Study completed FY15-16.
ES-25	Assessment of agricultural operations within City jurisdiction and active engagement with growers as needed to attain water quality objectives.	If agricultural properties within the City of Escondido are determined to be a potential source of bacteria, and interim load reduction goals are not met, this strategy will be triggered and the City will take action to more actively engage with agricultural operations within our jurisdiction. This may include: Prepare and maintain a figure of the locations of agricultural operations in Escondido; identifying agricultural land close to receiving waters and/or MS4 system; conducting a site reconnaissance to assess if discharges are likely to occur; developing a series of follow-up actions specific to those risks. Sites of concern will be referred to the Irrigated Lands Group at the RWQCB. The resources required for this strategy include: staff time and budget to administer the program, administrative procedures developed and enacted, and (potentially) outreach materials developed directed at this specific audience. The estimated cost of implementation of this strategy is unknown at this time, and it would be an ongoing strategy with approximately 6-12 months to develop the program.	Triggered	Continuous - Ongoing	Not applicable	Not applicable	Not applicable	City staff has participated in the development of waste discharge requirements for agricultural operations. Any complaints relating to agricultural facilities have been addressed through our IDDE program.

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
ES-24	If invasive plant removal is necessary in key locations, collaborate with and/or support volunteer groups as needed to encourage invasive plant removal and habitat restoration.	This strategy will be triggered if invasive species removal is determined to be a high priority in sections of the WMA within City of Escondido jurisdiction, and all necessary resources are secured to support such projects. The City will participate in opportunities for collaboration with qualified volunteer groups for the removal of invasives at key locations, as needed and as possible with available resources. The resources required for this strategy include: identifying potential volunteer group partners to manage the work, identifying key locations within the WMA in need of invasive species removal, securing necessary permits from resource agencies and/or permission from landowners to perform the work, and staff or equipment resources as needed to complete each volunteer event. The estimated cost of this strategy is unknown at this time, and dependent on the size of the area, the number of volunteers, and the leadership capacity of volunteer organizations. This would be an ongoing strategy on an as-needed basis, with approximately 3-6 months needed to plan a single invasive plant removal event; more time would be needed if resource agency permits are required.	Triggered	Continuous - As needed	Not applicable	Not applicable	Not applicable	While this optional strategy was not triggered, the City implemented a mitigation plan for 4.44 acres of wetland habitat in Kit Carson Park as part of the channel maintenance program. The City also monitors and maintains another 2.60 acre mitigation project within Kit Carson Park (for RGP87). Both projects incorporate the removal of invasive species.
ES-25	Participate in a Felicita Creek Subwatershed Group	Should citizens choose to pursue organizing a forum dedicated to addressing issues specific to Felicita Creek, this strategy will be triggered and the City will participate in said group, as it relates to addressing MS4 sources, habitat restoration. The City will consider providing staff or equipment resources to address issues which can be addressed through group collaboration (e.g. invasive species removal). The resources required to implement this strategy include: staff time allocation for participation in the group. Resources such as equipment or resource agency permits may need to be secured for activities outside the scope of group participation, and the City's commitment to providing such resources will be considered on a case-by case basis and must be approved by City Council in the annual budget hearing. This strategy would be ongoing and would require approximately 3-9 months to contact representative stakeholders and plan the initial meeting(s).	Triggered	As needed	Not applicable	Not applicable	Not applicable	No group has convened.

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Structural Strategies								
Multiuse Treatment Areas								
Infiltration and Detention Basins								
ES-26	Eagle Scout (formerly Sand) Lake Project	Eagle Scout Lake (formerly Sand Lake) is an existing multiuse treatment area and sediment detention basin in the City of Escondido. A major restoration project in early 2014 improved water flow, water quality issues (providing capacity for sediment settlement) and health and safety issues (vector control). The project drains the water from Kit Carson Creek and an adjacent ephemeral stream an area of approximately 4 acres. It is anticipated to be regularly maintained as needed, current estimates are once every five years, but will be determined on visual evaluation. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	As needed, likely once every five years	Y	No	Y	Restoration was completed in 2014. Ongoing observational monitoring and minor maintenance conducted during FY15-16.

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Stream, Channel and Habitat Rehabilitation Projects (B.3.b.(1)(b)(iii))								
ES-27	If interim load reduction goals are not met and additional stream, channel, and habitat rehabilitation projects are required, implement as needed.	This strategy may be triggered if interim load reduction goals are not met, funding and staff resources are identified and secured, partners have been identified and agreed upon, permits required by regulatory agencies are secured, and recommendations from the community are identified and support has been achieved. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs; up to$500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project) 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function will be by approval by City Council as part of the City's annual budget, or through an alternative funding source	Triggered	Continuous - Ongoing	Not applicable	Not applicable	Not applicable	-

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Green Infrastructure								
ES-28	If interim load reduction goals are not met and additional green infrastructure is required, approximately 26.15 acres of available space have been identified as potential opportunities for green infrastructure implementation on public parcels.	If monitoring data suggests that it is unlikely that goals will be met using the strategies identified for implementation through FY20, construction, operation and maintenance of potential green infrastructure projects on public parcels will be investigated by initiating planning and assessing feasibility for 25% of the total parcel acreage identified. If feasibility study supports that this is beneficial then initiation of securing funding this strategy will be triggered. The resources required to complete this strategy include: securing of grant funding, City Council approval of seeking grant funding and using funds for this purpose, staff resources secured, and contracts secured to complete designs and permitting. The estimated cost of this strategy is unknown at this time, and depends largely on the size and scope of projects and grant funding available. A source of funding for maintenance will also need to be secured.	Triggered	Continuous - Ongoing	Not applicable	Not applicable	Not applicable	-
ES-29	Evaluate additional green infrastructure opportunities, including green streets, as needed to achieve final goals.	This strategy will be triggered if interim load reduction goals are not met and additional green infrastructure is required. The strategy includes application of green street design principles to planned Capital Improvement Projects, and the construction, operation and maintenance of such streets, if and where feasible and as funding allows. Resources necessary to implement this strategy include: staff time allocation, approval of such projects as part of the Capital Improvement Project list by City Council (annual), securing adequate funding through City Council approval of annual budget and/or securing grants with Council approval, selecting and contracting with firms for both the design and the construction of such projects. The estimated cost of this strategy is unknown and depends on the size of each individual project, the timeframe in which it will be accomplished, and any grant funding secured to support said projects. A funding source for maintenance will also need to be secured.	Triggered	Continuous - Ongoing	Not applicable	Not applicable	Not applicable	Green streets are being incorporated as requirements for offsite developer improvements. This year no developments required green street improvements in this watershed.

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-1	Collaborative Approach to Irrigation Reduction	Collaborate with jurisdictional water agencies to encourage implementation of water conservation efforts. Water conservation that attempts to reduce irrigation and minimize storm water runoff can also improve water quality of receiving waterbodies. MWD's SoCal Water$mart Program supports conservation efforts by offering incentives in the form of rebates for rain barrels, rotating sprinkler nozzles, weather-based irrigation controllers, soil moisture sensor systems, and turf replacement. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous - Ongoing	Y	No	Y	-
WMA-2	Offsite Alternative Compliance Option (WMAA)	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015, jurisdictions can formally implement an optional Alternative Compliance Program by December 2015 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.		Continuous - Ongoing	-	-	-	-

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-3	Collaboration with the Regional Board	Collaborate with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Ag Waiver, 2) enforcement of other non-MS4 dischargers, and 3) Bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Resources to implement this strategy include staff time and are currently secured for FY16. Funding for future fiscal years is contingent on annual budget approval by Council.	Prior to FY16	Continuous - Ongoing	Y	No	Y	-
WMA-4	Participation in Watershed Council	If a Watershed Council is re-established, the City of Escondido will participate. Watershed Councils are typically locally organized, voluntary, non-governmental organizations, and are intended to broadly represent various stakeholders in the WMA. Goals of Watershed Councils may vary, but they generally promote protecting the watershed and sustaining natural resources. This coordination could assist in selecting WMA projects, identifying potential funding opportunities, and promoting communication among community groups and regulated agencies. Resources necessary to implement this strategy include participating jurisdictional staff to coordinate with the regional effort and the development of an agreement (e.g. MOU, JPA) among participating entities, which may take up to one year to coordinate. Projected funding needs may be met through grant funding, support from community groups or other institutions, or jurisdictional General Funds. Participation is dependent on funding availability and continued benefit to the watershed.	Triggered	Continuous - Ongoing	Not applicable	Not applicable	Not applicable	No group has convened.

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
WMA-5	Participation as a stakeholder in the San Diego Integrated Regional Water Management Program as appropriate	Escondido participates as a stakeholder in the San Diego IRWM program as appropriate and necessary, and provides matching funding for a project in the San Dieguito WMA. The City of San Diego, County of San Diego, and San Diego County Water Authority form the Regional Water Management Group (RWMG) and administer and implement the San Diego IRWM Program. The Regional Advisory Committee (RAC) include rotating members from various functional areas related to water management. In San Dieguito River WMA, two integrated projects, funded through Proposition 50 and 84, target water quality in Lake Hodges: 1) San Dieguito Watershed Management Plan Implementation – Lake Hodges Natural Treatment System Conceptual Design and 2) Lake Hodges Water Quality and Quagga Mitigation Measures. Along with grant funding, the City of San Diego Public Utilities Department, City of Escondido, San Dieguito River Valley Conservancy, Santa Fe Irrigation District, and the San Diego County Water Authority are providing local match or in-kind funding. All General Funds are secured on an annual basis and are contingent upon annual budget approval by each participating Responsible Agency.	Prior to FY16	Continuous - Ongoing	Y	No	Y	The City provided documentation of expenses for City projects relating to project grant applications for Lake Hodges to be counted as a project match.
Other Identified Strategies to be considered in future WQIP updates. Insufficient information available at this point to commit to these strategies.								
ES-30	Collaborate with the City of San Diego Lake Hodges source investigations effort	The City of San Diego's Public Utilities Department will conduct studies that can characterize the nutrient budget or "loading rate" for Lake Hodges. Escondido will participate in collaborative watershed efforts as they relate to the MS4.	TBD	TBD	-	-	-	-
ES-31	Proactively repair and replace corrugated metal pipe (CMP) MS4 components to provide source control from MS4 infrastructure	This strategy is unfunded and there is no firm timeframe for development. The timeframe for this strategy will be updated in future WQIP updates, as funding becomes available. Need funding and council approval to use funding for that purpose.	TBD	TBD	-	-	-	-

Table D-2 (continued)
City of Escondido Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
ES-32	If a regional social services effort is established, support workgroup to provide sanitation and trash management for persons experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals	If a regional effort is established, participate in workgroup and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	TBD	TBD	-	-	-	-

D.2.4 Modifications to the BMP Design Manual

No modifications to the BMP Design Manual have been made since the WQIP was approved in fall 2015. The current Escondido BMP Design Manual is posted on the Escondido's website, and the link to this page is listed on Project Clean Water.

D.2.5 Modifications to the Jurisdictional Runoff Management Plan

Escondido's JRMP is being updated and re-submitted concurrent with this WQIP Annual Report. The changes to the JRMP are mostly related to changes in the final approved WQIP for the Carlsbad Watershed Management Area. In the process of reviewing the JRMP for resubmittal, several clarifications, corrections, and updates were made, but no notable changes were made to strategies presented in this WQIP. A summary table of the changes is included below. The current Escondido JRMP is posted on Escondido's website, and the link to this page is listed on Project Clean Water.

Section	Description of Change
Executive Summary; Chapters 1, 3, 5, 6, 7, 8, 9, and 10	Revised references to the applicable highest priority water quality conditions (HPWQCs) for the City of Escondido based on the changes made to the HPWQCs and associated goals in the final, accepted Carlsbad Watershed Management Area Water Quality Improvement Plan (November 2016). When the City's Jurisdictional Runoff Management Program (JRMP) document was finalized in June 2015, the applicable HPWQC listed in the Carlsbad WMA WQIP was indicator bacteria; however, the final HPWQCs that are applicable to the City of Escondido are riparian habitat degradation for the Escondido Creek hydrologic subarea (HSA) and nutrients for the San Marcos Creek HSA. San Dieguito River WQIP HPWQC of indicator bacteria remains the same.
Chapters 3, 7, 8, and 9	Revised references to City's goals, strategies, and schedules related to the HPWQCs listed in the final, accepted Carlsbad WMA WQIP. Removed references to dry weather flow reduction goals in Carlsbad WMA Focus Areas. Edited Chapter 9 (Retrofit and Stream Rehabilitation Programs) and other sections as necessary to highlight the Spruce Street Channel Improvement Project as the City's goal in the Carlsbad WMA WQIP. Added text to Chapter 9 regarding WQIP strategies in Upper San Marcos Creek HSA. Removed reference to rehabilitation at Escondido Creek at Harmony Grove due to focus on Spruce Street Channel Improvement Project in Escondido Creek HSA and other projects.

Section	Description of Change
Chapter 3, Appendix C-3a	Added text to provide clarification on how the City determines if a non-storm water discharge is considered a threat to human health or the environment. Added information regarding spill response through existing and updated City programs. Updated Major MS4 Outfall Inventory and associated text.
Chapter 3	Updated the criteria used to prioritize non-storm water discharges for investigation to better represent the City's IDDE program and the criteria provided by the MS4 Permit.
Chapter 3	Removed Table 3-5 and references, and replaced with reference to analyte list and monitoring plans in WQIPs.
Chapter 6, Appendix C-6A	Updated the municipal inventory, including the removal of nine facilities and the addition of eight facilities. The removed facilities have been sold or are not operated by the City and are addressed by other inspection programs (i.e., through industrial and commercial facility inspections or through residential area inspections).
Chapter 7	Clarified language related to the food service establishment facilities inspections; only high priority Food Service Establishments are inspected twice annually.
Chapter 8	Updated the residential management area inventory, map, and text to correct alignment with water district.
Chapters 4, 9	Updated language describing the City's Hydraulic Analysis, as it has now been completed, and grant funding sought in Storm Water Resource Plans. Described implementation progress and process for updating retrofit and rehabilitation programs.
Appendix C-7a	Appendix C-7a was removed since it must be updated annually and is not required to be included in the City's JRMP document. Industrial facilities are included in the City's Industrial/Commercial inventory and available upon request.
All chapters	Administrative updates were made to the document including updating page numbers, terminology, and organizational updates since JRMP submittal in 2015.

D.3 City of Poway

D.3.1 Annual Report Certifications

The City of Poway's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.3.2 Annual Report Form

Poway's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

CITY OF POWAY

STATEMENT OF CERTIFICATION

San Dieguito River Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report and JRMP Certificate of Legal Authority

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

I also certify that the City of Poway has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 9th day of January, 2017, at the City of Poway.

Date 1/9/17

Robert J. Manis
Director
Development Services Department

City Hall Located at 13325 Civic Center Drive
Mailing Address: P.O. Box 789, Poway, California 92074-0789
www.poway.org

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015/2016

I. COPERMITTEE INFORMATION

Copermittee Name: City of Poway (San Dieguito Watershed)

Copermittee Primary Contact Name: Steven Strapac

Copermittee Primary Contact Information:
Address: 13325 Civic Center Drive
City: Poway, CA | County: San Diego | State: CA | Zip: 92064
Telephone: (858) 668-4653 | Fax: | Email: sstrapac@poway.org

II. LEGAL AUTHORITY

Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES	☒
	NO	☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES	☐
	NO	☒
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES	☐
	NO	☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

Number of non-storm water discharges reported by the public	2
Number of non-storm water discharges detected by Copermittee staff or contractors	9
Number of non-storm water discharges investigated by the Copermittee	11
Number of sources of non-storm water discharges identified	11
Number of non-storm water discharges eliminated	3
Number of sources of illicit discharges or connections identified	11
Number of illicit discharges or connections eliminated	3
Number of enforcement actions issued	11
Number of escalated enforcement actions issued	0

V. DEVELOPMENT PLANNING PROGRAM

Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES	☐
	NO	☒
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES	☐
	NO	☐

Number of proposed development projects in review	10
Number of Priority Development Projects in review	3
Number of Priority Development Projects approved	0
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	0

Number of completed Priority Development Projects in inventory	16
Number of high priority Priority Development Project structural BMP inspections	0
Number of Priority Development Project structural BMP violations	0
Number of enforcement actions issued	0
Number of escalated enforcement actions issued	0

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Number of construction sites in inventory	30
Number of active construction sites in inventory	30
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	10
Number of construction site inspections	49
Number of construction site violations	5
Number of enforcement actions issued	5
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	42	7	2	23
Number of existing development inspections	15	4	0	23
Number of follow-up inspections	0	2	0	0
Number of violations	0	2	0	1
Number of enforcement actions issued	0	2	0	1
Number of escalated enforcement actions issued	0	0	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Steven E Strapac
Signature

10/17/16
Date

STEVEN E. STRAPAC
Print Name

SENIOR CIVIL ENGINEER
Title

858.668.4653
Telephone Number

SSTRAPAC@POWAY.ORG
Email

FISCAL ANALYSIS

Fiscal information for 2015/2016 is reported in the tables on the following page. The tables are based largely on the standard templates used by the Copermittees in previous fiscal years, but with a distinction between labor costs and other expenses (materials, contracts, etc.) as requested in the Municipal Permit (San Diego Regional Water Quality Control Board, Order No. R9-2013-0001 as amended by Order No. R9-2015-001 and Order No. R9-2015-0100).

Regional programs include Copermittee shared costs for education and other regional expenses, as well as City staff time to participate in regional meetings. Watershed costs include meeting participation, monitoring, and the City's portion of watershed cost shares.

The City anticipates using the same funding sources as shown in Table 2 for 2015/2016 program funding needs. Developer fees are contingent on the number of development projects in the City, and the fees are only used for reviews and similar services provided for those development projects.

Table 1: 2015/2016 Expenditure Summary

Jurisdictional Components	Labor	Expenses	Total
Administration and Permit Fee	$192,655	$24,220	$216,875
Development Planning	$12,120	$0	$12,120
Construction	$22,372	$0	$22,372
Municipal	$703,942	$355,244	$1,059,186
Industrial and Commercial	$27,325	$31,760	$59,085
Residential	$14,375	$176,075	$190,450
IDDE	$0	$48,500	$48,500
Education	$0	$1,000	$1,000
Public Participation	$0	$0	$0
Jurisdictional Total	**$972,789**	**$636,799**	**$1,609,588**
Watershed Programs			
Los Peñasquitos	$14,256	$145,360	$159,616
San Dieguito	$14,256	$27,301	$41,557
Watershed Programs Total	**$28,512**	**$172,660**	**$201,172**
Regional Programs	**$12,217**	**$20,500**	**$32,717**
Total Costs	**$1,013,517**	**$829,960**	**$1,843,477**

Table 2: 2015/2016 Funding Source Summary

Funding by Source	Amount
General Fund	$1,674,987
Storm Water Fee	$0
Developer Deposits and Fees	$21,000
Registration and Inspection Fees	$4,752
Grant Funds	$13,903
Other	$175,075
Total Funding	**$1,889,717**

D.3.3 City of Poway Strategies

City of Poway's strategies are detailed in Table D-3.

Table D-3
City of Poway Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
JRMP (E.2 – E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
PW-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to JRMP. All high priority projects are inspected annually prior to the rainy season. 20% of all projects are inspected annually.	FY16	Continuous-Ongoing	Y	None	Y	None
Priority Development Projects (PDPs)								
PW-2	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to JRMP. For structural BMPs, all high priority projects will be inspected prior to the start of the rainy season. Any projects that do not provide sufficient documentation to verify that appropriate maintenance work has been performed through the annual maintenance verification program will also be inspected before the end of the fiscal year.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-3	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP.	FY16	Continuous- As needed	Y	None	Y	None
PW-3.1	Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover.	Implemented through the Minor Development Review process and the plan check process.	FY16	Continuous- As needed	Y	None	Y	None
PW-4	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects). Refer to Section 4.2.5. And Appendix N for further details.	Refer to JRMP.	FY16	Continuous- As needed	Y	None	Y	None

Table D-3 (continued)
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E.4 Construction Management								
PW-5	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Refer to JRMP; Perform daily inspections during construction. During the wet season, high priority construction sites are inspected every two weeks, medium priority are inspected monthly, and low priority sites are inspected as needed. During the dry season, all construction sites are inspected as needed.	FY16	Continuous-Ongoing	Y	None	Y	None
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
PW-6	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP; Commercial/industrial/municipal are inspected annually, with municipal receiving more frequent inspections by staff.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-6.1	Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	Annually review policies and procedures.	Prior to FY16	Continuous- As needed (Annually)	Y	None	Y	None
PW-6.2	Track stationary and mobile businesses through communication with Business Licensing Division.	Maintain through the City's Commercial/Industrial program.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-7	Promote and encourage implementation of designated BMPs in commercial areas.	Collaborate with MWD and promote their SoCal Water$mart rebates and products such as weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and turf removal.	FY16	Continuous-Ongoing	Y	None	Y	None

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PW-8	Implement program to investigate illegal grading on private property.	Program to investigate reports of illegal grading. Maintain records of reported illegal gradings and immediately investigate. If activity violates grading or stormwater regulation, issued a "Stop Work" notice and must obtain grading permit and correct stormwater violations. Reports are tracked in "Trackit" software as a code violation and bi-monthly meetings to discuss the status of reports. Grading cases are subject to a strict timeline of action, and enforcement is upped until either compliance, or a Notice of Violation is filed against the property. If it is a stormwater issue, the City's on-call stormwater contractor corrects the issue and City liens the property for payment.	FY16	Continuous-Ongoing	Y	None	Y	None
MS4 Infrastructure								
PW-9	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	Refer to JRMP.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-9.1	Perform catch basin cleaning.	Inspect and clean catch basins annually.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-9.2	Clean open-channels to reduce pollutant loads and invasive plants and animals.	Inspect and clean open channels annually.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-10	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers and identify sewer leaks and areas for sewer pipe replacement.	Program implemented through sewer maintenance and inspection program.	FY16	Continuous-Ongoing	Y	None	Y	None
Roads, Street, and Parking Lots								
PW-11	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP; the City of Poway is divided into 8 zones for road operation and maintenance activities; rotational cycle: one zone inspected each year.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-11.1	Implement street sweeping.	Refer to JRMP; all areas swept twice per month.	FY16	Continuous-Ongoing	Y	None	Y	None

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PW-11.2	Continue maintenance on access roads and trails by proactively monitoring for erosion and completing minor repair and slope stabilization.	Actively identify and repair eroding slopes that may be contributing to sediment loading. Prepare an inventory and assessment of eroding areas and their risk to surface waters. Follow assessment with a schedule for ongoing inspection and stabilization (potentially based on a number or percentage of sites annually). Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Y	None	Y	None
Pesticide, Herbicides, and Fertilizer BMP Program								
PW-12	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP.	FY16	Continuous-Ongoing	Y	None	Y	None
Retrofit and Rehabilitation in Areas of Existing Development								
PW-13	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	The Offsite Alternative Compliance Program will include methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to high priority water quality conditions, potential pollutant load removal effectiveness, and feasibility of implementation. The development of such program is contingent on the completion of a current water quality equivalency study and development of a crediting system across multiple Responsible Agencies. Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories.	FY18	Continuous-Ongoing	Y	None	Y	None

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PW-14	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	The Offsite Alternative Compliance Program will include methods for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas. Rehabilitation project selection will be based upon a variety of factors including existing stream or habitat degradation, potential future cumulative stream or habitat impacts, and feasibility of implementation. The development of such program is contingent on the completion of a current water quality equivalency study and development of a crediting system across multiple Responsible Agencies.	FY18	Continuous-Ongoing	Y	None	Y	None
E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
PW-15	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP. The City must visually inspect at least 80% of their outfalls two times per year during dry weather conditions.	FY16	Continuous-Ongoing	Y	None	Y	None
E.7 Public Education and Participation (B.3.b.(1)(a)(iii))								
PW-16	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-16.1	Target school-based education and outreach.	Through "I Love a Clean San Diego," give school presentations to fourth-graders eight times per year.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-16.2	Conduct education through community-based organizations.	Through "I Love a Clean San Diego," staff street fair booths twice per year. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Y	None	Y	None

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PW-16.3	Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions.	Review City storm water website, identify and implement required updates to reflect WQIP and JRMP revisions.	Prior to FY16	Continuous- As needed	Y	None	Y	None
PW-16.4	Collaborate with regional education and outreach efforts.	Participate in Regional Think Blue campaign and collaborate with other regional efforts to provide consistent message or efficiency in training for targeted audiences.	FY16	Continuous- Ongoing	Y	None	Y	None
E.6 Enforcement Response Plan								
PW-17	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP.	FY16	Continuous- Ongoing	Y	None	Y	None
Non-JRMP Strategies (Optional Strategies, B.3.b.(1)(b))								
Nonstructural Strategies								
PW-18	Require implementation of low impact development BMPs with all new construction.	The City requires LID at all sites, with an emphasis on an effective combination of both erosion control BMPs and sediment control BMPs to reduce discharges of sediment. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous- Ongoing	Y	None	Y	None
PW-19	Promote MWD and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	Collaborate with MWD to promote their SoCal Water$mart rebates and products such as weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and turf removal. Collaborate with San Diego County Water Authority (SDCWA) to promote their Water Smart irrigation system checkups and turf replacement incentives. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous- Ongoing	Y	None	Y	The City also partnered with the San Diego County Water Authority to promote their artificial turf rebate program.

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PW-20	Proactively repair and replace corrugated metal pipe (CMP) MS4 components to provide source control from MS4 infrastructure.	Implement CMP replacement program with an emphasis on pipes in open canyons.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-21	Target human behavior in parks and other public areas including trash reduction or other high impact behavior to habitat, wildlife, and water quality.	Implement trash reduction programs by increasing the number of trash and recycling bins during high-traffic public events and in public parks. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Y	None	Y	None
PW-22	Participate in Reference Watershed Study.	The San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for “natural sources” to establish the concentrations or loads from streams in a minimally disturbed or “reference” condition. Refer to Section 5.1 for further details. Will occur region-wide. Funding and resources were previously secured.	Prior to FY16	One Time, With Continuous O&M	Y	None	Y	None

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PW-23	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas, creating permanent open space protections on undeveloped city-owned land, and acquiring privately-owned undeveloped open areas.	As opportunities arise, where feasible, avoid hardscape development and degradation in unpaved open space areas, create permanent open space protections to undeveloped city-owned land, and acquire privately owned undeveloped parcels of land. This strategy may be implemented if there is interest in participation by the public or private entity with current control of the land. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) identification of partners, if needed (public, private, non-profit), 2) identification of costs and potential sources of funding, 3) final agreement by public or private entity with current control of the land, 4) final agreement by all other participating partners including acceptance by intended land- or asset-owning City department, and 5) funding in place. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The time frame for implementation will vary by project. Implementation is in perpetuity as long as funding is available.	Triggered	Continuous as funding allows	Strategy not triggered in FY16	None	If triggered	None
Structural Strategies								
PW-24	Reconfiguring DPW waste yard to reduce pollutants/runoff.	Follow the site's SWPPP and perform annual monitoring. Relocate activities to limit exposure to reduce pollutants and runoff. Monitoring will continue. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Y	None	Y	None

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Green Infrastructure								
PW-25	If interim load reduction goals are not met and additional green infrastructure is required, 0.26 acre has been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 74.58 acres with a total storage volume of 3.64 acre-feet.	Construction, operation and maintenance of 0.26 acre of potential green infrastructure projects on public parcels to treat an impervious drainage area of 74.58 acres with a total storage volume of 3.64 acre-feet. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project) 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Triggered	Continuous-Ongoing	Strategy not triggered in FY16	None	If triggered	None

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Multiuse Treatment Areas								
Infiltration and Detention Basins								
PW-26	If interim load reduction goals are not met and additional multiuse treatment areas are required, an infiltration basin can be implemented near Chaparral Elementary School.	There are 4.4 acres available to construct an infiltration basin to treat 45.5 acres of primarily single-family residential areas. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months;) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project) 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Triggered	Continuous-Ongoing	Strategy not triggered in FY16	None	If triggered	None

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PW-27	If interim load reduction goals are not met and additional multiuse treatment areas are required, a subsurface detention basin can be implemented on the grounds of Painted Rock Elementary School.	Painted Rock Elementary has about 2.2 acres available for a subsurface detention basin that could potentially treat 164 acres of residential areas. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project) 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Triggered	Continuous-Ongoing	Strategy not triggered in FY16	None	If triggered	None

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WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-1	Collaborative Approach to Irrigation Reduction	Responsible Agencies are collaborating with water agencies to encourage implementation of water conservation efforts. Water conservation that attempts to reduce irrigation and minimize storm water runoff can also improve water quality of receiving waterbodies. MWD's SoCal Water$mart Program supports conservation efforts by offering incentives in the form of rebates for rain barrels, rotating sprinkler nozzles, weather-based irrigation controllers, soil moisture sensor systems, and turf replacement. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous - Ongoing	Y	None	Y	None
WMA-2	Offsite Alternative Compliance Option (WMAA)	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015, jurisdictions can formally implement an optional Alternative Compliance Program by December 2015 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).	Prior to FY16	Continuous - Ongoing	Y	None	Y	None

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ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-3	Collaboration with the Regional Board	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Ag Waiver, 2) enforcement of other non-MS4 dischargers, and 3) Bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous - Ongoing	Y	None	Y	None
WMA-4	Participation in Watershed Council	If a Watershed Council is re-established, the City of San Diego, County of San Diego and potentially other Responsible Agencies will participate. Watershed Councils are typically locally organized, voluntary, non-governmental organizations, and are intended to broadly represent various stakeholders in the WMA. Goals of Watershed Councils may vary, but they generally promote protecting the watershed and sustaining natural resources. This coordination could assist in selecting WMA projects, identifying potential funding opportunities, and promoting communication among community groups and regulated agencies. Resources necessary to implement this strategy include participating jurisdictional staff to coordinate with the regional effort and the development of an agreement (e.g. MOU, JPA) among participating entities. Projected funding needs may be met through grant funding, support from community groups or other institutions, or jurisdictional General Funds. Participation is dependent on funding availability.	Triggered	Continuous as funding allows	Strategy not triggered in FY16	None	If triggered	None

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D.3.4 Modifications to the BMP Design Manual

No modifications to the BMP Design Manual have been made since the WQIP was approved in fall 2015. The current Poway's BMP Design Manual is posted on the Poway's website, and the link to this page is listed on Project Clean Water.

D.3.5 Modifications to the Jurisdictional Runoff Management Plan

No modifications to the Poway's JRMP have been made since the WQIP was approved in fall 2015. The current Poway JRMP is posted on the Poway's website, and the link to this page is listed on Project Clean Water.

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D.4 City of San Diego

The City of San Diego is proposing the administrative changes in the table below to the San Dieguito River Water Quality Improvement Plan. The proposed administrative changes include clarifications, corrections to errors and typos, and other minor edits that only apply to the City of San Diego.

WQIP Section		Administrative Changes
1	Appendix I – Jurisdictional Strategies and Schedules; Section I.4.2 Funding Needs for the City of San Diego	Included the following text: "Funding needs presented in this section are a snapshot in time and are based on the best information available at the time they were prepared. As program implementation progresses, updates to estimated funding needs are likely to change. For the most recent estimate of funding needs, refer to the WAMP available at the Storm Water Division website, www.sandiego.gov/stormwater/plansreports.
2	Appendix I – Jurisdictional Strategies and Schedules; Table I-5 City of San Diego Jurisdictional Strategies	Refined the text (shown as track changes in red text in Appendix D) to provide greater clarity and/or to correct errors and typos.
3	Appendix I – Jurisdictional Strategies and Schedules; Table I-5 City of San Diego Jurisdictional Strategies	Changed strategy identification numbering system (See Appendix D).
4	Appendix I – Jurisdictional Strategies and Schedules; Table I-5 City of San Diego Jurisdictional Strategies	Structural Strategies, Priority Development Project (PDP) BMPs: All PDP BMPs have been combined into a single strategy for ease of viewing. A table with an updated list of PDP BMPs is included in the WQIP Annual Report (See Appendix D).
5	Appendix I – Jurisdictional Strategies and Schedules; Table I-5 City of San Diego Jurisdictional Strategies	Structural Strategies, Multi Use Treatment Areas (MUTAs): Planned MUTAs that are not yet built have been combined into a single strategy for ease of viewing. The total sum of drainage area treated (level of commitment) has not changed. A table with all structural strategies (MUTAs, Green Infrastructure, Green Streets, etc.) is included in the WQIP Annual Report (See Appendix D).

D.4.1 Annual Report Certifications

The City of San Diego's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.4.2 Annual Report Form

City of San Diego's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

D.4.3 City of San Diego Strategies

City of San Diego's strategies and project implementation status are detailed in Tables D-4 through D-7.

THE CITY OF SAN DIEGO

STATEMENT OF CERTIFICATION

San Dieguito River Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Drew Kleis
Deputy Director
Transportation & Storm Water Department

1/12/17
Date

Transportation & Storm Water Department
9370 Chesapeake Drive, Suite 100, MS 1900 • San Diego, CA 92123
Hotline (619) 235-1000 Fax (858) 541-4350

CITY OF SAN DIEGO

SCOTT CHADWICK
CHIEF OPERATING OFFICER

January 27, 2017

Mr. David W. Gibson, Executive Officer
Regional Water Quality Control Board
San Diego Region
2375 Northside Drive, Suite 100
San Diego, CA 92108

Subject: Certification of Adequate Legal Authority

Dear Mr. Gibson:

Pursuant to San Diego Regional Water Quality Control Board Order No. R9-2013-0001, as amended by Order No. R9-2015-0100 (Municipal Permit or Permit), Provision E.1.b, the City of San Diego, as a Copermittee in the above referenced permit, submits this certification of adequate legal authority with the first Water Quality Improvement Plan Annual Report. The City has adequate legal authority to implement and enforce each requirement contained in 40 C.F.R. section 122.26(d)(2)(i)(A)-(F), and the Municipal Permit (including Provision E.1.a(1)-(10)). The San Diego Municipal Code, including the following provisions, provides the City with adequate legal authority as required by the Municipal Permit:

1. Storm Water Management and Discharge Control, sections 43.0301 through 43.0312. These provisions are being amended, although the current version also complies with the requirements of the Municipal Permit.
2. General Construction Permit Authority and Procedures, sections 129.0101 through 129.0120.
3. Grading Regulations, sections 142.0101 through 142.0150.
4. Storm Water Runoff Control and Drainage Regulations, sections 142.0201 through 142.0230.

The City looks forward to working with you and the Regional Board on storm water management matters. If you have any questions, please contact Senior Planner Jim Harry at (858) 541-4353 or email JHarry@sandiego.gov.

Sincerely,

Scott Chadwick
Chief Operating Officer

AK/jph

cc: Mara Elliott, City Attorney, Office of the City Attorney
Stephen Puetz, Chief of Staff, Office of the Mayor
Stacey LoMedico, Assistant Chief Operating Officer
Mike Hansen, Deputy Chief of Staff and Chief of Policy, Office of the Mayor
Paz Gomez, Deputy Chief Operating Officer, Infrastructure/Public Works
Alejandra Gavaldon, Director of Federal Government Affairs & Water Policy, Office of the Mayor
Kris McFadden, Director, Transportation & Storm Water Department
Drew Kleis, Deputy Director, Transportation & Storm Water Department
Davin Widgerow, Deputy City Attorney, Office of the City Attorney
Clem Brown, Program Manager, Transportation & Storm Water Department
Ruth Kolb, Program Manager, Transportation & Storm Water Department
Jim Harry, Senior Planner, Transportation & Storm Water Department

I. COPERMITTEE INFORMATION			
Copermittee Name: **City of San Diego (San Dieguito WMA)**			
Copermittee Primary Contact Name: **Drew Kleis, Deputy Director, Storm Water Division, Transportation & Storm Water Department**			
Copermittee Primary Contact Information:			
Address: **9370 Chesapeake Drive, Suite 100**			
City: **San Diego**	County: **San Diego**	State: **CA**	Zip: **92123**
Telephone: **858-541-4320**	Fax: **858-541-4350**	Email: **Akleis@sandiego.gov**	

II. LEGAL AUTHORITY	
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	**YES** ☒ **NO** ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE	
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	**YES**[1] ☒ **NO** ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	**YES** ☒ **NO** ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM[2]	
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
Number of non-storm water discharges reported by the public	**119**
Number of non-storm water discharges detected by Copermittee staff or contractors	**60**
Number of non-storm water discharges investigated by the Copermittee	**171**
Number of sources of non-storm water discharges identified	**143**
Number of non-storm water discharges eliminated	**141**
Number of sources of illicit discharges or connections identified	**142**
Number of illicit discharges or connections eliminated	**140**[3]
Number of enforcement actions issued	**141**[3]
Number of escalated enforcement actions issued	**69**

V. DEVELOPMENT PLANNING PROGRAM[2]	
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	**YES**[1] ☒ **NO** ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	**YES** ☒ **NO** ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	**YES**[4] ☒ **NO** ☐
Number of proposed development projects in review	**70**[5]
Number of Priority Development Projects in review	**5**[6]
Number of Priority Development Projects approved	**88**[7]
Number of approved Priority Development Projects exempt from any BMP requirements	**0**
Number of approved Priority Development Projects allowed alternative compliance	**0**
Number of Priority Development Projects granted occupancy	**76**[8]
Number of completed Priority Development Projects in inventory	**118**[9]
Number of high priority Priority Development Project structural BMP inspections	**1**
Number of Priority Development Project structural BMP violations	**1**[10]
Number of enforcement actions issued	**1**[11]
Number of escalated enforcement actions issued	**0**

VI. CONSTRUCTION MANAGEMENT PROGRAM[2]	
Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES[1,12] ☒ NO ☐
Number of construction sites in inventory	1,364
Number of active construction sites in inventory	26
Number of inactive construction sites in inventory	12
Number of construction sites closed/completed during reporting period	23
Number of construction site inspections	10,074
Number of construction site violations	169
Number of enforcement actions issued	114
Number of escalated enforcement actions issued	65

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM[2]	
Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	23	1,542 (includes mobile)	81	12[13]
Number of existing development inspections	22	308	6	1[13]
Number of follow-up inspections	0	14	0	0
Number of violations	3	49	0	109[13]
Number of enforcement actions issued	4	58	0	107[13]
Number of escalated enforcement actions issued	0	23	0	50

VIII. PUBLIC EDUCATION AND PARTICIPATION	
Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES[1] ☒ NO ☐

IX. FISCAL ANALYSIS	
Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES[1,14] ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Andrew Kleis
Signature

1/12/17
Date

Drew Kleis
Print Name

Deputy Director
Title

(858) 541-4320
Telephone Number

Akleis@sandiego.gov
Email

---

[1] The City of San Diego approved an update to the Jurisdictional Runoff Management Plan (JRMP) in FY 16. The update of the JRMP was done in compliance with Order No. R9-2013-0001.

[2] See the JRMP Annual Report FY 2016 Attachment 1 for a citywide summary of this data.

[3] The number of enforcement actions issued does not equal the number of identified illicit discharges or connections because some discharge complaints in the last quarter of FY 2016 were still under investigation at the end of FY 2016.

[4] The Storm Water Standards Manual (Part 1: BMP Design Manual, and Part 2: Construction BMP Standards) was updated in January 2016.

[5] The number of ongoing Standard and Priority Development Projects in review as of 6/30/16. The Development Services Department processes other types of permits, in addition to those included in the JRMP Annual Report, that are not subject to the requirements of the municipal permit.

[6] The number of ongoing Priority Development Projects in review as of 6/30/16. Only a portion of the projects that the Development Services Department processes qualify as a priority development project.

[7] The number of Priority Development Projects approved in FY 2016.

[8] This number includes the City's Priority Development Projects that received final inspection in FY 2016 as well as certain Priority Development buildings and grading projects that did not require a Certificate of Occupancy, that were completed in FY 2016.

[9] Represents the total number of completed Priority Development Projects in the City's inventory as of the end of FY 2016. These projects include projects entered into the inventory as complete in previous years.

[10] The number of Priority Development Project structural BMP violations included Notices of Violation, Notices of Deficient Maintenance, and Administrative Citations issued to public and private entities within the City's jurisdiction in this watershed.

[11] The number of enforcement actions included Notices of Violation and Notices of Deficient Maintenance issued to public and private entities within the City's jurisdiction in this watershed. The City has achieved compliance at 146 of the 150 sites identified in the San Diego RWQCB's Notice of Violation (Order Number R9-2014-0034). The San Diego RWQCB granted the City an extension to achieve compliance at the remaining four sites by May 26, 2017.
During the process of achieving compliance for the aforementioned 150 identified sites, the City has discovered an additional 74 sites which initially appear to be out of compliance due to varying degrees of circumstances. Each of these potential violations consist of post-construction BMP issues. Continuing the same process as outlined in our quarterly reports to the RWQCB, the City is currently researching each case. After initial research to verify non-compliance or not, we will follow our established procedures to have each site be in conformance to the MS4 permit under which it was permitted.

[12] Responses in this report are based on the City's internal data. Potential program deficiencies were identified by the Board in FY 2016, however, the City has taken steps to correct issues identified by the Board as detailed in the JRMP Annual Report FY 2016 Appendix. The City has implemented several improvements that address the Regional Board's concerns. These improvements ranged from procedural changes to creating multi-language brochures for contractors. Several operating and internal procedures have been refined to improve enforcement actions, add clarity to how sites are inspected, and to better define the staff's roles and expectations.

[13] Existing facilities for residential uses are characterized as Residential Management Areas (RMA), which could include hundreds of residences. When all of the residences in an RMA are inspected by City staff that is only counted as one inspection. However, all individual issues noted at each residence during an RMA inspection is counted as a separate violation and/or enforcement action.

[14] See the JRMP Annual Report FY 2016 Appendix for the FY 2016 Fiscal Analysis.

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The City of
SAN DIEGO
Development Services Department
Engineering Division

January 12, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Development Services Department Engineering Division Contributions

Please accept this letter as certification of the City of San Diego Development Services Department Engineering Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Edric Doringo, Program Manager at 619-446-5098 or email edoringo@sandiego.gov.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Development Services Department, Engineering Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

Gregory Hopkins

Gregory Hopkins
Deputy Director, Development Services Department

GH/cmm

Enclosure:
cc: Robert Vacchi, Director, Development Services Department
Drew Kleis, Deputy Director, Transportation and Storm Water Department

1222 First Avenue, M.S. 501
San Diego, CA 92101-4155

T (619) 446-5291

The City of
SAN DIEGO

Development Services Department
Inspection Services Division

January 24, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Development Services Department Inspection Services Division Contributions

Please accept this letter as certification of the City of San Diego Development Services Department Inspection Services Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Senior Inspector Sam Lindsey or Project Manager Xavier Del Valle at (858) 492-5070.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Development Services Department, Inspection Services Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

William Barrañón
Inspection Services Manager

The City of
SAN DIEGO
Public Works Department
Construction Management and Field Services Division

November 3, 2016

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Public Works Department, Construction Management and Field Services Division Contributions

Please accept this letter as certification of the City of San Diego Public Works Department Construction Management and Field Services Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Julie Ballesteros, Senior Civil Engineer, at (858) 573-5012.

I certify under penalty of law that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Public Works Department Field Engineering Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, to the best of my knowledge and belief, is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Myrna M. Dayton, PE, QSP, QSD, DCE
Deputy Director

9485 Aero Drive, Mail Station 18
San Diego, CA 92123
engineering@sandiego.gov

T (858) 627-3200
sandiego.gov

THE CITY OF SAN DIEGO

January 30, 2017

Christina Arias
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, CA 92108

Dear Ms. Arias:

Subject: City of San Diego Jurisdictional Runoff Management Plan (JRMP) FY 2016 Annual Report, Public Works Department, Project Implementation Division Contributions

Please accept this letter as certification of the City of San Diego Public Works Department, Project Implementation Division's contributions to the City of San Diego's JRMP Fiscal Year 2016 Annual Report, and associated Appendices.

If you have any questions, please contact Catherine Dungca, Senior Civil Engineer, at (619) 533-3778.

I certify, under penalty of law, that this Jurisdictional Runoff Management Plan Fiscal Year 2016 Annual Report and attachments (associated with the Public Works Department, Project Implementation Division) were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Sincerely,

Marnell Gibson
Assistant Director
Public Works Department

APPENDIX

1 OPERATIONAL ADAPTIVE MANAGEMENT

In Fiscal Year (FY) 2016 the City of San Diego (City) completed technical and non-technical monitoring, special studies, pilot studies, and various other efforts related to its Storm Water Program. The City gained valuable information that led to effective adaptation of procedures and operations, which ultimately led to more effective implementation of its Storm Water Program and the Jurisdictional Runoff Management Plan (JRMP). The following are operational adaptive management improvements that the City made during FY 2016:

- **Get it Done Application**
  In late FY 2016, the City released the Get it Done Application (App), which provides a modern, efficient method for members of the public to report issues to the City. One of the App's features allows illicit discharges to be reported by taking a photo with a phone that includes Global Positioning System (GPS) coordinates, and uploading it to the App. According to a recent City survey, 83 percent of respondents stated that they did not want to call the City government to report a problem. The new Get It Done App eliminates the need to call the City for various problems, by allowing residents to report issues online, which was the preferred method of 50 percent of survey respondents. The App also allows residents to report problems using their name or anonymously.

- **Phase V Street Sweeping Pilot**
  The City completed the fifth and final pilot study of the Targeted Aggressive Street Sweeping Pilot Program in FY 2016, which tested the effectiveness of posting limited-hour "no parking" signs on traditionally non-posted street sweeping routes. After two years of data collection on two subject routes, the study confirmed the hypothesis that a significant amount of additional debris (48% and 58% over baseline on the subject routes) can be removed from posting no parking signs on traditionally non-posted roadways. Based on this finding, the City will consider posting additional routes if supported by the community.

- **Enhanced Catch Basin Cleaning Optimization**
  Enhanced catch basin cleaning is a strategy to address pollutant removal from the Municipal Separate Storm Sewer System (MS4) in three of the City's six watersheds. While most catch basins are inspected once per year, this strategy involves inspecting catch basins within the specified watersheds between two and four times per year. The optimization study assigned priorities to individual basins and watersheds based on eight years of historic debris removal. This optimization focused efforts by reducing the number of inspections performed per year, while increasing total debris removal from those inspections. This enhancement will allow the City to target high priority drains to maximize pollutant removal while maintaining cost efficiencies. In FY 2016, approximately 2,500 additional catch basin inspections and cleanings (if necessary) were completed in the Chollas Creek area of the San Diego Bay Watershed.

- **Flood Control Pump Stations**
  To help minimize the risk of flooding in flood-prone areas during storm events, the City utilizes a number of pump stations to increase the flow of water through the conveyance network. Considering the pump stations are connected to the electric network, they only

function when power is running. In FY 2016, a 2,400 volt automatic transfer switch and generator were installed at a critical pump station that are capable of pumping 130,000 gallons of water per minute. This significantly decreases the risk of flooding in the related drainage area because the pump station will continue to operate during a storm event. The City also replaced or refurbished 11 other critical pump stations. Additionally, the City modernized operations at 14 pump stations by installing a telemetry system that remotely alerts staff of failures, allowing for a more immediate response.

- **Storm Drain Inspections**
  To help prioritize replacement of corrugated metal piping in the City's conveyance network, the City used closed-circuit televising at 62 locations in FY 2016 to assess pipe conditions. The City assessed the condition of 28,000 linear feet of corrugated metal piping in FY 2016.

- **Property-Based Inspections**
  In FY 2016, the City further committed to implementing property-based inspections to increase the business inspection program's efficiency and effectiveness. A previously conducted pilot study on inspection practices found property-based inspections more effective at identifying and resolving water quality issues (e.g., improper trash disposal practices and irrigation runoff, etc.) associated with commercial and industrial businesses. The inspections are focused on areas and activities associated with businesses that would not otherwise be inspected for storm water compliance. The inspections greatly increase the number of businesses subjected to storm water inspections while focusing on the pollution generating areas and activities without unduly increasing the inspection load of City inspectors. In FY 2016, the City performed 835 property-based inspections that accounted for over 4,700 business inspections.

- **Tiger Team**
  The Tiger Team was established in FY 2016 to identify, locate and eliminate sources of human specific bacteria sources in the MS4. The Transportation & Storm Water Department (TSW) leads this effort in partnership with the Public Utilities Department. After a specific portion of the MS4 with elevated human specific bacteria was identified, the Tiger Team performed escalated enforcement activities through TSW Code Enforcement, MS4 sampling, MS4 sanitary sewer line televising, and MS4 and sanitary sewer cleaning. Over several months during the reporting year, one problem area within the City was investigated extensively and a source of human specific bacteria in the MS4 was identified and abated.

- **Increased Non-Stormwater Discharge Investigations**
  The City received 215 more complaints of non-stormwater discharges in FY 2016. Approximately 81% of the complaints citywide were resolved. A majority of the investigations that were resolved involved irrigation runoff. Cases were unresolved either because the source could not be identified or the source was groundwater.

  The identification and elimination of irrigation efforts in FY 2016 involved the following:
  1) Special irrigation patrols were conducted on a monthly basis. All violating properties were issued notices of violation and/or a citation.
  2) TSW code compliance partnered with the Public Utilities Department. If a complaint of irrigation with runoff was received, a storm water code compliance officer would issue a notice of violation. If the property had multiple complaints,

that property would become part of an irrigation patrol and could result in a citation.

- **Waterways Maintenance Plan**
  The City began development of the Waterways Maintenance Plan in FY 2016, which will replace the Master Storm Water System Maintenance Program, which expires in 2018. The goals of the Plan are to create an overall holistic storm water management strategy with standard mitigation measures and streamlined maintenance approvals. Objectives of the Plan include flood risk reduction, infrastructure sustainability and resource protection and restoration. In addition to technical scoring criteria, the Plan also includes a unique public input metric so that public concerns are given a tangible value. Planning efforts will continue in FY 2017, with implementation beginning in FY 2019.

- **Off-Site Alternative Compliance Program**
  In FY 2016, the City implemented phase I of the Alternative Compliance Program. This gives development projects that would require on-site structural Best Management Practices (BMPs) to comply with pollutant control and hydromodification management the option to propose off-site alternative compliance projects. The development of phase II also began in FY 2016 and includes establishing an in-lieu fee structure and credit system as an alternative to installing on-site stormwater BMPs.

- **Watershed Master Planning**
  To provide the high-resolution data needed to drive systematic and cost-effective implementation of green infrastructure (GI) projects, the City has developed a comprehensive and dynamic Watershed Master Plan (WMP) in the Chollas Creek Watershed that quantifies progress towards water quality goals and incorporates synergies with other municipal programs. The WMP has the capability to dynamically assess the cost-based water quality benefits of specific GI projects against one another and incorporates a robust prioritization logic that realizes the complex nature of implementing retrofit GI facilities within a highly urbanized environment. Ultimately, the output of this project gives the City a project-by-project roadmap that is prioritized to implement high-impact and high-efficiency BMPs first, leaving less desirable projects for later implementation.

- **Bacteria Regrowth Study**
  The bacteria regrowth study currently being completed by the City includes monitoring to characterize the magnitude and extent of potential *Enterococcus* loading due to regrowth within the City's storm drain system. This study will quantify the amount of bacteria in receiving water samples that are harmless to humans and would potentially be used to refine bacteria water quality standards of the Bacteria TMDL as a part of the re-opener process.

- **Los Peñasquitos Lagoon Restoration Project**
  Modeling was completed in FY 2016 to confirm the preferred alternative for the Los Peñasquitos Lagoon Restoration project. The City was identified as the "lead" for the project. The upcoming tasks in FY 2017 include completing the concept design and starting the public outreach process. In coordination with Copermittees, Caltrans and SANDAG completed the environmental and construction phases for various rail and transit, highway, and environmental protection projects.

2 Stormwater Program Accomplishments/Notable Updates

The City continued to implement the key elements of the JRMP. The following are stormwater accomplishments and notable updates that occurred during the FY 2016 reporting period.

- **Water Quality Improvement Plans**

  In FY 2016, the San Diego Regional Water Quality Control Board (Regional Board) accepted the six Water Quality Improvement Plans (WQIPs) that included City jurisdiction. The goal of the WQIPs is to protect, preserve, enhance, and restore the water quality of receiving water bodies. These WQIPs identify the adaptive planning and management process necessary to address the highest priority water quality conditions within a watershed. The WQIPs also identify strategies to achieve improvements in the quality of discharges from the Responsible Agencies' storm drain systems. The City is the lead on the WQIP for the San Dieguito, Los Penasquitos, and Mission Bay watersheds. The City is also a participating agency in the San Diego River, San Diego Bay, and Tijuana River watersheds.

- **JRMP Refinements**

  In FY 2016, the City identified refinements to the JRMP. These refinements were incorporated into the JRMP and will be completed in mid FY 2017. Refinements included minor changes to text to update the discussions of WQIP strategies, updates to the fiscal analysis, updates to the minimum BMPs to address pesticide applications, and updated references to the Storm Water Standards Manual that was adopted in FY 2016. The updated JRMP can be viewed at https://www.sandiego.gov/stormwater/plansreports/jrmp.

- **General Plan and Community Plan Amendments**

  Southeastern San Diego and Encanto Neighborhoods Community Plan Updates:

  The recently adopted Southeastern San Diego and Encanto Neighborhoods Community Plans incorporate language, policies and recommendations concerning the reduction of urban runoff and storm water quality. Stormwater quality plays a significant role in both of these communities since Chollas Creek is a significant feature within both plan areas lead directly to the San Diego Bay. A primary recommendation in both community plans is the restoration and enhancement of the creek, consistent with the Chollas Creek Enhancement Program, which includes the reduction of pollutants that enter the storm water system from nearby uses (see respective Conservation Elements). Specific stormwater language and policies have been adopted for the newly updated Southeastern San Diego and Encanto Neighborhoods Community Plans (adopted October 2015 by City Council).

The following policies have been adopted and will be used to implement BMPs for new development projects in Encanto as an example:

- PLU-53:
    - Facilitate urban gardening as a strategy for creating local healthy food systems and fighting chronic obesity related illnesses, contributing to stormwater retention, and fostering community interaction;
    - Figure 3-4 in the Southeastern San Diego and Encanto Neighborhoods Community Plan illustrates stormwater treatment for streets;
    - Images on page 4-15 in the Southeastern San Diego Encanto Neighborhoods Community Plan illustrate stormwater treatment images;

- P-UD-88: Utilize permeable paving, bioswales, green alleys and/or other stormwater design features that will manage rain water and irrigation runoff while supporting the heavy load vehicles that would service the loading docks and refuse containers;

- Upgrade infrastructure for water and sewer facilities and institute a program to clean the storm drain system prior to the rainy season.

- Install infrastructure that includes components to capture, minimize, and/or prevent pollutants in urban runoff from reaching San Diego Bay and Chollas Creek. (See also Urban Runoff Management in the Conservation and Sustainability Element.)

- P-RE-20: Require that all stormwater and urban runoff drainage be filtered or treated before entering into open space lands.

Draft North Park Community Plan: The draft North Park Community Plan, scheduled to be adopted by City Council in October 2016, also contains specific Stormwater and BMP language in the Conservation Element of the Community Plan as well as in the appendices. The draft North Park Community Plan incorporates language, policies and recommendations concerning the reduction of urban runoff and storm water quality specifically in relation to tree planting as well as "Green Streets". Specific policies include:

- PF-1.15 Implement water improvements programs so there are systematic improvements and gradual replacement of water and wastewater facilities throughout the community. Also see General Plan PF-F.6 PF-G.2, PFH. 3, and PF-I.1.
    - Implement Green Infrastructure strategies to address storm water runoff throughout North Park.

- SE-3.17 Encourage property owners to design or retrofit landscaped or impervious areas to better capture stormwater runoff.

Draft Uptown and Golden Hill Community Plans: Public review drafts of the community plans for Uptown and Golden Hill plan updates were made available for public review in June 2016. The Conservation Elements of the draft community plans address conservation of the natural resources in each community, including open space, natural habitats, canyon sewer maintenance, and management of water resources and

urban runoff. The Public Facilities, Services and Safety Elements also address water, sewer and stormwater infrastructure. The discussion and policies related to these topics are intended to guide sustainable development practices that will minimize ecological footprints within each community and preserve natural features and resources. The Draft Programmatic Environmental Impact Reports were released in the summer of 2016. Adoption of the community plans are anticipated at the end of 2016.

San Ysidro Community Plan Update: A comprehensive community plan update started in San Ysidro in June of 2010 and aims to reflect the current conditions, improve mobility, include the pedestrian environment, and address quality of life issues. A Community Plan Update Stakeholders Advisory Committee (Advisory Committee) was established as part of the plan update effort and consists of diverse representation from the residents, property owners, various business interests, local community organizations, and not-for-profit groups, and participating public agencies within the plan update boundary. The San Ysidro Community Planning Group, which provides City decision-makers with input and recommendations regarding land use plans and development proposals within the San Ysidro plan boundary, makes up the majority of the Advisory Committee members. The Plan update effort is informed by technical studies and the City's 2008 General Plan which promotes current storm water, urban runoff, and water conservation policies. A discussion draft of the plan was released in June 2014 and a public review draft was released in April 2015 and 2016. The plan includes a Conservation Element as well as a Public Facilities Services and Safety Element, and contains specific policies related to reducing storm water runoff in the San Ysidro Community planning area. The plan is anticipated to be adopted in fall 2016.

- **Notices of Violation**

Treatment Control BMPs Notice of Violation: The City has achieved compliance at 146 of the 150 sites identified in the Regional Board's Notice of Violation (Order Number R9-2014-0034). The Regional Board granted the City an extension to achieve compliance at the remaining four sites by May 26, 2017.

During the process of achieving compliance for the aforementioned 150 identified sites, the City has discovered an additional 74 sites which initially appear to be out of compliance due to varying degrees of circumstances. Each of these potential violations consist of post-construction BMP issues. The City is continuing the same process outlined in its quarterly reports to the Regional Board, and is researching each case. After initial research to verify non-compliance or not, the City will follow its established procedures to achieve compliance at each site as required by the MS4 permit that it was permitted.

Administrative Civil Liability Complaint: The Regional Board conducted an audit of the City's construction management program during the 2014-2015 rainy season, and issued an Administrative Civil Liability Complaint in July 2016 for several alleged violations involving the City's construction oversight and enforcement practices. The City has worked diligently to address their initial concerns, and will continue to evaluate and implement strategies to ensure long-term success.

Since 2011, there has been a steady increase in the number of construction projects citywide. This surge in activity required the City to respond in a manner that would

enable the staff to keep up with the demand and allow the managers to effectively oversee the growth.

Several substantial improvements have been made, ranging from updating our standard procedures and increasing our outreach efforts to improving the City's escalating enforcement practices and issuing Administrative Citations and Administrative Civil Penalties to repeat offenders. In addition, the City established bi-weekly coordination meetings with the Storm Water teams from Public Works, Development Services and TSW to more effectively share up-to-date project information, discuss various strategies, collaborate on solutions, and coordinate enforcement on a more routine basis so that escalated enforcement is effective.

Another significant improvement involves the development of a unified storm water enforcement database. This will ensure collaboration between Resident Engineers (RE) and storm water inspectors while in the field so they will know the full inspection and enforcement history prior to entering a site. This resource is expected to be available in FY 2017.

Updating the Storm Water Standards Manual is another milestone improvement that was completed during FY 2016. The additional clarity that's now provided in the Construction BMP Standards section (Part 2) gives the responsible party increased guidance to help prevent construction activities from adversely impacting water quality downstream.

The frequency of the citywide storm water training has increased and proven to be a key factor in equipping and empowering our staff to properly address various field challenges and confidently communicate concerns and violations to the responsible parties. Some of the trainings included mandatory annual storm water training for the REs, Inspectors and Code Enforcement Officers, as well as training for our operations staff from the Public Utilities Department and TSW Streets Division.

3 FISCAL ANALYSIS

3.1 GENERAL BUDGET INFORMATION

The Storm Water Division is responsible for reporting annually on the jurisdictional, watershed and regional fiscal analyses to the Regional Board in accordance with the regional Fiscal Analysis Method developed by the Copermittees in response to Regional Board Order No. R9-2007-0001 (2007 Permit). During the reporting period, the Storm Water Division collected and analyzed financial information from 23 City departments/divisions through its "Annual Report Form" questionnaire, as well as from within the Storm Water Division. A summary of the findings is included below.

FY 2016 fell within the transitional period, as defined under Regional Board Order No. R9-2013-0001, as amended by Order No. R9-2015-0001 (Municipal Permit). During the transitional period, most of the jurisdictional portions of the City's program continue to follow the requirements of the 2007 Permit, while the JRMP and WQIPs were being developed in response to the current Municipal Permit. The WQIPs were approved by the Regional Board at the end of FY 2016. The expenditures described for FY 2015 therefore reflect costs to comply with the transitional period stormwater requirements in effect during FY 2015, which are a combination of 2007 Permit and current Municipal Permit standards. Since the WQIPs were approved during FY 2016, partial implementation began, but full implementation will commence in FY 2017.

It is expected that the City will begin full implementation of current Municipal Permit requirements during FY 2017. The City will implement the revised JRMP, which updates the City's jurisdictional stormwater program to follow the current Municipal Permit requirements rather than the 2007 Permit requirements. The City's fiscal analysis reporting structure in turn will change, reporting expenditures, and funding sources in the following three main categories: JRMP (jurisdictional), WQIP (watershed), and flood risk management. That structure is consistent with the framework described in the City's Watershed Asset Management Plan (WAMP), the WQIPs to which the City is a party, and the JRMP. FY 2015 is the last year in which JRMP and flood risk management will be lumped together under the heading of "Jurisdictional Component" rather than reported separately.

3.2 FISCAL ANALYSIS METHODS

While the City used the format and guidelines included in the Fiscal Analysis Method for reporting purposes, a few modifications were necessary to address how the City tracks accounts internally. Modifications to the expenditure categories are described in the relevant sections below. In many cases, estimated percentages were used to allocate expenditures into the appropriate municipal permit component categories, including watershed and regional.

3.2.1 Fiscal Analysis Results

3.2.1.1 Expenditures

The City's FY 2016 Transitional JRMP Regional Program total expenditures ($75,934,083) for implementing the Municipal Permit requirements are summarized in Table 1.

Table 1: FY 2016 Jurisdictional, Watershed, and Regional Expenditures Summary

Jurisdictional Component	
Administration	$11,179,605
Development Planning (including public and private projects)	$1,897,784
Construction (including public and private projects)	$632,646
Municipal (including Non-emergency Fire Fighting expenditures)	$30,146,109
Storm Water Division Capital Improvements Program (CIP)	$7,929,308
Industrial and Commercial	$2,001,544
Residential, Education, and Public Participation	$2,159,991
Illicit Discharge Detection and Elimination (IDDE)	$11,339,120
Jurisdictional Total	**$67,286,108**
Watershed Component[1]	
San Dieguito Watershed	$1,105,348
Los Peñasquitos Watershed	$2,061,071
Mission Bay Watershed	$1,242,769
San Diego River Watershed	$680,843
San Diego Bay Watershed	$2,165,456
Tijuana River Watershed	$686,584
Watershed Total	**$7,942,071**
Regional Component	
Total Copermittee Cost Share for the City of San Diego	$342,001
Additional Regional Costs for education efforts, monitoring, document reviews, regional meeting attendance, and special projects	$363,903
Regional Total	**$705,904**
Total Costs	**$75,934,083**

[1] Watershed Component costs do not include Capital Improvements Program (CIP) costs. CIP costs are only included in the Jurisdictional Component's Storm Water Division Capital Improvements Program Category.

Transitional JRMP Expenditures

The City's FY 2016 Citywide expenditures for implementing the jurisdictional Municipal Permit requirements are depicted in Figure 1. Expenditures were provided as actual costs in most cases, and when the actual costs could not be determined, estimates of actual costs were provided. The Storm Water Division used the expenditure categories detailed in the Fiscal Analysis Method for jurisdictional reporting. However, because of implementation overlap with the City's education, public participation, and residential Municipal Permit components, it is difficult to separate out individual component costs. Therefore, the expenditures for residential, education, and public participation are reported as one expenditure category.

A total of $67,286,108 was expended in FY 2016 to implement JRMP activities citywide. This amount includes costs paid by sewer and water rate payers (which are used for sewer and water-related services) and costs reimbursed by project applicants. An overview of the expenditures reflected in this component is described below.

Administration ($11,179,605)

Activities identified in this section represent personnel and non-personnel expenses for administration and contracts, grant management, citywide management, staff training, reporting, and assessment of the Municipal Permit.

Development Planning ($1,897,784)

Activities identified in this section represent personnel and non-personnel expenses for plan check reviews, incorporating BMPs into project designs, BMP Design Manual development, and General Plan updates. This category includes expenses for private and public projects.

Construction ($632,646)

Activities identified in this section represent personnel and non-personnel expenses for plan check review services, field inspections related to grading permits, public improvements, and building activities. This category includes expenses for private and public projects.

Municipal ($30,146,109)

Activities identified in this section represent personnel and non-personnel expenses for street sweeping, storm drain and channel maintenance, BMP implementation, and municipal facility and activity inspections. Additionally, this section includes the expenditures for Fire Department activities not related to emergency firefighting, such as facility inspections, stormwater BMPs, etc.

Capital Improvement Program ($7,929,308)

Activities identified in this section represent personnel and non-personnel expenses for implementation of new construction and planned improvements to existing facilities for storm water management. Projects may include, but are not limited to, the construction, purchase, or major renovation of buildings, utility systems, and other facilities to achieve storm water requirements. In addition, they may also include land acquisitions and roadway projects to install storm water facilities.

Industrial and Commercial ($2,001,544)

Activities identified in this section represent personnel and non-personnel expenses for inspection of industrial and commercial facilities. This also includes personnel and non-personnel expenses for the stormwater components of Food Establishment Wastewater Discharge Program (FEWD) and Industrial Wastewater Control Program (IWCP) inspections.

Residential, Education, and Public Participation ($2,159,991)
Activities identified in this section represent personnel and non-personnel expenses for educational materials, outreach efforts and events, public service announcements (PSAs), household hazardous waste (HHW) and used oil outreach, and community events.

Illicit Discharge Detection and Elimination ($11,339,120)
Activities identified in this section represent personnel and non-personnel expenses for identification and elimination of illicit discharges, enforcing the City's stormwater ordinance and implementation of the administrative civil penalties and citation process, and the urban runoff monitoring program.

Watershed Expenditures

The City's watershed expenditures during FY 2016 for the implementation of the watershed Municipal Permit requirements were provided as actual costs and when the actual costs could not be determined, estimates of actual costs were provided. The Storm Water Division used the expenditure categories (administration, watershed activities, cost share contribution, and other) detailed in the Fiscal Analysis Method for watershed reporting. The watershed expenditures included in this report only capture City expenditures and do not account for any expenditure disbursed by other Copermittees within the watershed(s).

In total, $7,942,071 was expended in FY 2016 for the implementation of citywide watershed activities. This amount includes costs for the implementation of applicable TMDLs along with special studies.

Regional Expenditures
The City's FY 2016 regional expenditures ($705,904) for the implementation of the regional Municipal Permit requirements are primarily the City's share of regional Copermittee stormwater program costs. Additional costs include estimated staff time to attend regional meetings and other related administration costs. The Storm Water Division used the expenditure categories (administration, cost share contribution, regional activities, and other) detailed in the Fiscal Analysis Method for regional reporting. The regional expenditures included in this report only capture City expenditures, and do not account for any expenditure disbursed by other Copermittees in the region.

*3.2.1.2 **Grant Funding for Special Studies***
In addition to resources identified for Municipal Permit requirements, the City actively seeks grants, and other funding sources, for special studies and Capital Improvement Projects. For the most part, funding for these projects may be limited to the projects specified and the City may restrict funding reallocation to other projects. Therefore, these resources are currently not incorporated in calculations for total Municipal Permit requirements expenditures detailed in Section 2.2.1.4 above. Table 2 lists projects that were initiated and/or in progress during FY 2016. It is important to note that the projects span multiple years and the amounts listed below are not just representative of FY 2016.

Table 2: Funding for Special Projects

Funding Source	Project	Amount	Matching Fund Amount	Total Amount[2]
San Diego County Water Authority (SDCWA)	Memorial Park Infiltration Basin Construction	$255,651.00	$295,904.00	$551,555.00
State Water Resources Control Board (SWRCB)	43rd & Logan Monitoring & Assessment	$689,300.00	$85,362.00	$774,662.00
SDCWA	Bannock Avenue Infiltration Construction	$630,500.00	$893,300.00	$1,523,800.00
SWRCB	Southcrest Park Infiltration Project	$1,880,070.00	$777,970.00	$2,658,040.00
Total Grant Funding		**$3.5 million**	**$2.0 million**	**$5.5 million**

2 Amounts span multiple years and not just FY 2016

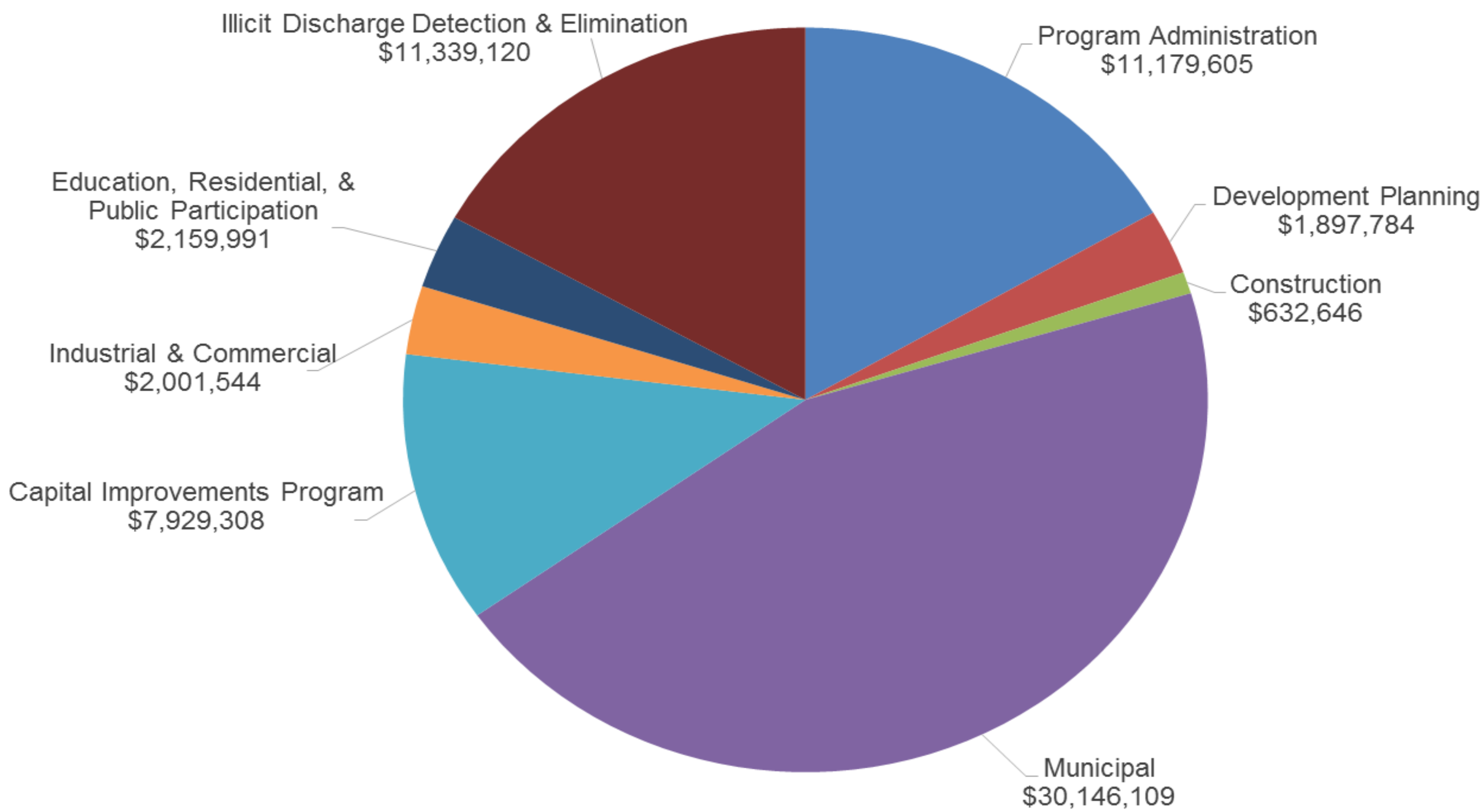

Figure 1: FY 2016 Citywide JRMP Expenditures by Permit Area

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3.2.2 Funding Sources
Citywide implementation of Municipal Permit requirements is funded through four main types of governmental funds: the General Fund, Special Revenue Funds, Enterprise Funds, and Internal Service Funds.

3.2.2.1.1 General Fund
The General Fund is the main fund for the City and is supported by major revenue sources, including property tax, sales tax, transient occupancy tax, and franchise fees. Departments funded by the General Fund provide core community services.

3.2.2.1.2 Special Revenue Funds
Special Revenue Funds account for revenues received for specifically identified purposes. Some of the larger funds that fall under this category include TransNet, Gas Tax, and Special Promotion programs.

3.2.2.1.3 Enterprise Funds
Enterprise Funds are initiated for specific purposes and funded through fees for services. This funding type is designated for the operations, management, maintenance, and development of the department providing the service. For implementation of citywide JRMP activities, activities are funded through the following enterprise funds:

- Airports Fund
- Development Services Enterprise Fund
- Golf Course Enterprise Fund
- Recycling Fund
- Refuse Disposal Fund
- Sewer Revenue Funds
- Water Utility Fund

3.2.2.1.4 Internal Service Funds
Internal Service Funds are comprised of fees for services provided by one City department to another City department or division. For implementation of citywide JRMP activities, activities are funded through the following internal service funds:

- Engineering and Capital Projects Fund
- Equipment Division Funds

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City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 1: Summary of Watershed Specific Data from the IDDE Program

JRMP Annual Report Form – Section IV. Illicit Discharge Detection and Elimination Program	**San Dieguito Watershed**	**Los Peñasquitos Watershed**	**Mission Bay/La Jolla Watershed**	**San Diego River Watershed**	**San Diego Bay Watershed**	**Tijuana River Watershed**	**Total Citywide**
Number of non-storm water discharges reported by the public	119	353	541	368	634	47	**2,062**
Number of non-storm water discharges detected by Copermittee staff or contractors	60	172	317	314	393	50	**1,306**
Number of non-storm water discharges investigated by the Copermittee	171	518	845	683	1,021	97	**3,335**
Number of sources of non-storm water discharges identified	143	442	736	559	828	94	**2,802**
Number of non-storm water discharges eliminated	141	434	697	553	819	92	**2,736**
Number of sources of illicit discharges or connections identified	142	437	715	551	805	94	**2,744**
Number of illicit discharges or connections eliminated	140	429	676	545	796	92	**2,678**
Number of enforcement actions issued	141	436	709	553	819	93	**2,751**
Number of escalated enforcement actions issued	69	197	351	349	445	61	**1,472**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 2: Summary of Watershed Specific Data from the Development Planning Program

JRMP Annual Report Form – Section V. Development Planning Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/ La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of proposed development projects in review	70	241	332	233	561	60	**1,497**
Number of Priority Development Projects in review	5	32	15	21	38	8	**119**
Number of Priority Development Projects approved	88	110	76	61	138	27	**500**
Number of approved Priority Development Projects exempt from any BMP requirements	0	0	0	0	0	0	**0**
Number of approved Priority Development Projects allowed alternative compliance	0	0	0	0	0	0	**0**
Number of Priority Development Projects granted occupancy	75	63	7	30	40	9	**224**
Number of completed Priority Development Projects in inventory	118	178	141	113	213	89	**852**
Number of high priority Priority Development Project structural BMP inspections	1	9	0	1	1	5	**17**
Number of Priority development project structural violations	1	8	0	1	1	5	**16**
Number of enforcement actions issued	1	15	0	3	4	12	**35**
Number of escalated enforcement actions issued	0	3	0	1	1	1	**6**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 3: Summary of Watershed Specific Data from the Construction Managment Program

JRMP Annual Report Form – Section VI. Construction Management Program	San Dieguito Watershed	Los Peñasquitos Watershed	Mission Bay/ La Jolla Watershed	San Diego River Watershed	San Diego Bay Watershed	Tijuana River Watershed	Total Citywide
Number of construction sites in inventory	1,364	4,300	2,091	1,830	3,870	448	**13,903**
Number of active construction sites in inventory	26	47	37	38	51	8	**207**
Number of inactive construction sites in inventory	12	112	216	188	425	36	**989**
Number of construction sites closed/completed during reporting period	23	169	276	258	518	44	**1,288**
Number of construction site inspections	10,074	27,037	9,404	8,875	18,737	2,801	**76,928**
Number of construction site violations	169	270	195	78	211	154	**1,077**
Number of enforcement actions issued	114	164	183	51	187	150	**849**
Number of escalated enforcement actions issued	65	91	16	25	32	6	**235**

City of San Diego FY 2015 JRMP Annual Report
Attachment 1
Table 4: Summary of Watershed Specific Data from the Existing Development Managment Program

JRMP Annual Report Form – Section VII. Existing Development Management Program	San Dieguito Watershed				Los Peñasquitos Watershed				Mission Bay/La Jolla Watershed				San Diego River Watershed				San Diego Bay Watershed				Tijuana River Watershed				Total Citywide			
	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES	MUN	COM	IND	RES
Number of facilities or areas in inventory	23	1,542	81	12	123	8,282	915	27	218	8,911	464	32	121	10,175	513	33	197	14,085	690	70	20	2,075	369	6	702	45,070	3,032	180
Number of existing development inspections	22	308	6	1	117	1,533	140	4	159	4,801	186	5	114	2,573	99	5	195	3,197	102	5	19	233	41	2	626	12,645	574	22
Number of follow-up inspections	0	14	0	0	0	263	13	0	0	166	4	3	0	193	5	4	0	270	44	4	0	31	7	0	0	937	73	11
Number of violations	3	49	0	109	18	388	37	375	34	413	6	424	10	420	11	481	23	511	34	709	1	60	19	69	89	1,841	107	1,819
Number of enforcement actions issued	4	58	0	107	22	490	48	285	46	462	9	407	16	514	13	365	41	623	44	543	1	65	21	62	130	2,212	135	1,790
Number of escalated enforcement actions issued	0	23	0	50	2	148	8	134	0	205	3	182	0	172	0	236	6	217	11	291	0	26	13	36	8	791	35	884

MUN Municipal
COM Commercial
IND Industrial
RES Residential

Table D-4
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

~~Strikeouts~~ and red text are text edits that have been made up to the current date since the WQIP September 2015 submittal.

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Jurisdictional Strategies								
Note: Strategy IDs with an asterisk indicate those strategies that are considered "jurisdictional" in the MS4 Permit, but are considered enhancements to the JRMP to target highest priority water quality conditions.								
JRMP (E.2-E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
CSD-JRMP-01	Establish guidelines and standards for all development projects; provide technical support related to implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area or implement easements to protect water quality, where applicable and feasible. Includes internal coordination and collaboration between City departments (DSD, PWD, and Engineering) to improve success and long-term benefits of BMPs.	Refer to JRMP Section 4. ~~All high priority projects will be inspected annually prior to the rainy season. 20 percent of all projects will be inspected annually. Maintenance inspections include examination of all structural BMPs at a project to verify that each structural BMP is working, being maintained properly, and is in compliance with all applicable City ordinances and permits.~~ May include providing technical support and consultation for other City departments that review project submittals for compliance with Storm Water Standards Manual requirements. May also include review of City projects for compliance with Storm Water Standards Manual requirements.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Revised Storm Water Standards Manual went into effect on February 16, 2016. FY17 Notes: The Storm Water Standards will be revised to include Critical Coarse Sediment Yield Area mitigation measures that were developed through a TAC process, along with other minor clarifications.
CSD-JRMP-02	Develop Design Standards for Public LID BMPs.	Improve quality of design to ensure efficiency and reliability in public designs.	FY14-FY15	Continuous- As needed	Yes	No Change	Yes	FY16 Notes: Draft Green Infrastructure standard drawings and specifications are currently in the review process. FY17 Notes: Plan to develop more standard drawings and specifications for other green infrastructure components.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-03	Outreach to impacted ~~industry~~ commercial, industrial, municipal, and residential development regarding minimum BMP requirement updates.	~~Affects commercial, industrial, and residential development.~~ May include onsite education at the time of inspections, city staff training, and mailers to business owners and prospective business owners.	FY15	Continuous- As needed	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Sent out monthly business Tax License renewal mass mailings, which included information about storm water BMPs. Violation location information from the Residential Patrol Program is used to target outreach.
CSD-JRMP-04*	Train staff on LID regulatory changes and LID practices.	Formal training is required for all staff involved in development plan review to increase knowledge of LID BMPs. Goal of training associated with LID practices and regulations is to promote LID implementation and to avoid adverse conditions such as trees planted within swales, or planned drainage patterns which obstruct or inhibit LID performance.	FY16	Continuous- As needed	Yes	No Change	Yes	FY16 Notes: Presented at a PWD training to discuss the revised Storm Water Standards Manual. Provided a plan check training for plan reviewers at DSD and PWD staff in May 2016.
CSD-JRMP-05*	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities to support compliance with the MS4 Permit and TMDLs in a reasonable manner. Ensure consistency with the City of San Diego's BMP Design Manual. Update the Storm Water Standards Manual accordingly.	Municipal codes and ordinances will be brought to City Council for consideration to encourage LID implementation (e.g., runoff detention and filtration using natural filters and stormwater retention for reuse). LID stormwater management will be encouraged in proposed codes and ordinances associated with development and redevelopment projects, which are brought to City Council for consideration.	FY15	Continuous- As needed	Yes	No Change	No	None
CSD-JRMP-06	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	Technical education and outreach to the development community includes outreach on design standards, City design manuals, and the WMAA.	Prior to FY16	Continuous- Ongoing	Yes	No Change	Yes	FY16 Notes: Presented the revised draft Storm Water Standards at two public workshops in September 2016.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
Priority Development Projects (PDPs)								
CSD-JRMP-07	For PDPs, administer a program and provide technical support to other City departments to ensure implementation of on-site structural BMPs to control pollutants and manage hydromodification by developing City wide storm water development standards and design guidelines.	Administer a program in coordination with other City departments to promote and confirm a thorough understanding of requirements for implementing structural BMPs that control pollutants and manage hydromodification. Includes requirements to confirm proper design and construction through processes controlled by other City departments. Please see Attachment 1 for details on PDP related BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City enhanced the Storm Water Quality Management Plan (SWQMP) template that was developed as a Copermittee effort for developers to use.
CSD-JRMP-08	Institute a program to verify and enforce maintenance and performance of treatment control BMPs.	Refer to JRMP Section 4.5. The Storm Water Division is responsible for annually verifying that all structural BMPs within its inventory are being properly maintained. The Storm Water Division performs verification through an Annual Maintenance Verification mailing and a direct maintenance inspection program. Parties responsible for maintenance of structural BMPs are required to complete and sign the Annual Maintenance Verification, certifying that the structural BMPs are being properly maintained. Direct maintenance inspections will be performed at all projects for which an Annual Maintenance Verification Form was not completed. All high priority projects will be inspected annually prior to the rainy season. 20 percent of all projects will be inspected annually. Inspect additional BMPs as needed. Medium and low priority projects will not require inspection if they have completed their Annual Maintenance Verification form, unless they are part of the 20 percent of projects that are annually inspected.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY17 Notes: For porous pavement BMPs, staff plan to use an infiltrometer to measure BMP effectiveness.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-JRMP-09	Update ~~BMP Design Manual procedures~~ Storm Water Standards Manual to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP Section 4. Storm Water Standards Manual will be updated in accordance with the Permit and made available on the City's website.	FY15	Continuous every 5 years/ permit cycle	Yes	Revised to clarify strategy.	Yes	FY17 Notes: The Storm Water Standards will be revised to include Critical Coarse Sediment Yield Area mitigation measures that were developed through a TAC process, along with other minor clarifications.
CSD-JRMP-10*	Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	Amend BMP Design Manual and zoning standards/requirements which address reduction of pollutants for common areas of trash build-up (e.g. restaurants, supermarkets, "big box" retail stores with food, pet stores). Most effective method for source control of bacteria and trash is to employ four-sized trash enclosures with a cover over trash areas.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on trash enclosures (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-11*	Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding, and training facilities, groomers, and pet care stores.	Amend BMP Design Manual and zoning requirements (including retrofits) to provide supplemental standards for animal facilities (including animal shelters, dog daycares, veterinary clinics, groomers, pet car stores, and breeding, boarding, and training facilities). Supplemental standards may include requiring covered trash enclosures, identification of landscaped relief areas on site plans, ensuring drainage connections and treatment swales for areas that will not drain to the sanitary sewer, as well as inspection of grading, drainage, and landscaping for outdoor exercise areas.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on animal facilities(See Part 1, Appendix E of the Storm Water Standards).

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-JRMP-12*	Amend BMP Design Manual for nurseries and garden centers.	Amend BMP Design Manual to provide supplemental standards for plant nurseries and garden centers. Standards will focus on reducing irrigation runoff, and loading of sediment, pesticides, and nutrients. Measures may include: covered outdoor storage, green waste management BMPs, improved irrigation efficiency to reduce dry-weather runoff, and containment of runoff from impervious areas where plants and materials are stored.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on nurseries (See Part 1, Appendix E of the Storm Water Standards).
CSD-JRMP-13*	Amend BMP Design Manual for auto-related uses.	Amend BMP Design Manual to provide supplemental standards for automotive-related uses to reduce loading of metals, oils, grease, and trash. Measures may include: four-sized covered trash enclosures, and careful review of auto-related usage areas (e.g. garage bays at repair shops) for grading, drainage, and drain connections to sanitary sewer systems.	FY15	Completed within schedule	Yes	No Change	Completed	FY16 Notes: Developed a fact sheet on auto-related facilities (See Part 1, Appendix E of the Storm Water Standards).

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-JRMP-14*	~~Develop and administer an alternative compliance program for on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects). Refer to Section 4.2.5.~~ Offsite Alternative Compliance Option	Refer to JRMP Section 4.2.3.1. WMAA and Water Quality Equivalency Study completed in FY15. Phase I, applicant implemented projects, is anticipated to be in effect by the end of FY16 contingent on Regional Board's approval of the WQIPs. Phase II, the expansion of the program to include other alternative compliance options, is expected to begin in FY16.	FY15	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Phase 1 of the Alternative Compliance Program (ACP) went into effect on 2/16/16. Development on Phase 2 of the ACP, including public involvement via Technical Advisory Committee (TAC) meetings, began during FY16. FY17 Notes: Continue developing Phase 2 of ACP. Topics to discuss include: environmental permitting, long-term facility maintenance, legal agreements and credit tracking, maintenance and permitting rules, and credit tracking and legal rules. Public involvement via TAC meetings will continue.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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E.4 Construction Management								
CSD-JRMP-15	Administer a program to oversee implementation of temporary BMPs that control sediment and other pollutants during the construction phase of projects. Includes requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other City departments.	Refer to JRMP Section 5. Inspections performed by the City or City staff provide verification that each site is in conformance with the Construction Storm Water BMP Performance Standards in the Storm Water Standards Manual. Inspections are tracked to ensure that they meet the minimum inspection frequencies. High priority active and inactive sites are inspected bi-weekly during the rainy season. Medium priority sites are inspected monthly during the rainy season. Low priority sites are inspected as-needed during the rainy season. All sites are inspected as-needed during the dry season. Please see Attachment 1 for details on construction BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
CSD-JRMP-17	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP Sections 6, 7, and 8. All industrial and commercial areas are inspected once within ~~the Permit term (~~five years~~)~~. At a minimum, 20 percent of industrial and commercial areas receive onsite inspections every year. Municipal facilities are inspected twice annually, once prior to the rainy season, and once during the rainy season. Residential management areas (RMAs) within the City are to be inspected once within five years ~~the Permit term~~, at a minimum. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: The City began patrols of residential management areas in FY16. See the City's JRMP Annual Report form, also included in Appendix 2, for numbers of inspections, violations, and enforcement actions for all types of existing development.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-JRMP-18	Update minimum BMPs for existing residential, commercial, and industrial development. Specific updates to BMPs include required street sweeping, catch basin cleaning, and maintenance of private roads and parking lots in targeted areas.	Refer to JRMP Appendix IX. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY15	Continuous every 5 years/ permit cycle	Yes	No Change	Completed	None
CSD-JRMP-19	Outreach to property managers and trash haulers to elevate the emphasis of power washing as a pollutant source.	Emphasis will be placed on non-compliant washing as an enforceable violation. Will occur city-wide in residential, commercial, and industrial areas.	FY15	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: City staff utilized a new fact sheet consistent with updated permit conditions to inform non-compliant power-washing operators of BMP requirements. The fact sheet was also provided to the San Diego Downtown Partnership as part of the City's education and outreach effort for downtown businesses. FY17 Notes: The City anticipates distributing a comprehensive BMP guidebook to businesses and business district leaders in areas with regular power-washing activities.
CSD-JRMP-20	Implement property based inspections.	Property-based inspections increase awareness and responsibility for individual properties to tackle issues associated with trash, landscapes, and parking areas. Expanding beyond the business-level inspections will achieve different and more effective opportunities for education, outreach, inspection, and enforcement to encourage water conservation strategies. Inspection frequency dependent on type of facility. See CSD-9 for inspection frequency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Inventoried properties have been mapped in GIS. The City's inspection data management system has also been set up to track and map the properties inspected each fiscal year and over the Permit cycle.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-JRMP-21	Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	Verify and bring to City Council for consideration an update (as needed) for the City's Municipal Code (43.0301) to meet new permit requirements for swimming pool discharges.	FY15	Continuous- As needed	Yes	No Change	Completed	None
CSD-JRMP-22*	Promote and encourage implementation of designated BMPs for residential and non-residential areas.	Landscape-based rebates are a "gateway" for adoption of other beneficial practices and are one of the nonstructural methods which address impacts from single-family residential areas (City of San Diego 2011 program development background study). Residential incentives can include: education and training ~~(neighborhood watershed field days)~~, and aggressive subsidies or rebates for grass replacement and rainwater harvesting. Existing programs will be expanded overall, and ~~also have targeted expansion within specific subwatershed, particularly with highest water quality priority conditions. W~~will occur city-wide in residential, commercial, and industrial areas.	Prior to FY16	Continuous- Ongoing	Yes	Revised to clarify strategy.	Yes	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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MS4 Infrastructure								
CSD-JRMP-23	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels as allowed by resource agencies, detention basins, pump stations, etc.) for water quality improvement and for flood control risk management.	Refer to JRMP Section 7. Storm drain inlets are inspected ~~at least once per year~~ generally annually, and cleaned when accumulated materials are present. Other MS4 and related structures are inspected as needed.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: 2,438 storm drain inspections were completed in the WMA, and 125.2 tons of sediment, trash, and debris were removed during storm drain cleaning. In addition to routine maintenance of the MS4 across its entire jurisdiction the City repaired or replaced 12 pump stations and modernized another 14 pump stations, televised 28,000 linear feet of pipe in 62 locations, and began the development of the Waterways Maintenance Plan and Channel Maintenance Prioritization Plan. Removed 0.06 tons of trash from routine open channel trash cleaning in the WMA.
CSD-JRMP-28	Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	In order to limit inflow of pollutants and reduce pollutant loads, proactive measures will be taken to improve, repair, and replace MS4 components. The City of San Diego will start a multi-year program of repairing and replacing storm drain pipes to reduce sediment loading to the MS4. Development of an assessment management program and bond issues will be addressed. Exploration of daylighting pipes will take place where feasible and appropriate.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-JRMP-29	Replacement of hard assets.	Includes needed replacement of storm drains and structures.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-4 (continued)
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CSD-JRMP-30	Coordinate with other City departments (PUD) to implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	Refer to JRMP Section 7.	FY16	Continuous- Ongoing	Yes	No Change	Yes	FY16 Notes: The Tiger Team was established in the in FY16 as a joint effort between TSW & PUD to identify and eliminate exfiltration sources from the sanitary sewer system to the MS4. Since the team was created, it has successfully eliminated one major source. FY17 Notes: For FY17, the team is focusing on two sites within the City and are identifying more.
CSD-JRMP-31*	Identify sewer leaks and areas for sewer pipe replacement prioritization.	Risk assessment to include identifying targeted areas (age, location, proximity to MS4), coming up with methodology, pilot, desktop exercise/analysis.	FY16	Continuous- As needed	Yes	No Change	Yes	None
Roads, Streets, and Parking Lots								
CSD-JRMP-32	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP Section 7.	FY16	Continuous- Ongoing	Yes	No Change	Yes	FY16 Notes: 2,878 curb miles of roads, streets and highways were swept in the WMA.
CSD-JRMP-35*	Initiate sweeping of medians on high-volume arterial roadways.	Medians of roadways are also a potential source of pollutants. Consider implementing or increasing sweeping of medians. Consider mechanical and hand sweeping techniques.	FY17	Continuous- Ongoing	Yes	No Change	Yes	FY16 Notes: Median sweeping began in FY16. A total of 4,315 median miles were swept in FY16 City-wide.
Pesticides, Herbicides, and Fertilizer BMP Program								
CSD-JRMP-37	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education. ~~permits, and certifications.~~	Refer to JRMP Sections 7, 8, and 9.	FY16	Continuous- Ongoing	Yes	Revised to clarify strategy.	Yes	None

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Retrofit and Rehabilitation in Areas of Existing Development								
CSD-JRMP-38	Development of a strategy and identification of candidate areas of existing development necessary for implementing retrofit projects and facilitate the implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program will include methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to high priority water quality conditions, potential pollutant load removal effectiveness, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards. Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None
CSD-JRMP-39	Development of a strategy and identification of candidate areas necessary to implement stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program ~~(Section 4.2.5.3 and Appendix N)~~ will include methods for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas. Rehabilitation project selection will be based upon a variety of factors including existing stream or habitat degradation, potential future cumulative stream or habitat impacts, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	Revised to clarify strategy.	NA, Not scheduled to be implemented in FY17	None

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E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
CSD-JRMP-40	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP Section 3. ~~The City must visually inspect at least 500 identified and prioritized major MS4 outfalls at least annually during dry weather conditions.~~ Inspections of major MS4 outfalls conducted in response to public reports and staff or contractor reports and notifications may count toward the required visual inspections of MS4 outfall discharge monitoring stations. Please see Attachment 1 for details on how the IDDE Program will address sources causing or contributing to the HPWQC.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: 171 cases were investigated, including 119 reported by the public; 140 illicit discharges or illicit connections were eliminated; and 141 enforcement actions and 69 escalated enforcement actions were issued in the WMA. City-wide, the number of discharges investigated has almost tripled since FY14 (1,186 in FY14 to 3,335 in FY16). The increase is believed to be mainly due to increased reports of irrigation runoff discharges from the public and from PUD.
E.7 Public Education and Participation (B.3.b(1)(a)(iii))								
CSD-JRMP-42	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Section 9.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City continued its extensive education and outreach effort across each of the six watershed areas in the City. This included regular attendance at community events in order to share education materials and the continuing sponsorship of community clean-up and pollution prevention education events with the City's Non-Governmental Organization partners, including I Love A Clean San Diego and San Diego Coastkeeper.

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City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-JRMP-43	Continue implementation of a Pet Waste Program.	Pet Waste Program includes outreach on "Scoop the poop", installation of posts for dispensers, distribution of lawn signs, and attendance at dog-related community activities.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Printed and distributed more pet waste signage. FY17 Notes: New bag dispensers will be installed and there will be outreach at community events. More signage will be installed.
CSD-JRMP-44	Promote and encourage implementation of designated BMPs in commercial and industrial areas.	Provide education and outreach on BMPs for commercial businesses and industrial facilities. Will occur city-wide in non-residential areas.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City continued its mandated commercial and industrial facility inspection effort sharing industry specific education materials with business and property owners when BMP deficiencies were discovered. FY17 Notes: The City will continue its inspection and education effort while also introducing alternative compliance strategies for new developments and sharing the updated Storm Water Standards Manual with target audiences.
CSD-JRMP-45*	Expand outreach to homeowners' association (HOA) common lands and HOA incentives.	Approaches to consider include: offering incentives to HOAs and maintenance districts to adopt water-conserving/efficiency and stormwater-reduction changes to their landscapes, irrigation, and maintenance; conducting workshops with property managers; providing supplemental standards, inspection, or enforcement for HOA-managed properties.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Finalized updated code compliance fact sheets applicable to common lands activities. Coordinated water conservation pollution prevention incentive programming with PUD.

Table D-4 (continued)
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CSD-JRMP-46*	Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	Approaches to engage HOAs and property managers include: conducting workshops with property managers, providing supplemental standards, inspections or enforcement around HOA properties, and offering incentives to HOAs and maintenance districts to adopt changes to landscapes, irrigation, or maintenance which promote water conservation or stormwater reduction. Property managers are also a target for enhanced outreach.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-JRMP-47	Develop a targeted education and outreach program for homeowners with orchards or other agricultural land uses on their property.	Educate residents on practices of small-scale or on-site composting to protect local water quality. May include targeted education of owners of chickens to address bacteria. Outreach can be coordinated through the San Diego County Agriculture, Weights, and Measures division.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-JRMP-48	Enhance school and recreation-based education and outreach.	Develop curriculum and establish distribution in public schools. Includes education on water conservation.	FY15	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City worked with its NGO partners to expand the number of children reached through school-aged education programs. The City updated curriculum materials for Project Swell in conjunction with San Diego Coastkeeper and provided printed education materials to leaders with the Ocean Discovery Institute in hope of establishing new partnerships with that organization. FY17 Notes: The City will be expanding the Blue Brigade Middle and High School program sponsored with I Love A Clean San Diego. The City will also distribute written education materials through the newly completed Ocean Discovery Institute headquarters.

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CSD-JRMP-49	Develop education and outreach to reduce irrigation runoff.	Example approaches to reduce or eliminate irrigation runoff may include: education and outreach, prohibition, enhanced enforcement of existing prohibitions, and pilot projects such as the City of Del Mar's pilot door hanger project.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City used communication materials designed to address potential threats from El Nino rains as a new vehicle for educating the public about the need to eliminate irrigation runoff. FY17 Notes: The City is working with partner agencies and other City operations to develop new education and outreach efforts targeting urban runoff.
CSD-JRMP-50*	Develop and distribute regional training materials for water-using mobile businesses.	Consider development of supplemental standards for mobile businesses including: covered trash enclosures, careful review of washing areas (grading, drainage, landscaping, sanitary sewer system connectivity), and appropriate signage (either through zoning for retrofits or "best fix" approaches, or through BMP Design Manual standards). Businesses may include carpet cleaners, tile installers, plumbers, etc.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: The City updated its suite of fact sheets related to mobile business activities to bring them up-to-date with current permit requirements.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-JRMP-51*	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	Use effectiveness surveys to enhance existing education and outreach programs while proactively keeping up with and incorporating changing regulatory requirements.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City annually conducts thousands of event-based surveys gathering information about public understanding of pollution prevention and about the City's storm water management efforts. The survey effort continued in FY16 and allowed the City to update its education materials and strategies based on current findings about public awareness. FY17 Notes: The City will contract with a new public opinion research firm to perform a statistically valid assessment of general public awareness. The finding from that effort will be combined with the discoveries of the ongoing event survey effort to drive future outreach priorities.
CSD-JRMP-52	Continue to promote and encourage implementation of Integrated Pest Management (IPM) for residents and businesses.	The City will continue to provide education on IPM techniques during presentations and on the City's Think Blue website.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
CSD-JRMP-53*	Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	Websites will be updated to provide a user-friendly format and clarity for stormwater violations, conditions which citizens can and should report, and how to make such reports. Examples of reports for common incidents will be developed and posted which may vary locally and regionally. Photographs of allowable practices as well as illegal practices should be shown for utmost clarity. Displaying hotline numbers prominently on the website and near the photographs of illegal practices will ensure that those seeking to report will be able to do so easily. Also ensure hotline number and website are searchable and can be retrieved by simple internet searches.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City completely revamped its website improving public access and availability of web-based resources including the storm water management and pollution prevention materials developed and posted by the City. The City also brought forward the environmental response documents associated with its channel maintenance efforts. These documents include descriptions of water quality protections undertaken by the City allowing the public to view our agency's watershed protection strategies. FY17 Notes: The Storm Water City will review and renew the entire portfolio of education materials available for public downloading from the City's website.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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E.6 Enforcement Response Plan								
CSD-JRMP-54	Continue to implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Storm Water Code Enforcement Unit's Standard Operating Procedures (SOPs) - Enforcement Response Plan.	Refer to JRMP Appendix XIII.	Prior to FY16	Continuous- Ongoing	Yes	No Change	Yes	None
CSD-JRMP-55*	~~Increase~~ Focused enforcement of irrigation runoff.	~~Increased~~ Focused enforcement policies against irrigation runoff will be established in tandem with the education and outreach programs on how these actions lead to pollutant loading. By shifting to property-based inspections irrigation runoff can be handled as enforceable violations once the public is well-informed.	FY16	Continuous- Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Performed irrigation patrols and one Residential Management Area Patrol within the WMA throughout FY16. Also receive referrals from Water Conservation at PUD for over irrigation cases that have runoff entering the curb and gutter.
CSD-JRMP-56*	~~Increase~~ Focused enforcement of water-using mobile businesses.	In addition to education, pollution associated with mobile business sources can be handled through policy, code development, inspections of business practices, and enforcement.	FY16	Continuous- Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Performed early morning patrols to find mobile sources and over-irrigation to the MS4.
CSD-JRMP-57*	~~Increase~~ Focused enforcement of all minimum BMPs for existing residential, commercial, and industrial development.	~~Increased~~ Focused enforcement of existing development minimum BMPs.	FY16	Continuous- As needed	Yes	Revised to clarify strategy.	Yes	None
CSD-JRMP-58*	~~Increase~~ Focused enforcement associated with property-based inspections.	Shifting inspections from businesses-specific to property-based will increase effectiveness and sense of responsibility and ownership. Education and outreach must be followed up with inspection and enforcement of regulations to encourage proper landscape and water conservation strategies.	FY16	Continuous- Ongoing	Yes	Revised to clarify strategy.	Yes	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-JRMP-59*	~~Increase~~ Focused enforcement of sweeping and maintenance of private roads and parking lots in targeted areas.	Refer to Minimum BMPs in JRMP (Appendix IX).	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-JRMP-60*	~~Increase~~ Focused identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	Eroding and unstable slope areas on private property (excluding construction sites) will be identified as potential sediment loading sources and subject to enforcement. In the short term, this will target enhanced inspection and enforcement programs to ensure inspectors address erosion and slope instability for the purpose of education.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: City staff completed patrols of construction sites that included sediment discharges. They also began the Residential Patrol Program, which notes and addresses sediment discharges in residential areas.
Non-JRMP Strategies (Optional Strategies, B.3.b(1)(b))								
Nonstructural Strategies								
CSD-NS-02	Investigation and research of emerging BMP technology.	Annually the Construction & Development Standards Group identifies new tasks to conduct literature review, communication with researchers outside of the City, physical testing and experimentation of new or emerging technologies, and other research with the goal of updating tools available for reducing pollutant loads from development and redevelopment sites. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous- As needed	Yes	No Change	Yes	FY16 Notes: Continued monitoring and assessment of the biofiltration basin and curbside filtration units at 43rd and Logan.
CSD-NS-03	Approve and implement a green infrastructure policy.	The City will begin developing a policy in FY16 that will increase the green infrastructure requirements for City CIP projects. This policy will be coordinated with ongoing efforts to update City design manuals and LID design standards for public LID BMPs. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous- As needed	Yes	No Change	Yes	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-NS-04	Create a manual that outlines right-of-way design standards.	Create a manual that includes flood control performance standards, permanent BMP elements design standards, design standards for green streets and other BMPs, and maintenance access. Provides drainage and streets design standards. Opportunity to merge various existing manuals and provide consistency. Funding and resources were secured for FY2015.	FY15	Completed within schedule	Yes	No Change	Yes	FY17 Notes: Will be published in FY17.
CSD-NS-05	Create a fund that allows habitat acquisition, protection enhancement, and restoration in conjunction with other cooperating entities including community groups, academic institutions, state county, and federal agencies, etc.	This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired or restored lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. It is anticipated that a minimum of 1 FTE will be needed to implement the program. Once initiated, the time frame for planning to initial implementation is expected to be 3 years. Implementation is in perpetuity as long as funding is retained.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-NS-06	Residential and Commercial BMP: Rain Barrel	The existing PUD rebate program will continue for residential properties and expand for commercial properties for water collection, conservation, and reuse with rain barrels. Will occur city-wide in residential areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates for rain barrels were issued to capture 772,740 gallons of rainwater City-wide.
CSD-NS-07	Residential and Commercial BMP: Grass Replacement	The existing PUD grass replacement cash rebate program will continue and expand for residential and commercial properties. Program encourages a reduction in water use through the conversion of non-artificial grass to water wise plant material, while maintaining a high level of living landscape to benefit the environment. Program does not allow for conversion to artificial turf. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates were issued to convert 61,032 sq. ft. of turf in the WMA.
CSD-NS-08	Residential and Commercial BMP: Downspout Disconnect	Disconnecting downspouts provide alternate runoff pathways from rooftops, sidewalks, driveways, and roads. Disconnecting downspouts from residential areas to pervious land can allow for depression storage and infiltration. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Completed downspout redirect guidelines in collaboration with PUD.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-NS-09	Residential and Commercial BMP: Microirrigation	The existing PUD micro-irrigation rebate program will continue and increase for residential and commercial properties. Application of microirrigation aims to improve the efficiency of landscape irrigation through the precise application of water. Will occur city-wide in residential areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Rebates were issued for installing microirrigation for 10,657 sq. ft. of landscaping in the WMA.
CSD-NS-10	Provide Onsite Water Conservation Surveys.	Provide free onsite water conservation surveys to commercial and residential customers to reduce overirrigation and to encourage water conservation. Will occur city-wide in residential and commercial areas. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None
CSD-NS-11	Enhance and expand trash cleanups through community-based organizations involving target audiences.	Increase effectiveness and reach of trash/beach cleanups and community based efforts by engaging community groups to self-define and carry-out trash clean-ups. Longstanding partnerships and sponsorships with I Love A Clean San Diego and others are recommended to be continued and enhanced. To effectively target stream clean-up efforts, focus on partnerships with community organizations which provide strong engagement with target audiences and communities. Cleanups target trash, however a reduction in trash also reduces other pollutants such as bacteria and nutrients that can attach to food waste wrappers and yard waste. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY 16 Notes: The City partnered with I Love a Clean San Diego on four clean-ups, which resulted in the removal of 24,674 pounds of trash and debris in the WMA.

Table D-4 (continued)
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CSD-NS-16	Conduct a Comprehensive Benefits Analysis to identify benefits other than water quality that are applicable to each of the specific WQIP strategies.	The analysis identifies which other benefits apply to each strategy, and documents the assumptions making those linkages. The delineation of other benefits to strategies includes a general description of each benefit, and a listing of the assumptions that were made to link those benefits to strategies. In addition, the other benefits are characterized with respect to who is directly affected: the city, local residents, local businesses, or visitors. This analysis may be used as part of the adaptive management process to modify future strategies. Funding and resources were secured for FY2015.	FY15	Completed within schedule	Yes	No Change	No	None
CSD-NS-17	Address and clean up trash from transient encampments with collaboration from the Environmental Services Department, which consults with the Homeless Outreach Team.	Coordinate with the Environmental Services Department, in conjunction with the Homeless Outreach Team, to respond to transient encampment trash complaints. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-NS-18	Continue participating in source reduction initiatives.	Source reduction initiatives are ultimately the most effective measure to remove pollutants from surface waters, where feasible. Bans or progressive phase-outs that may be considered include: leaf blowers, plastic bags, architectural copper (generally a legacy issue), as well as prohibiting or more aggressively regulating vehicle washing. Additional source reduction initiatives to consider include pesticide sales at hardware stores and irrigation supply stores. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: The City began development of plastic bag ban ordinance. FY17 Notes: Pursuit of City-specific plastic bag ban ordinance will depend on whether Statewide plastic bag ban ballot initiative passes.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-NS-19	Coordinate with Fleet Services to replace City-owned vehicle brake pads with copper-free brake pads as they become commercially available.	Consider legislative mandate and cooperative implementation of copper-free brake pads on city-owned vehicle to reduce pollutant deposition. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	FY18	Continuous-Ongoing	NA, Not scheduled to be implemented in FY16	No Change	NA, Not scheduled to be implemented in FY17	None
CSD-NS-22	~~Proactively~~ Coordinate with appropriate City Departments that monitor for erosion, and complete minor repair and slope stabilization on municipal property.	~~Actively~~ Coordinate with Streets Division and other appropriate City Departments that identify and repair eroding slopes that may be contributing to sediment loading. Prepare an inventory and assessment of eroding areas and their risk to surface waters. Follow assessment with a schedule for ongoing inspection and stabilization (potentially based on a number or percentage of sites annually). Consider Caltrans program as a template. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None
CSD-NS-23	Conduct special studies.	Special studies will be conducted to gather data to identify pollutant sources, appropriate targets, or other information. Includes collaboration with universities. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-4 (continued)
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CSD-NS-26	Participate in Reference Watershed Study.	The San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for "natural sources" to establish the concentrations or loads from streams in a minimally disturbed or "reference" condition. Refer to Section 5.1 for further details. Will occur region-wide. Funding and resources were previously secured.	Prior to FY16	Completed within schedule	Yes	No Change	Completed	FY16 Notes: See Section 5.2 in Appendix C for more information.
CSD-NS-27	Participate in Reference Beach Study.	The San Diego Regional Reference Beach Study (currently being conducted by the Southern California Coastal Water Research Project) will develop numeric targets that account for "natural sources" to establish the concentrations or loads from the beach in a minimally disturbed or "reference" condition. The purpose of this monitoring program is to advise the public of potential health risks that could occur with water contact recreation at local beaches. DEH will post a health advisory notice or close a beach when FIB results are above REC-1 water quality standards. Will occur region-wide in the Los Peñasquitos, San Dieguito River, Mission Bay, and San Diego River WMAs. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	One time	Yes	Revised to clarify strategy.	Completed	FY16 Notes: See Section 5.1 in Appendix C for more information.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-NS-29	San Dieguito Source Identification and Prioritization Process	Assess sources of bacteria in the watersheds using the San Diego Bacteria Source Identification and Prioritization Process developed in 2012 as part of the MS4 Permit Report of Waste Discharge process. Focus is on the beach/lagoon area of the San Dieguito River WMA, with inputs from the upper watershed also considered where relevant and necessary to identify sources of bacteria to the beach/lagoon. Refer to Section 5.1 for further details. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	One time	Yes	No Change	Completed	None
CSD-NS-30	Collaborate with City of San Diego PUD and other watershed stakeholders in the Lake Hodges Water Quality Concentration Study. Study will characterize conditions and identify sources.	The City of San Diego's Public Utilities Department will conduct studies that can characterize the nutrient budget or "loading rate" for Lake Hodges. The proper characterization of nutrient loads to Lake Hodges include two components: (1) Uninterrupted sampling during storm events or high water flow to Lake Hodges; and (2) Independent characterizations of nitrogen and phosphorus loads to the reservoir. This strategy will include collaboration with other watershed stakeholders. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	FY17	Completed within schedule in 2 yrs.	NA, Not scheduled to be implemented in FY16	No Change	Yes	FY 16 Notes: The Responsible Agencies completed the Lake Hodges Nutrients Evaluation Tech Memo to analyze the receiving water and MS4 data collected. FY17 Notes: RAs plan work with PUD on development of a draft work plan for a conceptual model of nutrient sources in the subwatershed surrounding Hodges Reservoir; and, a Study Plan, Monitoring Plan, and Quality Assurance and Project Plan (QAPP) for the Hodges Reservoir Nutrient Source Study.

Table D-4 (continued)
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CSD-NS-31	Using adaptive management, delist the beach segment from the TMDL and Attachment E of the MS4 Permit.	Using the adaptive management process outlined in Section 6, remove 303(d) delisted beach segments from the Bacteria TMDL and Attachment E of the MS4 Permit. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Working with the Regional Board on re-evaluating the bacteria TMDL.
CSD-NS-32	Conduct a Storm Water Fee ~~Cost of Service~~ Study.	Conduct a Storm Water Fee ~~Cost of Service~~ Study that will examine the full cost of flood control and storm water strategies needed to comply with storm water regulations for the City of San Diego. The City of San Diego's Watershed Asset Management Plan will be used as the basis for the study. Funding and resources have been secured for FY2016.	FY16	Completed within schedule	Yes	No Change	Yes	FY16 Notes: Significant progress was made on the fee study; it will be finalized and posted on the City website in FY17. FY17 Notes: Study results to be posted in FY17.

Table D-4 (continued)
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CSD-NS-33	Conduct Sustainable Return on Investment (SROI) analysis to estimate strategies' co-benefits and impacts to the public and the private sector on a common scale.	SROI is an economics-based framework for evaluating quantitative and qualitative performance metrics and monetizing them, if possible, along a triple bottom line (i.e. financial, societal, and environmental). This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated one-time cost to implement is $115,000. Once initiated, the analysis is expected to be complete in 1 year.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-NS-34	Collaborate with the County, if a County-led regional social services effort is established, to provide sanitation and trash management for individuals experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	Support a non-profit or consortium to provide sanitation services associated with hygiene as well as trash management for persons experiencing homelessness. Rented or purchased shower/sanitary trailers providing mobile showers may be organized at specifically scheduled locations and times. This provision has been proposed as a method for preventing surface water usage for sanitation and bathing, as well as opportunity for outreach and referral by social service agencies. The trash management services will include providing trash bags, trash collection areas, and shower/sanitary facilities at centers which provide daytime shelter to their clients, or on a mobile-basis for known transit camps. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, and 4) consensus and community support has been achieved. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City’s General Fund.	Must be triggered	Continuous as funding allows	Not Triggered	Revised to clarify strategy.	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-NS-34 (continued)	Collaborate with the County, if a County-led regional social services effort is established, to provide sanitation and trash management for individuals experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy includes an initial first year planning cost of $30,000 and implementation is expected to cost $10,000 annually thereafter. Once initiated, development of the program is expected in 1 year. Implementation is in perpetuity as long as funding is available.	Must be triggered	Continuous as funding allows	Not Triggered	Revised to clarify strategy.	If Triggered	None
CSD-NS-35	Identify strategy, resources, and funding to support mapping and assessment of agricultural operations.	Prepare and maintain an inventory of the locations of agricultural operations. Identify agricultural land close to receiving waters and/or MS4 system and conducting a site reconnaissance to assess if discharges are likely to occur and develop a series of follow-up actions specific to those risks. Coordinate with other City of San Diego departments that own and lease land for agricultural uses. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include a coordinator or project manager. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, development of the program is expected in 2 years.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-36	Coordinate with County of San Diego and identify resources and funding to implement a program to target on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	Coordinate with County of San Diego program. The extent, age, and location of on-site systems are generally not well documented. Recommended first step is to inventory and map all of the on-site systems. Techniques involve cross-referencing addresses for customers of central sewer provides with addresses of properties on the associated tax assessor's list, and identifying those addresses without a sewer account. Once on-site systems have been identified, the following parameters can be estimated or analyzed for risk assessment: location on the property, system age (from permit or property tax records), soil and slope conditions, development densities, and proximity to surface and groundwater resources. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include a coordinator or project manager. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, development of the program is expected in 2 years.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-37	Participate in an assessment to determine if implementation of an urban tree canopy (UTC) program would benefit water quality and other City goals, where feasible.	Perform a feasibility study to determine if implementing an UTC program would be beneficial to the City's goals. UTC intercepts rainfall through increased coverage of leaves, branches, and stems and reduces runoff from the storm drainage system. Benefits associated with enhancing an UTC include reducing heat island effects and air pollution in addition to aesthetics and community benefits. Where feasible, native trees will be utilized to prevent invasive trees from migrating to open spaces and to conserve water. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, implementation and assessment is expected in 2 years.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-38	Conduct a feasibility study to test Permeable Friction Course (PFC), a porous asphalt that overlays impermeable asphalt.	Perform an assessment to determine the feasibility of implementing PFC on City streets. PFC, an overlay of porous asphalt, is an innovative roadway material that improves driving conditions in wet weather and water quality. Placed in a layer 25-50mm thick on top of regular impermeable pavement, PFC allows rainfall to drain within the porous layer rather than on top of the pavement. PFC has also been shown to reduce concentrations of pollutants commonly observed in highway runoff. PFC incorporates stormwater treatment into the roadway surface and does not require additional right-of-way. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) funding to address MS4 discharges is identified and secured and 2) staff resources are identified and secured. Resources necessary to implement this strategy include City staff or consulting team. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The anticipated cost to implement the strategy is $50,000. Once initiated, implementation and assessment is expected in 2 years.	Must be triggered	Completed within schedule	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-39	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas, creating permanent open space protections on undeveloped city-owned land, and accepting privately-owned undeveloped open areas.	This strategy may be implemented if there is interest in participation by the public or private entity with current control of the land. This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) identification of partners, if needed (public, private, non-profit), 2) identification of costs and potential sources of funding, 3) final agreement by public or private entity with current control of the land, 4) final agreement by all other participating partners including acceptance by intended land- or asset-owning City department, and 5) funding in place. Resources necessary to implement this strategy include a coordinator or manager and maintenance for acquired lands. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. The time frame for implementation will vary by project. Implementation is in perpetuity as long as funding is available.	Must be triggered	Continuous as funding allows	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-43	Lake Hodges Natural Treatment System Project	This strategy may be implemented at any time at the City's discretion. This strategy will coordinate with watershed stakeholders on Integrated Regional Water Management (IRWM) Proposition 84 funding grant project to model the Lake Hodges watershed (hydrology and water quality loading) to assist in siting locations for nutrient reducing BMPs. Recommendations include using the 85th percentile event for sizing multiuse treatment area BMPs, locating and defining baseflow within key reaches. Resources necessary to implement this strategy include City staff time for coordination with the collaborative effort. Projected funding needs may be met through award of a grant, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Proposition 84 grant application has been submitted. Grantees will be identified in FY2016.	Must be triggered	Continuous as funding allows	Yes	No Change	Yes	FY16 Notes: The City of San Diego's Public Utilities Department secured $2.9M in Prop 84 funding. FY17 Notes: Complete the preliminary design and permitting phase.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
CSD-NS-44	Participate in a watershed council or group if one is established.	This strategy may be implemented at any time at the City's discretion if the following triggers are met: 1) partners have been identified and formal MOUs have been developed and 2) consensus and community support has been achieved. Resources necessary to implement this strategy include a coordinator or project manager. Projected funding needs may be met through award of a grant, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council. Once initiated, development of the program is expected in 2 years. Implementation would be in perpetuity as long as funding is retained.	Must be triggered	Continuous as funding allows	Not Triggered	City-specific version of WMA strategy.	If Triggered	None
CSD-NS-47	Coordinate with Development Services Department to ~~P~~prohibit introduction of invasive plants in new development and redevelopment projects.	Coordinate with the City's Development Services Department to continue to prohibit introduction of invasive species such as Arundo donax and Cortaderia selloana for new development or redevelopment projects as specified in the City's municipal code for landscape. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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CSD-NS-50	San Dieguito Wetland Restoration Project	Collaborate with Copermittees and organizers of the San Dieguito River Park (SDRP) to restore the San Dieguito coastal wetlands and lagoon system. The 150-acre wetland restoration work has been primarily accomplished by Southern California Edison (SCE) and partner owners of the San Onofre Nuclear Generating Station (SONGS), including San Diego Gas & Electric (SDG&E), City of Riverside, and City of Anaheim. Construction began in fall 2006 and the $90-million Restoration Project was officially dedicated in 2011. Funding for monitoring and managing the wetlands is ongoing. Resources necessary to implement this strategy include City staff to coordinate with the regional effort. Projected funding needs may be met through grant funding, support from community groups or other institutions, or the City's General Fund. All General Funds are secured on an annual basis and are contingent upon annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	City-specific version of WMA strategy.	Completed	None
CSD-NS-51	Collaboration with the Regional Board.	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Industrial General Permit, 2) enforcement of the Ag Waiver, 3) enforcement of other non-MS4 dischargers, and 4) Bacteria TMDL updates, as appropriate for each WMA. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	City-specific version of WMA strategy.	Yes	<u>FY16 Notes:</u> Provided written comments to the Regional Board, State Water Board, and US Environmental Protection Agency (EPA) regarding proposed rules and regulations.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Structural Strategies								
Green Infrastructure								
CSD-GI-15	If interim load reduction goals are not met and additional green infrastructure is required, additional publicly-owned parcels have been identified as potential opportunities for green infrastructure implementation.	Construction, operation, and maintenance of bioretention and permeable pavement on prioritized public parcels. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs.) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs.; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr.; project construction costs are TBD and are based on size of the project). 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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Green Streets								
CSD-GS-03	Callado Road	Construction, operation and maintenance of a green street project at Callado Road and Pastoral Street to treat a drainage area of 9.86 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	FY16	Completed within schedule in FY18	Yes	No Change		See Table D-6 for an updated list of completed and planned Structural Projects.
CSD-GS-11	If interim load reduction goals are not met and additional green infrastructure is required, the additional acreage of bioretention and permeable pavement may be implemented through green streets if potential opportunities for green infrastructure implementation on public parcels are not available.	This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs.) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs.; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr.; project construction costs are TBD and are based on size of the project) 8) Operation&M will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	**Plan to implement next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	
Multiuse Treatment Areas								
Infiltration and Detention Basins								
CSD-MUTA-10	If interim load reduction goals are not met and additional multiuse treatment areas are required, an infiltration basin may be implemented on open space across from San Pasqual Union Elementary School can be implemented upon detailed site assessment.	Construction, operation and maintenance of an Infiltration basin that would treat a total drainage area of 5,818 acres on 19 acres of available space. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured.	Must be triggered	Continuous-Ongoing	Not Triggered	No Changes	If Triggered	None
CSD-MUTA-11	If interim load reduction goals are not met and additional multiuse treatment areas are required, an infiltration basin may be implemented on open space between I-15 and West Bernardo Drive.	Construction, operation and maintenance of an infiltration basin that would treat a total drainage are of 146 acres on 6.0 acres of available space. The site is centrally located in the San Dieguito WMA, between I-15 and West Bernardo Drive (south of the Ed Brown Center). This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None
CSD-MUTA-12	If interim load reduction goals are not met and additional multiuse treatment areas are required, an infiltration basin(s) may be considered on publicly owned open spaces in canyon areas on a case-by-case basis when no other opportunities for load reductions exist.	Construction, operation, and maintenance of infiltration basin(s) in canyon areas. 9 potential canyon sites, owned by the City of San Diego or CSD Open Space Parks, have been identified in San Dieguito WMA that provide up to 1,406 acres of available space (1,885 total parcel acreage). This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Stream, Channel and Habitat Rehabilitation Projects (B.3.b.(1)(b)(iii))								
CSD-MUTA-20	If interim load reduction goals are not met and additional stream, channel, and habitat rehabilitation projects are required, implement as needed.	This strategy may be triggered as 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, 4) permits required by regulatory agencies are secured, and 5) recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None
Water Quality Improvement BMPs								
Priority Development Projects (PDPs)								
CSD-PDP-05	Priority Development Project BMPs in San Dieguito River WMA.	Per the Storm Water Standards Manual, all non-exempt public PDPs are subject to requirements to construct and maintain permanent BMPs. See WQIP Annual Report for updated PDP BMP Inventory. Funding and resources have been secured for PDPs implemented prior to FY16. Funding for PDP BMPs constructed in future fiscal years is contingent on annual budget approval by City Council.	Prior to FY16	Continuous-Ongoing	Yes	Multiple similar strategies were compiled into this new strategy listing to simplify recordkeeping and reporting.	Yes	See Table D-7 for a current list of PDP BMPs.

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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Dry Weather Flow Separation and Treatment Projects								
CSD-WQBMP-09	If interim load reduction goals are not met and additional dry weather flow separation and treatment projects are required, implement as needed.	Construction of dry weather flow separation and treatment projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3-6 months) 2) Secure funds in the form of general funds, bonds, or grants (6 months-2 yrs.) 3) Obtain City Council approval of Capital Improvement Projects budget (occurs annually in May) 4) Initiate preliminary engineering to narrow project scope (6 months; approx. $30K per CIP project) 5) Hire design consultant to develop detailed construction plans and construction cost estimates (2 yrs.; approx. $500K per CIP project) 6) Complete construction contractor bid and award process for construction phase (6 months) 7) Construct project (4 months- 1 yr.; project construction costs are TBD and are based on size of the project) 8) Operation and maintenance will be in perpetuity. Funds and staff resources for this function must be approved by City Council as part of the City's annual budget.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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Trash Segregation								
CSD-WQBMP-10	If interim load reduction goals are not met and additional trash segregation projects are required, implement as needed.	Construction of trash segregation (Trash Guards, etc.) projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in high loading areas city-wide.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None
WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-3	San Dieguito Wetland Restoration Project	The Cities of San Diego and Del Mar are collaborating organizers of the San Dieguito River Park (SDRP) to restore the San Dieguito coastal wetlands and lagoon system. The 150-acre wetland restoration work has been primarily accomplished by Southern California Edison (SCE) and partner owners of the San Onofre Nuclear Generating Station (SONGS), including San Diego Gas & Electric (SDG&E), City of Riverside, and City of Anaheim. Construction began in fall 2006 and the $90-million Restoration Project was officially dedicated in 2011. The Restoration Project has enhanced southern California's unique coastal and marine environment as the restoration has provided adequate tidal flushing and circulation to support biologically diverse habitats. Beyond protecting endangered species and providing habitat to hundreds of bird species and fish, the restoration project has also added a coastal segment to the Coast to Crest Trail, allowing public enjoyment of the wetlands area while protecting sensitive habitat and vegetation. Funding for monitoring and managing the wetlands is ongoing.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Completed	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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WMA-4	Collaborative Approach to Irrigation Reduction	Responsible Agencies are collaborating with water agencies to encourage implementation of water conservation efforts. Water conservation that attempts to reduce irrigation and minimize storm water runoff can also improve water quality of receiving waterbodies. MWD's SoCal Water$mart Program supports conservation efforts by offering incentives in the form of rebates for rain barrels, rotating sprinkler nozzles, weather-based irrigation controllers, soil moisture sensor systems, and turf replacement. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council or appropriate legislative body (i.e. the Board).	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

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WMA-6	Offsite Alternative Compliance Option ~~(WMAA)~~	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, ~~anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015,~~ which was submitted and approved in FY 2016. Following this approval, jurisdictions can formally implement an optional Alternative Compliance Program by ~~December 2015~~ February 2016 (time coincident with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).	Prior to FY16	Continuous-Ongoing	Yes	Revised to clarify strategy.	Yes	FY16 Notes: Phase 1 of the Alternative Compliance Program (ACP) went into effect on 2/16/16. FY17 Notes: Proposed Water Quality Equivalency (WQE) guideline development for stream restoration.
WMA-7	Collaboration with the Regional Board	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Ag Waiver, 2) enforcement of other non-MS4 dischargers, and 3) bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	FY16 Notes: Working with Regional Board to include non-Phase I MS4s in general permits, waivers, and Waste Discharge Requirements (WDRs).

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications		Notes
						Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	
WMA-13	Participation in Watershed Council	If a Watershed Council is re-established, the City of San Diego, County of San Diego and potentially other Responsible Agencies will participate. Watershed Councils are typically locally organized, voluntary, non-governmental organizations, and are intended to broadly represent various stakeholders in the WMA. Goals of Watershed Councils may vary, but they generally promote protecting the watershed and sustaining natural resources. This coordination could assist in selecting WMA projects, identifying potential funding opportunities, and promoting communication among community groups and regulated agencies. Resources necessary to implement this strategy include participating jurisdictional staff to coordinate with the regional effort and the development of an agreement (e.g. MOU, JPA) among participating entities, which may take up to one year to coordinate. Projected funding needs may be met through grant funding, support from community groups or other institutions, or jurisdictional General Funds. General Funds are contingent on approval of the annual budget by City Council or appropriate legislative body. Participation is dependent on funding availability and continued benefit to watershed.	Must be triggered	Continuous-Ongoing	Not Triggered	No Change	If Triggered	None

Table D-4 (continued)
City of San Diego Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Proposed Modifications: Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Proposed Modifications: Plan to implement next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-14	Participation in San Diego Integrated Regional Water Management Program	The City of San Diego, County of San Diego, and San Diego County Water Authority form the Regional Water Management Group (RWMG) and administer and implement the San Diego IRWM Program. The Regional Advisory Committee (RAC) includes rotating members from various functional areas related to water management. In San Dieguito River WMA, two integrated projects, funded through Proposition 50 and 84, target water quality in Lake Hodges: 1) San Dieguito Watershed Management Plan Implementation – Lake Hodges Natural Treatment System Conceptual Design and 2) Lake Hodges Water Quality and Quagga Mitigation Measures. Along with grant funding, the City of San Diego Public Utilities Department, City of Escondido, San Dieguito River Valley Conservancy, Santa Fe Irrigation District, and the San Diego County Water Authority are providing local match or in-kind services. All General Funds are secured on an annual basis and are contingent upon annual budget approval by each participating Responsible Agency.	Prior to FY16	Continuous-Ongoing	Yes	No Change	Yes	Hodges Reservoir Natural Treatment System was awarded $2.9 million in grant funding. This project will create a biofiltration wetland at Hodges Reservoir to improve water quality. The wetland also will provide habitat and species conservation benefits, in addition to recreational opportunities. – More information on IRWM efforts is available at http://www.sdcwa.org/more-31-million-awarded-water-projects-san-diego-region#sthash.5sYifWjP.dpuf.

* Strategy IDs with an asterisk indicate those strategies that are considered “jurisdictional” in the MS4 Permit, but are considered enhancements to the JRMP to target highest priority water quality conditions.

Table D-5
City of San Diego Structural BMP Implementation Status for San Dieguito WMA

Strategy Number	Strategy	Implementation Approach	Total Drainage Area (Ac)	Implementation Year*	Status	Permit Term Goal**
Green Streets		**Total Acres Treated Required for Green Streets:**	**9.86**			
CSD-GS-03	Callado Road	Construction, operation and maintenance of a green street project at Callado Road and Pastoral Street to treat a drainage area of 9.86 acres. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	9.86	FY16	Design	✓

*For additional details, please see the schedule following the City's strategy table in the WQIP.
** Projects with a check in the "Permit Term Goal" column are counted toward the green infrastructure installation goal applicable to the current Permit term. See Table D-8 for a summary

Table D-6
City of San Diego Priority Development Project Implementation Status for San Dieguito WMA

San Dieguito River PDP BMP Ledger (CSD-PDP-05)					
Project Name	**Project Description**	**Total Drainage Area (Ac)**	**Implementation Year**	**Status**	**Permit Term Goal**
Del Mar Heights Rd Median (Project ID 1018)	A grassed/vegetated swale or grassed/vegetated strip has been proposed for the Del Mar Heights Road median about 350 feet west of the Del Mar Heights and Carmel Valley Road intersection to treat a drainage area of 0.8 acre. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	0.8	Prior to FY16	Completed	✓
Black Mountain Ranch - Northern Areas, Project ID 1386	Existing project - constructed BMPs include 4 drainage inserts, 2 filtration systems and 10 hydrodynamic separation systems. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY16	Completed	
Black Mtn. Ranch Community Park (discretionary) - Project ID 1006	A hydrodynamic separation system and 3 drainage inserts were installed at Black Mountain Ranch Community Park under the west corner of the property, behind the baseball fields and near an existing concrete swale. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY16	Completed	
Camino Del Sur and Maranatha Dr. - Project ID 139	A hydrodynamic separation system was installed along the north side of Camino Del Sur, just west of Maranatha Drive. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY16	Completed	
Fire Station #46 Santaluz - Project ID 991	Installed 4 drainage inserts at Fire Station #46 near the entrance of parking lot off of Lazanja Drive. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY16	Completed	
Rancho Bernardo Community Park Dog Off-Leash Area - Project ID 865	A drainage insert was installed at Rancho Bernardo Community Park near the Dog Off-Leash Area. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council.	unknown	Prior to FY16	Completed	
(Additional PDPs will be added after they are completed.)					

* Projects with a check in the "Permit Term Goal" column are counted toward the green infrastructure installation goal applicable to the current Permit term. See Table D-7 for a summary.

Table D-7
Summary of City of San Diego Priority Structural BMP Implementation Status for San Dieguito WMA

Permit Term Goal FY2018	Total Drainage Area (Ac)
Structural BMP Total Acres Treated Required by FY 18	**10.60 (Required by FY 18)**
Total Completed/Planned BMPs	9.86
Total Completed/Planned PDP BMPs	0.80
Remaining to Goal	-0.06 **(Goal Met/Exceeded)**

D.4.4 Modifications to the BMP Design Manual

In FY16 the City, along with other government agencies, professional engineers and members of the local development community, developed a new Regional Best Management Practices (BMP) Design Manual that conforms to the 2013 Municipal Storm Water Permit (Order No. R9-2013-0001, as amended by R9-2015-0001 and R9-2015-0100). The Manual supersedes the San Diego County-wide Model Standard Urban Runoff Storm Water Management Plan (SUSMP) and provides technical guidance and regional standards for pollutant and flow control requirements for new development and significant redevelopment. The City of San Diego's local version of the BMP Design Manual, the Storm Water Standards Manual, became effective on February 16, 2016.

D.4.5 Modifications to the Jurisdictional Runoff Management Program

The City of San Diego is proposing the following administrative changes to its JRMP. The updated JRMP can be viewed at https://www.sandiego.gov/stormwater/plansreports/jrmp.

	JRMP Section/ Appendix	JRMP Update
1	Executive Summary	Strategy categories and definitions were modified to align with the categories and definitions in the Municipal Storm Water Permit and San Diego Water Board's approved Water Quality Improvement Plans (WQIPs).
2	Section 2.3	In accordance with the Municipal Storm Water Permit, Section 2.3 was updated to state that JRMP updates can be proposed/submitted as part of the WQIP Annual Reports.
3	Section 7.3.13-8	Updated BMP #16 to provide greater clarity.
4	Section 7.3.14	Updated section to include new BMPs for herbicide application.
5	Section 10	Strategy categories and definitions were modified to align with the categories and definitions in the Municipal Storm Water Permit and San Diego Water Board's approved WQIPs. Updated tables, graphs, charts, and text to reflect funding needs to meet the goals and schedules identified in the WQIPs. Added language stating "Estimates of funding needs presented were based on the best information available at the time they were prepared."
6	Sections 7.3.1, 7.3.2, and 7.3.4-15	Updated Minimum BMP language to reflect changes to Appendix IX.

	JRMP Section/ Appendix	JRMP Update
7	Section 3, Section 4, Section 5, Section 6, Section 7, Section 8, Section 9	Based on updates made to the categories and definitions of strategies noted above, the “JRMP Strategies Identified in the WQIPs” tables and “Additional Public Education and Participation Program WQIP Strategies” tables for these sections have been updated for consistency. The strategy identification numbering system and text was updated to reflect administrative changes included in the WQIP Annual Reports.
8	Appendix VI- Residential Management Areas and Patrol Protocols	Updated the residential management areas maps and included newly developed patrol protocols.
9	Appendix IX - Minimum BMPs for Residential, Industrial, Commercial, and Municipal Sites/Sources	Updated references to ordinance sections, changed the “Think Blue” references to the Storm Water Division, and made minor changes to some BMP and description wording for clarification.
10	Appendix XIV- Certificate of Adequate Legal Authority	Signed Certificate of Adequate Legal Authority was added.
11	Appendix XX- Water Quality Improvement Plan Strategies	Updated strategies to reflect the administrative changes made to strategies in the Fiscal Year 2016 WQIP Annual Reports.
12	Appendix XXII- Storm Water Division Projected Funding Needs, 2016-2035	Updated Appendix XX to reflect the funding needs to meet the goals and schedules identified in the WQIPs.

D.5 City of Solana Beach

D.5.1 Annual Report Certifications

The City of Solana Beach's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.5.2 Annual Report Form

Solana Beach's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

CITY OF SOLANA BEACH www.cityofsolanabeach.org
635 SOUTH HIGHWAY 101 • SOLANA BEACH, CA 92075 • (858) 720-2400 • Fax (858) 720-2455

January 3, 2017

STATEMENT OF CERTIFICATION

SAN DIEGUITO WATERSHED MANAGEMENT AREA
WATER QUALITY IMPROVEMENT PLAN 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (40 C.F.R. 122.22(d)).

M. Sammak

Mohammad Sammak
City of Solana Beach
City Engineer / Public Works Director

1/3/17
Date

CITY OF SOLANA BEACH www.cityofsolanabeach.org
635 SOUTH HIGHWAY 101 • SOLANA BEACH, CA 92075 • (858) 720-2400 • Fax (858) 720-2455

January 25, 2017

STATEMENT OF CERTIFICATION

SAN DIEGUITO WATERSHED MANAGEMENT AREA 2015-2016 JRMP ANNUAL REPORT LEGAL AUTHORITY ESTABLISHMENT AND ENFORCEMENT

I certify under penalty of law that the City of Solana Beach has taken necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in section E.1 of the San Diego Regional Water Quality Control Board Order No. R9-2013-0001 as amended by Order No. R9-2015-0100 (Municipal Permit). The Solana Beach Municipal Code (SBMC), including the following provision, provides the City with full legal authority as required by the Municipal Permit as well as authorizes judicial and administrative enforcement procedures to mandate compliance:

1. Storm Water Management, SBMC Section 13.10
2. Excavation and Grading, SBMC Section 15.54

Johanna N. Canlas
City Attorney

1/25/17
Date

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
CITY OF SOLANA BEACH – ANNUAL REPORT FORM
FY 2015-2016

I. COPERMITTEE INFORMATION		
Copermittee Name: City of Solana Beach – San Dieguito HU		
Copermittee Primary Contact Name: Ron Borromeo		
Copermittee Primary Contact Information: Address: 635 South Highway 101 City: Solana Beach County: San Diego State: CA Zip: 92075 Telephone: 858-720-2474 Fax: Email: rborromeo@cosb.org		
II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☒ ☐
III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?[1]	YES NO	☒ ☐
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☒ ☐
IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM[2]		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
Number of non-storm water discharges reported by the public		10
Number of non-storm water discharges detected by Copermittee staff or contractors		18
Number of non-storm water discharges investigated by the Copermittee		28
Number of sources of non-storm water discharges identified		28
Number of non-storm water discharges eliminated		27[3]
Number of sources of illicit discharges or connections identified		22
Number of illicit discharges or connections eliminated		21[3]
Number of enforcement actions issued		28
Number of escalated enforcement actions issued		0
V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	☒ ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☒ ☐
Number of proposed development projects in review		47
Number of Priority Development Projects in review		4
Number of Priority Development Projects approved		4
Number of approved Priority Development Projects exempt from any BMP requirements		0
Number of approved Priority Development Projects allowed alternative compliance		0
Number of Priority Development Projects granted occupancy		0
Number of completed Priority Development Projects in inventory		10
Number of high priority Priority Development Project structural BMP inspections		10
Number of Priority Development Project structural BMP violations		0
Number of enforcement actions issued		0
Number of escalated enforcement actions issued		0

[1] The City of Solana Beach submitted an update to the JRMP with the San Dieguito WQIP. The document has been posted to the regional clearinghouse
[2] Illicit Discharge Detection and Elimination data was reported based on the monitoring year as presented in the WQIP annual report versus the FY15-16. The IDDE data presented in this report is for the time period 10/1/2015-9/30/2016.
[3] One issue is currently an open investigation; the City of Solana Beach is actively working with the property owner to close out this issue.

FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒	NO ☐

Number of construction sites in inventory	27
Number of active construction sites in inventory	24
Number of inactive construction sites in inventory	3
Number of construction sites closed/completed during reporting period	30
Number of construction site inspections	400
Number of construction site violations	22
Number of enforcement actions issued	22
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES ☒	NO ☐

	Municipal	Commercial	Industrial	Residential[4]
Number of facilities or areas in inventory	15	69	1	2
Number of existing development inspections	15	138	1	4
Number of follow-up inspections	0	21	0	0
Number of violations	0	37	0	1
Number of enforcement actions issued	0	37	0	1
Number of escalated enforcement actions issued	0	0	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES ☒	NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES ☒	NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES ☒	NO ☐

X. CERTIFICATION

I ☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

M. Sammak
Signature

1/3/17
Date

MOHAMMAD SAMMAK
Print Name

City Engineer
Title

858-720-2470
Telephone Number

Msammak@cosb.org
Email

4 The City of Solana Beach has two designated Residential Management Areas fully encapsulated within the San Dieguito Watershed.

1. Fiscal Analysis

1.1 Jurisdictional Runoff Management Program Implementation

This section of the Jurisdictional Runoff Management Program (JRMP) Annual Report provides a fiscal analysis of the City's stormwater management programs. On May 8, 2013 the RWQCB adopted a revised Municipal Permit, Order No. R9-2013-0001 requiring Copermittees to conduct an annual fiscal analysis of its jurisdictional runoff program in line with the requirements specified in Section E.8 Fiscal Analysis.

On January 29, 2009, the San Diego Municipal Copermittees adopted the "Standardized Fiscal Method and Format" which provides a model for the City of Solana Beach and other Copermittees to perform the review and annual reporting as required in Order R9-2007-0001, Section G. This methodology and reporting format proved to be an effective model for reporting on City expenditures, and for consistency the City of Solana Beach will continue to use the format for this reporting period FY 2015-2016. The City however, recognizes the additional elements required to be included in the fiscal analysis as specified in Order No. R9-2013-001 Section E.8, and has included those components in this year's report.

1.1.1 General Budget Information

The City of Solana Beach's Budget for FY 2015-2016 was presented to the Solana Beach City Council and approved at a public hearing held on June 10, 2015. The City's NPDES program is primarily implemented by the Public Works Department's Environmental Services. Environmental Services is responsible for the coordination of all storm water related tasks. Therefore, the majority of the reported projected expenditures included in this section are part of the Environmental Services Program's FY 2015-16 budget, which is approximately 6% of the total FY 2015-2016 Public Works Department budget. The budget for the City of Solana Beach has the appropriate funds allocated to meet the requirements of Permit 2013-0001, including any development, implementation, and enforcement activities required.

1.1.2 Fiscal Analysis Methods

The City of Solana Beach used the format and guidelines included in the Fiscal Analysis Method for reporting purposes; however, given the City's financial accounting methods, a few modifications were necessary. These adjustments are described below.

1.1.3 Fiscal Analysis Results

The City's Fiscal Year 2015-2016 jurisdictional (JRMP), watershed and regional projected expenditures for the implementation of the Municipal Permit requirements are summarized in **Table 1-1**.

Table 1-1: Fiscal Year 2015-2016 Expenditure Summary by Program Component

Component Description	Fiscal Year 2015-2016 Projected Expenditures
Jurisdictional Component	
Administration	62,331
Development Planning	22,290
Construction	24,870
Municipal (Including Non-Emergency Fire Flows)	147,385
Industrial and Commercial	14,930
Residential, Education, and Public Participation	23,630
IDDE	57,230
Jurisdictional Total	**$352,666**
Watershed Component	
Carlsbad Watershed	26,287
San Dieguito Watershed	33,787
Watershed Total	**$60,074**
Regional Component	
Total Copermittee Cost Share for Solana Beach	**23,350**
Total Costs	**$436,090**

1.1.4 JRMP Expenditures

The City of Solana Beach used the expenditure categories detailed in the Fiscal Analysis Method for jurisdictional reporting. However, due to the implementation overlap of some of the City's municipal permit components; it is difficult to separate out individual component costs. As a result, the expenditures for residential, education, and public participation are reported as one expenditure category. Additionally, since the City does not explicitly track expenditures by permit component for its budgeting purposes, in many cases estimated percentages were utilized to allocate expenditures into the appropriate municipal permit component categories.

A total of $436,090 was projected to be expended in Fiscal Year 2015-2016 for the implementation of JRMP activities. An overview of the expenditures reflected in JRMP activity components is described below.

Administration
Activities identified in this component represent labor and non-labor expenditures for materials, supplies, equipment, or tools that are not otherwise incorporated into other expenditure categories, general administrative functions (e.g., program planning, budgeting, staff supervision), and program assessment and reporting.

Development Planning
Activities identified in this component represent labor and non-labor expenditures related to issuance or oversight of permits or of plans (e.g., permit counter support, plan checks, permit or application processing), project planning and engineering (e.g. project design specifications, capital improvement projects).

Construction
Activities identified in this component represent labor and non-labor expenditures related to construction site inspections and enforcement.

Municipal
Activities identified in this component represent labor and non-labor expenditures related to maintenance inspections of streets, roads, catch basins and inlets, open channels, and the MS4, municipal facility inspections, street and parking lot sweeping, catch basins and inlets, open channels, and MS4 cleaning, and municipal BMP implementation. Any costs associated with preparing for non-emergency fire-fighting flows are included in the municipal component.

Industrial and Commercial
Activities identified in this component represent labor and non-labor expenditures related to evaluation and enforcement of program requirements at industrial and commercial sites or sources (e.g. routine inspections and complaint investigations).

Residential, Education, and Public Participation
Activities identified in these components represent labor and non-labor expenditures related to investigation and enforcement of residential areas or activities, staffing outreach events, development and production of outreach materials, and any expenditures associated with waste collection and recycling (e.g. household hazardous waste, used oil).

Illicit Discharge Detection and Elimination (IDDE)
Activities identified in this component represent labor and non-labor expenditures related to the identification and elimination of illicit discharges or connections, enforcing the City of Solana Beach's storm water ordinance, and any expenditures related to monitoring programs (e.g. dry weather monitoring, coastal storm drain monitoring, special investigations, field or sampling equipment, materials and supplies).

1.1.5 Watershed Expenditures

The City of Solana Beach used the expenditure categories (administration, watershed activities, cost share contribution, and other) detailed in the Fiscal Analysis Method for watershed reporting. The watershed expenditures included in this report only capture City of Solana Beach's expenditures and do not account for any expenditure disbursed by other Copermittees included in the watershed(s).

A total of $60,074 was projected to be expended in Fiscal Year 2015-2016 for the implementation of watershed activities, which primarily included the development of Water Quality Improvement

Plans (WQIP) for the Carlsbad Watershed and the implementation of planned strategies in the San Dieguito Watersheds.

1.1.6 Regional Expenditures

The City of Solana Beach used the expenditure categories (administration, cost share contribution, regional activities, and others) detailed in the Fiscal Analysis Method for regional reporting. The regional expenditures included in this report only capture the City of Solana Beach's expenditures and do not account for any expenditure disbursed by other Copermittees in the region. A total of $23,350 was projected to be expended in Fiscal Year 2015-2016 for the implementation of regional activities and coordination.

1.1.7 Funding Sources

The City primarily finances its Storm Water Management Department via revenues from an NPDES solid waste fee that was initiated in 2004. The City went through a long, arduous process to establish a long-term funding source to ensure the program would be sufficiently financed from 2004 through 2007. The City was sued by the Howard Jarvis Taxpayer's Association (HJTA), and the fee was put to a vote of the community. In September 2007, property owners in Solana Beach voted in favor of the fee which ultimately results in the City having a funding source to maintain, enhance, and ensure the long-term future of the NPDES program at the City. The NPDES Fee is to be used exclusively for the mandated NPDES Permit programs. For more information on the City's NPDES Solid Waste Fee, please see the City's website at http://www.cityofsolanabeach.org

The City also utilizes the General Fund to assist in supporting some elements of the City's NPDES program. The General Fund is supported by major revenue sources that include property tax, the local portion of the sales tax and use tax, and transient occupancy tax.

D.5.3 City of Solana Beach Strategies

City of Solana Beach's strategies are detailed in Table D-8.

Table D-8
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	**Implemented as planned in current FY (FY16)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(ii)	**Modification for FY17 (If modified or canceled, provide rationale)** MS4 Permit Section: F.3.b.(3)(d)(iv))	**Plan to implement into next FY (FY17)? (Y/N)** MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
JRMP (E.2 – E.7) Strategies (E.3.b.(1)(a))								
E.3 Development Planning								
All Development Projects								
SB-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to JRMP Section 5.	FY16	Continuous-Ongoing	Y	N	Y	Guidelines specified in BMP Design Manual. City has a construction verification process to ensure post construction BMPS are installed.
SB-2	Municipal code and ordinances will be amended as necessary to encourage LID opportunities.	Refer to JRMP Section 5.	FY16	Continuous – Ongoing	In progress	N	Y	Planning staff emphasizes LID incorporation in conceptual design process.
SB-3	Development Planning staff will review LID regulatory changes and ensure compliance with BMP Design Manual.	The City, due to its small size, has one staff member overseeing implementation of the development planning MS4 Permit requirements and ensures compliance with new requirements.	FY16	As required or needed by permit	Y	N	Y	BMP Design Manual has been updated.
SB-4	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and WQIP requirements.	At the initial plan review, a Stormwater Checklist is provided which lists the minimum standards required. One-on-one education is available at that time and throughout the development planning process.	FY16	Continuous – Ongoing	Y	N	Y	-

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
Priority Development Projects (PDPs)								
SB-5	For PDPs, administer a program requiring implementation of on-site structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to JRMP Section 5.	FY16	Continuous – Ongoing	Y	N	Y	Annual inspection and verification program.
SB-6	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP Section 5. County BMP Design Manual will be used and adapted for the City.	FY16	As needed or required by permit	Y	N	Y	BMP Design Manual has been updated.
SB-7	Expanded requirement for on-site treatment if impervious area is planned to increase by more than 500 square feet, a detention basin is required.	With increased impervious area of greater than 500 sq. ft., the City requires a detention basin to treat stormwater runoff. An agreement to maintain the detention basin is also required. This encourages LID and the protection of open space.	Prior to FY16	As needed or required by permit	Y	N	Y	-

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
SB-8	Institute a program to verify and enforce maintenance and performance of treatment control BMPs.	Refer to JRMP Section 5. The City has an annual verification of effective operation and maintenance of constructed structural BMPs. The City's structural BMP verification program utilizes the following steps to verify the effective operation and maintenance of each structural BMP constructed under the City's processes: 1) Utilize the structural BMP inventory to create a list of sites, responsible parties, addresses and the associated BMPs. 2) Annually mail out a verification form to be returned to the City. The form will include the following information: a. BMPs to verified b. Description of maintenance taken during previous year c. Requirement to supply information to demonstrate maintenance and/or operating status (vendor invoices, photos etc.) d. Certification from the responsible party that the BMP(s) were maintained and are operating In the event that a responsible party does not respond the City may use its available enforcement measures to obtain compliance.	FY15	Continuous – Ongoing	Yes, the City of Solana Beach has completed visual inspections of all TCBMPS, but has not yet sent out letters.	Letters to be sent out in FY17	Y	-
E.4 Construction Management								
SB-9	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Refer to JRMP Section 6. BMPs are inspected once a month and before known rain events. Inventory is updated weekly.	FY16	Continuous-Ongoing	Y	N	Y	City has a construction verification process to ensure BMPs are appropriately installed and annual inspection thereafter.
SB-10	Maintain and update a watershed-based inventory of all construction projects issued a local permit that allows ground disturbance or soil disturbing activities.	Create a watershed-based inventory to track all construction projects issued a permit that allow ground disturbance or soil disturbing activities. Track the frequency and results of inspections.	FY16	Continuous-Ongoing	Y	N	Y	Construction database in place.

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

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SB-11	Implement or require implementation of BMPs that are site specific, seasonally appropriate and construction phase appropriate. Includes inspections at an appropriate frequency and enforcement of requirements.	Ensure that erosion control plans and BMP plans are appropriately designed at the permit and plan review phase. Perform and document BMP inspections per the Permit.	FY16	Continuous-Ongoing	Y	N	Y	-
E.5 Existing Development								
Commercial, Industrial, Municipal, and Residential Facilitates and Areas								
SB-12	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP Sections 7, 8, & 9. . All existing commercial and industrial facilities are inspected annually. All existing municipal facilities are inspected monthly. Please see Attachment 1 for details on updated minimum BMPs that will be implemented to address sources causing or contributing to the HPWQC.	FY16	Continuous-Ongoing	Y	N	Y	Low flow diverters are vacuumed out monthly.
SB-12.1	Inspection of all commercial and industrial facilities annually	All commercial and industrial facilities are inspected annually.	FY16	Continuous-Ongoing	Y	N	Y	-
SB-12.2	Require minimum BMPs for mobile businesses.	Water-using mobile businesses require minimum BMPs including recovery and removal of waste water.	FY16	Continuous-Ongoing	Y	N	Y	-
SB-12.3	Review policies and procedures to ensure discharges from swimming pools are meeting current permit requirements.	Refer to JRMP.	FY16	Continuous-Ongoing	Y	N	Y	Policies meet permit requirements.
SB-13	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, signage and education, physical removal of pet waste, and enforcement.	Implement education and prevention program. Pet waste bag dispensers and trash bins provided in public areas.	Prior to FY16	Continuous-Ongoing	Y	N	Y	2,000 bags used up every 3 months.

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

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MS4 Infrastructure								
SB-14	Implementation of operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.).	Refer to JRMP Section 7. The City inspects all MS4 facilities that receive or collect high volumes of trash and debris between May 1st and September 30th once per year. These locations are assessed periodically to determine if inspection frequency revisions are necessary. All remaining MS4 facilities are inspected at any time during the year.	FY16	Continuous-Ongoing	Y	N	Y	-
SB-14.1	Perform catch basin inspection and cleaning	All catch basins inspected annually. Catch basins with excess trash and debris are cleaned annually.	FY16	Continuous-Ongoing	Y	N	Y	More than 300 catch basins Citywide inspected and 18 catch basins cleaned totaling 1.25 cubic yards of debris removed.
SB-14.2	Inspect open-channels and repair scour ponds to reduce pollutant loads and invasive plants and animals as needed.	Stevens Creek Channel is inspected annually. Maintenance is conducted as-needed.	FY16	Continuous-Ongoing	Y	Corrected to Stevens Creek Channel	Y	On May 9, 2016 500 ft of Stevens Creek channel was inspected.
SB-14.3	Repair and replace MS4 components to provide source control from MS4 infrastructure.	Refer to JRMP Section 7. The City proactively repairs and replaces corrugated metal pipe throughout the MS4 in order to control and prevent pollutant sources from within the MS4 infrastructure.	Prior to FY16	Continuous - Ongoing	Y	N	Y	-
SB-15	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers and identify sewer leaks and areas for sewer pipe replacement.	The City will continue to implement an aggressive sewer infrastructure replacement program. The City CCTVs a quarter of the sewer infrastructure each year. The results lead to a prioritized list of sewer line replacement projects. The City invests approximately $500,000 in sewer replacement projects per year.	Prior to FY16	Continuous - Ongoing	Y	20% annually	Y	-
Roads, Streets, and Parking Lots								
SB-16	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP Section 7.	FY16	Continuous-Ongoing	Y	N	Y	-

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

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SB-16.1	Implement street sweeping on roads and in parking lots	Refer to JRMP Section 7. High priority streets are swept twice per month. Medium priority streets, including all residential streets, are swept once per month. Low priority streets, including 12 parking lots, are cleaned once per month.	FY16	Continuous-Ongoing	Y	N	Y	718,491 total miles swept in FY16.
SB-16.2	Perform sweeping of medians on high-volume arterial roadways.	Refer to JRMP Section 7. Medians on Highway 101 and Lomas Santa Fe are swept once per month.	FY16	Continuous-Ongoing	Y	N	Y	Swept twice per month.
Pesticides, Herbicides, and Fertilizer BMP Program								
SB-17	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP Section 7. City does not have authority over application of pesticides, but will implement BMPs. Industrial and commercial inspections cover requirement.	FY16	Continuous-Ongoing	Y	N	Y	-

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

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Retrofit and Rehabilitation in Areas of Existing Development								
SB-18	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Refer to JRMP Section 8. The process for identifying retrofits will evaluate the following considerations: • Water Quality Improvement Plan (WQIP) Priority and Highest Priority Water Quality Conditions • Likely sources of pollutants generating pollutants related to WQIP conditions • Focus areas identified in WQIP • Vintage of geographic areas of the City – time period existing development was constructed • Public retrofit opportunities through Capital Improvement Program (CIP) projects • Areas of persistent discharges • Inspection/Illicit Discharge Detection and Elimination program findings • Identified areas of hydromodification/other stream impacts Using the considerations above, the City will identify areas where opportunities could provide water quality improvement benefits. Evaluation will include layering of the findings to determine where compounding factors overlap. The City will consider the locations where overlapping occurs and significance of the factors to prioritize areas suited for retrofits and rehabilitation projects. Once specific areas within the City have been identified and prioritized for retrofits and/or rehabilitation projects, the City will perform field verifications on an as-needed basis to substantiate the: • need for retrofits or rehabilitation projects • locations of potential retrofits or rehabilitation projects • appropriate type(s) of retrofit or rehabilitation project • appropriate responsible party to implement the retrofits or rehabilitation projects Specific retrofit projects are included in the Non-JRMP, Structural Strategies categories.	FY18	Continuous-Ongoing	N/A	N/A	N/A	-

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

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SB-19	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP Section 8. The process for identifying retrofits will evaluate the following considerations: • Water Quality Improvement Plan (WQIP) Priority and Highest Priority Water Quality Conditions • Likely sources of pollutants generating pollutants related to WQIP conditions • Focus areas identified in WQIP • Vintage of geographic areas of the City – time period existing development was constructed • Public retrofit opportunities through Capital Improvement Program (CIP) projects • Areas of persistent discharges • Inspection/Illicit Discharge Detection and Elimination program findings • Identified areas of hydromodification or other stream impacts Using the considerations above, the City will identify areas where opportunities could provide water quality improvement benefits. Evaluation will include layering of the findings to determine where compounding factors overlap. The City will consider the locations where overlapping occurs and significance of the factors to prioritize areas suited for retrofits and rehabilitation projects. Once specific areas within the City have been identified and prioritized for retrofits and/or rehabilitation projects, the City will perform field verifications on an as-needed basis to substantiate the: • need for retrofits or rehabilitation projects • locations of potential retrofits or rehabilitation projects • appropriate type(s) of retrofit or rehabilitation project appropriate responsible party to implement the retrofits or rehabilitation projects	FY18	Continuous-Ongoing	N/A	N/A	N/A	-

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

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E.2 Illicit Discharge, Detection, and Elimination (IDDE) Program								
SB-20	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP Section 3.	FY16	Continuous-Ongoing	Y	N	Y	Online reporting system, staff training and IDDE follow-up investigations completed.
E.7 Public Education and Participation (B.3.b.(1)(a)(iii))								
SB-21	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Section 12 and 13.	FY16	Continuous-Ongoing	Y	N	Y	City supports community based organizations and partnerships and conducts trash and beach cleanups.
SB-21.1	Expand outreach, training, and incentive programs to homeowners' associations (HOAs).	Refer to JRMP Section 12 and 13.	FY16	Continuous-Ongoing	N	Strategy shifted from FY16 to FY17 due to scheduling delays and limited resources	Y	-
SB-21.2	Develop outreach and training program for property managers responsible for HOAs and Maintenance Districts.	Refer to JRMP Section 12 and 13.	FY16	Continuous-Ongoing	N	Strategy shifted from FY16 to FY17 due to scheduling delays and limited resources	Y	-

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

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SB-21.3	Conduct trash cleanups through community-based organizations involving target audiences.	In partnership with I Love a Clean San Diego, host a site in Solana Beach during two beach clean-ups per year.	FY16	Continuous-Ongoing	Y	N	Y	600 pounds of trash collected from sites in Solana Beach over three different cleanup events.
SB-21.4	Target school-based education and outreach.	Collaborate with Solana Center to present relevant watershed and storm water pollution prevention information to school groups once a year.	FY16	Continuous-Ongoing	Y	N	Y	City of Solana Beach provides funding to the Solana Center for stormwater presentations.
SB-21.5	Develop education and outreach to reduce over-irrigation.	Work with SFID to educate residents about reducing over irrigation. Municipal code will be modified to address over irrigation issues.	FY16	Continuous-Ongoing	Yes, Solana Beach works with the SFID. Municipal code modifications forthcoming	N	Y	-
SB-21.6	Continue to support the Clean and Green Committee; a committee of local residents and business owners working to preserve Solana Beach's environment.	Encourage public participation by supporting the Clean and Green Committee. The Clean and Green Committee addresses issues pertaining to water quality, air quality, and climate change. The City Council has also formed a Council Ad-Hoc subcommittee on Environmental Sustainability to work closely with the Clean and Green committee and provide direction to City staff on sustainability programs.	FY16	Continuous-Ongoing	Y	N	Y	-
SB-21.7	Collaborate with regional education and outreach efforts.	Participate in Regional Think Blue campaign and collaborate with other regional efforts to provide consistent message or efficiency in training for targeted audiences.	FY16	Continuous-Ongoing	Y	N	Y	Participates in regional meetings.

Table D-8 (continued)
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E.6 Enforcement Response Plan								
SB-22	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP Section 11.	FY16	Continuous-Ongoing	Y	N	Y	-
SB--23	Increase enforcement of over-irrigation. Enforcement of power-washing included here.	Refer to JRMP Section 11.	FY16	Continuous-Ongoing	Y	N	Y	Online reporting system and patrol implemented.
Non-JRMP Strategies (Optional Strategies, B.3.b.(1)(b))								
Nonstructural Strategies								
SB-24	Promote and encourage implementation of designated BMPs at residential areas.	Collaborate with Santa Fe Irrigation District (SFID) to promote runoff reduction products and services and provide education to residential customers. Includes residential landscape evaluations and links to MWD and SDCWA rebates and incentives including weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and turf removal.	FY16	Continuous – Ongoing	Y	N	Y	-
SB-25	Promote and encourage implementation of designated BMPs in commercial areas.	Collaborate with SFID to promote MWD's SoCal Water$mart rebates and products such as weather based irrigation controllers, rotating sprinkler nozzles, soil moisture sensor system, rain barrels, and turf removal to commercial facilities.	FY16	Continuous – Ongoing	Y	N	Y	-
SB-26	Continue to apply NPDES pollution management fee to residential and commercial waste and recycling to secure funding for implementation of water quality related programs.	To ensure continued implementation of water quality improvement efforts, the City has secured funding through a NPDES pollution management fee.	FY16	Continuous - Ongoing	Y	N	Y	-
SB-27	Continue participating in source reduction initiatives.	The City was the first to ban non-reusable plastic bags within the region in 2012.	Prior to FY16	Continuous - Ongoing	Y	N	Y	-

Table D-8 (continued)
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SB-28	Develop a program to address and capture trash and debris.	Continue to maintain catch basin inserts to collect trash and prevent from flowing into the MS4 and subsequently the receiving water. Two catch basin inserts are installed within the jurisdiction in the San Dieguito River WMA	FY16	Continuous-Ongoing	Y	N	Y	-
SB-29	Conduct special studies.	San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for “natural sources” to establish the concentrations or loads from streams in a minimally disturbed or “reference” condition. Refer to Section 5.1 for further details.	FY15	One Time	Y	N	N	Completed
SB-30	Reference watershed study.	Assess sources of bacteria in the watersheds using the San Diego Bacteria Source Identification and Prioritization Process developed in 2012 as part of the MS4 Permit Report of Waste Discharge process. Focus is on the beach/lagoon area of the San Dieguito River WMA, with inputs from the upper watershed also considered where relevant and necessary to identify sources of bacteria to the beach/lagoon. Refer to Section 5.1 for further details.	FY15	One Time	Y	N	N	Completed
SB-31	If projects are unable to meet structural BMP design standards or hydromodification management criteria, administer an alternative compliance program for on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects). Refer to Section 4.2.5 and Appendix N for further details.	This strategy may be triggered if the City decides to administer an alternative compliance program for development and redevelopment	Must be Triggered	Continuous-Ongoing	N/A	N/A	N/A	Not triggered

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

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SB-32	If a regional social services effort is established, support workgroup to provide sanitation and trash management for persons experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	This strategy may be triggered if a regional effort is established. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) a City staff member to participate in workgroup and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	Must be Triggered	Continuous-Ongoing	N/A	N/A	N/A	Not triggered
SB-33	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas, creating permanent open space protections on undeveloped city-owned land, and acquiring privately-owned undeveloped open areas.	As feasible opportunities arise, the City will protect areas that are functioning naturally. This may include avoiding hardscape development and degradation in unpaved open space areas and creating permanent open space protections to undeveloped city-owned land. This strategy will be triggered on a case by case basis. The following resources, funds, and steps are needed to implement this strategy 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants if necessary (2 -18 months) 3) Obtain City Council approval	Must be Triggered	Continuous – Ongoing	N/A	N/A	N/A	Not triggered
Structural Strategies								
Green Infrastructure								
SB-34	Highway 101 curb cuts	Curb cuts were installed along Hwy 101 in 2014 and will continue to be maintained.	Prior to 2014	Continuous-Ongoing	Y	N	Y	-

Table D-8 (continued)
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SB-35	If interim load reduction goals are not met and additional green infrastructure is required, 8.9 ac of available space have been identified as potential opportunities for green infrastructure implementation on public parcels.	Will utilize the adaptive management process to determine if green infrastructure is necessary to achieve goals. City will assess opportunities and implement as applicable. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants (2 -18 months) 3) Obtain City Council approval 4) Initiate preliminary engineering, design and develop construction plans and cost estimates (6 months -2 Years)	Must be Triggered	Continuous-Ongoing	N/A	N/A	N/A	Not triggered

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

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Green Streets								
SB-36	If interim load reduction goals are not met and additional green infrastructure is required, the additional acreage required can be implemented through green streets if potential opportunities for green infrastructure implementation on public parcels are not available.	City will assess opportunities and implement as applicable This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured. Will occur in downstream reaches where persistent dry weather flows have been observed. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations (3 months) 2) Secure funds in the form of general funds, bonds, or grants (2 -18 months) 3) Obtain City Council approval 4) Initiate preliminary engineering, design and develop construction plans and cost estimates (6 months -2 Years) 5) Bid and Award process for construction phase (6 months) 6) Construct project (4 months- 1 yr; project construction costs are TBD and are based on size of the project) 7) Operation and maintenance will be in perpetuity.	Must be Triggered	Continuous-Ongoing	N/A	N/A	N/A	Not triggered
Water Quality Improvement BMPs								
Proprietary BMPs								
SB-37	CDS treatment unit	Installation of a CDS treatment unit at the north end of N. Cedros in 2004. (CG-3064)	2004	Continuous-Ongoing	Y	N	Y	Installed and maintained
SB-38	CDS treatment unit	Installation of a CDS unit in Fletcher Cove Park in 2007. Drainage area is 2.5 acres. (PF-004)	2007	Continuous – Ongoing	Y	N	Y	Installed and maintained
SB-39	Biofilter	Installation of a biofilter at La Colonia Park in 2002. (CG-3069)	2002	Continuous – Ongoing	Y	N	Y	Installed and maintained

Table D-8 (continued)
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Dry Weather Flow Separation and Treatment Projects								
SB-40	Seascape Sur Outfall Storm Water Diversion Structure Project	Proposed Seascape Sur Outfall Storm Water Diversion Structure Project. Approximate drainage area is 40.5 acres. Plan to start construction September 2014. Funded by Proposition 84 IRWM grant. Estimated cost is between $79,000 and $105,000. (Latitude 32.985441 Longitude 117.273058). Partner agency is San Elijo Joint Powers Authority.	Prior to FY16	Continuous-Ongoing	Y	N	Y	Installed and maintained
WMA Strategies (Optional Strategies, B.3.b.(2))								
WMA-1	Collaborative Approach to Irrigation Reduction	Responsible Agencies are collaborating with water agencies to encourage implementation of water conservation efforts. Water conservation that attempts to reduce irrigation and minimize storm water runoff can also improve water quality of receiving waterbodies. MWD's SoCal Water$mart Program supports conservation efforts by offering incentives in the form of rebates for rain barrels, rotating sprinkler nozzles, weather-based irrigation controllers, soil moisture sensor systems, and turf replacement. Funding and resources have been secured for FY2016. Funding for future fiscal years is contingent on annual budget approval by City Council or appropriate legislative body (i.e. Board).	Prior to FY16	Continuous-Ongoing	Y	N	Y	-

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-2	Offsite Alternative Compliance Option (WMAA)	The WMAA provides alternative compliance methods in lieu of meeting structural BMP design standards and/or hydromodification management criteria on the project site. The San Diego County Copermittees have collectively funded and provided guidance for development of a regional WMAA. Copermittees compiled a list of candidate projects that consider the numeric goals of the WMAs as well as projects previously identified in JRMPs and other regulatory documents. Next steps include submittal of the water quality equivalency standards final document, anticipated in September 2015. Following a public review and Executive Officer approval, anticipated by November 2015, jurisdictions can formally implement an optional Alternative Compliance Program by December 2015 (time coincides with implementation of standards set forth in the regional BMP Design Manual and local Storm Water Standards Manuals).	Prior to FY16	Continuous-Ongoing	Y	N	Y	-
WMA-3	Collaboration with the Regional Board	The Responsible Agencies will work with the Regional Board to identify solutions and address sources of potential water quality impairments. Priorities include 1) enforcement of the Ag Waiver, 2) enforcement of other non-MS4 dischargers, and 3) Bacteria TMDL updates. Discussions with the Regional Board were initiated in FY15. Collaboration will continue in FY16 to identify an appropriate path forward, including a more detailed time line. Funding and resources have been secured for FY16. Funding for future fiscal years is contingent on annual budget approval by each Responsible Agency.	Prior to FY16	Continuous-Ongoing	Y	N	Y	-

Table D-8 (continued)
City of Solana Beach Jurisdictional Strategies for San Dieguito River WMA

ID	Strategy	Implementation Approach	Implementation or Construction Year	Implementation Schedule	Implemented as planned in current FY (FY16)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(ii)	Modification for FY17 (If modified or canceled, provide rationale) MS4 Permit Section: F.3.b.(3)(d)(iv))	Plan to implement into next FY (FY17)? (Y/N) MS4 Permit Section: F.3.b.(3)(d)(iii))	Notes
WMA-4	Participation in Watershed Council	If a Watershed Council is re-established, the City of San Diego, County of San Diego and potentially other Responsible Agencies will participate. Watershed Councils are typically locally organized, voluntary, non-governmental organizations, and are intended to broadly represent various stakeholders in the WMA. Goals of Watershed Councils may vary, but they generally promote protecting the watershed and sustaining natural resources. This coordination could assist in selecting WMA projects, identifying potential funding opportunities, and promoting communication among community groups and regulated agencies. Resources necessary to implement this strategy include participating jurisdictional staff to coordinate with the regional effort and the development of an agreement (e.g. MOU, JPA) among participating entities. Projected funding needs may be met through grant funding, support from community groups or other institutions, or jurisdictional General Funds. General Funds are contingent on approval of the annual budget by City Council or appropriate legislative body. Participation is dependent on funding availability.	Must be Triggered	Continuous-Ongoing	N/A	N/A	N/A	Not triggered

D.5.4 Modifications to the BMP Design Manual

The BMP Design Manual was modified since the WQIP was approved in fall 2015. The current Solana Beach's BMP Design Manual is posted on the City of Solana Beach website, and the link to this page is listed on Project Clean Water.

D.5.5 Modifications to the Jurisdictional Runoff Management Plan

The City of Solana Beach's JRMP is being updated and re-submitted concurrent with this WQIP Annual Report. The changes to the JRMP are mostly related to changes in the final approved WQIP for the Carlsbad Watershed Management Area. The updated Solana Beach JRMP will be posted on Solana Beach's website, and the link to this page is listed on Project Clean Water.

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D.6 County of San Diego

D.6.1 Annual Report Certifications

The County of San Diego's required certifications regarding the preparation of the Water Quality Improvement Plan Annual Report, as well as the legal authorities required by the MS4 Permit are included on the following pages.

D.6.2 Annual Report Form

County of San Diego's completed JRMP Annual Report form and fiscal analysis for FY16 are included on the following pages.

County of San Diego

SARAH E. AGHASSI
DEPUTY CHIEF ADMINISTRATIVE OFFICER

LAND USE AND ENVIRONMENT GROUP
1600 PACIFIC HIGHWAY, ROOM 212, SAN DIEGO, CA 92101
(619) 531-6256 • Fax (619) 531-5476
www.sdcounty.ca.gov/lueg

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT SAN DIEGUITO RIVER WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the County of San Diego has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 6th day of January, 2017, at the County of San Diego.

Sarah Aghassi
SARAH E. AGHASSI
Deputy Chief Administrative Officer

1/6/17
Date

ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM

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JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

I. COPERMITTEE INFORMATION

I.A Copermittee Name: County of San Diego (PIN 255223)

I.B Copermittee Primary Contact Name: Todd Snyder

I.C Copermittee Primary Contact Information:
Address: 5510 Overland Avenue, Suite 410
City: San Diego County: San Diego State: California Zip: 92123
Telephone: (858) 694-3672 Fax: (858) 495-5623 Email: Todd.Snyder@sdcounty.ca.gov

II. LEGAL AUTHORITY

II.A Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐
II.B A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES	☒
	NO	☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

III.A Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES	☒
	NO	☐
III.B If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES	☒
	NO	☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

IV.A Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐

IV.B.1 Number of non-storm water discharges reported by the public	286
IV.B.2 Number of non-storm water discharges detected by Copermittee staff or contractors	95
IV.B.3 Number of non-storm water discharges investigated by the Copermittee	375
IV.B.4 Number of sources of non-storm water discharges identified	115
IV.B.5 Number of non-storm water discharges eliminated	112
IV.B.6 Number of sources of illicit discharges or connections identified	85
IV.B.7 Number of illicit discharges or connections eliminated	84
IV.B.8 Number of enforcement actions issued	93
IV.B.9 Number of escalated enforcement actions issued	1

V. DEVELOPMENT PLANNING PROGRAM

V.A Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES	☒
	NO	☐
V.B Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES	☒
	NO	☐
V.C If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES	☒
	NO	☐

V.D.1 Number of proposed development projects in review	925
V.D.2 Number of Priority Development Projects in review	237
V.D.3 Number of Priority Development Projects approved	96
V.D.4 Number of approved Priority Development Projects exempt from any BMP requirements	0
V.D.5 Number of approved Priority Development Projects allowed alternative compliance	0
V.D.6 Number of Priority Development Projects granted occupancy	62

V.E.1 Number of completed Priority Development Projects in inventory	410
V.E.2 Number of high priority Priority Development Project structural BMP inspections	691
V.E.3 Number of Priority Development Project structural BMP violations	170
V.E.4 Number of enforcement actions issued	170
V.E.5 Number of escalated enforcement actions issued	0

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM

VI. A Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

VI.B.1 Number of construction sites in inventory	2,748
VI.B.2 Number of active construction sites in inventory	2,684
VI.B.3 Number of inactive construction sites in inventory	0
VI.B.4 Number of construction sites closed/completed during reporting period	1,124
VI.B.5 Number of construction site inspections	18,858
VI.B.6 Number of construction site violations	416
VI.B.7 Number of enforcement actions issued	590
VI.B.8 Number of escalated enforcement actions issued	38

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

VII.A Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001? YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
VII.B.1 Number of facilities or areas in inventory	a. 263	b. 1,779	c. 150	d.110
VII.B.2 Number of existing development inspections	a. 1,885	b. 974	c. 38	d.468
VII.B.3 Number of follow-up inspections	a. 23	b. 131	c. 12	d.165
VII.B.4 Number of violations	a. 46	b. 279	c. 31	d.346
VII.B.5 Number of enforcement actions issued	a. 28	b. 130	c. 10	d.0
VII.B.6 Number of escalated enforcement actions issued	a.0	b.1	c.0	d.0

VIII. PUBLIC EDUCATION AND PARTICIPATION

VIII.A Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

VIII.B Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001? YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001? YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Sarah Aghassi
Signature

10/26/16
Date

SARAH E. AGHASSI
Print Name

LAND USE AND ENVIRONMENT GROUP
DEPUTY CHIEF ADMINISTRATIVE OFFICER
Title

(619) 531-5451
Telephone Number

SARAH.AGHASSI@SDCOUNTY.CA.GOV
Email

ATTACHMENT D.1

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM BY WATERSHED

JRMP ANNUAL REPORT ATTACHMENT D.1 by WATERSHED

Fiscal Year 2015-2016

			SANTA MARGARITA	SAN LUIS REY	CARLSBAD	SAN DIEGUITO	PENASQUITOS	SAN DIEGO RIVER	SAN DIEGO BAY	TIJUANA RIVER	JURISDICTION TOTALS
			*(902.00)	*(903.00)	*(904.00)	*(905.00)	*(906.00)	*(907.00)	*(908.00, 909.00, 910.00)	*(911.00)	
IV.	**ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM**										
IV.B.1	Number of non-storm water discharges reported by the public		12	46	30	40	2	78	72	6	286
IV.B.2	Number of non-storm water discharges detected by Copermittee staff or contractors		9	11	7	14	1	28	24	1	95
IV.B.3	Number of non-storm water discharges investigated by the Copermittee		15	57	37	51	3	106	99	7	375
IV.B.4	Number of sources of non-storm water discharges identified		4	22	17	11	1	30	28	2	115
IV.B.5	Number of non-storm water discharges eliminated		4	21	16	10	1	30	28	2	112
IV.B.6	Number of sources of illicit discharges or connections identified		4	14	16	8	0	18	23	2	85
IV.B.7	Number of illicit discharges or connections eliminated		4	14	15	8	0	18	23	2	84
IV.B.8	Number of enforcement actions issued		4	21	17	9	1	23	16	2	93
IV.B.9	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	1	1
V.	**DEVELOPMENT PLANNING PROGRAM**										
V.D.1	Number of proposed development projects in review		27	219	109	189	0	158	183	40	925
V.D.2	Number of Priority Development Projects in review		2	53	30	53	0	43	50	6	237
V.D.3	Number of Priority Development Projects approved		4	23	11	21	0	20	11	6	96
V.D.4	Number of approved Priority Development Projects exempt from any BMP requirements		0	0	0	0	0	0	0	0	0
V.D.5	Number of approved Priority Development Projects allowed alternative compliance		0	0	0	0	0	0	0	0	0
V.D.6	Number of Priority Development Projects granted occupancy		2	16	5	8	0	18	12	1	62
V.E.1	Number of completed Priority Development Projects in inventory		12	89	54	85	0	66	93	11	410
V.E.2	Number of high priority Priority Development Project structural BMP inspections		1	100	70	273	0	110	82	55	691
V.E.3	Number of Priority Development Project structural BMP violations		1	43	31	53	0	24	8	10	170
V.E.4	Number of enforcement actions issued		1	43	31	53	0	24	8	10	170
V.E.5	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	0	0
VI.	**CONSTRUCTION MANAGEMENT PROGRAM**										
VI.B.1	Number of construction sites in inventory		63	637	397	636	2	438	513	62	2748
VI.B.2	Number of active construction sites in inventory		60	622	393	627	2	424	496	60	2684
VI.B.3	Number of inactive construction sites in inventory		0	0	0	0	0	0	0	0	0
VI.B.4	Number of construction sites closed/completed during reporting period		20	314	137	235	1	175	219	23	1124
VI.B.5	Number of construction site inspections		245	3655	4473	3934	3	2868	3361	319	18858
VI.B.6	Number of construction site violations		1	50	55	38	0	64	205	3	416
VI.B.7	Number of enforcement actions issued		1	66	64	66	0	104	286	3	590
VI.B.8	Number of escalated enforcement actions issued		1	6	8	9	0	3	9	2	38
VII.	**EXISTING DEVELOPMENT MANAGEMENT PROGRAM**										
VII.B.1	Number of facilities or areas in inventory	a. Municipal	8	23	27	34	4	63	82	22	263
		b. Commercial	154	315	196	210	2	466	410	26	1779
		c. Industrial	15	4	5	22	0	67	36	1	150
		d. Residential	12	11	11	22	1	15	21	17	110
VII.B.2	Number of existing development inspections	a. Municipal	48	181	239	244	41	421	561	150	1885
		b. Commercial	106	155	115	102	0	180	309	7	974
		c. Industrial	1	5	5	12	0	2	13	0	38
		d. Residential	17	55	67	107	2	109	77	34	468
VII.B.3	Number of follow-up inspections	a. Municipal	0	3	0	0	0	2	14	4	23
		b. Commercial	7	10	10	13	0	22	65	4	131
		c. Industrial	1	3	0	2	0	0	6	0	12
		d. Residential	3	22	30	43	0	34	24	9	165
VII.B.4	Number of violations	a. Municipal	0	7	0	1	0	5	26	7	46
		b. Commercial	15	21	25	16	0	51	140	11	279
		c. Industrial	0	7	0	4	0	0	20	0	31
		d. Residential	4	47	59	85	0	70	50	31	346
VII.B.5	Number of enforcement actions issued	a. Municipal	0	2	0	0	0	3	19	4	28
		b. Commercial	10	13	11	7	0	21	65	3	130
		c. Industrial	0	2	0	2	0	0	6	0	10
		d. Residential	0	0	0	0	0	0	0	0	0
VII.B.6	Number of escalated enforcement actions issued	a. Municipal	0	0	0	0	0	0	0	0	0
		b. Commercial	0	0	0	0	0	0	0	1	1
		c. Industrial	0	0	0	0	0	0	0	0	0
		d. Residential	0	0	0	0	0	0	0	0	0

ATTACHMENT D.2

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FISCAL ANALYSIS

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FISCAL ANALYSIS COMPONENT

1.1. Introduction

This section presents an estimated annual budget for the County's runoff management programs for FY 2015-16.

1.2. Fiscal Analysis Methods

This section continues to utilize the methodologies and standards established in *Fiscal Analysis Method* submitted by the Copermittees in January 2009.

1.3. Fiscal Analysis Results

As shown the County estimated its total FY 2015-16 expenditures at $27,414,216. This fiscal analysis addresses each of the County's Runoff Management Program elements (jurisdictional, watershed, and regional activities) for the current reporting period (FY 2015-16). Expenditures are described by department and major program area. They represent an estimate of the expenditures that the County incurred in meeting its compliance obligations for FY 2015-16. They should not be interpreted as either budgeted or actual expenditures. Because stormwater program expenditures are distributed throughout a considerable number of County programs, a single consolidated "budget" does not exist for the program as a whole. As such, these figures should be considered best estimates of stormwater-related expenditures.

1.3.1 Expenditures

1.3.1.1. Jurisdictional

Table 1.1 presents the County's estimated jurisdictional expenditures for FY 2015-16.

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
1	**ADMINISTRATION**	**$6,840,583**	These costs correspond to the DPW WPP development, administrative oversight, and assessment of the County's stormwater programs. The WPP is responsible for the development of new and augmented County stormwater programs, regulatory reporting, and program assessment. Some administrative costs are associated with other specific functions shown below, but are included here because they could not be separated out.
2	**DEVELOPMENT PLANNING**	**$1,109,654**	
A	**Land Use Planning**	$0	Expenditures not reported for FY 2015-16; included in other elements.
B	**Environmental Review**	$0	Expenditures not reported for FY 2015-16; included in other elements.
C	**Development Project Approval and Verification**	**$1,109,654**	
C1	**Public Projects (CIP)**	$824,219	
	Project Planning and Engineering	$570,229	Costs include: preparing and reviewing plans and specifications for stormwater BMPs, and SWPPP/WPCP review. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$15,000	
	BMP Implementation	$238,990	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
C2	**Private Projects**	$285,435	
	Permitting and Licensing	$285,435	This cost covers PDS plan reviews at permitted sites. Total costs are estimated as fixed percentages of annual plan-checking fees.
3	**CONSTRUCTION**	**$4,500,593**	
A	**Public Projects (CIP)**	$2,886,893	Costs include: BMP compliance inspections during construction, and implementation of construction phase BMPs. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$1,613,880	
	BMP Implementation	$1,273,013	
B	**Private Projects**	$1,613,700	
	Compliance Inspection and Enforcement	$1,613,700	This cost primarily covers DPW and PDS construction inspections at permitted sites. Total costs are estimated as fixed percentages of inspection program fees.
4	**MUNICIPAL**	**$7,572,297**	
A	**Administration**	$267,805	Expenditures associated with the administrative oversight of the stormwater programs, regulatory reporting, and program assessment of municipal facilities by the DPW - Watershed Protection Program.
B	**Streets, Roads, and Highways Element**	$2,256,091	
	Administration	$291,160	Founded road operations activities include: culvert inspections and cleaning;

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	Maintenance Inspections	$1,890,813	increased culvert waste disposal costs, street sweeping, installation and maintenance of BMPs and road structures, and the placement of additional controls. 10% of the Maintenance and Inspections and BMP Implementation is reported as Administration cost.
	BMP Implementation	$74,118	
	Other	$0	
C	**MS4 Element**	$1,530,000	
	Administration	$191,000	The combined costs shown here apply across (1) DPW Flood Control -- conversion of existing concrete lined channels to natural bottom channels, updating flood control master plans, increased maintenance of flood control systems, and construction and maintenance of regional treatment BMPs; and (2) DPW Flood Control MS4 Operation & Maintenance -- maintenance on flood control facilities throughout the unincorporated areas of the County, exclusive of facilities within road rights-of-way (included in 4.B above). Other includes the cost of disposal of debris removed from MS4.
	Maintenance Inspections	$1,046,900	
	BMP Implementation	$290,500	
	Other	$2,500	
D	**Solid Waste Facilities Element**	$406,618	
	Administration	$35,047	Costs include Regional Board stormwater permit fees, consultant costs associated with stormwater upgrade and repair projects, and office staff time.
	Maintenance Inspections	$16,922	Costs include staff time to perform site inspections.
	BMP Implementation	$79,149	Costs include stormwater consultant site inspections, sampling/testing and BMP materials.
	Other (construction)	$275,500	Drainage improvement projects and BMP site maintenance projects.
E	**Wastewater Facilities Element**	$187,000	
	Administration	$10,000	This includes costs associated with JRMP report, the sanitary sewer system and facilities including: pump stations, sewage treatment plants and Spring Valley Operations facility. Also includes the cost of BMP design, acquisition,
	Maintenance Inspections	$127,000	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$50,000	maintenance and monitoring, for wastewater Capital Improvement Projects, and Major maintenance projects, and at various wastewater facilities.
	Other	$0	
F	**Road Stations Element**	$919,867	
	Administration	$83,624	This includes DPW road station operations related to Permit compliance. The Administration cost is determined as 10% of the total costs of maintenance and Inspections and BMP Implementation as reported by the DPW Roads Divisions.
	Maintenance Inspections	$799,414	
	BMP Implementation	$36,829	
	Other	$0	
G	**Fleet Maintenance Element**	$11,722	
	Administration	$1,036	This includes costs associated with operation of the County's fleet maintenance and fueling facilities.
	Maintenance Inspections	$7,392	
	BMP Implementation	$3,294	
	Other	$0	
H	**Municipal Airfields Element**	$338,110	These costs involve site inspections, annual reporting, and maintenance of BMPs at airports, including oversight of tenant operations. The BMP implementation item includes Palomar asphalt cap repairs.
	Administration	$12,737	
	Maintenance Inspections	$0	
	Compliance Inspection and Enforcement	$0	
	BMP Implementation	$300,623	
	Other (sampling and analysis)	$24,750	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
I	**Parks & Recreational Facilities Element**	$1,214,562	
	Administration	$121,362	This includes: coordinating all training requirements, preparing and reviewing reports, and overseeing the overall implementation of the stormwater program for DPR.
	BMP Implementation	$991,603	This includes costs associated with implementation of BMPs at County parks.
	Compliance Inspection and Enforcement	$101,597	Costs are for DPR enforcement of stormwater requirements at County parks.
	Other	$0	
J	**Office Buildings & Other Municipal Facilities Element**	$297,867	
	Administration	$0	DGS conducts a variety of storm water activities including: inspections and clean-up of County-owned, occupied, and leased facilities and vacant lands; maintenance and signage of storm drain inlet inserts and trash dumpsters; placement of inlet filters; maintenance of coverage and containment improvements for on-site supplies and materials; parking lot sweeping and controlled parking lot power washing; and application of erosion and sediment control measures. These costs are exclusive of fleet maintenance and fueling operations.
	Maintenance Inspections	$99,808	
	BMP Implementation	$198,059	
	Other	$0	
	Management of Pesticides, Herbicides, & Fertilizers	$142,656	
	Administration	$142,656	Integrated Pest Control Program within the Department of Agriculture, Weights and Measures (AWM) performs eradication and control of invasive weeds. This program also provides weed control on roadsides, airports, flood control channels,
	Maintenance Inspections	$0	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$0	sewage treatment plants and inactive landfills. It also provides structural pest control to facilities owned and operated by the county.
	Other	$0	
5	**INDUSTRIAL and COMMERCIAL**	**$1,575,635**	
	Administration	$253,047	DPW and AWM conduct inspections of a variety of businesses in the unincorporated County, provide regulatory oversight of mobile businesses, and conduct follow-up and enforcement of stormwater violations.
	Compliance Inspection and Enforcement	$1,245,279	
	Educational Outreach	$77,309	
	Other expenditures	$0	
6	**RESIDENTIAL**	**$1,205,386**	
	Compliance Inspection and Enforcement	$688,453	DPW conducts complaint investigations for residential sources in the unincorporated County, and conduct follow-up and enforcement of stormwater violations. DPW also operates a regional hotline.
	Educational Outreach	$516,933	Several County departments coordinate and provide outreach to the residential sector and schoolchildren in support of Permit Section D.5 requirements. Costs reported here correspond to DPW only. Funded activities include developing pollution prevention content and providing direct outreach to various target audiences within the general residential and schoolchildren target audiences.
7	**IDDE**	**$321,523**	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
		$321,523	DPW conducts monitoring programs, assesses scientific data, and provides technical and scientific support to other County program staff. They also provide support for all technical and scientific aspects of JRMP development and implementation. These costs are exclusive of the regional monitoring program which is addressed separately under regional costs.
8	**EDUCATION**	**$0**	Education costs are included in other sections as applicable.
9	**PUBLIC PARTICIPATION**	**$0**	Public participation costs are included in other sections as applicable.
10	**SPECIAL INVESTIGATIONS**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.
11	**NON-EMERGENCY FIREFIGHTING**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.
		$23,125,671	

1.3.1.2 Watershed

Table 1.2 presents the County's estimated watershed expenditures for FY 2015-16.

Table 1.2 – Estimated Watershed Expenditures for FY 2015-16

	Santa Margarita WMA	San Luis Rey WMA	Carlsbad WMA	San Dieguito WMA	Peñasquitos WMA	San Diego River WMA	San Diego Bay WMA	Tijuana WMA
Administration	$37,583	$201,492	$82,653	$113,035	$75,309	$105,117	$37,583	$75,309
Cost Share Contribution	$0	$62,494	$46,204	$8,885	$1,062	$68,970	$6,659	$2,346
Watershed Activities	$626,917	$119,390	$14,860	$171,640	$26,423	$125,705	$111,491	$80,300
Other	$0	$0	$0	$0	$0	$0	$0	$0
Total Estimated Watershed Costs	**$664,500**	**$383,376**	**$143,717**	**$293,560**	**$102,794**	**$299,792**	**$155,733**	**$157,955**

1.3.1.3 Regional

Table 1.3 presents the County's estimated regional expenditures for FY 2015-16. This includes only those expenditures associated with the Copermittees' adopted Regional Budget and Work Plan. Other costs associated with regional participation (meeting attendance, etc.) are included within the jurisdictional expenditures presented above.

Table 1.3 – Estimated Regional Expenditures for FY 2015-16

Regional Programs	County Costs
Administration	$0
Cost Share Contribution	$2,087,118
Regional Activities	$0
Other	$0
Total Estimated Regional Costs	**$2,087,118**

1.3.1.4 Total Expenditures

Table 1.4 presents the County's total estimated expenditures for FY 2015-16 (jurisdictional, watershed, and regional).

Table 1.4 – Total Estimated County Expenditures for FY 2015-16

Component / Sub-component	Estimated Expenditures
Jurisdictional	
Administration	$6,840,583
Development Planning	$1,109,654
Construction	$4,500,593
Municipal	$7,572,297
Industrial And Commercial	$1,575,635
Residential	$1,205,386
IDDE	$321,523
Education	$0
Public Participation	$0
Special Investigations	$0
Non-emergency Firefighting	$0
Jurisdictional Total	**$23,125,671**
Watershed	
Santa Margarita WMA	$664,500
San Luis Rey WMA	$383,376
Carlsbad WMA	$143,717
San Dieguito WMA	$293,560
Peñasquitos WMA	$102,794
San Diego River WMA	$299,792
San Diego Bay WMA	$155,733
Tijuana WMA	$157,955
Watershed Total	**$2,201,427**
Regional	**$2,087,118**
Total Estimated County Costs	***$27,414,216***

1.3.2 Funding Source

Table 1.5 shows the major sources of funding for the County's urban runoff management programs in FY 2015-16, and describes the legal restrictions applicable to the use of each.

Table 1.5 – Legal Restrictions on the Use of Program Funding

Funding Source	Legal Restrictions
General Fund	There are no restrictions on the use of general fund for County water quality programs and activities except that they must be used only for the purposes for which they are budgeted and allocated by the County Board of Supervisors.
Flood Control District Fees	Revenue generated from these fees must be expended for activities related to flood and storm management.
Developer Deposits / Permit Fees	Deposits / fees may be used only to fund activities related to the work for which the permits are issued.
Gas Tax	Gas Tax is collected by the state and allocated to local government for transportation-related work including maintenance of existing transportation systems and construction of new transportation facilities. These funds may not be used for other purposes.
Sanitary District Fees	Sanitary District Fees are used for work related to the maintenance of sewer lines, pump stations, force mains, and several treatment plants that serve the unincorporated areas. They may be used only for such maintenance-related purposes within the respective sewer district for which they are collected.
Other Funding Sources	Other funding sources collectively account for a relatively small portion of ongoing expenditures. However, all funding for the County's stormwater compliance programs is expended within applicable legal restrictions and limitations.

1.4. Conclusions and Recommendations

The figures presented here are an estimate of the expenditures that the County incurred to meet its compliance obligations for FY 2015-16. For the reasons explained above, they should be considered only best estimates of stormwater-related expenditures.

D.6.3 County of San Diego Strategies

County of San Diego’s strategies are detailed in Tables D-9 and D-10.

Table D-9
County of San Diego Jurisdictional Strategies for San Dieguito River WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
Illicit Discharge, Detection, and Elimination (IDDE) Program						
1	Maintain stormwater conveyance system map to facilitate IDDE program	Yes	Updated as needed	N	N/A	Y
2	Utilize municipal personnel and contractors to identify and report Illicit Connections and Discharges	Yes	IDDE Program	N	N/A	Y
3	*Updated focused training for County field staff*	Yes	Updated training for BMP Design Manual and Stormwater Implementers	N	N/A	Y
4	Collect effluent on the ground (EOG), sanitary sewer overflow (SSO) data	Yes, fully	Approximately 87 EOG complaints related to septic systems and 14 SSO events recorded and responded to.	N	N/A	Y
5	*Address septic system failures where observed*	Yes, fully	Suspected septic discharges are reported to DEH HIRT Response line when they occur after hours and DEH Land and Water Quality Division during normal hours. All complaints resolved during 15-16.	N	N/A	Y
6	Facilitate public reporting of ICID via telephone and email	Yes	Bilingual hotline, dedicated e-mail address, and multiple online reporting tools	N	N/A	Y
7	*Refer homeless issue complaints to Sheriff or appropriate jurisdictions*	Yes	Collaborate with multi-departmental group to address homeless encampments	N	N/A	Y
8	*Bilingual hotline answered by a live operator (I Love a Clean San Diego) to provide better customer service*	Yes	Bilingual hotline operated by ILACSD	N	N/A	Y
9	Implement practices and procedures to address spills with the potential to enter the storm drain system	Yes	NOV issued by DEH for failing septic systems when effluent could reach the storm drain. Prompt follow up and mitigation is implemented. Such cases are rare; <5 in 15-16	N	N/A	Y
10	*Coordinate spill response with responsible sewer agencies*	Yes	Major DEH role is to inform the public of risks associated with sewer spills, conducting sampling, reporting, posting signs, etc.	N	N/A	Y
11	Implement practices and procedures to prevent/limit infiltration of seepage from sanitary sewers	Yes	If illicit connections are identified as part of an IDDE investigation, investigation will be conducted to define and eliminate the source.	N	N/A	Y
12	Coordinate with upstream entities to prevent illicit discharges from upstream sources entering into the storm drain system	Yes	If illicit connections are identified as part of an IDDE investigation, investigation will be conducted to define and eliminate the source. If determined to be from an upstream entity, coordination will occur.	N	N/A	Y
13	Utilize municipal personnel and Contractors to monitor stormwater outfalls for discharges of potential ICIDs	Yes	This is part of the IDDE Program	N	N/A	Y
14	Develop and implement a strategy for investigating and addressing ICIDs.	Yes	Focused, collaborative investigations with Planning and Science staff of high priority outfalls.	N	N/A	Y

Table D-9 (continued)
County of San Diego Jurisdictional Strategies for San Dieguito River WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
Development Planning						
15	Require implementation of source control and Low Impact Development (LID) BMPs for all development projects.	Fully	The County BMP DM requires all projects regardless of size and location to implement SC and SD BMPs. These requirements are captured in the WPO and County's BMP DM.	N	N/A	Y
16	Priority Development Projects: In addition to requirement for all development projects, implement or require implementation of onsite structural BMPs to control pollutants and manage hydromodification for PDPs.	Fully	The County BMP DM requires all PDPs to implement PC and HMP BMPs. These requirements are captured in the WPO and County's BMP DM.	N	N/A	Y
17	Update BMP Design Manual procedures to specify stormwater requirements applicable to development and redevelopment projects, identify and design appropriate BMPs, establish maintenance criteria, and establish where implemented alternative compliance options.	Partially	Updated to reflect the Regional Model BMP DM with additional changes to incorporate County implementation practices. BMP DM became effective on February 26, 2015. Rene can provide details on the differences between CoSD BMP DM and Model BMP DM.	N	N/A	N
18	*Conduct internal (staff) training on the updated BMP Manual.*	Fully	The JRMP requires the County to conduct internal training every fiscal year and after release of new guidance documents.	N	N/A	N
19	*Hold external land development workshops targeting the development community.*	Fully	The County conducts external training regularly and after release of new guidance documents.	N	N/A	N
20	Implement a program that ensures that all structural and Low Impact Development (LID) BMPs are designed, constructed and maintained on Priority Development and Redevelopment Projects.	Fully	Structural BMPs and LID BMPs are designed and constructed per the BMP Design Manual. In addition, Structural BMPs are tracked for maintenance through inspections and self verification letters. LID BMPs that are installed as a result of implementation of the BMP Design Manual are proposed to be inspected.	N	N/A	Y
21	Impose legal authority to ensure all development and redevelopment projects are in compliance with all post construction requirements.	Fully	The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated permit and the inclusion of applicant-implement offsite alternative compliance.	N	N/A	Y
22	*Update County codes, ordinances, and stormwater design standards consistent with the permit and the updated BMP Manual.*	Fully	The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated permit and the inclusion of applicant-implement offsite alternative compliance. WPO update became effective on February 26, 2016.	N	N/A	N
Construction Management						
23	Maintain, update, and prioritize a watershed based inventory of all projects issued local permits that allow soil disturbing activities.	Yes	Projects that are issued local permits that allow soil disturbance activities are part of the inventory that is watershed-based.	N	N/A	Y

Table D-9 (continued)
County of San Diego Jurisdictional Strategies for San Dieguito River WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
24	Require implementation of BMPs that are site specific, seasonally appropriate, and appropriate to the construction phase, year round.	Yes	Every project requires implementation of site specific construction BMPs, seasonably appropriate and appropriate to the construction phase.	N	N/A	Y
25	Impose legal authority to ensure inventoried construction projects are in compliance with all requirements.	Yes	The Watershed Protection Ordinance is the current legal authority to insure inventoried construction projects are in compliance with all requirements.	N	N/A	Y
26	*Make updates to County ordinances related to construction; reference to existing grading ordinance.*	Yes	County ordinances are updated with subsequent Construction General Permit updates; the Watershed Protection Ordinance will be updated as necessary as a result of the future Grading Ordinance Update.	N	N/A	N
27	Provide internal staff training related to construction storm water management.	Yes	The County conducts construction stormwater training annually and it targets construction inspectors in DPW-PDCI, PDS-Building, and CIP Inspectors in DPW and DGS.	N	N/A	Y
Existing Development						
28	Maintain and update a watershed-based inventory of existing development (i.e. commercial, industrial, municipal, and residential areas).	Yes	Inventory is tracked in Accela Automation.	Y	Database is continually updated to increase accuracy and efficiency	Y
29	*Improve the tracking of watershed based inventories via consolidated database.*	Yes	see 28	Y	see 28	Y
30	Designate a minimum set of BMPs required for all existing development inventories, including special event venues. The designated minimum BMPs must be specific to facility or area types and pollutant generating activities, as appropriate.	Yes	JRMP establishes minimum BMPs for all land use types.	N	N/A	Y
31	*Create an Equestrian BMP Handbook.*	No	Handbook created in FY2014-15	Y	Handbook will be revised in FY2016-17 to encompass additional BMPs and be more user friendly.	Y
32	Require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types and pollutant generating activities, as appropriate.	Yes	See 30	N	N/A	Y
33	*Pet waste management and outreach in County Parks.*	Yes	Mutt-mitt dispensers are installed and maintained in many County parks, providing people who are walking their dogs with waste disposal bags to use to pick up after their pets.	N	N/A	Y

Table D-9 (continued)
County of San Diego Jurisdictional Strategies for San Dieguito River WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
34	Implement a schedule or operation and maintenance activities for the stormwater conveyance system and related structures.	Yes	Stormwater maintenance is referred to appropriate departments when needed.	N	N/A	Y
35	Implement a schedule of operation and maintenance for County paved and unpaved roads.	Yes	County Road Crews employ a schedule for maintenance of County Roads.	N	N/A	Y
36	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Yes	1. 450 Facilities received the Agricultural Water Quality Best Management Practices for Pesticides through annual registration notifications. 2. Inspections were conducted at 83 Commercial Ag Facilities	N	N/A	Y
37	Promote and encourage implementation of designated BMPs in residential areas.	Yes	Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas. All Residential Management Areas were inspected in FY15-16	N	N/A	Y
38	Conduct inspections of inventoried existing development to ensure compliance.	Yes	Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas.	N	N/A	Y
39	*Conduct focused residential inspections based on strategic assessments.*	Yes	Focused, collaborative investigations with Planning and Science staff of high priority outfalls.	N	N/A	Y
40	*Develop a residential inspections tracking program via mobile platform - miles, violations, etc.*	Yes	In pilot testing phase	Y	Modifications based on pilot testing phase to increase effectiveness	Y
41	*Improve inspections data tracking through mobile phone applications.*	Yes	See 40	Y	see 40	Y
42	Enforce legal authority established for all inventoried existing development to achieve compliance.	Yes	see JRMP	N	N/A	Y
43	*Update county ordinance related to existing development; reference to existing guidance documents.*	Yes	Watershed Protection Ordinance and BMP Design Manuals were updated.	N	N/A	N
44	Promote incentive program for BMP retrofits (e.g. water smart irrigation controllers, turf replacements programs, residential landscape evaluation program).	Yes	The County continues to collaborate with and promote the efforts of partner agencies incentive programs.	N	N/A	N
45	Collaborate with partner agencies and groups to promote non-County sponsored incentive programs for BMP retrofits, including rain barrels, smart controllers, soil sensors, turf replacement, etc.	Yes	The County continues to collaborate with and promote the efforts of partner agencies incentive programs.	N	N/A	Y

Table D-9 (continued)
County of San Diego Jurisdictional Strategies for San Dieguito River WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
46	Identify candidate areas of existing development for stream, channel, and/or habitat rehabilitation projects and facilitate implementation of such projects.	No	N/A	N	N/A	N
Outreach and Public Participation						
47	*Develop, improve, and distribute outreach materials*	Yes	Improved outreach materials through a focused Community-based Social Marketing approach.	Y	Continual improvement of existing materials, including translation into Spanish	Y
48	*Give outreach presentations to elementary, middle, and high school students*	Yes	Offer presentations to elementary, middle, and high schools serving unincorporated communities.	N	N/A	Y
49	*Outreach to mobile landscaping service providers*	Yes	Pesticide Regulation Program collaboration with the California Department of Pesticide Regulation on a pilot program to offer workshops for maintenance gardeners. Two workshops were held where attendees were provided training materials and concluded with a pesticide certification exam. Attendees at both workshops had high success rates for the exam.	N	N/A	Y
50	*Conduct large residential property pet waste management outreach*	No	Unable to implement due to lack of community service organization partners.	N	N/A	N
51	*Conduct over irrigation outreach pilot study*	Yes	Community-based Social Marketing pilot study on the effectiveness of irrigation runoff prevention materials.	Y	N/A	Y
52	*Conduct Homeowners Associations Outreach and Coordination Pilot Study*	Partial	HOA Outreach materials in draft format. Additional development will take place in FY2016-17.	Y	N/A	Y
53	*Expand Homeowners Associations Outreach and Coordination based on the pilot project within San Luis Rey, San Dieguito, or San Diego River as needed and as funding is identified*	No	Additional development may occur based on pilot study in FY2016-17.	N	N/A	N
54	Collaborate with watershed partners to develop consistent messaging to targeted audiences such as commercial, residents to conserve water and reduce dry weather flows	Yes	Collaboration between the Regional Education Workgroup and Think Blue San Diego Region to develop and distribute educational materials such as the "Be the Solution to Pollution" booklet which includes irrigation and runoff reduction measures. Other items developed under this included posters, calendars and coloring books.	N	N/A	y
55	*Sponsor Trash Collection Events through public outreach and participation*	Yes	The County sponsors ILACSD to establish cleanup sites at the Coastal Cleanup Day and Creek to Bay events.	N	N/A	Y
56	*Educational Workshops on Integrated Pest Management, manure management and others as needed*	Yes	Various workshops presented throughout the year by County staff including UCCE, FHA and contractors.	N		Y

Table D-9 (continued)
County of San Diego Jurisdictional Strategies for San Dieguito River WMA

Jurisdictional Runoff Management Programs (JRMP) Strategies		Implemented in FY16? *(No/Partially/Fully)*	Comments on Implementation (#events, #attendees, miles swept etc.)	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
57	Partner with Master Gardeners Programs to provide education opportunities on water use and practices for gardening	Yes	Various workshops presented throughout the year by County staff including UCCE, FHA and contractors.	N	N/A	Y
58	*Conduct Effectiveness Survey's on Education & Outreach programs*	Yes	Surveys to determine the efficacy of watershed education to unincorporated elementary, middle, and high schools serving unincorporated communities.	N	N/A	Y
Enforcement Response Plan						
59	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Yes	County implemented the ERP as described in the JRMP.	N	N/A	Y
60	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) within five (5) calendar days of issuing escalated enforcement to a construction site that poses a significant threat to water quality as a result of violations or other noncompliance	Yes	County implemented the ERP as described in the JRMP.	N	N/A	Y
61	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) any persons required to obtain coverage under the statewide Industrial General Permit and Construction General Permit and failing to do so, within five (5) calendar days from the time the Copermittee become aware of the circumstances.	Yes	County implemented the ERP as described in the JRMP.	N	N/A	Y
Public Education and Participation						
62	Implement a public education and participation program to promote and encourage development of programs, management practices and behaviors that reduce the discharge of pollutants in storm water prioritized by high risk behaviors, pollutants of concern, and target audiences.	Yes	The County completes numerous education and public participation programs for a diverse target audiences. See JRMP.	N	N/A	Y

Table D-10
County of San Diego Optional Strategies for San Dieguito River WMA

	Optional Jurisdictional Runoff Management Programs (JRMP) Strategies	Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/ Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implemen-tation into next FY? *(Y/N)*
Provision B.3.b.(1)(b)(i) - BMPs, incentives, or programs that may be implemented that are in addition to requirements of Provision B.3.b.(1)(a)										
1	Implement Sustainable Landscapes Program to encourage landscape retrofits.	FY 2016-17; Continuous until grant funding and incentives are depleted	Implementation of this strategy may be triggered if (1) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (2) all of the necessary resources have been secured. Continue implementation when the funding and incentives items are secured.	Staff resources, Grant funding, Incentive items, Partnerships	No	Partially	N/A	N	N/A	Y
2	Implement an incentive program for BMP Retrofits (Public-Private Partnerships - a County sponsored program to offer incentives for rain barrel installation, downspout disconnects from the stormwater system, etc.).	FY 2015-16; Continuous, as resources allow	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Incentive items, Partnerships	No	Partially	N/A	N	N/A	Y
3	Implement a program that provides rebates or incentives for pumping septic systems, with a focus in high risk areas adjacent to waterways (within 600 feet).	Once triggered, Pilot program 1 -2 years, as needed thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Incentive items	No	No	Funding source not identified. All 4 triggers have not been met.	No	N/A	N

Table D-10 (continued)
County of San Diego Optional Strategies for San Dieguito River WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/ Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implemen-tation into next FY? *(Y/N)*
4	Identify where sewer and stormwater infrastructure are in close proximity and subsequently, confirm the absence of flow at nearby stormwater MS4 outfall during dry weather.	Once triggered, 2-3 years; one-time	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	No	N/A	No	N/A	N
5	Implement a program for on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	Once triggered, 2-3 years	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) septic systems have been determined to be a pollutant sources to the MS4; and (4) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	Partially	Under the Local Area Management Plan (LAMP) for onsite wastewater treatment systems the treatment systems with supplemental treatment are required to be permitted annually. The annual operating permit will define the monitoring and maintenance requirements as specified by the manufacturer and/or qualified professional who designed the system. The LAMP ordinance can be found at: http://www.sandiegocounty.gov/content/dam/sdc/deh/lwqd/RWQCB%20Approved%20LAMP%20Final%202-24-15.pdf	N	N/A	Y

Table D-10 (continued)
County of San Diego Optional Strategies for San Dieguito River WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/ Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implemen-tation into next FY? *(Y/N)*
6	Divert persistent dry weather flows from storm drains to sewer.	Once triggered, 3-6 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) permission is granted from sewer agency; and (4) ground water or permitted discharges have been ruled out; and (5) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Engineering design, Environmental review, Permits, Ongoing funding for operation/maintenance	No	No	Diversions are a last resort strategy and will be reviewed for outfalls that are persistently flowing after all other implementation strategies have been exhausted.	N	N/A	N
Provision B.3.b.(1)(b)(ii) - Incentives or programs that may be implemented to encourage or implement projects to retrofit areas of existing development										
7	Implement trash capture program (e.g., retrofit storm drain intakes with trash capture devices).	Baseline study 2-3 years; FY 15-16 implementation as needed and as resources allow	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) baseline study completion and success; and (4) focus areas identification; and (5) detailed inlet inventory of focus areas; and (6) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Equipment, Permits, Ongoing funding for operation/maintenance	No	Partially	The County of San Diego is in process of conducting several studies to develop Baseline Trash Generation Rates.	N	N/A	Y

Table D-10 (continued)
County of San Diego Optional Strategies for San Dieguito River WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/ Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implemen-tation into next FY? *(Y/N)*
8	Implement a Green Streets Retrofits Program.	Once triggered, 3-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered on a project-by-project basis if (1) a specified interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) pilot program success; and (4) all of the necessary resources have been secured.	Each green street retrofit project is preliminary estimated to cost an average of $5,500,000 per linear mile of retrofit for construction. Resources include: Staff resources, Grant funding or alternative source, Contractor funding, Engineering or landscaping design, Permits, Environmental review, Right of way acquisition, Ongoing funding for operation/maintenance	No	Partially	Design standards and specifications have been developed. Green streets are now being used to meet compliance for all retrofit and/or redeveloped road projects that in the Capital Improvement Projects plan. Pursuing Grant Funding	N	N/A	Y
9	Construct Treatment Control BMPs (retrofits projects).	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Engineering or landscaping design, Permits, Environmental review, Ongoing funding for operation/maintenance	No	No	N/A	N	N/A	N

Table D-10 (continued)
County of San Diego Optional Strategies for San Dieguito River WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/ Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implemen-tation into next FY? *(Y/N)*
10	Implement an alternative compliance program to enable "offsite" compliance for new and redevelopment projects.	Once triggered, 3-6 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Engineering design , Permits, Environmental review, Right of way acquisition (if needed), Ongoing funding for operation/maintenance	No	Partially	Currently applicant implemented offsite alternative compliance is available for use by the development community. The Water Quality Equivalency (WQE) provides the currency for structural BMPs and some natural system management practices (NSMPs). Additional work on the WQE will be conducted during FY17. The County is not currently pursuing a credit system but is participating as a stakeholder on the City of San Diego TAC and as a member of the Western Riverside Coalition of Governments (WRCOG) discussion on offsite alternative compliance.	N	N/A	Y

Table D-10 (continued)
County of San Diego Optional Strategies for San Dieguito River WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/ Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implemen-tation into next FY? *(Y/N)*
Provision B.3.b.(1)(b)(iii) - Incentives or programs that may be implemented to encourage or implement projects that will rehabilitate the conditions of channels or habitats										
11	Flood Control Channel Rehabilitation Projects (e.g., removal of impervious lining in flood control channel and replacement with earthen or vegetated surface)	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (4) engineering design, monitoring, and outreach plans are approved; and (5) all of the necessary resources have been secured.	Project costs vary by size and complexity. Resources include: Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Engineering design, Permits, Environmental review, Right of way acquisition (if needed), Ongoing funding for operation/maintenance	No	Partially	One project has been identified in SDR for retrofit/rehabilitation. Project planning, design and environmental review will begin in FY17	N	N/A	Y
12	Implement a program to remove invasive non-native plants (i.e. Arundo) upstream areas rivers or tributaries.	Once triggered, 1-2 years per project	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) community support and partnerships established; and (4) it has been determined that invasive plants have been found to have an impact on water quality; and (5) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships	No	No	The County has developed several Habitat Restoration Plans and Non-Native Plant Removal Guidelines including for the Otay Valley Regional Park. Implementation of projects resulting from these guidelines requires acquisition of land and funding. No projects were completed during this reporting period.	N	N/A	N

Table D-10 (continued)
County of San Diego Optional Strategies for San Dieguito River WMA

Optional Jurisdictional Runoff Management Programs (JRMP) Strategies		Implementation Timeframe	Triggers	Resources	Triggered? *(Y/N)*	Implemented in FY16? *(No/Partially/ Fully)*	Comments on Implementation	Proposed Modifications? *(Y/N)*	Modification Type & Rationale *(if none, N/A)*	Planned Implementation into next FY? *(Y/N)*
13	Habitat Restoration and rehabilitation projects in County Parks	Once triggered, 4-7 years per project; ongoing operation & maintenance thereafter	Implementation of this strategy may be triggered if (1) an interim goal has not been met; and (2) it has been determined by the County of San Diego through adaptive management that implementation is necessary; and (3) all of the necessary resources have been secured.	Staff resources, Grant funding or alternative source, Contractor funding, Partnerships, Restoration / Rehabilitation Designs Approved, Environmental Permits issued, CEQA / NEPA Environmental review, Ongoing funding for maintenance and monitoring	No	Partially	Habitat restoration and rehabilitation has occurred in the Tijuana River Valley Regional Park and will continue for an additional 3-5 years. Additionally habitat restoration and rehabilitation has been initiated for the Sweetwater Loop Trail Phase I and Phase III however additional funding is necessary to complete Phase I. Phase III will begin in Fall 2016.	N	N/A	Y

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D.6.4 Modifications to the BMP Design Manual

No modifications to the BMP Design Manual have been made since the WQIP was approved in fall 2015. The current County of San Diego's BMP Design Manual is posted on the County of San Diego's website, and the link to this page is listed on Project Clean Water.

D.6.5 Modifications to the Jurisdictional Runoff Management Plan

No modifications to the County of San Diego's JRMP have been made since the WQIP was approved in fall 2015. The current County of San Diego's JRMP is posted on County of San Diego's website, and the link to this page is listed on Project Clean Water.

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Appendix E: Adaptive Management

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Adaptive Management – Changes to Water Quality Improvement Plan Elements

1. The assessment of Provision A.4 will now be considered once per MS4 Permit term during the development of the Regional Monitoring and Assessment Report.
2. A number of Responsible Agencies have made adminstrative changes to their strategies. Updates are described in Appendix D.

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County of San Diego

RICHARD E. CROMPTON
DIRECTOR

DEPARTMENT OF PUBLIC WORKS
5510 OVERLAND AVE, SUITE 410
SAN DIEGO, CALIFORNIA 92123-1237
(858) 694-2212 FAX: (858) 694-3597
Web Site: www.sdcounty.ca.gov/dpw/

January 30, 2017

Mr. David W. Gibson
San Diego Regional Water Quality Control Board
Storm Water Management Unit
2375 Northside Drive, Suite 100
San Diego, CA 92108-2700

Dear Mr. Gibson:

COUNTY OF SAN DIEGO, PERMIT R9-2013-001, PIN 255223 – SAN LUIS REY RIVER WATERSHED MANAGEMENT AREA WATER QUALITY IMPROVEMENT PLAN 2015-2016 ANNUAL REPORT, PIN NO. 794836: ERYAN

On behalf of the Cities of Oceanside, Vista, and the California Department of Transportation, the County of San Diego is pleased to submit the San Luis Rey River Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report (Report) in accordance with requirements set forth in Provisions F.3.b(3) of Order No. R9-2013-0001, as amended by Orders No. R9-2015-0001 and No. R9-2015-0100, the *National Pollution Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Dischargers form the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region*, NPDES No. CAS0109266 (Permit).

Appendix 2 of the Report contains the following Jurisdictional Runoff Management Program Information from each agency, as applicable:

- Certification Statements for the 2015-2016 Water Quality Improvement Plan Annual Report pursuant to 40 C.F.R Section 122.41(k);
- Certification Statements for the legal authority within their jurisdictions to implement and enforce each of the requirements contained in the Municipal Permit pursuant to Provision E.1.b;
- Completed Jurisdictional Runoff Management Program Annual Report Forms pursuant to Provision F.3.b.(3)(e);
- Updates to jurisdictional runoff management programs pursuant to Provision F.3.b.(2)(a)(3);
- Updates to the BMP Design Manual pursuant to Provision F.3.b.(2)(b)(2); and
- Proposed administrative changes to the Water Quality Improvement Plan.

If you have any questions or comments, please feel free to contact me at (858) 694-3672 or e-mail at Todd.Synder@sdcounty.ca.gov.

Sincerely,

Todd Snyder

TODD E. SNYDER, Manager
Watershed Protection Program

Attachment: San Luis Rey River Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report

cc: Mo Lahsaiezadeh, City of Oceanside, PIN 245793
Greg Mayer, City of Vista, PIN 270704
Bruce L. April, California Department of Transportation, PIN 212814

SAN LUIS REY RIVER WATERSHED MANAGEMENT AREA WATER QUALITY IMPROVEMENT PLAN 2015-2016 ANNUAL REPORT

Final

Prepared for the following San Luis Rey River WMA Participating Agencies:

City of Oceanside
County of San Diego
City of Vista
Caltrans

Order No.R9-2013-0001
Amended Order No. R9-2015-0001 and R9-2015-0100

January 2017

Prepared By:

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ABBREVIATIONS AND ACRONYMS

%	percent
µg	microgram
µg/L	micrograms per liter
µS/cm	microSiemens per centimeter
ac	acres
AEP	Association of Environmental Professionals
AFDM	ash-free dry mass
AMAL	average monthly action level
Basin Plan	Water Quality Control Plan for the San Diego Region
Bight	Southern California Bight Regional Monitoring Program
BMI	benthic macroinvertebrate
BMP	best management practice
BMP DM	BMP Design Manual
Caltrans	California Department of Transportation
CCC	criterion continuous concentration
CCR	California Code of Regulations
CCTV	closed circuit television
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
cf	cubic feet
CFR	Code of Federal Regulations
cfs	cubic feet per second
CFU/100 mL	colony-forming units per 100 milliliters
CIPP	cured in place pipe
CMC	criterion maximum concentration
Copermittees	Municipal Copermittees
CRAM	California Rapid Assessment Method
CSBP	California Stream Bioassessment Procedure
CSCI	California Stream Condition Index
CTR	California Toxics Rule
EMC	event mean concentration
ft	feet
FY	fiscal year
gpm	gallons per minute
HA	hydrologic area

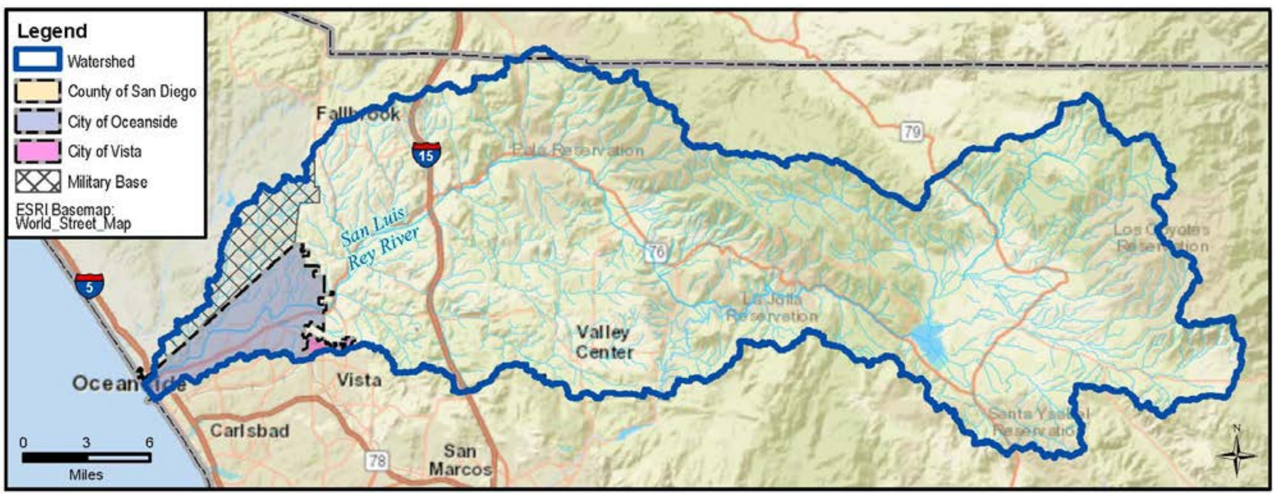
HM	hydrology manual
HMP	Hydromodification Monitoring Program
HPWQC	highest priority water quality condition(s)
HSA	hydrologic subarea
HU	hydrologic unit
IBI	Index of Biotic Integrity
IC/ID	illegal connection and illicit discharge
IDDE	Illicit Discharge Detection and Elimination
ILACSD	I Love a Clean San Diego
IM	instantaneous maximum
JRMP	Jurisdictional Runoff Management Program
LID	Low Impact Development
LOE	line of evidence
LTMS	long term monitoring station
MAP	Monitoring and Assessment Plan
MBAS	methylene blue active substance
MRCD	Mission Resources Conservation District
MCL	maximum contaminant level
MDAL	maximum daily action level
mg/L	milligram per liter
mL	milliliter
MPN/100 mL	most probable number per 100 milliliters
MS4	municipal separate storm sewer system (storm drain system)
MST	microbial source tracking
NAL	non-stormwater action level
ND	not detected
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NS	not sampled
NTU	nephelometric turbidity unit
NWS	National Weather Service
O/E	observed to expected
Permit	Regional MS4 Permit
pMMI	predictive multi-metric index
ppt	parts per thousand
PWQC	priority water quality condition(s)
QA	quality assurance
QMRA	quantitative microbial risk assessment

Regional Board (RWQCB)	San Diego Regional Water Quality Control Board
RMA	Residential Management Area
SAL	stormwater action level
SCCWRP	Southern California Coastal Water Research Project
SLRWC	San Luis Rey Watershed Council
SMC	Stormwater Monitoring Coalition
SQO	sediment quality objective
SSM RWL	single sample maximum receiving water limitations
SSO	sanitary sewer overflow
SUSMP	Standard Urban Stormwater Mitigation Plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TIE	toxicity identification evaluation
TMDL	total maximum daily load
TRE	toxicity reduction evaluation
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VCP	vitrified clay pipes
WMA	Watershed Management Area
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan
WQO	water quality objective
WRCC	Western Regional Climate Center

Executive Summary

ES.1 INTRODUCTION

This first Water Quality Improvement Plan (WQIP) Annual Report for the San Luis Rey River Watershed Management Area (WMA) was developed in compliance with the Regional municipal separate storm sewer system (MS4) Permit (Permit) (San Diego Regional Water Quality Control Board [Regional Board], 2013). This Annual Report represents the work of the Participating Agencies in the WMA, including the Cities of Oceanside and Vista, the County of San Diego, and the California Department of Transportation (Caltrans). These Participating Agencies implement strategies through their WQIP and Jurisdictional Runoff Management Programs (JRMPs) to achieve improvements in the quality of stormwater (wet weather) and non-stormwater (dry weather) discharges from the MS4 (storm drain system) and, in turn, within the receiving waters by focusing on the highest priority water quality condition (HPWQC) and priority water quality condition(s) (PWQC) within the watershed. Caltrans' participation in the development of the WQIP was voluntary as they are regulated under a separate Permit from the California State Water Resources Control Board. Therefore, while they participated in the WQIP development on certain strategies, they do not participate in the Monitoring and Assessment Programs under the WQIP.



The HPWQC and PWQCs for the WMA were identified based on an assessment of receiving water conditions, storm drain outfall discharges and their potential impacts, and the sources of pollutants in the watershed. Using the methodology outlined in the WQIP, bacteria was identified as the HPWQC for the WMA.

HPWQC:
Bacteria (Wet and Dry)

PWQCs:
Nitrogen, Phosphorus, Total Dissolved Solids, Toxicity (Wet and Dry)

Eutrophic Conditions, Chloride, Index of Biotic Integrity (Dry)

ES.2 MONITORING AND ASSESSMENT

The 2015-2016 monitoring year was the first under the Monitoring and Assessment Plan (MAP) of the accepted WQIP that focuses on addressing bacteria. Monitoring results as they relate to bacteria are presented in the following discussion, with details provided in the AR. Overall, monitoring results support the selection of bacteria as the HPWQC and provide substantial data to assess progress toward goals.

ES.2.1 Total Maximum Daily Load (TMDL) Monitoring

Bacteria Total Maximum Daily Load (TMDL) sampling was conducted during wet and dry weather at one receiving water monitoring location, Oceanside City Beach at the mouth of the San Luis Rey River (OC-100), in accordance with TMDL requirements specified in the Permit. Additional detail is provided in Section 3.1.2.

Oceanside City Beach in vicinity of TMDL Compliance Monitoring Location (OC-100)

- The only exceedance measured at OC-100 was the wet weather single-sample maximum (SSM) for *Enterococcus* for one of three monitored wet weather events.
- The arithmetic mean of the three wet weather events was only one unit above the SSM, but this resulted in a 75% frequency of exceedance when this mean was used to represent the unmonitored wet weather days.
- All other interim and final receiving water limitations (RWL) are currently being met.

- Interim numeric targets are not required to be achieved until 2020 for dry weather and 2028 for wet weather; therefore, the exceedances observed during 2015-2016 do not indicate non-compliance at this time.

ES.2.2 Lower San Luis Rey River Goal Monitoring

In addition to TMDL monitoring, receiving water monitoring to measure bacteria concentrations in the lower San Luis Rey River was conducted at Olive Hill Rd (SLR25). The downstream site at Benet Bridge was visited but was dry and therefore not sampled during 2015-2016. Bacteria sampling is conducted to evaluate the progress of strategies toward achieving the dry weather and wet weather goals for the lower river as presented in the WQIP. These goals are focused on bacteria load reductions in storm drain discharges (wet weather) and elimination of dry weather flows to the lower river. Monitoring in both the lower river and at storm drain outfalls (ES.2.6) support the assessment of strategies implemented towards achieving these goals. Additional detail is provided in Section 3.1.3.

Olive Hill Rd (SLR25) Monitoring Location

- All eight dry weather samples (taken monthly from February to September 2016) were above the SSM for *Enterococcus*, and one was above the SSM for fecal coliform.
- During the single wet weather event on February 1, 2016, the *Enterococcus* concentration was above the SSM, while the fecal coliform was below the limit.

ES.2.3 Storm Drain Outfall Dry Weather Field Screening

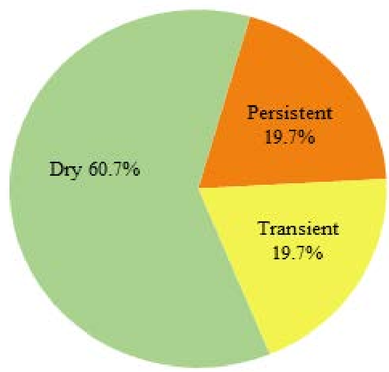
Field screening is conducted to identify non-stormwater and illicit discharges from the Participating Agencies' major storm drain outfalls, determine which discharges are persistent, and prioritize those discharges that will be investigated and eliminated.

- There was no trash or little trash (less than 50 pieces) during the majority (83%) of the trash assessments (n = 129) at visited outfalls.
- Outfalls were dry during 65% of routine field screening visits; flowing water was present during 20% of routine visits.
- When flow was observed, more than half (14 of 26) of the flow rates were less than five gallons per minute.

Based on field screening visits and available historical data, the Participating Agencies determined the flow status of each major storm drain outfall as persistent, transient, or dry. As defined in the Permit, flow status for a given outfall is "dry" if no flowing or standing water is observed at the outfall over three most recent visits, and "persistent" flow is defined as presence of flowing or standing water upon three most recent visits. Otherwise, the outfall status is classified as "transient." Additional detail is provided in Section 3.2.1.1.

Overall, since the prior monitoring year:

- The number of "dry" outfalls increased by four,
- Outfalls categorized as "transient" decreased by six,
- Outfalls with "persistent" flow increased by four,
- All outfalls have been visits three or more times and therefore none have a flow classification of "undetermined."
- No modifications to field screening monitoring locations or frequencies are planned for 2016-2017 in the WMA.



Flow Determinations for Major Storm Drain Outfalls (n=61)

Major storm drain outfalls are prioritized for monitoring by each Participating Agency based on criteria such as persistence of non-stormwater flow, monitoring data results, and the potential threat to receiving water quality. The highest priority outfalls shown in Figure ES-1 were monitored under the Highest Priority Storm Drain Outfall Monitoring described in ES.2.4. These outfalls were also a specific focus for the Illicit Discharge Detection and Elimination (IDDE) investigations by each Participating Agency as described in Section ES.2.5.

ES.2.4 Highest Priority Storm Drain Outfall Dry Weather Monitoring

Analytical monitoring during dry weather was conducted at the highest priority outfalls identified by each Participating Agency. Monitoring locations are shown in Figure ES-1, and results for fecal coliform in non-stormwater samples at these outfalls are shown in Figure ES-2. Additional detail is provided in Section 3.2.1.2.

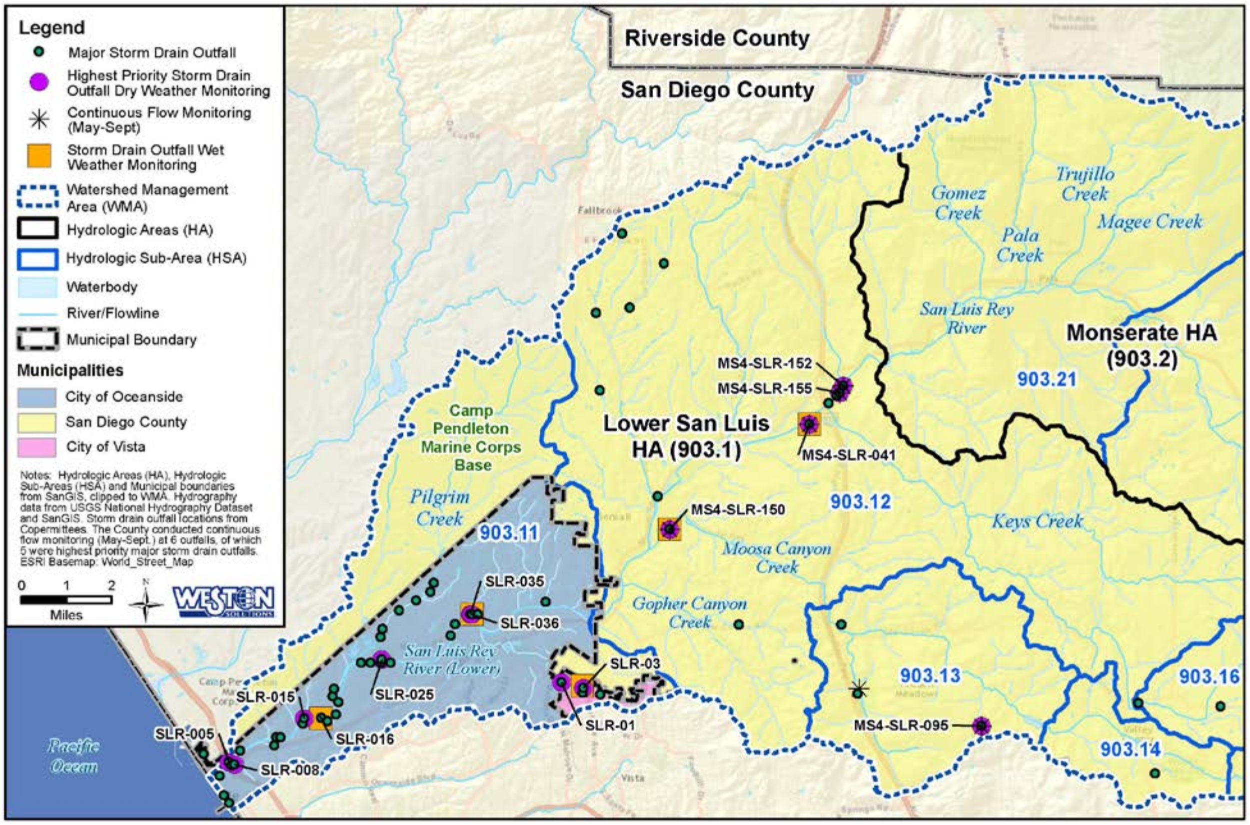


Figure ES-1. 2015-2016 Dry and Wet Weather Storm Drain Outfall Monitoring Locations

- 75% of *Enterococcus* and 50% of fecal coliform results were above non-stormwater action levels (NALs).
- No re-prioritizations of the highest priority outfalls are planned for 2016-2017 by the City of Vista or County of San Diego.
- The City of Oceanside is updating its outfall priorities. Two outfalls that were dry for three consecutive visits will be replaced with the next two high priority outfalls.

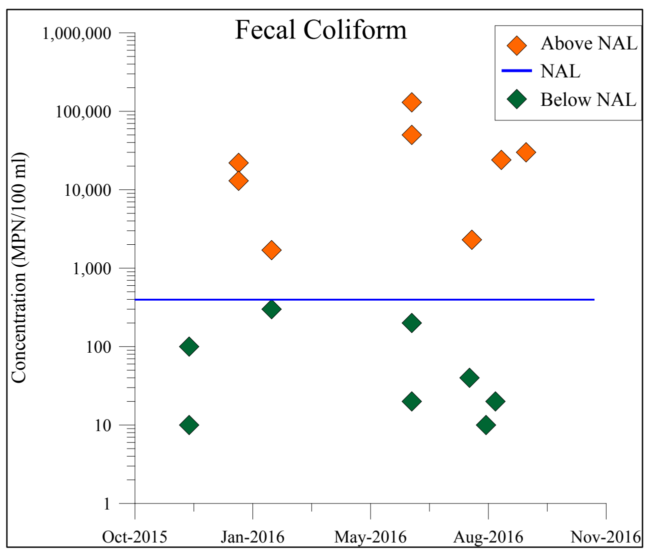


Figure ES-2. Fecal Coliform Concentrations at the Highest Priority Outfalls

ES.2.5 Illicit Discharge Detection and Elimination (IDDE) Program

Each Participating Agency's IDDE Program seeks to address and reduce the potential contribution of pollutants from stormwater and non-stormwater discharges through the storm drain system. The highest priority outfalls were a specific focus of IDDE investigations conducted during the 2015-2106 monitoring year. Additional detail is provided in Section 3.2.1.3.

Flow sources identified through the Participating Agencies' outfall flow investigations included:

- The most common source of non-stormwater flow was irrigation runoff, followed by groundwater. Irrigation runoff includes over-watering of residential and commercial landscaping.
- In several cases, the sources of non-stormwater flows investigated were allowable (e.g., groundwater), were reported to enforcement for follow-up actions, or were partially eliminated (e.g., irrigation runoff at SLR-025). Agricultural runoff, which is separately regulated and not under the Participating Agencies' legal authority, was identified as a source during investigations at two highest priority outfalls.
- The majority of sources were categorized as suspected while three were listed as known.

ES.2.6 Storm Drain Outfall Wet Weather Monitoring

Storm drain outfall wet weather monitoring identifies and quantifies pollutants in stormwater discharges from the storm drain system, guides pollutant source identification efforts, and tracks progress toward achieving wet weather numeric goals set forth in the WQIP. Monitoring locations are shown in Figure ES-1 in Section ES.2.4. Additional detail is provided in Section 3.2.2.

- 100% of *Enterococcus* and fecal coliform concentrations in storm drain outfall wet weather discharges were above the SSM water quality based effluent limitations specified in the Bacteria TMDL.

ES.2.7 Special Studies

Special studies conducted in the San Luis Rey River WMA are described in Section 3.3 and included the following:

- Reference Streams (Tiefenthaler et al., 2015) and Beaches (Tiefenthaler et al., 2016) Studies - provide a scientific basis for updating the "reference" conditions to be considered in evaluating compliance levels in the Bacteria TMDL, and will be useful in the re-evaluation of the Bacteria TMDL.
- San Luis Rey River Microbial Source Tracking (MST) Study (Geosyntec Consultants, 2015) - will be used to support Permit compliance and Bacteria TMDL implementation planning, and may potentially serve as the first step in future Natural Source Exclusion and/or Quantitative Microbial Risk Assessment (QMRA) work.

ES.3 WATERSHED STRATEGY IMPLEMENTATION AND PROGRESS TOWARD GOALS

The Permit requires the Participating Agencies to select the HPWQC for the WMA and develop strategies and numeric goals to address that HPWQC. Since the acceptance of the WQIP in February 2016, the Participating Agencies have implemented strategies and have begun making progress toward achieving numeric goals for bacteria. Strategies focusing on reducing bacteria from both human and non-human sources were implemented across the watershed and included the following:

- Preventing discharges of bacteria from human sources to the storm drain system by addressing sanitary sewer overflows, leaky sewer pipes, homeless encampments, and failing septic systems.
- Preventing discharges of other, non-human, bacteria sources to the storm drain system through public outreach programs related to pet waste management, discharge of wash water, and livestock.

Strategies implemented by the Participating Agencies were also focused on reduction and elimination of non-stormwater flow and address not only bacteria but other PWQC in the watershed, including nutrients. These strategies included irrigation runoff identification and control, additional source investigations and flow monitoring, inspections, and outreach (e.g., water conservation, trash control).

Progress made toward achievement of the interim Permit-term watershed numeric goals is measured using water quality and program activity data collected during 2015-2016. Progress is summarized below, with additional detail and a discussion of the strategies and progress specific to each Participating Agency provided in Section 4.

Permit Term Bacteria TMDL Numeric Goals for the San Luis Rey River Mouth:

- Dry Weather Goal: Flow Reduction – **Baseline Estimations are Complete**
- Wet Weather Goal: Programmatic BMP Implementation – **On Track to Achieve Goal**
- Wet Weather Goal: Distributed BMP Operation and Maintenance – **Goal Has Been Achieved**

Permit Term Numeric Goals for the Lower San Luis Rey River:

- Dry Weather Goal: Flow Reduction – **Baseline Estimations are Complete**
- Wet Weather Goal: Bacteria Load Reduction from Storm Drain Outfalls – **On Track to Achieve Goal**
- Wet Weather Goal: Meet Bacteria Goals in Lower River – **On Track to Achieve Goal**

ES.4 CONCLUSIONS

Data collected in the San Luis Rey River WMA during the 2015-2016 monitoring year support the identified priority and highest priority water quality conditions as provided in the WQIP and provide the information necessary to assess progress. Since the acceptance of the WQIP in February 2016, the Participating Agencies have begun implementing their strategies intended to result in achievement of dry and wet weather interim goals for the term of the current Permit, and progress has been demonstrated toward each goal. The strategies implemented by the Participating Agencies and identified in the WQIP focus on reducing bacteria discharges, but also address other pollutants, providing a multi-benefit approach to implementation.

The Participating Agencies will continue to implement these identified strategies, collect additional monitoring and programmatic data, and assess their progress toward goals on an annual basis. New data and information will be utilized as it becomes available to improve the WQIP with updates to priorities, assessments of and adjustments to goals, updates to strategies to meet the latest goals, and updates to the MAP as necessary through the adaptive management process.

1 Introduction

The San Diego Regional Water Quality Control Board (Regional Board) regulates discharges from municipal separate storm sewer systems (MS4s) (storm drain systems) in the San Diego Region under the Regional MS4 Permit[1] (Permit) (Regional Board, 2013). The Permit covers portions of San Diego County, southern Orange County, and southwestern Riverside County and regulates Phase I municipalities who own and operate storm drain systems, which discharge stormwater (wet weather) runoff and non-stormwater (dry weather) runoff to surface waters throughout the San Diego Region. One of the main goals of the Permit is to focus on water quality improvement outcomes rather than completing specific actions, giving the Participating Agencies more control over how their stormwater programs are implemented.

Within the Permit, the San Diego Region is sub-divided into 10 watershed management areas (WMAs), which cover the major, natural drainages in the region[2]. The Permit requires the development of a Water Quality Improvement Plan (WQIP) for each WMA, which guides the Participating Agencies' Jurisdictional Runoff Management Programs (JRMPs) (their local plans) towards an outcome-based approach and improved water quality. This process is accomplished through an adaptive planning and management method that identifies the highest priority water quality condition(s) (HPWQC) within a watershed and implements strategies through the WQIP and JRMPs to achieve improvements in the quality of discharges from the storm drain system and within the receiving waters.

Participating Agencies within each WMA are required by the Permit to submit an Annual Report to communicate the implementation status and progress of the WQIPs and corresponding JRMPs in meeting the defined numeric goals[3]. This San Luis Rey River WMA Annual Report covers two reporting periods on different schedules. The first is from July 1, 2015 to June 30, 2016 for the JRMPs and WQIP strategy implementation (note that the WQIP was accepted in February 2016), and the second is from October 1, 2015 to September 30, 2016 for monitoring and assessment programs. Progress to achieve goals may be assessed for either reporting period, depending on the goal metric. This Annual Report, the first under the San Luis Rey River WMA's WQIP, addresses the requirements of the Permit. Table 1-1 provides a summary of the Permit requirements that must be addressed by the Annual Report, and where they are discussed within this document. Appendix 1 includes additional detail regarding the specific Permit requirements as well as where they are addressed within the Annual Report[4]. Appendix 2 provides information related to each Participating Agency's JRMP.

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[1] Order No. R9-2013-0001, as amended by Order Nos. R9-2015-001 and R9-2015-0100. http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/docs/2015-1118_AmendedOrder_R9-2013-0001_COMPLETE.pdf

[2] Order No. R9-2013-0001 (as amended), Table B-1 (page 21 of 139)

[3] Order No. R9-2013-0001 (as amended), F.3.b.(3) (page 132-133 of 139)

[4] Order No. R9-2013-0001 (as amended), F.3.b.(3)(f) Each Copermittee must provide any data or documentation utilized in developing the Water Quality Improvement Plan Annual Report upon request by the San Diego Water Board. Any Copermittee monitoring data utilized in developing the Water Quality Improvement Plan Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN). Any Copermittee monitoring and assessment data utilized in developing the Water Quality Improvement Plan Annual Report must be available for access on the Regional Clearinghouse required pursuant to Provision F.4.

Table 1-1. Permit WQIP Annual Reporting Provisions and Corresponding Annual Report Sections[5]

Permit Provision	WQIP Annual Report Section						WQIP Appendix			
	Section 1 – Introduction	Section 2 – Priority & Goals	Section 3 – Monitoring	Section 4 – Achieving Goals	Section 5 – Adaptive Mgmt.	Section 6 – Conclusions	Appendix 2 – Jurisdictional Specific Info.	Appendix 3 – Goals	Appendix 4 – Monitoring	Appendix 5 – Adaptive Mgmt.
Provision A										
A.4.a.(2)			X		X		X		X	X
Provision B										
B.5.a.					X				X	X
B.5.b.			X	X	X		X	X	X	X
B.5.c.					X					X
Provision D										
D.1.e.(2)(c)			X						X	
D.2.b.(2)(iv)			X						X	
D.4.b.(1)(a)(ii)			X						X	
D.4.b.(1)(b)			X		X				X	X
D.4.b.(1)(c)			X		X				X	X
D.4.b.(2)(a)					X					X
D.4.b.(2)(b)			X		X				X	X
D.4.b.(2)(c)			X		X				X	X
D.4.b.(2)(d)									X	
D.4.c.			X						X	
D.4.d.					X					X
D.4.d.(1)					X					X
D.4.d.(2)					X					X
D.4.d.(3)					X					X
Provision E										
E.1.b.							X			
E.2.d.(4)			X						X	
E.8.c.	X						X			
Provision F										
F.1.b.(6)					X					X
F.2.a.(2)					X					X
F.2.a.(3)					X					X
F.2.b.(1)					X		X			
F.2.b.(2)					X		X			
F.2.c.(1)(c)					X					X
F.3.b.(3)(a-f)	X		X	X	X		X		X	X
Attachment E										
Attachment E			X						X	

[5]Appendix 1 includes additional detail regarding the specific Permit requirements as well as where they are addressed within the Annual Report.

This San Luis Rey River WMA Annual Report is structured as follows:

Section 1. Introduction – Provides an overview of the Permit, the WQIP, and the Annual Reporting requirements.

Appendix 1. Crosswalk of Permit Requirements and Annual Report References

Appendix 2. Jurisdictional Runoff Management Program Annual Report Certifications and Forms, Strategies, and Changes to the Best Management Practices (BMP) Manual (as applicable)

Section 2. San Luis Rey River WMA Priorities and Numeric Goals – Introduces the WMA, the priority water quality conditions of the watershed, and the numeric goals and schedules developed to measure progress in addressing the priority conditions.

Appendix 3. Water Quality Improvement Plan Numeric Goals

Section 3. Monitoring and Assessment – Summarizes the monitoring programs and provides an assessment of the data collected.

Appendix 4. Monitoring Results and Assessments

Section 4. Implementation and Progress toward Achieving Numeric Goals – Provides a detailed assessment of the progress towards meeting the numeric goals, with a focus on those numeric goals occurring during the Permit term. The section also provides an overview of the strategies implemented to meet the numeric goals, the status of implementation, and plans for the coming year.

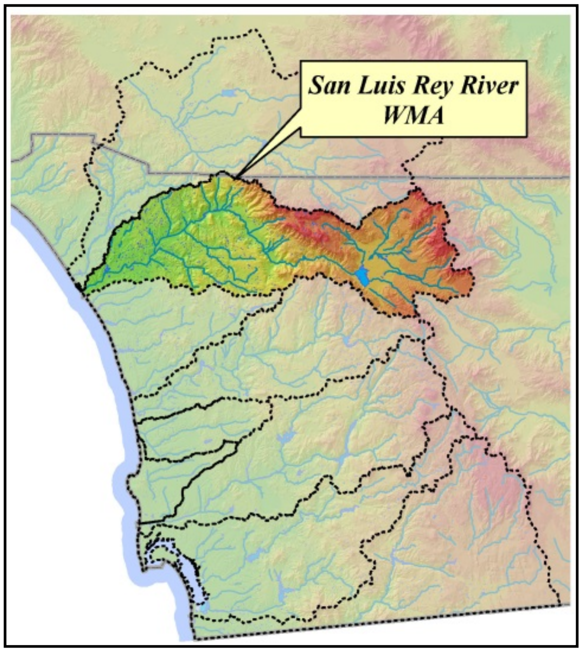
Section 5. Adaptive Management – Provides a summary of the elements of the WQIP process which can be altered during the course of Permit implementation and any changes that were made as a result of new information realized during the reporting period.

Appendix 5. Adaptive Management Modifications

Section 6. Conclusions and Recommendations – Provides the conclusions and recommendations that are based on the data collected and assessments conducted during implementation of the WQIP.

Section 7. References

2 Overview of San Luis Rey River Watershed



The San Luis Rey River WMA is located in northern San Diego County, bordered by the Santa Margarita River WMA to the north and the Carlsbad and San Dieguito River WMAs to the south. Major surface water bodies and the municipalities/agencies responsible for stormwater management within the WMA are summarized in Table 2-1. Although Caltrans is not a part of the Permit, Caltrans works cooperatively with the other Participating Agencies in accordance with their statewide National Pollutant Discharge Elimination System (NPDES) permit.

The WMA encompasses 360,000 acres or 562 square miles, and is the largest WMA located entirely within San Diego County. The WMA (hydrologic unit [HU] 903) consists of three hydrologic areas (HAs): Lower San Luis Rey (903.1), Monserate (903.2), and Warner Valley (903.3). These HAs are comprised of 11 hydrologic subareas (HSAs). The San Luis Rey River extends over 55 miles across northern San Diego County and discharges to the Pacific Ocean within the City of Oceanside. Lake Henshaw is the main reservoir for the San Luis Rey watershed and is the third largest reservoir in San Diego County. Henshaw Dam controls 36 percent (%) of the watershed drainage and is the dividing point between the Monserate HA and Warner Valley HA. One-third of the WMA is located above the dam and two-thirds is located below the dam. The principal aquifers in the watershed are the Warner, Pauma, Pala, Bonsall, Moosa, and Mission Basins. Additional information is provided in the San Luis Rey River WMA WQIP (Larry Walker Associates et al., 2016). A map of the watershed is shown in Figure 2-1. The area surrounding Oceanside Harbor within the City of Oceanside's jurisdiction has been assigned to the San Luis Rey River WMA for reporting and assessment under the 2013 Permit. Therefore, all acreages and outfalls for the area surrounding the Oceanside Harbor within the City of Oceanside's jurisdiction will be included in the San Luis Rey River WMA assessments. The Hydrologic Basin boundaries from SanGIS have not been modified on maps to reflect this assignment.

Table 2-1. Major Surface Water Bodies and the Municipalities/Agencies Responsible for Stormwater Management within the San Luis Rey River WMA

Hydrologic Unit	Major Surface Water Bodies	Municipalities/Agencies
San Luis Rey (903.00)	▪ San Luis Rey River ▪ San Luis Rey Estuary ▪ Pacific Ocean	▪ City of Oceanside ▪ City of Vista ▪ County of San Diego ▪ Caltrans[6]

[6]Caltrans is regulated under a separate permit from the State Water Resource Control Board (Order No. 2012-0011 DWQ). However, Caltrans has voluntarily participated in the development of Water Quality Improvement Plans throughout the San Diego Region.

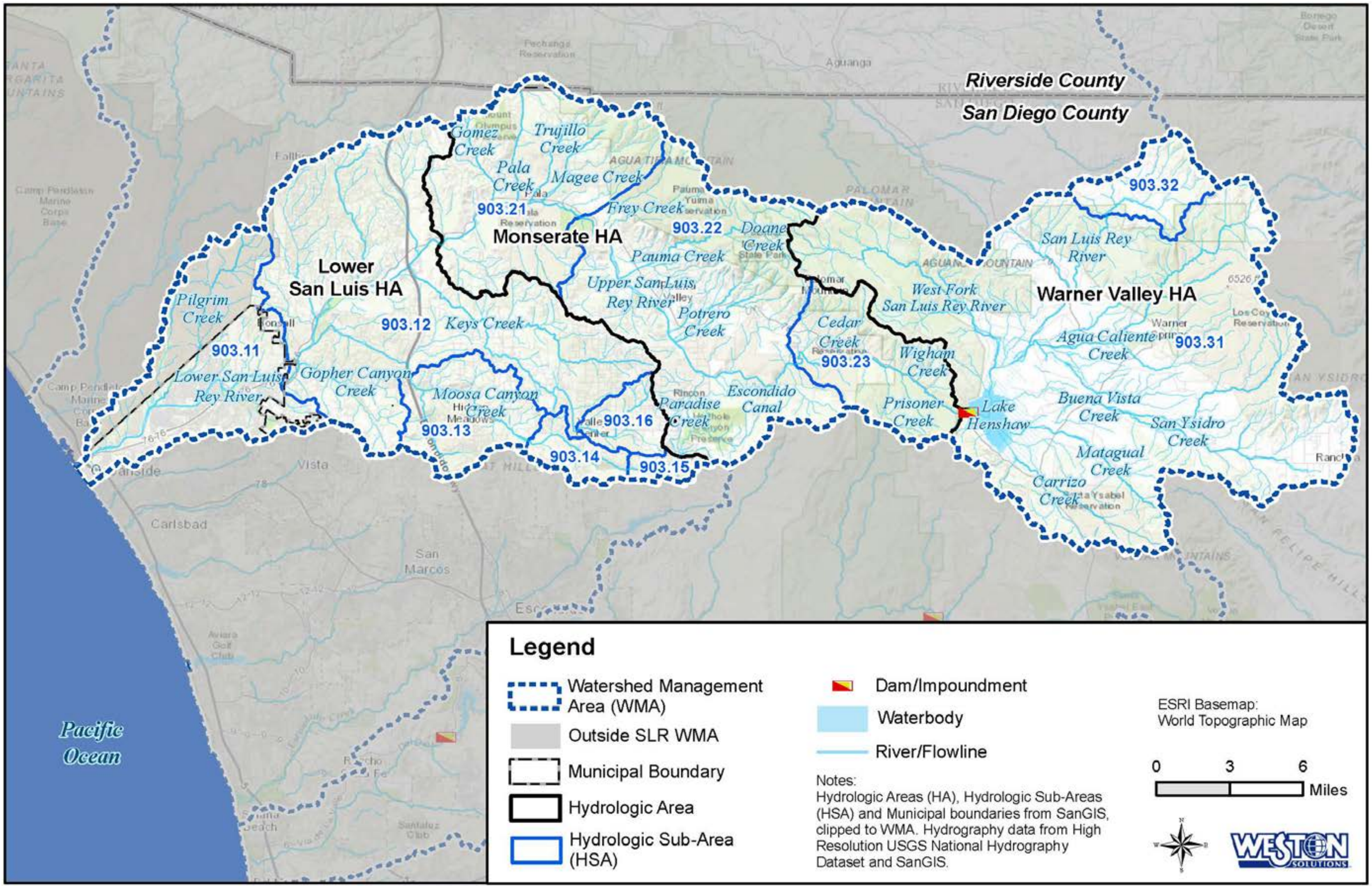


Figure 2-1. San Luis Rey River Watershed Management Area

The total annual rainfall in the region during the reporting period (October 2015 through September 2016), as measured at Oceanside Harbor, was 5.69 inches. Despite El Niño conditions reported by the National Weather Service (NWS) Climate Prediction Center through the spring of 2016 (National Oceanic and Atmospheric Administration [NOAA], 2016a), this total is below the historical (1909 to 2016) annual mean of 9.87 inches (Western Regional Climate Prediction Center [WRCC], 2016). Long-term drought conditions persisted in the San Diego region during the 2015-2016 monitoring year, and temperatures were generally above average (NOAA, 2016b).

Shown in Figure 2-2 are annual rainfall totals at four Alert System Precipitation Gauges (http://sdcfcd.org/whatalert.html) in the northern San Diego County, including two stations in the San Luis Rey River WMA, Oceanside (903.11) and Fallbrook (903.12). Annual rainfall totals at these stations ranged from 9.92 to 13.6 inches. Precipitation totals at the Alert Stations is provided for the fiscal year (FY) (July 1, 2015 to June 30, 2016) for consistency with the wet weather storm drain outfall assessments provided in Appendix 4. The rainfall total at Oceanside Harbor for FY 2015-2016 was lower at 7.51 inches (WRCC, 2016) than the inland Oceanside Alert station.

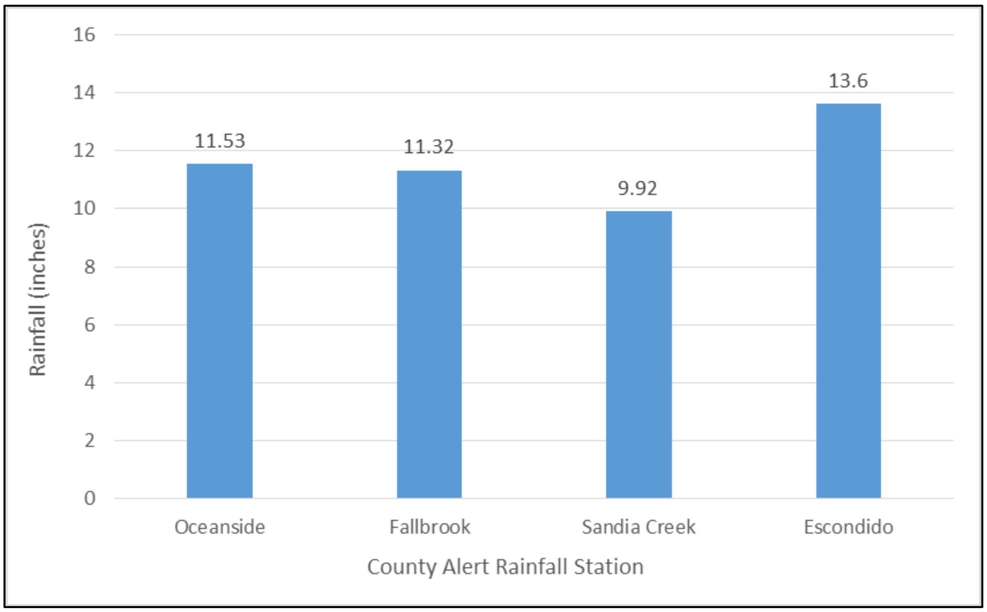


Figure 2-2. Rainfall Amounts for 2015-2016 Fiscal Year at Four County Alert Stations

2.1 SAN LUIS REY RIVER WATER QUALITY IMPROVEMENT PLAN

The WQIP for the San Luis Rey River WMA identifies strategies that will be implemented through JRMPs to address bacteria in pursuit of measurable numeric goals that will achieve improvements in the quality of storm drain outfall discharges and, in turn, the receiving waters. The WQIP outlines how the Participating Agencies within the watershed are evaluating water quality conditions, prioritizing those water quality conditions, and using these common priorities to guide jurisdictional and watershed scale programs to address the highest priorities. Figure 2-3 illustrates the general planning, implementation, monitoring, and adaptive management process and the text that follows briefly describes the components of the WQIP.

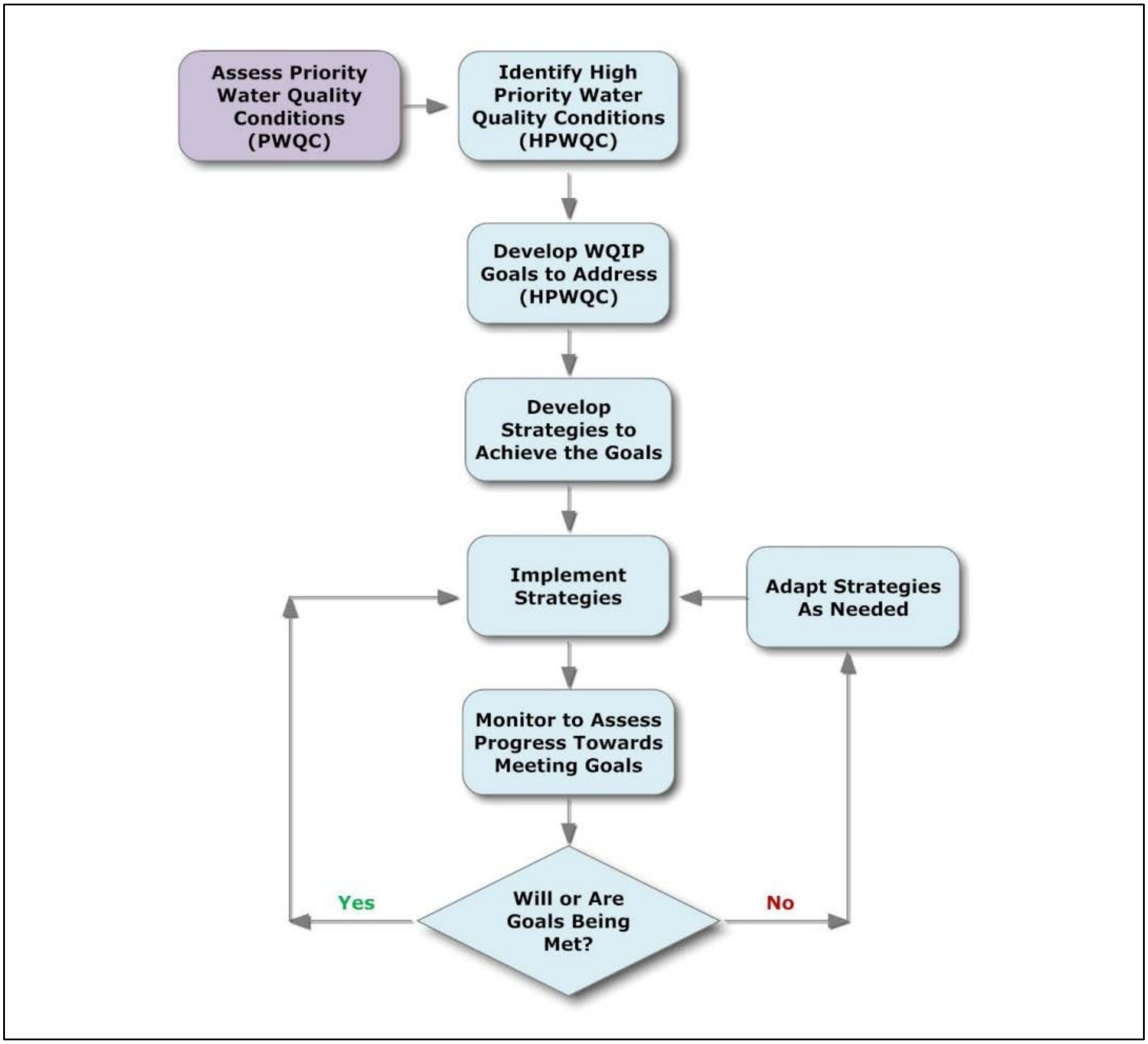


Figure 2-3. Water Quality Improvement Plan Process

The complete WQIP document contains the following components identified in the 2013 Permit:

- Priority Water Quality Conditions.
- Goals, Strategies and Schedules.
- Watershed Management Area Analysis (WMAA), which the Permit indicates is optional.
- Monitoring and Assessment Program (MAP), which also documents how the Participating Agencies will comply with the applicable monitoring and assessment portions of the Permit.
- Iterative Approach and Adaptive Management Process.

The complete WQIP was provided to the Regional Board on June 27, 2015. Comments from the Regional Board and from the public were received in August and September 2015. Appropriate revisions were made to address public comments and Regional Board concerns, and a revised WQIP was submitted to the Regional Board for acceptance on September 29, 2015. The Regional Board advised the WMA Participating Agencies on January 6, 2016 that minor deficiencies remained, and the Participating Agencies provided proposed corrections on January 29, 2016. The Regional Board accepted the revised WQIP, with the proposed corrections, on February 12, 2016. WQIP documents can be accessed on the Regional Board website: http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/wqip.shtml.

2.2 PRIORITY AND HIGHEST PRIORITY WATER QUALITY CONDITIONS

Using the methodology outlined in the WQIP, bacteria was identified as the HPWQC for the San Luis Rey River WMA. The HPWQC and additional priority water quality conditions (PWQCs) for the WMA are summarized in Table 2-2. Each of the waterbodies listed in Table 2-2 are located in the Lower San Luis HA except the Upper San Luis Rey River, which is located in the Lower San Luis and Monserate HAs. Additional information is provided in Section 2 and Appendix 2D of the WQIP.

Table 2-2. San Luis Rey River WMA Priority Water Quality Conditions

Constituent	Wet	Dry	Beneficial Use*	Geographic Area
Highest Priority Water Quality Condition				
Bacteria	X	X	REC-1 (water contact recreation)	Pacific Ocean Shoreline at San Luis Rey River Mouth, Lower San Luis Rey River
Priority Water Quality Conditions				
Eutrophic Conditions		X	WARM (warm freshwater habitat)	Guajome Lake
Chloride		X	MUN (municipal and domestic supply)	Lower San Luis Rey River
Nitrogen	X	X	WARM (warm freshwater habitat)	Lower San Luis Rey River, Upper San Luis Rey River
Phosphorus	X	X	WARM (warm freshwater habitat)	Lower San Luis Rey River
Total Dissolved Solids (TDS)	X	X	AGR (agricultural supply)	Lower San Luis Rey River
Toxicity	X	X	WARM (warm freshwater habitat)	Lower San Luis Rey River
Index of Biotic Integrity (IBI)		X	WARM (warm freshwater habitat)	Lower San Luis Rey River

* Source: Water Quality Control Plan for the San Diego Region (Basin Plan) (Regional Board, 1994).

Bacteria are important indicators of water quality for recreational users like surfers, swimmers, and beach waders. Indicator bacteria are used as detection surrogates or proxies for pathogens because they are easier and less costly to measure. Allowable bacteria loads for the watershed are defined by the Bacteria TMDL[7], which requires the Participating Agencies to improve water quality in local waters during both dry weather and wet weather conditions within a 10- and 20-year compliance timeline, respectively (see Section 2.3).

2.3 WATER QUALITY IMPROVEMENT PLAN NUMERIC GOALS

The Participating Agencies identified and developed specific water quality improvement numeric goals and strategies to address bacteria within the WMA. The numeric goals (interim and final) and corresponding schedules support implementation of the WQIP and measure reasonable progress towards addressing bacteria. In addition, the Participating Agencies' monitoring and assessment programs measure progress towards attaining these goals.

The numeric goals for the San Luis Rey River WMA WQIP are designed to demonstrate progress towards compliance with the Bacteria TMDL, which differentiates between wet and dry conditions. Since wet weather bacteria loads are more challenging to control, the wet and dry TMDL targets and load reductions have different schedules. The targets for dry and wet weather are on a 10- and 20-year timeline, respectively. As a result, some of the goals extend beyond the timeframe of the current Permit. For this reason, the numeric goals within the WQIP are categorized into three distinct time periods:

1. Interim goals within the five-year Permit term.
2. Interim goals based on interim Bacteria TMDL compliance pathways.
3. Final goals based on final Bacteria TMDL compliance options.

Attachment E.6 of the Permit outlines interim dry and wet weather TMDL compliance dates of April 4, 2017 and April 4, 2021, respectively. The Permit allows the Participating Agencies to propose alternative schedules. The Participating Agencies proposed moving the interim TMDL compliance dates for dry and wet weather to April 4, 2020 and April 4, 2028, respectively, to allow adequate time to investigate and mitigate sources of bacteria and to monitor progress and adjust implementation through the adaptive management process. The detailed numeric goals for the WMA are presented in Appendix 3, and the timeline for achievement of these goals is illustrated in Figure 2-4.

[7]Revised TMDL for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek). Resolution No. R9-2010-0001. Approved February 10, 2010.

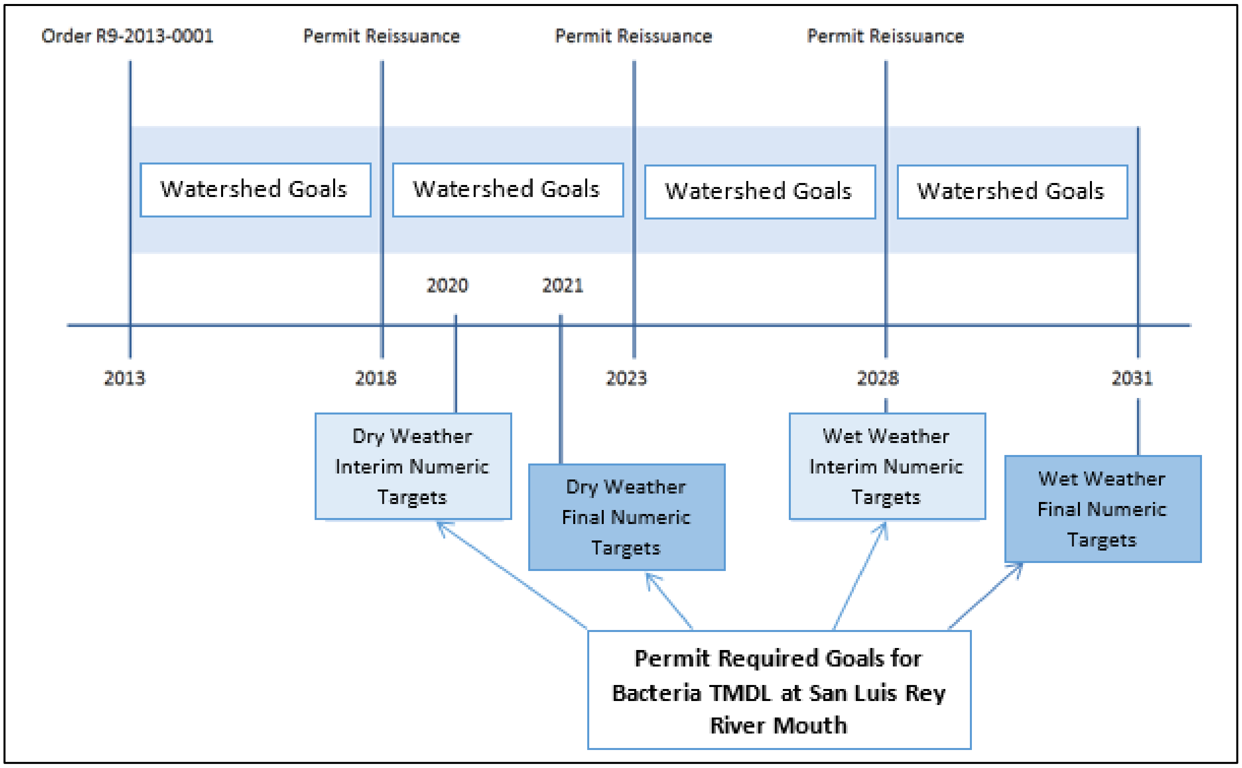


Figure 2-4. Timelines and Relationships between Bacteria TMDL Numeric Targets

3 Monitoring and Assessment

The Permit requires an outcome-based approach to improve water quality in stormwater and non-stormwater discharges, guided by strategies and goals identified in the WQIP. By conducting multiple types of monitoring activities, the Participating Agencies are collecting data to evaluate progress toward achieving numeric goals, and determine if modifications to stormwater program activities are necessary. Caltrans is not a Participating Agency for the monitoring and assessment program described in this section, as Caltrans is regulated under a separate permit from the State Water Resource Control Board.

This Annual Report assesses the data collected within the San Luis Rey River WMA in combination with the Participating Agencies' management actions to determine what actions are improving the quality of storm drain outfall discharges and/or receiving water conditions (Section 4) and where additional actions may be necessary (Section 5).

The Monitoring and Assessment Program includes five major components:

1. Receiving water monitoring that measures the long-term health of the watershed during dry and wet weather conditions;
2. Storm drain outfall discharge monitoring that investigates illicit non-stormwater flows from outfalls and measures changes in quality of the discharges from the storm drain system during wet weather;
3. Special studies that look further into the sources, pollutants, and/or stressors that contribute to bacteria;
4. Illicit Discharge Detection and Elimination (IDDE) investigations and inspections of potential pollutant sources; and
5. Monitoring to assess progress toward goals and schedules.

This section describes results from implementation of the MAP for the WMA as they pertain to bacteria. The MAP was developed and implemented to:

1. Measure the progress toward addressing bacteria;
2. Assess the progress toward achieving the numeric goals, strategies, and schedules; and
3. Evaluate each Participating Agency's overall efforts to implement the WQIP.

Because bacteria in the lower San Luis Rey River watershed was identified as the HPWQC for the WMA, monitoring is being conducted to identify sources of non-stormwater flow and assess the effectiveness of strategies to address non-stormwater flows that transport bacteria. Monitoring and IDDE program activities are also focused on identifying and eliminating non-stormwater flows that may discharge bacteria and other PWQC pollutants in urban runoff. Additionally, these programs will generate data to track the trends related to the PWQCs and the general water quality conditions within the watershed.

Monitoring programs where information related to bacteria was collected during the 2015-2016 monitoring year (October 1 - September 30) are shown in Table 3-1. Relevant results of these programs are summarized in the sections below, with details provided in Appendix 4. Monitoring program results not directly related to bacteria, such as those from the Bight and Southern California Stormwater Monitoring Coalition (SMC) regional programs, are also presented in Appendix 4.

Table 3-1. Monitoring Programs relevant to Bacteria for the San Luis Rey River WMA

Monitoring Program	Supports HPWQC and Summarized Below	
	Yes	No
Receiving Water Monitoring[1]		
Long Term Monitoring at Mass Loading Station		X[2]
Regional (SMC)		X[3]
Sediment Quality		X[3]
TMDL	X	
Storm Drain Outfall Monitoring		
Field Screening	X	
Dry Weather Monitoring	X	
Wet Weather Monitoring	X	
Illicit Discharge Detection and Elimination	X	
Special Studies	X	
Additional Monitoring to Assess Progress toward Goals and/or Strategies	X	

[1]HMP monitoring was conducted regionally but no sites were located in the San Luis Rey River WMA. The objectives and results of the program are summarized in Appendix 4.

[2]Long-term receiving water monitoring includes bacteria sampling but has not yet been conducted in the San Luis Rey River WMA due to lack of flow. Monitoring will be conducted during the 2016-2017 monitoring year, or when sufficient flow occurs.

[3]No bacteria data are collected for these programs.

3.1 RECEIVING WATER MONITORING

The purpose of receiving water monitoring is to characterize trends in the chemical, physical, and biological conditions of a receiving water to determine whether beneficial uses are being protected, maintained, or enhanced. An overview of receiving water monitoring activities for the WMA for the current Permit term is presented in Table 3-2. A summary of the results from each of these programs for the 2015-2016 monitoring year with respect to bacteria is presented below. Additional details and results for programs not related to bacteria in the WMA are presented in Appendix 4.

The receiving water assessments required by the Permit will be addressed in the Regional Monitoring and Assessment Report (RMAR) submitted to the Regional Board in December 2017 with the Report of Waste Discharge (ROWD).

Table 3-2. Elements of Water Quality Improvement Plan Receiving Water Monitoring

Monitoring Programs		Dry	Wet	Monitoring Element	Permit Schedule[a]				
					2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Long-Term [b]		X	X	Conventionals, bacteria, nutrients, metals, pesticides, toxicity (chronic), TIE/TREs	–	–	–	●	–
Long-Term [b]		X		Hydromodification (HMP)	–	–	–	●	–
Long-Term [b]		X		Bioassessment	–	–	–	●	–
Regional	Bight [c]	X		Chemistry, toxicity, benthic infauna	●	●	–	–	●
Regional	SMC	X		Bioassessment	●	●	●	●	●
Regional	2011 HMP Program		X	Channel assessments; flow monitoring; sediment transport monitoring	●	●	●	–	–
Sediment Quality [c]		X		Chemistry, toxicity, benthic infauna	●	–	–	–	–
Bacteria TMDL[d]		X	X	Bacteria	●	●	●	●	●
Monitoring to Assess Goals and Schedules		X	X	Varies by goal and jurisdiction	–	–	●	●	●

SMC = Southern California Stormwater Monitoring Coalition; Bight = Southern California Bight Regional Monitoring Program; TIE=Toxicity Identification Evaluation; TRE=Toxicity Reduction Evaluation

[a.] The Permit was adopted on May 8, 2013 and became effective on June 27, 2013.

[b.] Long-term receiving water monitoring has not yet been conducted in the San Luis Rey River WMA due to lack of flow. Monitoring will be conducted during the 2016-2017 monitoring year, or when sufficient flow occurs.

[c.] The 2018 Southern California Bight Regional Monitoring will occur during the summer of 2018 or 2019.

[d.] Includes the San Luis Rey River Mouth.

3.1.1 Regional Monitoring Participation

Regional monitoring includes several studies that provide information to evaluate various aspects of receiving water health on a regional scale. The Participating Agencies participated in the SMC Regional Monitoring Program during the 2015-2016 monitoring year. Because data collected under this program do not include bacteria, results are not included in this section. Detailed results are presented in Appendix 4, including results related to PWQCs.

3.1.2 Total Maximum Daily Load Monitoring

In February 2010, the Regional Board adopted Resolution No. R9-2010-0001, *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)* (Bacteria TMDL) (Regional Board, 2010). This TMDL amendment to the Water Quality Control Plan for the San Diego Region (Basin Plan) (Regional Board, 1994) includes one segment within the San Luis Rey River WMA, the Pacific

Ocean Shoreline at the San Luis Rey River Mouth. The Participating Agencies within the WMA that are named as responsible in the TMDL include the Cities of Oceanside and Vista and the County of San Diego. The compliance requirements and monitoring and reporting requirements of the TMDL have been incorporated into Attachment E of the 2013 Permit.

The Bacteria TMDL requires pollutant load reductions to restore and protect the designated beneficial use of water contact recreation (REC-1), as it is designated within the Basin Plan. The purpose of the TMDL monitoring program is to assess progress toward achieving compliance with the interim and final TMDL numeric targets, and is used to address the following questions:

- Are TMDL numeric targets for indicators being met at the compliance monitoring locations?
- Are levels of bacteria decreasing at the compliance monitoring locations?

During the monitoring season (October 1, 2015 through September 30, 2016), sampling was conducted during wet and dry weather at one receiving water monitoring site, OC-100, located at Oceanside City Beach at the mouth of the San Luis Rey River (Table 3-3, Figure 3-1). This was the third year of monitoring in accordance with the Bacteria TMDL. Samples were analyzed for the indicator bacteria compliance constituents (total coliform, fecal coliform, and *Enterococcus*) in accordance with the requirements of Attachment E.6 of the Permit.

Table 3-3. 2015-2016 Bacteria TMDL Beach Monitoring Summary

Season	Date Range	Event Type	Event Frequency	Monitoring Location	Samples Per Site Per Event[a]	Total Number of Samples
2015-2016 Wet Season	10/01/2015-04/30/2015	Wet	Three storm events	OC-100	1	3
	10/01/2015-03/30/2016	Dry	Monthly			6
	04/01/2016-04/30/2016	Dry	Weekly[b]			5
2016 Dry Season	05/01/2016-09/30/2016	Dry	Weekly[b]			25

[a] Quality assurance (QA) or replicate samples are not included in the count.

[b] A minimum of 5 samples are collected in a 30-day period.

Figure 3-1. Bacteria TMDL Compliance Monitoring Location

Table 3-4 presents the exceedance rates for each indicator bacteria at the monitored station within the San Luis Rey River WMA. The exceedances observed during the 2015-2016 monitoring year do not indicate non-compliance at this time. Progress toward meeting water quality based effluent limitations (WQBELs), in terms of interim and final receiving water limitations, is presented in Table 3-5 for each analyzed constituent. Interim WQBELs are not required to be achieved until 2020 for dry weather and 2028 for wet weather, while final WQBELS must be met by 2021 for dry weather and 2031 for wet weather. Based on the sampling data from 2015-2016, receiving water limitations that have already been achieved are indicated by (●), whereas receiving water limitations that have not yet been achieved are indicated by (X).

In summary, the only exceedances observed at OC-100 were for the wet weather single-sample maximum for *Enterococcus*. This outcome was due to a measured concentration of 220 colony-forming units per 100 milliliters (CFU/100 mL) during one monitored wet weather event, resulting in arithmetic mean of 104.67 CFU/100 mL for the three monitored events, which was applied to all of the unmonitored days with qualifying precipitation as required by the Permit. Had the arithmetic mean been lower by just 1 CFU/100 mL, the single-sample wet weather exceedance frequency would have been 10% and would have been in compliance with the single-sample wet weather allowable exceedance frequency. *Enterococcus* concentrations during the remaining two wet weather events were below the receiving water limitation of 104 most probable number (MPN)/100 mL[8]. All other interim and final WQBELs are currently being achieved.

Table 3-4. 2015–2016 Bacteria TMDL Monitoring Exceedance Frequency Results

Segment	Monitoring Location	Bacteria TMDL Constituent	2016 Dry Season Geometric Mean (CFU/100mL)	2015-2016 Wet Season Geometric Mean (CFU/100mL)	2015-2016 Wet Weather Single-Sample Maximum (CFU/100mL)
Pacific Ocean Shoreline	OC-100	*Enterococcus*	0%	0%	75%
		Fecal Coliform	0%	0%	0%
		Total Coliform	0%	0%	0%

CFU - colony-forming units per 100 milliliters. The Permit identifies WQBELs in most probable number per 100 mL (MPN/100 mL); the laboratory methods provide results in CFU. CFU and MPN units are comparable.

Table 3-5. 2015–2016 General Progress Toward Bacteria TMDL Interim and Final WQBELs

Monitoring Location	Bacterial TMDL Constituent	2015-2016 Dry Season Geometric Means		2015-2016 Wet Season Geometric Means		2015-2016 Wet Weather Single-Sample Maximum	
		Interim	Final	Interim	Final	Interim	Final
OC-100	*Enterococcus*	●	●	●	●	X	X
	Fecal Coliform	●	●	●	●	●	●
	Total Coliform	●	●	●	●	●	●

● = Numeric targets are met; X= Numeric targets are not yet met.

Additional information is provided in the 2015-2016 Bacteria TMDL Compliance Monitoring Report provided as Attachment 4B to Appendix 4. This data will also be uploaded to CEDEN (see Attachment K to Appendix 4).

3.1.3 Lower San Luis Rey River Goal Monitoring

To evaluate progress toward achieving goals for the lower San Luis Rey River, receiving water monitoring to measure bacteria concentrations was conducted during the 2015-2016 monitoring year at one in-stream site at Olive Hill Rd (SLR25). A second in-stream site, Benet Bridge (MLS),

[8] The Permit identifies receiving water limitations in MPN/100 mL; the laboratory methods provide results in CFU. CFU and MPN units are comparable.

was visited for monitoring but was dry during the entire year, and therefore was not sampled. Both sites are located along the San Luis Rey River, west of Interstate-15, with Olive Hill Rd (SLR25) located upstream of Benet Bridge. These monitoring locations are shown in Figure 3-2.

The lower San Luis Rey River location at Olive Hill Rd (SLR25) was sampled monthly during dry weather from February through September 2016, and once within 24 hours after a storm event in February 2016. Samples were analyzed for the indicator bacteria compliance constituents (fecal coliform and *Enterococcus*) in accordance with the Lower San Luis Rey River Bacteria Monitoring Plan (Attachment 4A-7 to the WQIP). Samples were also analyzed for *E. coli*, which is not a constituent of the indicator bacteria TDML and is not listed in the Lower San Luis Rey River Bacteria Monitoring Plan. The United States Environmental Protection Agency's (USEPA's) 2012 Recreational Water Quality Criteria recommends using *Enterococcus* and *E. coli* as indicators of fecal contamination for fresh water and *Enterococcus* for marine water (USEPA, 2012). Therefore, collection of *E. coli* data in advance of these anticipated changes provides historical data moving forward under revised recreational water quality standards developed in accordance with the USEPA guidelines. While the *E. coli* results are not presented here, the analytical data can be found in the laboratory reports provided in Attachment 4C to Appendix 4 and will be uploaded to CEDEN (see Attachment K to Appendix 4).

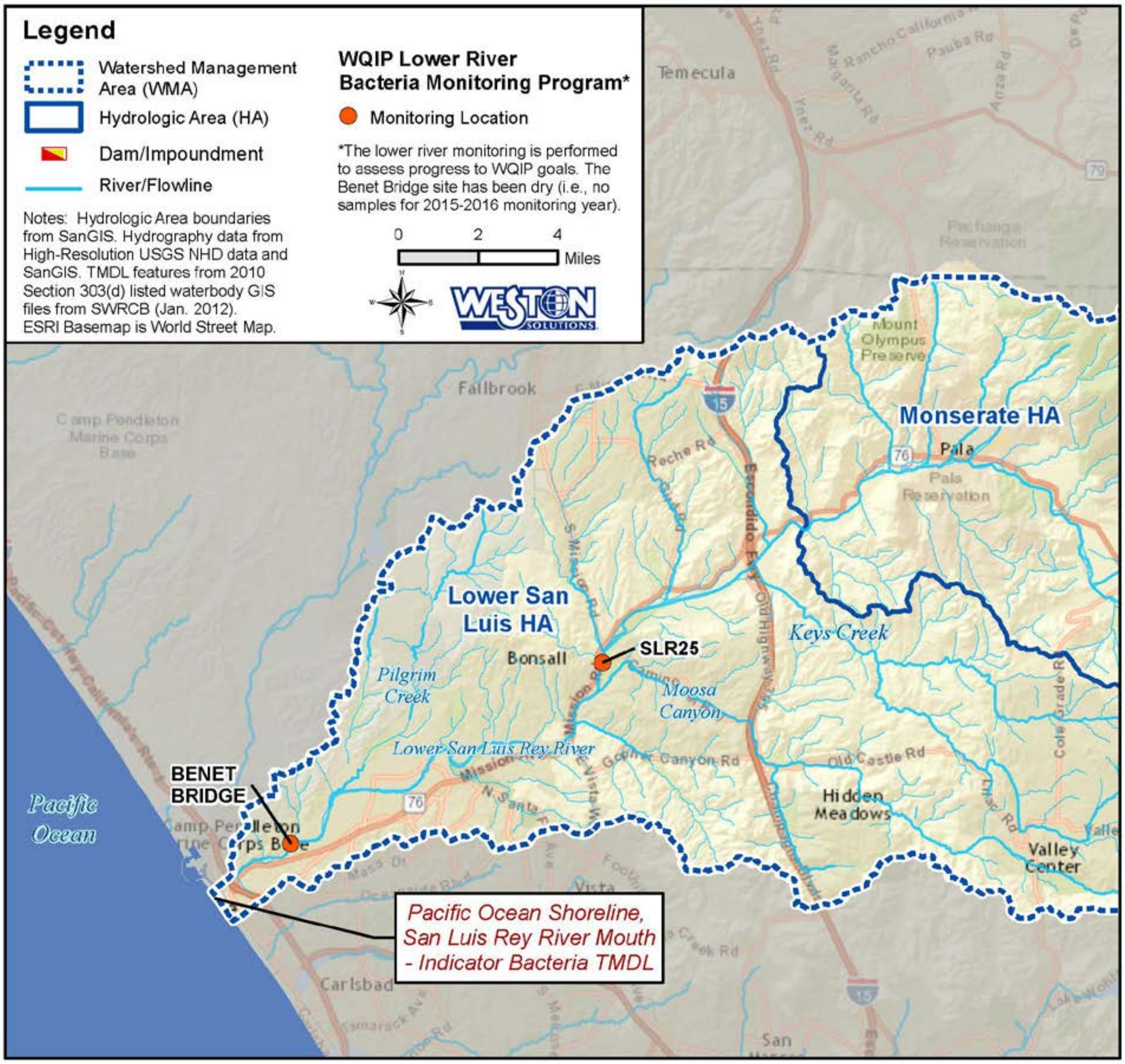


Figure 3-2. Bacteria WQIP Monitoring Locations in the Lower San Luis Rey River WMA (The Benet Bridge Location was Dry for the Entire Monitoring Season)

Individual dry and wet weather event data for *Enterococcus* and fecal coliform indicator bacteria are presented in Table 3-6 and Table 3-7, respectively, and exceedance rates are shown in Table 3-8. *Enterococcus* results from the single wet-weather event were above the freshwater single sample maximum water quality objective (WQO), whereas the fecal coliform concentration was below the WQO. Exceedance frequencies for the eight monitored dry weather events were 100% for *Enterococcus* and 13% (one event) for fecal coliform. These data will be used to inform progress by the Participating Agencies in meeting the lower San Luis Rey River bacteria goals (see Section 4.2). Supporting data are provided in Attachment 4C to Appendix 4.

Table 3-6. 2015-2016 Lower San Luis Rey River Bacteria Dry Weather Monitoring Event Results

Date	*Sample Results (CFU/100 mL)	
	Enterococcus (CFU/100 mL)	Fecal Coliform (CFU/100 mL)
SSM WQO	**61**	**400**
2/11/2016	**70e**	20
3/3/2016	**110e**	8e
4/6/2016	**63**	7e
5/4/2016	**80e**	16e
6/2/2016	**510**	**510**
7/7/2016	**820e**	53
8/4/2016	**600e**	45
9/1/2016	**180e**	20e

*Note: **Bolded/shaded** values indicate exceedances of water quality objectives based on comparison of results with the single sample maximum (SSM) indicator bacteria objective.
CFU - colony-forming units per 100 milliliters
e - estimated value, plate count falls outside recommended reporting limits per USEPA method guidelines.

Table 3-7. 2015-2016 Lower San Luis Rey River Bacteria Wet Weather Monitoring Event Results

Date	*Sample Results (CFU/100 mL)	
	Enterococcus (CFU/100 mL)	Fecal Coliform (CFU/100 mL)
SSM WQO	**61**	**400**
2/1/2016	**5,600**	250

*Note: **Bolded/shaded** values indicate exceedances of water quality objectives based on comparison of results with the single sample maximum (SSM) indicator bacteria objective.
CFU - colony-forming units per 100 milliliters

Table 3-8. 2015-2016 Lower San Luis Rey River Bacteria Results Summary

Analyte		Number of Events	*Enterococcus* (CFU/100 mL)		Fecal Coliform (CFU/100 mL)	
Station	Station		Total Exceedance	Percent Exceedance	Total Exceedance	Percent Exceedance
SSM WQO			**61**		**400**	
SLR25	Dry	8	8	100%	1	13%
	Wet	1	1	100%	0	0%

CFU - colony-forming units per 100 milliliters

3.2 STORM DRAIN OUTFALL MONITORING

The purpose of Storm Drain Outfall Monitoring is to evaluate potential impacts from storm drain outfall discharges on the beneficial uses of a waterbody during dry and wet weather conditions. During dry conditions, the program also facilitates elimination of non-stormwater discharges to waterbodies through follow-up investigations and IDDE program activities. The data generated are used to identify and quantify pollutants in discharges, guide pollutant source identification efforts, and track progress towards achieving numeric goals set forth in the WQIP.

An overview of the conducted and planned storm drain outfall monitoring activities for the current Permit term is presented in Table 3-9.

Table 3-9. Elements of Water Quality Improvement Plan Storm Drain Outfall Monitoring

Monitoring Programs	Dry	Wet	Monitoring Element	Permit Schedule[a]				
				2013-2014[b]	2014-2015	2015-2016	2016-2017	2017-2018
Field Screening	X		Visual: flow condition, presence and assessment of trash in and around the station, IC/IDs, descriptions	●	●	●	●	●
Storm Drain Outfall	X		Field parameters, conventionals, bacteria, nutrients, metals	-	-	●	●	●
		X	Field parameters, conventionals, bacteria, nutrients, metals	●	●	●	●	●
Illicit Discharge Detection and Elimination	X		Visual surveys, field parameter testing, analytical testing and follow-up investigations, if warranted	–	–	●	●	●

IC/ID – Illegal connection and illicit discharge

a. The Permit was adopted on May 8, 2013 and became effective on June 27, 2013.

b. Completed under the Transitional Monitoring Program.

The major storm drain outfalls currently included in the storm drain outfall discharge monitoring station inventory for the WMA are shown in Figure A4-5 in Appendix 4.

The number of major outfalls monitored under each element of the Storm Drain Outfall Monitoring Program by each Participating Agency in the WMA is provided in Table 3-10. In accordance with the Permit, Participating Agencies with fewer than 125 major storm drain outfalls in their inventory must conduct dry weather field screening at 80% of these major outfalls twice per year. The number of major outfalls monitored per year is subject to change based on new information, updates to the Participating Agencies' storm drain outfall inventories, changes in transient or persistent flow classifications, and/or changes or updates to the priority water quality conditions over the life of the WQIP.

Table 3-10. Number of Major Storm Drain Outfalls per Participating Agency in the San Luis Rey River WMA

Participating Agency	Number of Storm Drain Outfalls Monitored Per Year		
	Field Screening	Dry Weather Monitoring	Wet Weather Monitoring
County of San Diego	21	5*	2
City of Oceanside	36	5*	2
City of Vista	4	2	1

*Three outfalls in the City of Oceanside and one County outfall were dry or ponded with insufficient water to sample during monitoring visits; therefore analytical samples were not collected at four outfalls that had been identified for persistent flow storm drain outfall monitoring.

3.2.1 Storm Drain Outfall Dry Weather Monitoring

Storm drain outfall dry weather monitoring consisted of dry weather field screening, IDDE investigations, and highest priority storm drain outfall analytical monitoring. These programs are described in the following subsections.

3.2.1.1 Dry Weather Field Screening and Outfall Prioritization

Field screening is visual monitoring of major storm drain outfalls conducted to identify non-stormwater and illicit discharges, determine which discharges are persistent, and prioritize those discharges that will be investigated and eliminated. This program is designed to assess the effectiveness of jurisdictional programs to effectively prohibit non-stormwater discharges. Each Participating Agency performs field screening of a certain number of outfalls and at a frequency required by the Permit to maintain an up-to-date inventory of persistently flowing outfalls and to initiate follow-up investigations that identify and mitigate the source(s). The data collected during field screening are one of the sources of information for the Participating Agencies' IDDE Programs (see Section 3.2.1.3).

The number of storm drain outfall stations included in the field screening and the total number of visual observations conducted by each Participating Agency in the WMA are presented in Table 3-11. Field screening at upstream proxy locations (e.g., manholes) for inaccessible outfalls may result in more than one location representing an outfall, and these upstream locations are included in the station counts and visits. Some source investigations were performed during routine visits and are included in the routine visits column, while others were conducted as separate follow-up visits and are included in the source investigations column.

Table 3-11. Number of Visual Observations Conducted in the San Luis Rey River WMA During the 2015-2016 Monitoring Period

Participating Agency	Number of Major Storm Drain Outfall Stations Visited	Number of Routine Visits[1]	Number of Separate Source Investigations	Number of Additional Visits for Other Programs[2]
County of San Diego	21	48	41[3] (6 outfalls)	70 visits (16 stations)
Oceanside	36	72	NA[4]	NA
Vista	4	8	NA[4]	NA

[1] Includes persistent flow monitoring events.

[2] Includes flow data but may not include all visual observations typically conducted during a routine field screening visit. Data were used in flow determinations and estimation of annual non-stormwater volumes.

[3] Six source investigations were associated with SLR-045, a storm drain outfall of less than 36 inches in diameter with persistent non-storm water flow.

[4] Source investigations were performed during persistent flow monitoring events.

Participating Agencies recorded numerous visual observations regarding outfall and flow characteristics including flow conditions (flowing, ponded, dry, or tidal), whether or not the flow reached the receiving water, whether or not there was a non-storm water flow source, potential non-storm water sources, if the flow source was eliminated, evidence of obvious illicit connections or illicit discharges (IC/ID), whether trash was present and the relative amount, and whether there was evidence of illegal dumping. The results from these observations are discussed in detail in Appendix 4, and the complete set of visual observations recorded during dry weather field screening visits are provided in Attachment 4D to Appendix 4. Field screening observations included the following:

- Field screening trash assessment results indicated that there was no trash or a low (<50 pieces) presence of trash during the majority (83%) of the trash assessments (n = 129 at visited outfalls.
- Visual observations indicated no flowing water or standing water for 81% of visits conducted by the City of Oceanside, 50% by the City of Vista, and 47% by the County of San Diego. Flow was observed during 6% of the 72 visits conducted by the City of Oceanside, 50% of the 8 visits by the City of Vista, and 34% of the 53 visits by the County of San Diego.
- When flow was observed, more than half (14 of 26) of the flow rates were less than five gallons per minute.

Based on these field screening visits and available historical data, the Participating Agencies determined the flow status of each major storm drain outfall as persistent, transient, or dry. As defined in the Permit, flow status for a given outfall is "dry" if no flowing or standing water is observed at the outfall over three most recent visits, and "persistent" flow is defined as presence of flowing or standing water upon three most recent visits. Otherwise, the outfall status is classified as "transient." The number of storm drain outfalls in each category are shown by Participating

Agency in Table 3-12. Additional details and a map of these outfall flow determinations can be found in Appendix 4.

Overall, since the prior monitoring year (WESTON, 2016a), the number of dry outfalls increased by four, the number of transient outfalls decreased by six, and the number of persistent outfalls increased by four, two of which were previously classified as undetermined. No modifications to field screening monitoring locations or frequencies are planned for the 2016-2017 monitoring year in the San Luis Rey River WMA.

Table 3-12. 2015-2016 Dry Weather Storm Drain Outfall Flow Determinations for the San Luis Rey River WMA

Participating Agency	Persistent	Transient	Dry/No Flow	Grand Total
County of San Diego	7	4	10	21
City of Oceanside	3	8	25	36
City of Vista	2	0	2	4
GRAND TOTAL	**12**	**12**	**37**	**61**

Major storm drain outfalls are prioritized for monitoring based on criteria such as persistence of non-stormwater flow, monitoring data results, and the potential threat to receiving water quality. The highest priority outfalls for each Participating Agency in the WMA for the 2015-2016 monitoring year are shown in Table 3-13. These outfalls are also presented in Figure 3-3, which shows the dry and wet weather storm drain outfall monitoring locations in the San Luis Rey River WMA. The City of Oceanside began the season with five highest priority outfalls and added a sixth outfall (SLR-025) due to dry conditions at the several of the initial five highest priority outfalls.

Table 3-13. Highest Priority Outfalls in the San Luis Rey River WMA During the 2015-2016 Monitoring Year

Participating Agency	Station
County of San Diego	MS4-SLR-041, MS4-SLR-095, MS4-SLR-150, MS4-SLR-152, MS4-SLR-155
City of Oceanside	SLR-005, SLR-008, SLR-015, SLR-025, SLR-035, SLR-036
City of Vista	SLR-01, SLR-03

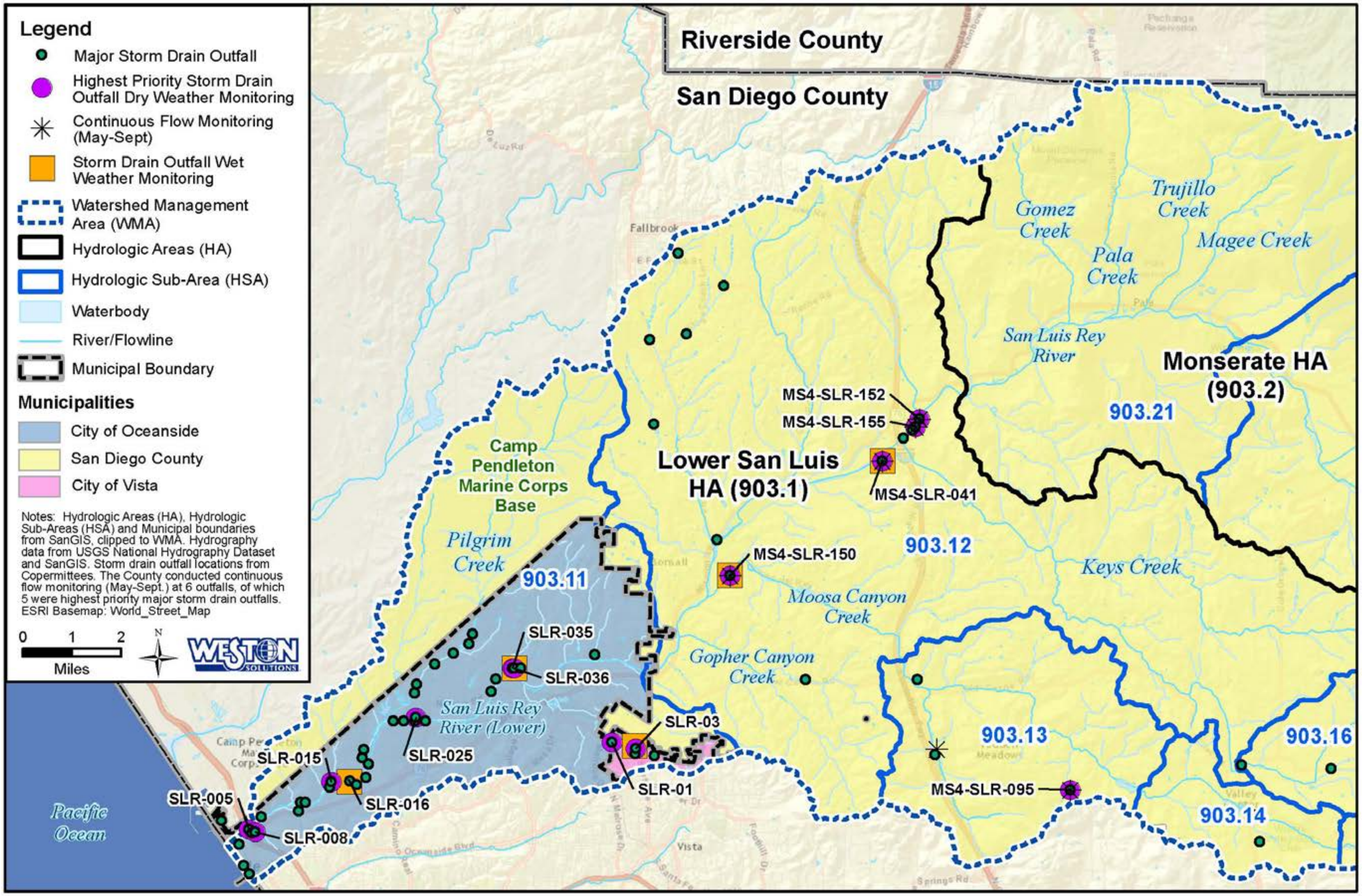


Figure 3-3. 2015-2016 Dry and Wet Weather Storm Drain Outfall Monitoring Locations in the San Luis Rey River WMA

3.2.1.2 Highest Priority Storm Drain Outfall Dry Weather Monitoring

The purpose of highest priority storm drain outfall dry weather monitoring is to evaluate the potential contribution from storm drain outfall discharges to receiving water quality during dry weather and to assess the ability of programs to effectively eliminate non-stormwater discharges to waterbodies or waterways.

The 2015-2016 monitoring year was the first year of dry weather storm drain outfall analytical sampling under the WQIP MAP, and monitoring was conducted at the highest priority outfalls identified for each Participating Agency in the WMA (Table 3-13). These monitored outfalls are shown in Figure 3-3. Two sampling events were conducted at each of the flowing outfalls. Three of the outfalls under the jurisdiction of the City of Oceanside were dry during both visits, and one was dry or ponded during three visits. These outfalls were not sampled due to lack of flow. In addition, one of the outfalls under the jurisdiction of the County of San Diego was dry during the first persistent flow monitoring visit and enough ponded water was available for analytical sampling during the subsequent monitoring visits. Temperature, pH, conductivity, dissolved oxygen, and turbidity were analyzed using field meters. Grab samples were analyzed in the laboratory for constituents contributing to the HPWQC, 303(d) List impairments, TMDLs, stormwater action levels (NALs), and those listed in Table D-7 of the Permit. Visual observations were also recorded.

A summary is provided in Table 3-14 in relation to bacteria in the WMA, and detailed results are presented in Sections 4.2.2 (data) and 4.2.3 (assessments) of Appendix 4. *Enterococcus* concentrations were above the instantaneous maximum (IM) NAL except in both samples from SLR-01 and one of two samples collected at MS4-SLR-095 and MS4-SLR-150. Fecal coliform concentrations were above the IM in approximately half of the samples collected. Both samples from MS4-SLR-095, MS4-SLR-155, and SLR-01 and one of two samples from MS4-SLR-152 and SLR-036 were below the IM. These highest priority outfalls were a specific focus for IDDE investigations (Section 3.2.1.3).

No re-prioritizations of the highest priority outfalls by the City of Vista or County of San Diego are planned for the 2016-2017 monitoring year in the WMA. The highest priority outfalls selected for analytical monitoring in 2015-2016 will continue to be monitored until one of the following conditions outlined in the Permit have been met:

- No flowing or standing water observed over the three most recent consecutive visits.
- No exceedances of NALs.
- Identified as a non-stormwater discharge authorized under a separate NPDES permit.

When an outfall fulfills one of these criteria or the threat to water quality has been reduced (as outlined in the Permit), it will be replaced with the next highest priority outfall on the Participating Agency's list for the WMA. Based on the 2015-2016 monitoring results, the City of Oceanside is updating its outfall prioritization due to changes in outfall flow determinations. SLR-005 and SLR-035, which were dry for three consecutive visits, will be replaced with the next two high priority outfalls, SLR-007 and SLR-025, in the top five high priority outfalls for analytical monitoring in 2016-2017.

Table 3-14. Dry Weather Storm Drain Outfall Discharge Monitoring Analytical Results for Bacteria

Outfall	Date	*Enterococcus* (MPN/100 mL)	Fecal Coliform (MPN/100 mL)	Total Coliform (MPN/100 mL)
NAL – Instantaneous Maximum		**61**	**400**	**NA**
County of San Diego				
MS4-SLR-095	01/19/2016	<2	<20	300
	06/14/2016	**1,700**	<200	30,000
MS4-SLR-150	01/19/2016	<200#	**22,000**	240,000
	06/14/2016	**2,300**	**13,000**	500,000
MS4-SLR-152	12/08/2015	**220**	300	1,300
	06/14/2016	**2,100**	**1,700**	35,000
MS4-SLR-155	12/08/2015	**80**	20	5,000
	06/14/2016	**140**	200	2,400
City of Oceanside				
SLR-025	02/16/2016	**3,200**	**50,000**	110,000
	08/29/2016	**2,020**	**130,000**	>1,600,000
SLR-036	02/16/2016	**75**	40	5,000
	08/02/2016	**19,600**	**2,300**	>1,600,000
City of Vista				
SLR-01	08/04/2016	<10	<20	2,300
	08/16/2016	20	20	7,000
SLR-03	08/24/2016	**2,700**	**24,000**	30,000
	09/19/2016	**>2,420**	**30,000**	160,000

MPN/100 mL – most probable number per 100 milliliters
Bold and shaded results are greater than the Instantaneous Maximum.
< - Results are less than the reporting limit.
#- Reporting limit greater than Instantaneous Maximum benchmark.

Since persistent non-stormwater flows were identified in the storm drain system by each of the Participating Agencies in the WMA, the Participating Agencies are required to calculate or estimate the non-stormwater volumes and pollutant loads collectively discharged from these persistently flowing outfalls to receiving waters, and estimate percent contributions from each known source for each outfall. The Participating Agencies are also required to identify and quantify (i.e., volume and pollutant loads) sources of non-storm water not subject to the Participating Agency's legal authority that are discharged from the major storm drain outfalls, with persistent flow, to downstream receiving waters. Annual discharge volumes and non-stormwater pollutant loads were estimated for the persistently flowing outfalls using instantaneous flow measurements made during field visits and continuous flow data where available. Dry weather visual observation and field investigation data related to known and/or suspected sources of non-stormwater discharge were used to estimate the percent contribution from each source, including suspected sources. The assessment was not limited to known sources given that most of the sources were recorded as suspected.

The estimated annual non-storm water volumes collectively discharged from major storm drain outfalls with persistent non-stormwater flows from each jurisdiction in the San Luis Rey WMA are presented in Table 3-15. Estimated pollutant loads and source percentages are provided in Attachment 4E to Appendix 4.

Table 3-15. 2015-2016 Non-stormwater Flow Estimates for Major Storm Drain Outfalls with Persistent Flow

Participating Agency	No. Persistently Flowing Major Storm Drain Outfalls	Annual Non-Storm Water Discharge (cf)	Annual Average Discharge by Outfall (cf/outfall)
County of San Diego	7	5,945,734	849,391
City of Oceanside	3	322,363	107,454
City of Vista	2	65,122 to 100,061	32,561 to 50,031*

*Range based on SLR-03 discharge for August-September 2016 (56 dry days) since IC/ID discovery, and continuous discharge for the year (298 dry days) to represent the most conservative result, given that the start date of the leak is unknown. Repair work is scheduled. Follow-up assessment is ongoing.

3.2.1.3 Illicit Discharge Detection and Elimination (IDDE) Program

In order to reduce the pollutant loads from the storm drain system to receiving waters, each Participating Agency implements a program to reduce non-stormwater flow into its storm drain system. These programs are designed to meet the requirements of the Permit related to IDDE. Each Participating Agency's IDDE Program is one of the primary programs of their JRMP.

Each Participating Agency's IDDE Program seeks to address and reduce the potential contribution of pollutants from stormwater and non-stormwater discharges. The IDDE Programs seek to achieve the following goals:

- Controlling the contribution of pollutants to and the discharges from the storm drain system within its jurisdiction,
- Effectively prohibiting non-stormwater discharges to the storm drain system, and
- Reducing the discharge of pollutants in stormwater to the maximum extent practicable.

In pursuit of these goals, and in addition to the programmatic elements of the IDDE Programs, the Participating Agencies prioritize outfalls and sources, conduct follow-up investigations, and seek to identify sources of non-stormwater discharges on the basis of the following:

- Field screening visual observations at major storm drain outfalls,
- Non-stormwater monitoring at prioritized outfalls, and
- Reports or notifications of illicit discharges, illicit connections, or other sources of non-stormwater flow (e.g., from hotlines).

In addition to outfall monitoring and associated source investigations, the IDDE programs also include the following components to prevent, identify, and eliminate IC/IDs:

- Educating the local community about prohibited discharges and how to prevent them. During the 2015-2016 fiscal year, this outreach program included working closely with water utilities to educate communities about outdoor water conservation, including preventing irrigation runoff.
- Operating a public complaint phone hotline and website and investigating the complaints received.
- Inspecting industrial/commercial and municipal facilities, construction sites, and residential areas. In addition to identifying and eliminating IC/IDs where applicable, inspectors also proactively educate responsible parties about how to avoid IC/IDs, such as cleaning outdoor areas by sweeping instead of hosing them off.
- Maintaining the storm drain system and sewer system, which provide opportunities to identify unpermitted connections to the storm drain system, cross connections, and other potential sources of IC/IDs.

The IDDE components listed above are described in more detail in Section 4 and in the jurisdictional strategy tables in Appendix 2. The Participating Agencies' JRMP Annual Report forms, also included in Appendix 2, list the total numbers of IC/IDs identified and eliminated through all IDDE program activities during the fiscal year. More details about source investigation and elimination specifically related to the dry weather MS4 outfall monitoring component of the IDDE program are described in greater detail in Appendix 4.

3.2.1.3.1 Dry Weather Storm Drain Outfall Source Identification Results

Source investigations for storm drain outfall monitoring broadly categorize identified sources as "controllable" and "uncontrollable." Uncontrollable sources include natural sources such as groundwater and springs. Controllable and uncontrollable sources are further classified as known and suspected. All but three sources were categorized as suspected; two known sources were groundwater and one was irrigation. The most common source of non-stormwater flow suspected during the Participating Agencies' investigations was irrigation runoff, a controllable source. This flow source includes over-watering of residential and commercial landscaping, and does not include irrigation runoff from agricultural areas, which is regulated by the Regional Board under a separate program and is outside of the jurisdiction of the Participating Agencies. Figure 3-4 shows the known or suspected flow sources identified during the 2015-2016 monitoring year through the Participating Agencies' outfall flow investigations.

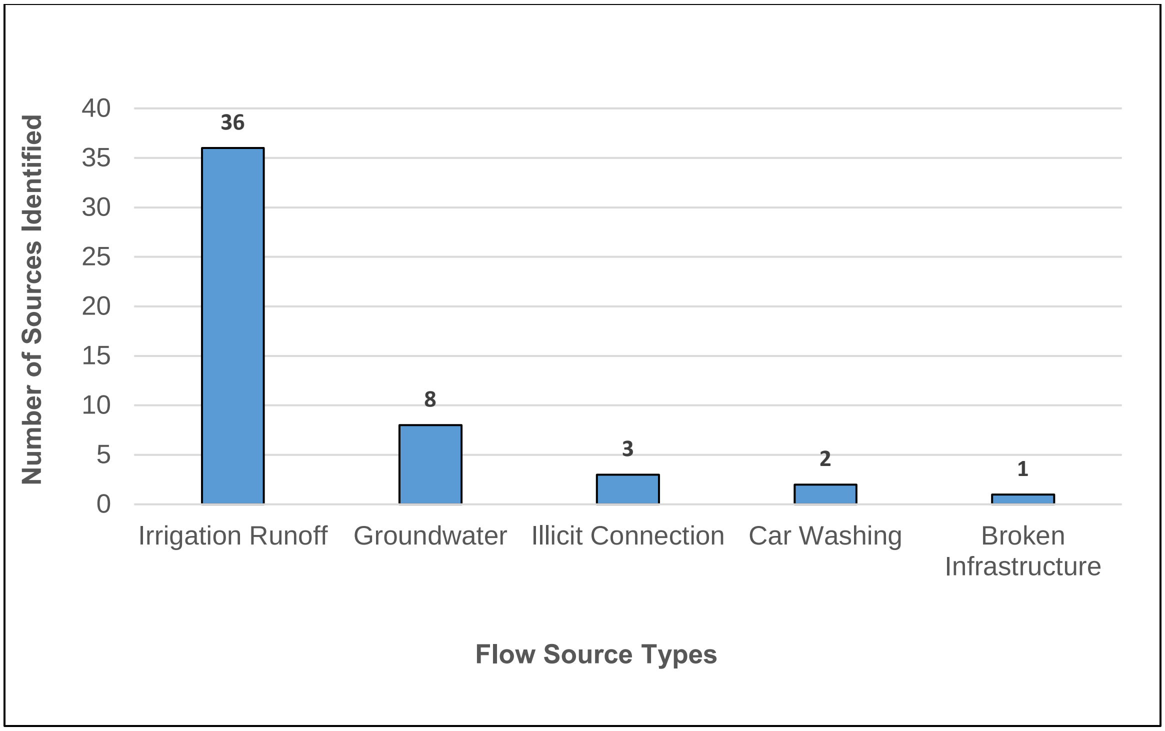


Figure 3-4. Known or Suspected Non-stormwater Flow Sources Identified for Participating Agencies' Outfalls

3.2.1.3.2 Storm Drain Outfall Investigation Details for Participating Agencies

The City of Oceanside conducted five non-stormwater flow source investigations upstream of two priority outfalls and found over irrigation as a known source for flows at one outfall during one visit and rising groundwater as a known source at the other outfall. The City of Vista conducted four non-stormwater flow source investigations upstream of two of its priority outfalls and did not find over irrigation as a source flow; instead, it suspected groundwater seepage, which is an allowable discharge, and a leaking fire hydrant as sources of flow. The County of San Diego conducted 41 non-stormwater flow source investigations upstream of six of its outfalls in the San Luis Rey River WMA, five of which are their highest priority outfalls and one which is not a major storm drain outfall (i.e., less than 36 inches in diameter) but was nonetheless prioritized for an IDDE investigation as it was found to have persistent non-stormwater flow, high concentrations of indicator bacteria in the discharge, and evidence of a potential human source of contamination (see Attachment 4J to Appendix 4). The County found numerous sources of non-stormwater flows draining to these outfalls; over-irrigation was the most common suspected source.

This information is presented in greater detail in Appendix 4, and additional information on these efforts and on other Participating Agencies' activities is provided in Section 4.

3.2.2 Storm Drain Outfall Wet Weather Monitoring

The purpose of storm drain outfall wet weather monitoring is to identify and quantify pollutants in stormwater discharges from the storm drain system, guide pollutant source identification efforts, and track progress in achieving numeric goals set forth in the WQIP. The Participating Agencies' five monitoring locations were chosen to be representative of the Residential, Commercial, Industrial, and typical Mixed-use land uses within the watershed in accordance with the Permit.

Three outfalls were located in the Mission HSA and two were in the Bonsall HSA. This is the first year of storm drain outfall wet weather monitoring in accordance with the WQIP MAP. The prior two years of wet weather monitoring were under the transitional monitoring program with a different list of analytical parameters. The storm drain outfall wet weather monitoring stations for the WMA are presented in Table 3-16 with both the station name used in the wet weather monitoring program and the identifier used by the jurisdiction in their storm drain outfall inventory. The monitored outfalls and their drainage areas are shown in Figure A4-10 in Appendix 4. The locations of outfalls MS4-SLR-1 and MS4-SLR-2 have not been adjusted since the second year of transitional monitoring, and the locations of outfalls MS4-SLR-3, MS4-SLR-4, and MS4-SLR-5 have been unchanged since transitional monitoring began. Therefore, two years of storm drain outfall wet weather monitoring data have now been collected at MS4-SLR-1 and MS4-SLR-2, and three years of data have been collected at MS4-SLR-3, MS4-SLR-4, and MS4-SLR-5.

Table 3-16. Storm Drain Outfall Wet Weather Monitoring Stations

Storm Drain Outfall Name	Jurisdictional Identifier	Participating Agency	HSA Name/No.	Latitude	Longitude
MS4-SLR-1	SLR-036	City of Oceanside	Mission/903.11	33.25583	-117.29243
MS4-SLR-2	SLR-016	City of Oceanside	Mission/903.11	33.22186	-117.34984
MS4-SLR-3	SLR-03	City of Vista	Mission/903.11	33.232546	-117.249591
MS4-SLR-4	MS4-SLR-150	County of San Diego	Bonsall/903.12	33.283702	-117.217033
MS4-SLR-5	MS4-SLR-041	County of San Diego	Bonsall/903.12	33.317871	-117.163833

Monitoring events were conducted in accordance with the WQIP MAP on December 11, 2015 at MS4-SLR-4; on January 5, 2016 at MS4-SLR-1 and MS4-SLR-2; and on January 31, 2016 at MS4-SLR-3 and MS4-SLR-5. Grab samples were collected and analyzed for pH, temperature, conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria. Composite samples were collected and analyzed for constituents contributing to the HPWQC, 303(d) List impairments, and stormwater action levels (SALs). Observational and hydrologic data were also recorded. The rainfall statistics for these monitored events, based on nearby Alert station gauges, are presented in Table 3-17. The highest event volume was observed at MS4-SLR-5 in the Bonsall HSA, and the highest peak flow was observed at MS4-SLR-2 in the Mission HSA. The lowest event volume and peak flow were observed at MS4-SLR-4 in the Bonsall HSA. Wet weather MS4 flow data are presented in Attachment 4F to Appendix 4.

Table 3-17. 2015-2016 Rainfall Statistics for Storm Drain Outfall Wet Weather Monitoring Events

Date	Outfall Name/ Jurisdictional Identifier	Total Rain (in)	Duration (hours)	Intensity (in/hour)	Antecedent Dry Days	Event Volume (cf)	Peak Flow (cfs)
01/05/2016	MS4-SLR-1/ SLR-036	1.20	7.55	0.16	13	33,644	9.54
01/05/2016	MS4-SLR-2/ SLR-016	1.20	7.55	0.16	13	76,181	14.6
01/31/2016	MS4-SLR-3/ SLR-03	0.55*	7.60*	0.07*	19	30,585*	6.75*
12/11/2015	MS4-SLR-4/ MS4-SLR-150	0.28	3.13	0.09	12	18,516	8.06
01/31/2016	MS4-SLR-5/ MS4-SLR-041	0.68	14.3	0.05	19	84,099	13.4

in – inches cf – cubic feet cfs – cubic feet per second

*Intermittent flow not associated with sampling activities was observed between 02:30 and 04:00 (peak of 0.88 cfs; discharge of 1,520 cf).

A summary is provided below in relation to bacteria, and detailed results are presented in Appendix 4 Section 4.25 (data) and 4.26 (assessments).

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform indicated that the highest concentrations were measured at MS4-SLR-1, located in the Mission HSA (903.11). Concentrations of *Enterococcus* and fecal coliform in stormwater discharges from all five outfalls were above the single sample maximums specified for the Bacteria TMDL (WQBELs discharging to freshwater creeks with REC-1 beneficial use). Results are summarized in Table 3-18. Analytical results for all constituents and the assessments required by the Permit are provided in Appendix 4. The required assessments are also provided in Appendix 4 and its attachments. The land-use based assessment required by the Permit was completed for the third year; a more robust data set was developed for the land-use based assessment of wet weather storm drain outfall discharge, and land-use based event mean concentrations (EMCs) were refined based on three years of monitoring. Details are provided in Appendix 4 and its attachments.

Table 3-18. Storm Drain Outfall Wet Weather Monitoring Analytical Results for Bacteria

Analyte	Single Sample Maximum[1]	MS4-SLR-1 (903.11)	MS4-SLR-2 (903.11)	MS4-SLR-3 (903.11)	MS4-SLR-4 (903.12)	MS4-SLR-5 (903.12)
		SLR-036	SLR-016	SLR-03	MS4-SLR-150	MS4-SLR-041
		1/5/2016	1/5/2016	1/31/2016	12/11/2015	1/31/2016
Enterococcus (MPN/100 mL)	61	**100,000**	**32,000**	**11,000**	**350**	**2,200**
Fecal Coliform (MPN/100 mL)	400	**34,000**	**4,400**	**800**	**500**	**2,400**
Total Coliform (MPN/100 mL)		60,000	60,000	5,400	1,600	2,400

[1] Single Sample Maximum Final Effluent Limitations from Table 6.2c. Regional Water Quality Control Board Order No. R9-2013-0001, Attachment E.

Bold/shaded values do not meet Single Sample Maximum Final Effluent Limitations.

MPN/100 mL – most probable number per 100 milliliters

3.3 SPECIAL STUDIES SUMMARY

Special Studies are conducted to "address pollutant and/or stressor data gaps and/or develop information necessary to more effectively address the pollutants and/or stressors that cause or contribute to highest priority water quality conditions identified in the Water Quality Improvement Plan (Regional Board, 2013)." An overview of the conducted and planned special studies for the watershed for the current Permit term is presented in Table 3-19. Descriptions of the studies and results, where available and applicable to bacteria, are provided below. An assessment of special study results is presented in Appendix 4.

Table 3-19. Special Studies Occurring within the San Luis Rey River Watershed

Monitoring Programs	Dry	Wet	Monitoring Element	Permit Schedule[a]				
				2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
San Diego Regional Reference Streams and Beaches	X		Field parameters, conventionals, bacteria instantaneous flow	2012-2014	●	–	–	–
			Streams only: nutrients, metals, bioassessment, including physical habitat and chlorophyll a		–	–	–	–
		X	Field parameters, conventionals, bacteria		●	–	–	–
			Streams only: nutrients, metals, toxicity, flow and precipitation (duration of storm)		●	–	–	–
San Luis Rey River Microbial Source Tracking Study	X		GIS analysis, visual surveys, flow monitoring, bacteria chemistry, host-specific MST markers, source investigations using CCTV, dye testing, smoke testing	–	–	–	●	●

[a] The Permit was adopted on May 8, 2013; the Permit became effective on June 27, 2013.

3.3.1 San Diego Regional Reference Streams and Beaches Studies

From 2014 to 2016, the Participating Agencies participated in the San Diego Regional Reference Streams (Tiefenthaler et al., 2015) and Beaches (Tiefenthaler et al., 2016) Studies, which measured levels of indicator bacteria that account for natural sources to establish the background concentrations, or "reference conditions," for streams or beaches minimally disturbed by anthropogenic activities. This reference system approach results in allocation of allowable exceedance days based on the frequencies of exceedance at reference sites with natural sources of bacteria. The results of these studies support the forthcoming re-evaluation of the Bacteria TMDL and numeric target development for future TMDLs. These studies were intended to provide data to support discussions of reasonable, accurate targets for indicator bacteria at Southern California streams and beaches.

3.3.1.1 Reference Streams Study

This study investigated concentrations of indicator bacteria, nutrients, metals, and conventional constituents occurring naturally at reference streams in minimally disturbed watersheds in

Southern California during wet and dry weather. Although additional constituents were analyzed, the primary focus of the study was indicator bacteria. The study also sought to categorize exceedance frequencies for indicator bacteria by hydrologic, geomorphologic, biotic, and abiotic factors. Human genetic marker results were used to exclude sites and samples with potential human sources of fecal contamination so that observed exceedance rates were not due to human sources of bacteria. Results are presented in detail in the Technical Report (Tiefenthaler et al., 2015) provided as Attachment 4H to Appendix 4 of this Annual Report.

Findings from the study included the following:

- Indicator bacteria concentrations measured during the study were generally below water quality objectives except for *Enterococcus*, and exceedance frequencies were highest during summer dry weather.
- Wet weather EMC exceedance frequencies were low except for *Enterococcus*. The number of events was not sufficient to determine whether relationships exist between the exceedance frequencies and watershed size and/or geology.
- Temperature was the major factor associated with elevated summer dry weather concentrations of indicator bacteria, although total suspended solids (TSS), nutrients, and organic carbon were also positively correlated. No significant relationships between indicator bacteria concentrations and watershed size or geology were observed during dry weather.
- EMC fluxes (flux was calculated as the ratio of mass loading and watershed area) during wet weather were two to three times greater than during dry weather and were comparable to those described in previous studies.

3.3.1.2 Reference Beaches Study

This study investigated concentrations of indicator bacteria occurring naturally at reference beaches during a period of prolonged drought. Results are presented in detail in the Technical Report (Tiefenthaler et al., 2016) provided as Attachment 4I to Appendix 4 of this Annual Report.

Findings from the study included the following:

- Indicator bacteria concentrations and exceedance frequencies during both winter and summer dry weather were low at both monitored beaches. This is consistent with results from previous studies of beaches with blocked estuary inlets or beaches with flowing creeks and no estuary.
- Indicator bacteria concentrations in the estuary or mixing zone associated with both beaches were one to three orders of magnitude greater than those at the corresponding beach, and were higher at San Onofre Creek than Deer Creek. Exceedance frequencies were also higher in the estuary associated with San Onofre Creek compared to the mixing zone associated with Deer Creek. This suggests that dry weather exceedance frequencies may have been greater if the estuary had been open to tidal exchange.
- At both study locations, no significant relationships between indicator bacteria and water temperature, salinity, or antecedent dry days were observed, but indicator bacteria concentrations decreased with the number of antecedent dry days at the San Onofre Creek

beach and increased with the number of antecedent dry days in the associated estuary. Significant positive correlations were found between total coliform concentrations and water temperature, salinity, and antecedent dry days and between *E. coli* and fecal coliform and salinity in the estuary associated with San Onofre Creek. These correlations indicate that freshwater input from the creek dilutes bacteria concentrations. Regrowth of bacteria may have been a factor at this estuary.

- During the single monitored storm event, indicator bacteria exceedances were common in the San Onofre Beach creek and estuary samples, but exceedances were observed at the beach only on the day of the storm. Since all samples associated with this storm event were positive for human genetic marker, results could not be used to determine natural background exceedance frequencies. However, positive human marker results were rare throughout the study overall, indicating that the study locations may be suitable reference sites.

3.3.2 San Luis Rey River Microbial Source Tracking Study

A dry weather microbial source tracking (MST) study was conducted in the San Luis Rey River watershed consisting of a preliminary outfall investigation, a storm drain network investigation, and an evaluation of potential remedial activities. Preliminary findings were reported in the Dry Weather Microbial Source Tracking Study Preliminary Findings Report (December 2015) included in the current report as Attachment 4J to Appendix 4. The findings are summarized below.

The preliminary outfall investigation involved inspections and sampling of storm drain outfalls in the sewered portions of the unincorporated area of San Diego County within the watershed. Of the 130 outfalls investigated, 14 were flowing and were sampled. Human marker was detected at quantifiable levels in samples from three of these 14 flowing outfalls (human marker was detected at a level below the quantification limit at one additional outfall). In addition, dog marker was found in samples from four outfalls, and pig and ruminant markers were found in one sample. Concentrations of fecal coliform and/or *Enterococcus* were above water quality objectives in all but one sample.

The storm drain network investigation involved water sampling for outfalls positive for human marker during the preliminary outfall investigation and visual observations for all outfalls flowing during the preliminary outfall investigation. Indicator bacteria results were elevated in all water samples, but none were positive for genetic markers. Several sources of non-stormwater flow and bacteria were observed, but no potential human sources of bacteria were identified in the vicinity of flowing outfalls. In addition, no illicit connections or leaks were observed during the storm drain network investigation. Irrigation runoff was identified as the most common source of non-stormwater flow, and agriculture discharge was identified as the largest contributor to flow volume.

The evaluation of potential remedial activities resulted in prioritization of several actions to achieve compliance with the Permit during dry weather. These actions included notifying agricultural owners of their pollutant contributing flows and discussing compliance approaches with the Conditional Waiver of Discharges from Agricultural and Nursery Operations, implementing source control measures (e.g., public outreach, ordinance development and enforcement, wildlife access restriction devices, and storm drain cleaning), evaluating the effectiveness of source control measures and identifying remaining flowing outfalls requiring additional remediation, and eliminating remaining non-stormwater flows using structural best management practices (BMPs) (e.g., wet weather BMPs recommended in the San Luis Rey Comprehensive Load Reduction Plan [CLRP], pervious gutters, catch basin drywells, and green street-type bioretention swales).

Results from this preliminary MST study will be used to support Permit compliance and Bacteria TMDL implementation planning, and may potentially serve as the first step in future Natural Source Exclusion and/or Quantitative Microbial Risk Assessment (QMRA) work. “Next steps” identified in the preliminary MST investigation report include:

- Conduct follow-up outfall investigations.
- Investigate whether recycled water tests positive for human genetic markers, and determine which outfalls may contribute recycled water.
- Conduct the dry weather MST study in the septic served areas of the County of San Diego’s jurisdiction in the San Luis Rey watershed.
- Continue to implement special studies that may potentially modify TMDL WQBELs during the TMDL reopener.
- Notify agriculture owners of their pollutant contributing flows and discuss compliance approaches with the Conditional Waiver of Discharges from Agricultural and Nursery Operations.
- Enhance source control measures.
- Develop an ongoing study evaluating the effectiveness of source control measures and monitoring the presence of non-stormwater flows.

4 Implementation and Progress Toward Achieving Numeric Goals

The Permit requires the Participating Agencies to develop specific water quality improvement numeric goals and strategies to address their HPWQC, which is identified as bacteria for the San Luis Rey River WMA.

Each year, the Participating Agencies assess specific water quality data and programmatic information in order to gauge progress towards achieving the numeric goals. These assessments provide information to determine whether intended outcomes are being realized or whether adaptations of Participating Agencies' programs are necessary. This section discusses the strategies that have been implemented during the reporting period, the progress towards achieving specific Permit term goals for the watershed, and provides an overview of proposed modifications to goals, strategies, and schedules. Data collected per the JRMP and MAP, along with the schedules developed in conjunction with each goal, were used to assess goals. Note that the selected strategies necessarily target bacteria in the watershed, but also address other pollutants as well, providing a multi-benefit approach to implementation.

4.1 STRATEGIES AND SCHEDULES

The strategies being implemented by the Participating Agencies are the mechanisms that enable improvements in water quality to achieve the numeric goals outlined in Section 2. The chosen strategies have been identified and selected based on their likelihood of achieving one or more of several of the following outcomes:

- Effectively prohibiting non-stormwater discharges to the storm drain system (dry weather);
- Reducing pollutants in stormwater discharges from the storm drain system to the maximum extent practicable (wet weather); and/or
- Protecting the beneficial uses of receiving waters from storm drain outfall discharges.

Achievement of these outcomes and the success of the strategies will ultimately be measured against the interim and final numeric goals.

4.1.1 Overall Watershed Strategy Implementation Highlights

During FY 2015-2016, the Participating Agencies implemented a broad range of strategies to target bacteria, as well as other constituents such as nutrients and trash. Highlights of some of the strategies being implemented by the Participating Agencies during FY 2015-2016 are described below. Tables presenting all strategies by jurisdiction are presented in Appendix 2.

In the San Luis Rey River WMA, numerous strategies focusing on reducing bacteria from both human and non-human sources were implemented across the watershed and are highlighted below.

- **Preventing discharges of bacteria from human sources to the storm drain system**. Human sources of bacteria are the highest priority from a public health perspective.
  - Sanitary Sewer Overflows (SSOs)
    - Implementation of internal staff training programs to identify and report SSOs to ensure a prompt response.
    - Existing development inspections programs address SSOs through outreach, inspections, and enforcement of ordinances.
  - Leaky Sewer Pipes
    - New monitoring programs focusing on persistent dry weather flows and investigations continue to identify areas where bacteria concentrations are elevated and trigger source investigations.
    - Participating Agencies may prioritize sewer lines repairs with analysis of water quality data.
  - Homeless Encampments
    - Sponsoring periodic trash cleanups along the lower San Luis Rey River, which reduce the impacts of trash and associated bacteria on receiving waters.
    - Coordination with local efforts to curb homeless issues in the region.
  - Failing Septic Systems
    - Residential inspections programs to identify properties with failing septic systems, triggering response and follow up.
    - Coordination with the County Department of Environmental Health for follow-up remediation and enforcement.

- **Preventing discharges of other bacteria sources to the storm drain system**. Non-human sources of bacteria can contribute to overall bacteria loads in our waterways. These sources are important to control as their prevalence makes them an important element of overall bacteria load reduction efforts for the Participating Agencies.
  - Pets
    - Pet waste management and outreach in municipal parks includes posting signs and installation of pet waste bag stations at trailheads. Agency maintained trails often have pet waste stations for use by the public.
  - Wash water
    - Extensive public outreach programs to educate the public about discharge prohibitions and the effect on the environment and to encourage their use of public hotlines to report illegal discharges of wash water.
    - Dry weather monitoring programs designed to focus on unusual flows, investigate their sources, and eliminate the discharge.
  - Livestock
    - The establishment and enforcement of minimum BMPs for existing development where livestock is present.
    - Outreach materials and programs provide information to owners of livestock explaining required BMPs, reasons for their necessity, and ways to implement BMPs properly.

Specific implementation approaches and actions are further described below for each of the Participating Agencies.

4.1.2 City of Oceanside

During FY 2015-2016, the City of Oceanside implemented strategies as described in the WQIP. The full list of strategies implemented is presented in Appendix 2. Notable accomplishments demonstrating progress towards applicable numeric goals related to bacteria during the reporting period are summarized below.

4.1.2.1 Illicit Discharge Strategies - Irrigation Runoff Control (IDDE 1-3, 10, 11)

Based on previously completed field screening of its outfalls in the WMA, the City of Oceanside conducted field reconnaissance in upstream residential areas to identify potential sources of non-stormwater flow into the stormwater system. In order to maximize the ability of City staff to identify these potential sources of non-stormwater flow, the City utilizes meter readers from its Water Department to identify and document runoff from residential irrigation. These staff are working in residential areas for much of their time and have the opportunity to cover large areas of the City's jurisdiction at a pace and level of detail that enables them to observe over-irrigation from residences. During the summer of 2015 the City also hired two part-time code enforcement officers to focus on residential irrigation runoff. The City has enacted drought-related restrictions on landscape irrigation and instances of over-irrigation are documented by the meter readers and followed up on by the City's Code Enforcement Division. During FY 2015-2016, 33 cases of residential irrigation runoff were documented by the meter readers, and 18 of those were in the San Luis Rey River watershed. Properties where irrigation runoff was observed were forwarded to City Code Enforcement so that a notification letter could be sent to the property owner/manager. Code Enforcement used escalated enforcement procedures as necessary for properties with recurrent irrigation runoff.

The City conducted sampling at five priority outfalls during dry weather for the 2015-2016 monitoring year to characterize the non-stormwater discharges flowing into the storm drain system and to further identify potential contributing sources of flow. Based on additional field observations of outfalls identified in the WQIP as persistently flowing, the City changed the classification of four of the five of these outfalls to dry or transient during 2015-2016, and added one new site to the priority list. These changes left the City with two of the five highest priority outfalls in the WMA that are subject to highest priority storm drain outfall dry weather monitoring during 2015-2016. Replacement outfalls with persistent flow will be added to the priority list as needed for the 2016-2017 monitoring year based on outfall field screening data. The monitoring and investigations conducted during 2015-2016 at the two outfalls mentioned above helped determine that irrigation runoff from an upstream apartment complex was a source of flow to one of the outfalls, and rising groundwater was contributing to the other. As groundwater is a natural source of flow that is exempt under the Permit, no further follow up was needed. However, the irrigation runoff case was referred for enforcement and a verbal and written warning were issued which resulted in partial termination of the flow. Subdrainage of irrigation water and other unknown sources may also be contributing flow to this site. The City will continue to monitor the outfall to determine all known and potential sources of non-stormwater discharge.

4.1.2.2 Illicit Discharge Strategies – Sanitary Sewer Line Inspections (IDDE 9, OPT-2)

In an effort to reduce the potential for sewage to leak from the City's sanitary sewer pipes, the City is in the process of using a specially designed 360-degree visualization closed circuit television (CCTV) system to inspect the sanitary sewer system. The City has determined that an effective strategy under the WQIP to reduce bacteria pollution would be to visually inspect its older vitrified clay pipes (VCP) in the sanitary sewer system which may be prone to leakage, allowing identification of potential problem areas and prioritization of repairs. The City has developed a plan to use a CCTV system to visually inspect 100% of its VCP sanitary sewer lines to look for signs of damage to the pipes where infiltration or exfiltration could occur. During FY 2015-2016, City contractors and staff visually inspected an approximate total of 130 miles of sewer lines across the entire City. Approximately 30 miles of the total footage inspected by CCTV was within the San Luis Rey River watershed. The City of Oceanside's in-house sewer collections crews inspected 98,652 linear feet (18.6 miles) of City-owned sewer lines within the watershed during FY 2015-2016.

4.1.2.3 Illicit Discharge Strategies – Slip Lining Sanitary Sewer Pipes (IDDE 8)

In an effort to minimize the potential for exfiltration from the sanitary sewer system, which could impact surrounding soils, the proximal storm drain system, and/or receiving waters, the City rehabilitated approximately 4,000 feet of sanitary sewer lines with new cured in place pipe (CIPP) liners within its entire jurisdictional area during FY 2015-2016. CIPP provides a new lining of the insides of the sanitary sewer pipes through insertion of a flexible liner pipe into the existing sanitary sewer pipes. The liner is then expanded to fit the old pipe and hardens in place providing a new leak resistant pathway for the sewage to flow. This method of retrofitting old sewer lines extends their service, reduces the potential for exfiltration, reduces sewer pipe replacement costs, and minimizes surface disruption as it requires little if any excavation of the old pipes.

4.1.2.4 Illicit Discharge Strategies – Illicit Discharge/Bacteria Source Control (IDDE 5, 10)

In order to reduce the potential impacts of homeless encampments on water quality, during FY 2015-2016, the City applied for grant funding under the Integrated Regional Water Management Program's Disadvantaged Communities grant programs. If the application is successful, the grant funds will be used to help conduct a survey of homeless citizens to determine what types of incentives could be implemented to assist them in helping to adopt behaviors related to trash and human waste management to help reduce bacteria pollution.

4.1.2.5 Illicit Discharge Strategies – Sanitary Sewer Systems (Strategies IDDE 5, 6, 10)

The City is a member of the San Luis Rey Watershed Council (SLRWC), a non-profit organization of diverse stakeholders who are working together to help restore and maintain the natural resources of the WMA. The SLRWC has been an active group in the watershed for many years and has implemented programs locally which aim to benefit water quality in the watershed. Their efforts have included water use efficiency conservation programs, which seek to help educate citizens about wise use of limited local water supplies. In addition, the SLRWC has provided assistance to homeowners in the Warner Springs community who have experienced problems with their onsite septic systems, which have been identified as potentially significant sources of bacteria if not properly sited and maintained. The SLRWC also installed composting toilets in various locations of the watershed.

4.1.2.6 Existing Development Strategies - Water Conservation Outreach (Strategies ED 1-3, 8)

The City of Oceanside hosted a series of landscaping educational workshops for residential property owners during FY 2015-2016. These workshops focused on helping citizens to understand watershed concepts which they can mimic on a small scale on their own properties in order to reduce water use and minimize irrigation runoff. The workshops promoted incentives to help homeowners undertake water saving changes such as replacing lawns or inefficient plumbing fixtures and appliances. Turf replacement is an effective tool for reducing residential water consumption, and during FY 2015-2016 more than 31,000 square feet of turf where replaced within the City. Additionally, as part of its irrigation system rebate program, the City provided 36 rebates for water conserving irrigation controllers and 19 rebates for sprinkler retrofits.

4.1.3 City of Vista

During FY 2015-2016, the City of Vista implemented strategies as described in the WQIP. The full list of strategies implemented is presented in Appendix 2. Notable accomplishments by the City in terms of progress towards achieving applicable numeric goals related to bacteria during the reporting period are summarized below.

4.1.3.1 Illicit Discharge Strategies – Identify and report (IDDE 1-7, 10)

In order to help reduce the potential for the discharge of bacteria, the City conducts an extensive program focused on eliminating illegal discharges or connections to its storm drain system. This IDDE program utilizes municipal staff and contractors to identify instances of runoff, spills, or illegal dumping that could pose a threat to water quality. When suspicious discharges are found, the City investigates the nature of the discharge and its potential sources and takes appropriate action to eliminate the discharge. During FY 2015-2016, the City documented five cases of illicit discharges in the WMA. One was a municipal source, one was an unconfirmed residential irrigation discharge, two were residential pool water discharges, and another was a residential sediment discharge. All four discharges that were able to be confirmed were eliminated upon investigation by the City.

4.1.3.2 Illicit Discharge Strategies – Dry weather flow control (IDDE 10)

During the 2015-2016 monitoring year, the City investigated its four major outfalls (SLR-01 through SLR-04) in the WMA in an effort to assess and eliminate non-stormwater flows. SLR-01 was found with persistent non-stormwater flow, and is the subject of an ongoing investigation. The source of its flow appears to be foundation drains discharging groundwater from a local school; however, the City is currently awaiting lab results to help identify the potential source. SLR-02 has been dry during all visits by City staff. SLR-03 has exhibited persistent flow from initially inconclusive sources; numerous field visits with varying degrees of flow have complicated source tracking efforts. However, a concerted effort by City staff suggests the source is a leaking fire hydrant. The hydrant is scheduled for repair, which should eliminate this source of flow. SLR-03 is one of the sites being studied in Vista (Special Study #1), which is intended to characterize persistent flows through the use of continuous flow monitoring equipment and the collection of water quality samples analyzed for the highest priority water quality conditions. Results from the study will be available upon completion. SLR-04 has been dry during investigations under this Permit term.

4.1.3.3 Illicit Discharge Strategies – Sponsor trash collection events (ED5)

During FY 2015-16, the City sponsored a site for the annual Creek to Bay cleanup day (April 23, 2016). City staff supporting the event distributed outreach materials and were available to talk directly with residents about environmental issues. Although the site was within the Carlsbad

WMA, a large number of attendees were members of an organization based within the San Luis Rey WMA. By involving and educating residents from throughout the region, cleanup events like this provide benefits beyond the limits of a particular WMA. Overall, cleanup events provide residents with the inspiration and tools to be stewards of the environment, including any waterways located near their own neighborhoods.

4.1.3.4 Existing Development Strategies - Inspections (ED 1, 12)

Similar to its efforts during FY 2014-2015, the City conducted inspections of industrial and commercial facilities during FY 2015-2016. To facilitate tracking and reporting of BMP compliance at existing development facilities, inspection forms were updated during FY 2015-2016. These revisions also included the addition of trash-related BMPs. The City conducted two municipal facility inspections, two commercial facility inspections, one industrial facility inspection, and five residential inspections in the WMA during FY 2015-2016. One commercial facility violation was found during the inspection, and zero violations were found during the municipal and industrial inspections.

Facilities likely to require a State General Industrial Permit were prioritized for inspection, enabling staff to focus inspections on facilities with an elevated potential to discharge pollutants to stormwater. Following inspections during FY 2014-2015, facilities with violations requiring follow-up were inspected again during FY 2015-2016 (along with additional sites). Although the number of enforcement actions initiated on a citywide basis for industrial and commercial facilities during these two reporting years was similar, the number of violations per site dropped substantially. This demonstrates that focused inspections have proven to be an effective use of City resources. In the upcoming fiscal year, the City plans to initiate an outreach program focused on homeowners associations within Residential Management Areas. The program will target behaviors associated with homeowner maintenance activities that have the potential to generate pollutants, which can impair water quality. This effort will include the distribution and use of bi-lingual outreach materials that were redesigned during FY 2015-2016. These materials include brochures and posters that focus on residential BMPs and the control of fats, oils, and grease (FOG).

4.1.4 County of San Diego

During FY 2015-16, the County of San Diego implemented strategies as described in the WQIP. The full list of strategies implemented is presented in Appendix 2. Notable accomplishments by the County in terms of progress towards achieving applicable numeric goals related to bacteria during the reporting period are summarized below.

4.1.4.1 Illicit Discharge Strategies - Investigation and Elimination (IDDE 1,2,4,5 and 6)

Non-stormwater flow into the storm drain system may be problematic as it can pick up and transport pollutants that have accumulated on land surfaces like roads, driveways, lawns, gutters and sidewalks. These pollutants can include bacteria from sources such as pet waste, illegal dumping, and septic systems, which can wash into the storm drain system, into receiving waters, and ultimately to local beaches. The County has enacted several strategies aimed at the reduction of non-stormwater flows to address bacteria pollution in the San Luis Rey River watershed.

Central to the County's efforts to address bacteria pollution in the WMA are programs designed to investigate and eliminate illicit discharges to the storm drain system, thereby reducing non-stormwater flows. These programs fall under the County's IDDE program, which is one of the primary programs under the JRMP. The IDDE program aims to reduce non-stormwater flow by following a process of steps as follows:

1. Determine where there are non-stormwater flows through the storm drain system by field screening major stormwater outfalls.
2. Prioritize persistently flowing outfalls for further investigation.
3. Investigate which pollutants may be in the flows by sampling the discharged water from the priority outfalls.
4. Identify where the flow is coming from by investigating areas upstream for signs of illicit discharges, like over-irrigation or wash water discharges, or by following up on complaints about illicit flows.
5. Eliminate illicit sources of flow through education, technical assistance, and/or enforcement actions.

Storm drain outfall dry weather monitoring conducted by the County is a key element of the IDDE program. Field screening of outfalls is performed following a standardized County monitoring procedure in which data and observations are recorded using the County's Storm Drain Outfall Visual Observation Field Datasheet. During the 2015-2016 monitoring year, the County conducted dry weather field screening in the WMA at 21 major storm drain outfalls. Storm drain outfall dry weather monitoring including field and analytical water quality sampling was performed at the five highest priority persistent flow outfalls determined through a prioritization/ranking process outlined in the Permit.

In addition to the Permit-required visual screening monitoring of all major storm drain outfalls in the WMA, the County of San Diego conducted visual screening monitoring of non-stormwater flows for all outfalls (including those with diameters less than 36 inches) that have been inventoried. This included all outfalls investigated during the 2015 Microbial Source Tracking Study (provided as Attachment 4J to Appendix 4). During 2015-2016, this screening was conducted approximately once every two months during dry weather. The purpose of this additional effort was to characterize the extent and distribution of non-stormwater discharges from the storm drain outfalls throughout the County of San Diego jurisdictional area subject to the Bacteria TMDL.

Further, the County has performed continuous flow monitoring using level loggers installed at six targeted outfalls during the dry season (May through September). The six outfalls included the five highest priority outfalls (Table 3-13) and one additional outfall (SLR-045) that has been prioritized due to the presence of persistent non-stormwater flow, high concentrations of indicator bacteria, and potential human source of the bacteria as determined during the 2015 Microbial Source Tracking Study (provided as Attachment 4J to Appendix 4). The County is analyzing these data in terms of flow patterns, rates and volumes in an effort to identify potential sources. The County also conducts direct investigations at these outfalls to determine management actions for elimination of non-stormwater flows. These continuous flow data are also used to determine baseline non-stormwater flows for comparison to WQIP pathway 6a goals and to determine non-stormwater flow volumes for assessments required by the Permit.

Supplemental to routine visits, extensive field investigations and discharge reconnaissance for illicit discharges in upstream areas were conducted at the six outfalls (including the County's five highest priority outfalls) to identify and eliminate sources of flow subject to the Participating Agency's legal authority. During 2015-2016, the County performed a total of 35 sources investigations associated with the six sites, making progress towards understanding the sources of these flows. Section 3.2.1.3 and Appendix 4 Section 4.2.4 of this report provide the details of these IDDE investigations, including suspected and known sources and progress made in reducing and eliminating non-stormwater flows. During 2016-2017, the six outfalls will be the subject of focused effort including additional inspections to determine key sources of the flows during the times of peak flow that were detected with the continuous monitoring.

Another program that provided key IDDE-related information during the 2015-2016 monitoring year was Residential Management Area (RMA) inspections conducted in accordance with the Permit within the WMA. RMAs were visited at least once, and investigations were conducted at various times of day to capture different water usage times, including "wee-hours" reconnaissance from 5 to 9 a.m. and 8 a.m. to 8 p.m.

In addition to field reconnaissance looking at surface sources of flow and pollution, the County also worked to find sources within its own stormwater and sewer systems. During FY 2015-2016, the County's Roads Section secured funding for the purchase of new trucks with remote camera systems which can be used to help the IDDE program to investigate conditions inside of underground pipes. These camera systems will be used by County staff to help investigate potential illicit discharges and illicit connections to the storm drain system. Also these camera systems can help locate areas of stormwater and sewer pipes in need of repair that may be leaking water or sewage, and can be sources of both non-stormwater flow and bacteria contamination.

4.1.4.2 Existing Development Strategies - Water Conservation/Partnering (ED 3, 4, 7, and 15, OPT 5)

The County undertakes a number of strategies designed to reduce the contribution of pollutants from existing development within the WMA. In order to track and record many of its efforts related to existing development, the County maintains a database inventory of existing development in the watershed. This database is continually updated with the new information as it becomes available to ensure the accuracy of the County's records and make its use by Staff as efficient and effective as possible.

As a regional leader in water conservation, several of the County's existing development strategies are implemented both independently and in partnership with other agencies to help conserve local water supplies. During FY 2015-2016, these efforts included the County conducting two rain barrel distribution events (Figure 4-1) in partnership with other agencies which provided 55 gallon water collection drums to qualifying local citizens. The County has also worked in partnership with local water agencies, including the San Diego County Water Authority under its WaterSmart campaign, to provide assistance within its jurisdiction on the distribution of water conservation educational materials. This effort has included the promotion of available water conservation rebates and incentives including water efficiency audits and other tools to help save water.

Figure 4-1. Rain Barrel Distribution Event

Through the County's collaboration with a diverse group of partners, the Sustainable Landscapes Program (SLP)[9] was developed to integrate multiple sustainability concepts and resource benefits for residential-scale urban landscapes. The program aims to reduce the amount of potable water applied to the landscape, capture and use rainwater as a resource, and reduce pollutant infiltration into local waterways. The comprehensive approach includes the following:

1. the development of landscape guidelines,
2. residential and professional landscape training courses,
3. technical landscaping assistance including planting and irrigation plans,
4. marketing and outreach
5. financial incentives for turf conversions, and
6. landscape materials provisions, including mulch and compost/compost tea.

During FY 2015-2016, the SLP partners offered free education and training opportunities to over 1,000 homeowners and professionals throughout San Diego County. All training opportunities align with the San Diego SLP Guidelines, which details best practices and recommendations for a watershed approach to landscaping, such as downspout diversion to landscaped areas, Low Impact Development (Site Design BMPs), use of water efficient irrigation equipment, low water use plants and compost and mulch to amend soils for maximum water retention. Financial incentives for turf conversions and discounts on landscape material are scheduled to commence in late 2016.

[9] Information on the San Diego Sustainable Landscapes Program can be found at http://sustainablelandscapessd.org/.

In addition, the County has taken a multi-faceted approach to reduce water consumption and limit non-stormwater flows through collaboration among departments. In response to drought conditions in the region, the County recently implemented a Water Shortage and Drought Response Plan to reduce water use at its facilities. For example, a collaborative effort between the Departments of Parks and Recreation and General Services resulted in installation of synthetic turf at several parks, including Clemmens Lane Park Soccer Field in Fallbrook (Figure 4-2). Since 2009, Parks and Recreation's installation of high-efficiency irrigation heads and smart irrigation controllers was completed in 20 parks county-wide, which has enabled the County to save over 180 millions of gallons of irrigation water. Other measures taken include, but are not limited to, elimination of regularly scheduled exterior window washing at County facilities and identification of parks and facilities with the potential for recycled water connections.

Figure 4-2. Clemmens Lane Park Soccer Field

4.1.4.3 Existing Development Strategies – Outreach/Source Control (ED 6, 7, 8, 10, and 12)

In addition to these water conservation focused efforts, the County has implemented a variety of other programs and strategies which aim to reduce bacteria pollution loads in the San Luis Rey River watershed. This work has included participation in and sponsorship of focused clean up events including the statewide Coastal Cleanup Day and Creek to Bay Cleanup Day. These events both take place at locations throughout the County and focus volunteer trash and debris removal efforts on specific locations. During FY 2015-16, these events, conducted in coordination with I

Love a Clean San Diego (ILACSD), were great successes, removing approximately half a million pounds of debris. These cleanup programs and have been shown to have multiple benefits including:

- removing significant amounts of garbage and debris;
- getting people out into local watersheds to connect with natural places;
- raising awareness about local water quality and the challenges posed to clean water; and
- raising awareness about the County's efforts to keep local waters clean, and the importance of proper disposal of all trash.

Also as part of the ILACSD program, during FY 2015-2016 the County overhauled its outreach presentations for local middle and high schools. These presentations include activities which are engaging and hands-on and help empower students to learn the difference they can make. Topics covered include watershed basics, stormwater pollution, ocean conservation and marine debris, waste reduction and water conservation. The County has also prepared a new outreach effort and materials packet for distribution specifically to homeowners associations, focusing on residential behaviors and pollution sources which will be piloted during FY 2016-2017. The County endeavors to continually update and improve its outreach materials to ensure their accuracy and effectiveness. This includes translating materials into other languages, including Spanish.

Also during FY 2015-2016, the County distributed three water quality related educational door hangers covering the topics of green waste and trash, sediment management, and water conservation (Figure 4-3). All three were designed using principles of community-based social marketing which aims to change selected public behaviors with specific, simple messages.

As the County's websites are also important conduits for the distribution of educational information, outreach materials related to water conservation programs were added to the Project Clean Water and County Department of Public Works websites. These outreach materials were also distributed to the County's water quality list serve of interested citizens who have requested additional information about the County's efforts to protect local waters.

Figure 4-3. Water Conservation Door Hanger

The County is also working to control sources of bacteria before they can enter local waters. One potentially significant source of bacteria is onsite waste treatment systems, including septic systems. If not properly sited or maintained these systems can fail and leak human sewage into the surrounding soils and water bodies. The County is planning to employ new technology that can look for certain kinds of human sewage specific bacteria to help determine the source of bacterial contamination in local water bodies. This process is known as Microbial Source Tracking (MST), and it can help pinpoint failing septic systems or other sources of bacteria loads and may be implemented in the watershed as part of future illicit connection or discharge investigations.

Another potential source of bacteria pollution is poorly managed manure from horses and livestock. In the San Luis Rey River WMA, the County began a program during FY 2014-2015 to conduct evaluations on residential equestrian properties and to provide technical assistance to help reduce the potential for pollution from leaving these properties. Follow up evaluation visits were started during FY 2015-2016, and will likely continue into the next fiscal year. In addition, the County has developed numerous outreach materials designed specifically for horse owners on BMPs that can help reduce bacterial pollution associated with horse ownership. These materials are available for download on the County's website. This type of rural outreach work in the watershed is often done in coordination with the Mission Resources Conservation District (MRCD). MRCD is a state conservation district which is a non-regulatory government agency which provides assistance to local property owners and agencies on effective management of soil and water resources. In the watershed, the MRCD also has conducted removal of giant reed (*Arundo donax*), an invasive weed which takes over creeks and riparian areas, outcompeting native plants such as willows. *Arundo* crowds out native, local plants, destroying wildlife habitat and it consumes large amounts of water which it pulls from the ground as it takes over local creek beds. It is also difficult to remove as it is very persistent and requires special tools, training and removal techniques which MRCD provides for the benefit of the local environment and local residents.

4.1.4.4 Development Planning Program Strategies – Updated Material/Outreach (DP 1,2,3)

The County is committed to improving training and guidance materials for construction contractors, businesses, and internal staff. The 2007 Low Impact Development (LID) Handbook[10] was updated to better align with the County's Standard Urban Stormwater Mitigation Plan (SUSMP) and Hydromodification Management Plan, and to reflect the most current data on LID approaches and their efficacy. For its distinguished efforts, the County was named the recipient of the 2015 Outstanding Innovation in Green Planning and Design Award by the San Diego Chapter of the California Association of Environmental Professionals (AEP), a non-profit organization established in 1974 and dedicated to enforcing and supporting the California Environmental Quality Act (CEQA). Additionally, the County received a similar award in October 2016 for work done during the fiscal year on development of its Guidance on Green Infrastructure[11], a document outlining tools to uniformly design, install, and maintain LID features in the public right-of-way.

4.2 WATERSHED GOALS

As discussed in Section 2, interim and final numeric goals were established for the watershed as a means of tracking progress in reducing bacteria loads, consistent with Bacteria TMDL and lower San Luis Rey River (WQIP) requirements. These goals are outlined in Chapter 3 of the WQIP and in Appendix 3 of this Annual Report. Each year, the Participating Agencies assess specific water quality data and programmatic information in order to gauge progress towards achieving the numeric goals. These assessments provide information to determine whether intended outcomes are being realized or if adaptations of Participating Agencies' programs are necessary.

Progress toward achieving numeric goals is measured by use of water quality and program activity data collected during the 2015-2016 monitoring year. The WQIP was accepted in February 2016, and none of the outlined goals were scheduled to be achieved during 2015-2016. The Participating Agencies are demonstrating progress towards meeting Bacteria TMDL goals at the San Luis Rey River mouth through the WQIP implementation option presented in Table 3-3 of the WQIP. This option involves the reduction of dry and wet weather bacteria loading from the storm drain system through implementation of non-structural BMPs in order to meet interim, and eventually final, goals. Progress toward meeting bacteria goals for the lower San Luis Rey River is focused on flow elimination at persistently flowing outfalls during dry weather and load reductions in storm drain outfall discharges during wet weather, also through implementation of non-structural BMPs. Tables detailing the Participating Agencies' non-structural BMPs can be found in Appendix 3B of the WQIP. Progress is summarized in Table 4-1 (for the Bacteria TMDL goals) and Table 4-4 (for the lower San Luis Rey River goals) and in the following subsections.

4.2.1 Bacteria TMDL Goals

Interim goals to address the Bacteria TMDL are provided in Tables 3-4 and 3-5 in the San Luis Rey WQIP. A summary of these goals, as applicable to the 2015-2016 monitoring year, is provided in Table 4-1.

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[10] http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html
[11] http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/DevelopmentandConstruction/BMP_Design_Manual.html

4.2.1.1 Dry Weather

The final dry weather goal for Compliance Pathway 6a (WQIP implementation) is to eliminate 100% of anthropogenic non-stormwater discharges and accompanying bacteria loads from storm drain outfalls to the receiving water by 2021. The Participating Agencies have established an interim goal for the first Permit term (2013-2018) to reduce by 20% the aggregate flow or the number of persistently flowing outfalls (see WQIP Table 3-4; Compliance Pathway 6a).

The 2015-2016 monitoring year was to be used to establish a baseline for non-stormwater flow. It should be noted that 2015-2016 was similar to other recent monitoring years in that the ongoing drought has resulted in dry conditions in the region. Flow has not been observed at the WMA's mass loading station since 2012-2013. During transitional period and 2015-2016, the Participating Agencies conducted dry weather field screening monitoring at all of their major storm drain outfalls to document the presence of standing or flowing water. These data were used to determine which outfalls have persistent non-stormwater flows and should be prioritized in accordance with the Permit for their potential impact on the quality of receiving waters. These highest priority storm drain outfalls were targeted for additional bi-annual field and analytical monitoring and focused source reduction activities during 2015-2016 in accordance with the Permit. The County also installed continuous flow monitoring equipment in their five highest priority outfalls and in one additional outfall to measure dry season baseline non-stormwater flows and to screen for cyclical trends in these flows. These data were used to determine baseline non-stormwater flows for comparison to WQIP Pathway 6a goals and to determine non-stormwater flow volumes for assessments required pursuant to the Permit. This information will be used to assist the Participating Agencies in reducing or eliminating non-storm water flows through source identification and abatement activities. Additional continuous flow monitoring by other Participating Agencies may be incorporated in the future to further develop the baseline.

Results for the 2015-2016 monitoring year demonstrate that persistent non-stormwater flow was observed at a total of 12 of 61 major storm drain outfalls in the WMA (seven of 21 under the jurisdiction of the County of San Diego, three of 36 under the jurisdiction of the City of Oceanside, and two of four under the jurisdiction of the City of Vista). Therefore, a 20% reduction in the number of persistent outfalls in the WMA would be equivalent to three fewer persistently flowing outfalls by 2018. The mean flow rate as measured at the six outfalls with continuous flow monitoring equipment equaled 15.88 gallons per minute (gpm). These preliminary flows represent a baseline against which progress toward achieving the goal of reducing and effectively eliminating anthropogenic non-stormwater flows from the storm water conveyance system to the receiving waters can be measured. Progress is summarized in Figure 4-4 and Table 4-1.

4.2.1.2 Wet Weather

The wet weather interim goal for the current Permit has two components. In WQIP Pathway 6a, Participating Agencies implement non-structural BMPs to achieve source reduction of bacteria loads from the storm drain outfalls. In WQIP Pathway 6b, the Participating Agencies reduce by 0.3% the baseline bacteria loads from distributed BMPs constructed between 2003 and 2009 during redevelopment (see WQIP Table 3-5; Compliance Pathway 6). These BMPs are outlined and mapped in Appendix E to WQIP Chapter 3. Since these BMPs were implemented to mitigate anticipated development, they are considered as contributing to the pollutant load reductions achieved under the WQIP. The County implemented all planned programmatic BMPs and is on track to achieve the first wet weather goal for the current Permit term. The Participating Agencies have achieved the second wet weather goal through operation and maintenance of existing distributed BMPs. Progress is summarized in Figure 4-4 and Table 4-1.

Permit Term Goal (2013-2018)	Baseline Estimations Complete	On Track to Meet Goal	Permit-Term Goal Met
Dry Weather Goal: Flow Reduction	✓		
Wet Weather Goal #1: Programmatic BMP Implementation		✓	
Wet Weather Goal #2: Distributed BMP Operation and Maintenance			✓

Figure 4-4. Progress towards Permit Term Bacteria TMDL Numeric Goals at the San Luis Rey River Mouth

Table 4-1. Permit Term Bacteria TMDL Numeric Goals for the San Luis Rey River Mouth (2013-2018)

Permit Term Goal (2013-2018)	Metric	Schedule	Baseline Data	Data Collected/Results	Progress
Dry Weather					
Reduce by 20% the aggregate flow or the number of persistently flowing outfalls.	(1) Reduction of flow volume. OR (2) Number of outfalls with flows mitigated from persistently flowing storm drain outfalls.	Achieve during Permit Term (expires June 27, 2018).	A dry weather flow monitoring study was conducted during 2015-2016 in order to establish the baseline. (1) 11 of total 61 outfalls had persistent non-storm water flows. (2) Mean flow rate at outfalls with continuous flow monitoring equipment was 15.88 gpm.	Dry weather flow data from major storm drain outfalls were collected during the 2015-2016 monitoring year to establish a baseline.	Data from the 2015-2016 monitoring year were used to set a baseline. Future years' data will be compared to that baseline. Baseline may be further refined using additional continuous flow data.
Wet Weather					
Implement programmatic (non-structural) BMPs to achieve source reduction of bacteria loads from the storm drain outfalls.	% bacterial load reduction. Interim compliance is implementation of strategies in accordance with schedule in WQIP.	Achieve during Permit Term (expires June 27, 2018).	3,835 x 10^{12} MPN during Water Year 1993.	During FY 15-16 the County implemented all planned programmatic BMPs according to the schedule in the WQIP.	The first year of BMP implementation under the WQIP was completed successfully; and the County is on track to achieve the goal via continued BMP implementation through 2018.
Reduce by 0.3% the baseline bacteria loads from distributed BMPs constructed between 2003 and 2009 during redevelopment.	Implementation and maintenance of BMPs. % bacterial load reduction is based on quantitative model.	Achieve during Permit Term (expires June 27, 2018).	3,835 x 10^{12} MPN during Water Year 1993.	BMPs were constructed between 2003 and 2009 and have continued to be operated and maintained.	The County is on track to achieve the goal via continued BMP operation and maintenance through 2018.

4.2.2 Lower San Luis Rey River Goals

Lower San Luis Rey River goals are focused on improving water quality in storm drain outfall discharges and in the receiving water, with an emphasis on eliminating non-stormwater flows at persistently flowing outfalls. Interim numeric goals for the current Permit term are shown in Table 4-4.

4.2.2.1 Dry Weather

During dry weather, the interim goal identified for the Permit term is a 20% reduction in the number of outfalls with persistent flows or a 20% reduction in aggregate flow from persistently flowing outfalls (see WQIP Table 3-6). Progress will be measured by assessing whether or not flow has been eliminated from 20% of persistently flowing outfalls or by assessing whether flow has been reduced by 20%.

As described in Section 4.2.1.1, to demonstrate progress toward the goal of reducing and eventually eliminating non-stormwater discharges, dry weather monitoring of priority major outfalls was conducted during the 2015-2016 monitoring year to develop a baseline flow rate. Monitoring during 2015-2016 indicated that 12 of 61 major storm drain outfalls in the WMA have persistent non-storm water flows. The mean flow rate at these outfalls, based on continuous flow monitoring equipment, was 15.88 gpm. Progress toward meeting the dry weather interim goal is summarized in Figure 4-6 and Table 4-4.

4.2.2.2 Wet Weather

Lower San Luis Rey River wet weather goals are focused on reducing bacteria loads in storm drain outfall discharges or reducing bacteria concentrations in the receiving water. For wet weather, the final goal to be achieved by 2031 is to reduce bacteria loads cumulatively or at key outfalls by 11.9% or meet the Bacteria water quality objective in the lower San Luis Rey River. The interim goal for the current Permit term is to reduce bacteria loads cumulatively or at key outfalls by 0.3% or to meet bacteria water quality objectives in the lower river (see WQIP Table 3-7). Progress will be measured by comparing bacteria loads per acre to baseline bacteria loads calculated as described below.

4.2.2.2.1 Baseline Calculation

Baseline wet weather bacteria loads were presented in the WQIP as 2.44E+10 MPN/storm/acre for fecal coliform and 1.18E+11 for *Enterococcus.* These baseline loads for San Luis Rey River WMA storm drain outfalls could not be reproduced using the methodology described in Attachment 3K of the WQIP; therefore the baseline values were recalculated to fix the apparent error. The new calculations were made using the same methodology, but with some modifications as described below.

As described in Attachment 3K of the WQIP, the calculations included wet weather data collected at random storm drain outfalls in the WMA during the five years of the 2007 Permit's storm drain outfall monitoring program (WESTON, 2015c). In this program, a grab sample was collected at five randomly-selected storm drain outfall stations within the WMA each year. No continuous flow data were collected during storm events. Therefore, the storm water runoff volume for a standardized storm event (daily precipitation = 0.5 inches) was estimated using hydrology manual

(HM) runoff coefficients based on the land use within the drainage area in order to estimate a pollutant load for the sample. At the completion of the five-year program, there were 27 stations in the WMA with estimated pollutant loads for a 0.5 inch model storm. The load/storm/acre or "flux" was determined by dividing the estimated pollutant load at each station by the drainage area acreage of the station.

The baseline was refined by including only 16 of the 27 stations from the 2007 Permit program in the calculation of average flux. This modification was made due to the difference between the current major storm drain outfall inventory and the original inventory of potential monitoring stations used in the random storm drain outfall program under the 2007 Permit. Some of the stations that were provided on the random list were in fact culverts that are not subsequently included in the major storm drain outfall inventory as advanced under the 2013 Permit. The drainage area sizes of the random program monitored sites varied widely, with some drainage areas appearing to represent large receiving water subwatersheds due to the inclusion of culverts. In an effort to make the monitoring locations more comparable between the 2007 program and 2013 programs, only the stations having drainage areas within the size range of the drainage areas for the current monitoring stations (less than 500 acres) were selected for the baseline estimation. This refinement in the methodology resulted in use of 16 samples from the random study to calculate the baseline, and results are shown below in Table 4-2. The revised baselines are an order of magnitude lower than the WQIP baseline loads of 2.44E+10 MPN/storm/acre for fecal coliform and 1.18E+11 for *Enterococcus*. Therefore, lower flux values will be necessary to demonstrate reductions during the current and future permit terms.

Table 4-2. "Baseline" Calculated Using 16 Storm Drain Outfall Random Program Monitored Stations (Drainage Areas less than 500 acres)

Analyte	Mean (MPN/Storm/Acre)
Fecal Coliform	6.67E+09
Enterococcus	2.02E+10

4.2.2.2.2 Comparison of 2015-2016 Monitoring Data to Baseline

Progress toward reducing storm drain outfall wet weather loads against these new baselines is summarized in Figure 4-6 and Table 4-4. In order to compare the 2015-2016 wet weather monitoring data to the baseline loads, the 2015-2016 monitored concentrations at the five outfalls were multiplied by the estimated runoff for a 0.5 inch storm based on HM coefficients similar to the methods used to estimate storm water volume from the random storm drain outfall stations in the 2007 Permit study. Although flow data were collected as part of the 2015-2016 monitoring program, the storm event loads for comparison to the baseline were calculated for a 0.5 inch storm using HM runoff coefficients rather than the actual monitored amount of rainfall and measured runoff coefficients in order to make the results more comparable to the random program. In general, the HM coefficients are larger than the actual runoff coefficients measured at the five storm drain outfall locations sampled, resulting in estimated storm loads that were generally larger than the actual event loads for a standardized 0.5 inch storm, and making the estimates a lot more conservative when compared to the recalculated baseline loads.

The calculated fecal coliform and *Enterococcus* loads in MPN/storm/acre for each of the five monitored storm drain outfalls is shown in Table 4-3 with a comparison to the arithmetic mean baselines represented as percent difference from baseline. Negative percentages indicate that the 2015-2016 monitoring result was lower than baseline.

Table 4-3. Estimated Loads for 2015-2016 Monitored Storm Drain Outfall Stations Compared to Baseline

Analyte	Station/Jurisdictional Identifier	2015-2016 Load (MPN/Storm/Acre)	Compared to Baseline*
Fecal Coliform	MS4-SLR-1/SLR-036	8.46E+09	27%
	MS4-SLR-2/SLR-016	1.19E+09	-82%
	MS4-SLR-3/ SLR-03	2.17E+08	-97%
	MS4-SLR-4/MS4-SLR-150	1.01E+08	-98%
	MS4-SLR-5/MS4-SLR-041	4.52E+08	-93%
Enterococcus	MS4-SLR-1/SLR-036	2.49E+10	23%
	MS4-SLR-2/SLR-016	8.64E+09	-57%
	MS4-SLR-3/ SLR-03	2.98E+09	-85%
	MS4-SLR-4/MS4-SLR-150	7.08E+07	-100%
	MS4-SLR-5/MS4-SLR-041	4.14E+08	-98%

*Percent change calculated as (2015-2016 Load – Baseline)/Baseline using the arithmetic mean baselines

Given the high variability in bacteria data, the 2015-2016 loads were also compared to the baseline range and distribution, as shown in the box and whisker plot in Figure 4-5. This figure shows the 2015-2016 load/storm/acre results as points for each of the five stations on a box and whisker plot of the random program data used in generating the baseline. This plot shows that the majority of the 2015-2016 samples were below the median load/storm/acre of the storm drain outfall data from the 2007 Permit random wet weather program. MS4-SLR-1 (SLR-036) was the only station with loads above the above the median of the historical data.

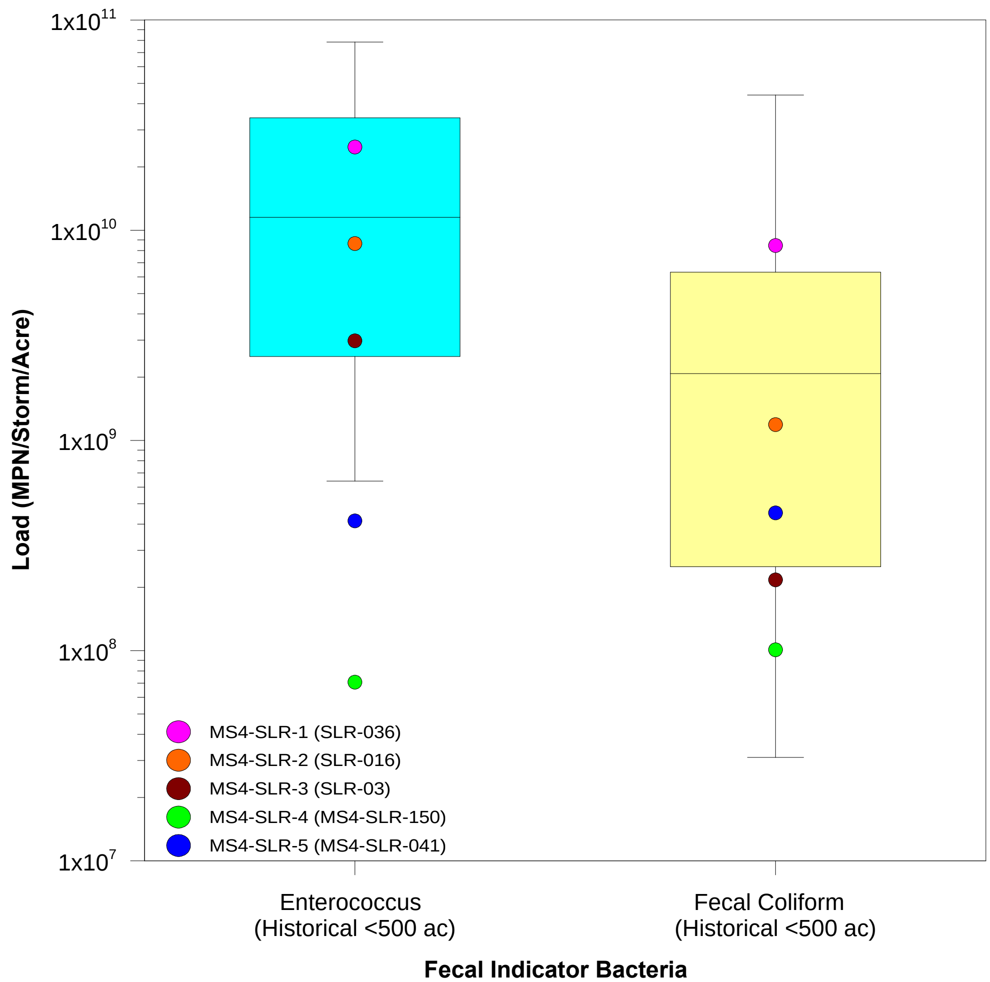

Figure 4-5. Box and Whisker Plot of Baseline Data Compared to 2015-2016 Monitoring Results for Each of the Five Monitored Outfalls

The wet weather goal can also be achieved by meeting the bacteria water quality objectives in the lower San Luis Rey River. Progress was evaluated by comparing bacteria concentrations measured at SLR25 in the lower River to REC-1 water quality objectives. The fecal coliform concentration during the wet weather event achieved the water quality objective, but the *Enterococcus* concentration did not.

Permit Term Goal (2013-2018)	Baseline Estimations Complete	On Track to Meet Goal	Permit-Term Goal Met
Dry Weather Goal: Flow Reduction	✓		
Wet Weather Goal #1: Bacteria Load Reduction from Storm Drain Outfalls		✓	
Wet Weather Goal #2: Meet Bacteria Goals in Lower River		✓	

Figure 4-6. Progress towards Permit Term Lower San Luis Rey River Numeric Goals

Table 4-4. Permit Term Lower San Luis Rey River Numeric Goals for Bacteria (2013-2018)

Permit Term Goal (2013-2018)	Metric	Schedule	Baseline Data	Data Collected/Results	Progress
Dry Weather					
Reduce by 20% the aggregate flow or the number of persistently flowing outfalls.	(1) Presence/absence of dry weather flow at persistent flowing outfalls. OR (2) Dry weather flow measurements at persistently flowing outfalls.	Achieve during Permit Term (expires June 27, 2018).	A dry weather flow monitoring study was conducted during 2015-2016 in order to establish the baseline. (1) 11 of 61 outfalls had persistent non-storm water flows. (2) Mean flow rate at outfalls with continuous flow monitoring equipment was 15.88 gpm.	Dry weather flow data from major storm drain outfalls were collected during the 2015-2016 monitoring year to establish a baseline.	Data from the 2015-2016 monitoring year were used to set a baseline. Future years' data will be compared to that baseline. Continuous flow data are also be analyzed in terms of flow patterns, rates and volumes in an effort to identify potential sources, direct investigations, and determine management actions for elimination of dry weather flows.
Wet Weather					
Reduce bacteria loads cumulatively or at key outfalls (MS4-SLR-1 through MS4-SLR-5 as described in Section 3.2.2) by 0.3%.	Bacteria load reductions per acre at key outfalls (5 wet weather monitoring outfalls) as described in Section 3.2.2).	Achieve during Permit Term (expires June 27, 2018).	Fecal coliform: $2.44*10^{10}$ MPN/storm/acre *Enterococcus*: $1.18*10^{11}$ MPN/storm/acre	Wet weather bacterial loads were calculated from historical data in order to update the baseline. Results indicated: (1) Fecal coliform: $6.67E*10^{9}$ MPN/storm/acre (2) *Enterococcus*: $2.02*10^{10}$ MPN/storm/acre	This goal was partially achieved. See Figure 4-5. Loads from outfalls MS4-SLR-2, MS4-SLR-3, MS4-SLR-4, and MS4-SLR-5 are below the updated baseline loads for both *Enterococcus* and fecal coliform. Loads from MS4-SLR-1 are above the updated baseline loads for both *Enterococcus* and fecal coliform.
OR					
Meet Bacteria water quality objectives in the lower San Luis Rey River.	Bacteria concentrations in the lower San Luis Rey River.	Achieve during Permit Term (expires June 27, 2018).	Water quality objectives for freshwater Single Sample Maxima: Fecal Coliform: 400 MPN/100 mL *Enterococcus*: 61 MPN/100 mL	Compliance with bacteria water quality objectives was evaluated as part of the Monitoring to Assess WQIP Goals, Strategies, and Schedules as described in Section 3.1.4 of this Annual Report. Based on data collected during 2015-2016: (1) The *Enterococcus* result from the single wet-weather event at SLR25 exceeded the objective. (2) The fecal coliform concentration met the objective.	This goal was partially achieved. The fecal coliform water quality objective has been met based on data from the 2015-2016 monitoring year, but the *Enterococcus* water quality objective has not been met.

5 Adaptive Management

This section presents a summary of the potential triggers for adaptation of the WQIP and the results of the adaptive management process for the San Luis Rey River WMA after the 2015-2016 monitoring year, with additional detail provided in Appendix 5.

Adaptive management entails using an iterative approach to re-evaluate the water quality conditions, priorities, numeric goals, strategies, and schedules based on the requirements of the Permit. The adaptive management process details how the Participating Agencies use new data and information to improve the WQIP through updates to priorities, assessments of and adjustments to goals, updates to strategies to meet the latest goals, and updates to the monitoring and assessment program to provide the necessary data to support the process.

Multiple triggers may warrant adaptive management or changes to stormwater program activities, including exceedances of water quality standards in receiving waters, new information, recommendations from the Regional Board, and public participation. Effectiveness assessments of JRMP programs and strategies may also trigger adaptations to the WQIP. The adaptive management process is used in conjunction with water quality and programmatic data to evaluate whether modifications to numeric goals, schedules, and/or strategies are necessary to achieve compliance with the interim and final compliance numeric goals. The timing of the adaptive management requirements is typically either annually or at the end of the Permit term.

5.1 DRIVERS FOR ADAPTIVE MANAGEMENT

The adaptive management process may be triggered when new information becomes available, including results of routine monitoring and special studies, new regulatory drivers, results of program effectiveness assessments and progress towards numeric goals, and recommendations from the public and/or Regional Board. Modifications may be made to the priority water quality conditions, goals, strategies, schedules, and/or the MAP. The potential triggers for adaptation that must be considered annually are summarized in Table 5-1. The assessments related to each of these potential triggers are included in Appendix 5.

With the acceptance of the WQIP in February 2016, the Participating Agencies have been implementing the WQIP for less than a year. Therefore, it is too early in the implementation process to have significant feedback necessary to drive the adaptive management process. Continued and further implementation of strategies and collection of additional monitoring and programmatic data is necessary for an evaluation that leads to meaningful adaptive management. The elements considered in the adaptive management process are identified in the section to follow; however, no changes to the WQIP are recommended at this early stage of implementation.

Table 5-1. Causes for Adaptive Management within the Water Quality Improvement Plan

Trigger	Frequency for Assessment	Potential Area(s) for Adaptation			
		Priority Water Quality Conditions	Goals and Schedules	Strategies and Schedules	Monitoring and Assessment
Exceedances of Receiving Water Limitations	Annual			X	X
Exceedances of Non-stormwater Action Levels or Stormwater Action Levels	Annual			X	X
Special Studies Results	Annual, as results are available		X	X	X
New Regulatory Actions	Annual, as applicable	X	X	X	X
Regional Board Recommendations	Annual, as applicable	X	X	X	X
Program Effectiveness Assessments/ Progress Towards Goals	Annual			X	X

5.2 WATER QUALITY IMPROVEMENT PLAN ADAPTIVE MANAGEMENT

The purpose of this section is to document changes to components of the WQIP, including priority water quality conditions, numeric goals, strategies, and/or schedules, if applicable, based on analyses and findings in this 2015-2016 Annual Report. Supporting information for these modifications are detailed in Appendix 5, if applicable. The potential areas for adaptation were presented in Table 5-1, which also shows the information that may trigger adaptation.

5.2.1 Water Quality Conditions

In accordance with the Permit, the priority water quality conditions within the watershed may be re-evaluated as needed as part of the annual reporting process. PWQCs, HPWQCs, and numeric goals are generally established based on longer periods of record compared to a monitoring year. The assessment of HPWQC would most appropriately be conducted following the collection of sufficient data to make scientifically-based decisions. At earliest, such consideration may be given during the preparation of the ROWD, which is due to the Regional Board in December 2017.

As outlined in Section 5, receiving water and storm drain outfall monitoring results from the 2015-2016 monitoring year supported the identified priority and highest priority water quality conditions as provided in the WQIP, and no modifications are necessary at this time. Further, there have been no new regulatory actions or Regional Board recommendations since the acceptance of the WQIP that would warrant reconsideration of priorities for the WMA through the annual reporting process. The baseline for the wet weather watershed goals for lower San Luis Rey River was revised to both correct the calculation and refine the methodology. This resulted in a lower baseline from which reductions will be measured.

5.2.2 Strategies and Schedules

On an annual schedule, it is more likely that modifications may be made to strategies and implementation schedules. These WQIP components may require updates on a more frequent basis to ensure effective implementation and assessment of progress in reducing pollutant loads and achieving established goals. Evaluation of the current goals, strategies, and schedules is required by the Permit as part of this Annual Report. The information that may be used to modify these elements of the WQIP through adaptive management is summarized in Table 5-2.

No changes to numeric goals or schedules for achieving them as listed in the WQIP are proposed at this time. Minor clarification to the text of two strategies has been proposed and is shown as markup in the jurisdictional strategy tables of Appendix 2. Since the acceptance of the WQIP in early 2016, the Participating Agencies have begun implementing jurisdictional strategies intended to result in achievement of dry and wet weather interim goals for the term of the current Permit. While one year of monitoring data have been collected in accordance with the MAP of the WQIP, only a few months of this time period have been under the accepted WQIP and implementation. These efforts to date have not identified the need for significant changes and, as described in Section 4.1, the Participating Agencies are demonstrating progress in implementing the existing strategies. Additional evaluation will be conducted and reported in the ROWD, due to the Regional Board in December 2017.

Table 5-2. Information Used to Modify Strategies and Schedules

Evidence	WQIP Sections	2015-2016 Status	Changes Triggered (Y/N)
Receiving water monitoring results.	Section 3, Appendix 4	No new information pertaining to receiving water exceedances not addressed by the WQIP.	N
Storm drain outfall monitoring results.	Section 3, Appendix 4	NAL and SAL exceedances are consistent with WMA priority constituents.	N
Special studies results.	Section 3, Appendix 4	Data from these studies will be useful for the re-evaluation of the Bacteria TMDL and to support Permit compliance and Bacteria TMDL implementation planning.	N
New or updated regulations.	Section 5	No new regulatory drivers; adaptive management will be required as new TMDLs are approved and as the Trash Amendments are incorporated into the Permit.	N
Program effectiveness assessments.	Section 5	Additional data will be necessary to supplement 2015-2016 data before program effectiveness can be evaluated.	N
Progress towards achieving numeric goals.	Section 4	Initial results related to program effectiveness indicate that the Participating Agencies have made progress towards meeting each of their dry and wet weather interim goals for the current Permit term.	N

5.2.3 Monitoring and Assessment Plan

Changes to the MAP may be triggered by several factors including:

- Modifications to other elements of the WQIP, including priority water quality conditions, numeric goals and schedules, and/or strategies and schedules.
- Identification of data gaps through the Permit-required assessments.
- Results of special studies.
- Requests/requirements from the Regional Board.

None of these triggers are applicable to the 2015-2016 monitoring year, and adaptive management of the MAP is not required at this time. Modifications not requiring adaptive management include:

- Modifications have been made to the outfall priorities for dry weather monitoring due to highest priority outfalls becoming dry. Further detail is provided in Appendix 5.
- The baseline established to determine progress towards meeting wet weather lower San Luis Rey River bacteria goals was revised (lowered), requiring lower monitored loads to demonstrate load reductions.

Additional assessments are planned for the ROWD, including evaluation of the monitoring data and receiving water limitations.

6 Conclusions

This was the first year of monitoring under the accepted WQIP and its associated MAP. The monitoring performed during 2015-2016 in the San Luis Rey River WMA, which was focused on addressing bacteria as the HPWQC in the WMA, is summarized in Table 6-1. Although the goals and strategies outlined in the WQIP are focused on bacteria, implementation of the chosen strategies are expected to also improve conditions in relation to the PWQCs and other potential contaminants, providing a multi-benefit approach to implementation.

Table 6-1. Monitoring Conducted during 2015-2016 in the San Luis Rey River WMA

Monitoring Element	Related to HPWQC? (Y/N)
Receiving Water Monitoring*	
SMC Regional Monitoring	N
TMDL	Y
Monitoring for Assessment of WQIP Goals and/or Strategies	
Bacteria Monitoring in the Lower San Luis Rey River	Y
Storm Drain Outfall Monitoring	
Field Screening	Y
Dry Weather Monitoring	Y
Wet Weather Monitoring	Y
Illicit Discharge Detection and Elimination	Y
Special Studies	
Reference Streams and Beaches Study	Y
San Luis Rey River Microbial Source Tracking Study	Y

* HMP monitoring was conducted regionally but not in the San Luis Rey River WMA. The objectives and results of the program are summarized in Appendix 4.

A summary of findings and achievements as they pertain to bacteria is presented in Table 6-2. Detailed results and the related assessments required by the Permit are found in the referenced sections of Appendix 4.

Table 6-2. Summary of Findings and Achievements Related to the Highest Priority Water Quality Condition in the San Luis Rey River WMA for the 2015-2016 Monitoring Year

Monitoring Element	Location of Detailed Results	Major Findings and Achievements
Regional Monitoring		
TMDL	Section 3.1.3 Appendix 4 Section 4.1.6	• Interim and final numeric targets are achieved at OC-100 for: o Fecal and total coliform dry and wet season geometric means and wet weather single-sample maximum. o *Enterococcus* dry and wet season geometric means. • Interim and final numeric targets are not being met for the *Enterococcus* wet weather single-sample maximum.
Additional Monitoring for Assessment of Goals and/or Strategies		
Bacteria Monitoring in the Lower San Luis Rey River	Section 3.1.4 Appendix 4 Section 4.1.7	• Based on a single wet-weather event monitored at SLR25, the *Enterococcus* concentration exceeded the bacteria water quality objective, whereas fecal coliform did not. • Based on eight dry weather events monitored, the exceedance frequencies were 100% for *Enterococcus* and 13% (one event) for fecal coliform.
Storm Drain Outfall Monitoring		
Dry Weather Field Screening	Section 3.2.1.1 Appendix 4 Section 4.2.1	• There was no trash or a low presence of trash (less than 50 pieces) during most (83%) of the trash assessments (n = 129) at visited outfalls. • Dry conditions/no flow were observed for 81% of visits conducted by the City of Oceanside, 50% by the City of Vista, and 47% by the County of San Diego. Flow was observed during 6% of the 72 visits conducted by the City of Oceanside, 50% of the 8 visits by the City of Vista, and 34% of the 53 visits by the County of San Diego. • For outfalls with flowing or standing water, more than half (14 of 26 estimations) had flow rates lower than five gallons per minute. • Based on the latest three field visits, the number of dry outfalls increased from 33 to 37, the number of transient outfalls decreased from 18 to 12, and the number of persistent outfalls increased from 8 to 12. • The highest priority outfalls in each jurisdiction were prioritized for dry weather monitoring.
Highest Priority Storm Drain Outfall Dry Weather Monitoring	Section 3.2.1.2 Appendix 4 Section 4.2.2	• Samples collected from most of the monitored outfalls exceeded the NAL (instantaneous maximum) for *Enterococcus* and fecal coliform (HPWQCs in the WMA) and NALs for total nitrogen and total phosphorus (PWQCs in the WMA); this indicates that the HPWQC and PWQCs for the WMA and the highest priority outfalls for the WMA were properly selected. • Data collected during this first monitoring year were used to estimate the non-stormwater volumes and pollutant loads collectively discharged from the major storm drain outfalls with persistent non-stormwater flows in each Participating Agency's jurisdiction.
Storm Drain Outfall Wet Weather Monitoring	Section 3.2.2 Appendix 4 Section 4.2.5	• Samples collected from all five monitored outfalls exceeded the single sample maximum final effluent limitations for *Enterococcus* and fecal coliform. • Building upon the transitional wet weather storm drain outfall program, a more robust data set was developed for the land-use based assessment of wet weather storm drain outfall discharges and land-use based EMCs were refined based on two years of monitoring at MS4-SLR-1 and MS4-SLR-2 and three years of monitoring at MS4-SLR-3, MS4-SLR-4, and MS4-SLR-5.
Illicit Discharge Detection and Elimination Program	Section 3.2.1.3 Appendix 4 Section 4.2.4	• The highest priority outfalls with persistent non-stormwater flow were a focus for IDDE investigations. Irrigation runoff was the most common known or suspected source of non-stormwater flows, followed by groundwater infiltration, an uncontrollable source.
Special Studies		
Reference Streams and Beaches Studies	Section 3.3.1.1 Appendix 4 Section 4.3.1	• These studies measured concentrations of indicator bacteria that account for natural sources to establish the background concentrations, or "reference conditions", for streams and beaches minimally disturbed by anthropogenic activities. Data will support the forthcoming re-evaluation of the Bacteria TMDL and numeric target development for future TMDLs.
San Luis Rey River Microbial Source Tracking Study	Section 3.3.1.2 Appendix 4 Section 4.3.2	• *Enterococcus* concentrations exceeded the water quality objective in all but one of the investigated storm drains. • Genetic indicators of human and/or animal waste were detected in some of the samples collected from the outfalls, but were not confirmed during the network investigations. • No illicit sewer connections or leaks were found. • Results from this preliminary MST study will be used to support Permit compliance and Bacteria TMDL implementation planning, and may potentially serve as the first step in future Natural Source Exclusion and/or Quantitative Microbial Risk Assessment (QMRA) work.
Jurisdictional Programs		
Vary by Jurisdiction	Section 4 Appendix 2	• Participating Agencies in the San Luis Rey River WMA have begun implementing jurisdictional strategies aimed at achieving their interim dry and wet weather goals for the current Permit term and are demonstrating progress. • The Participating Agencies are on track to meet or have already met the Permit-term goals for the watershed.

During FY 2015-2016, the Participating Agencies implemented a broad range of strategies focusing on reducing both human and non-human sources of bacteria across the watershed, as well as other constituents such as nutrients and trash. Human sources of bacteria are the highest priority from a public health perspective, but non-human sources can contribute to overall bacteria loads in waterways and are important to control. Highlights included the following:

- Preventing discharges of bacteria from human sources to the storm drain system by addressing sanitary sewer overflows, leaky sewer pipes, homeless encampments, and failing septic systems.
- Preventing discharges of other, non-human, bacteria sources to the storm drain system through public outreach programs related to pet waste management, discharge of wash water, and livestock.

Strategies implemented by the Participating Agencies were also focused on reduction and elimination of non-stormwater flow, which address not only bacteria but other PWQC in the watershed, including nutrients. These strategies address the final dry weather goal associated with the WQIP Implementation pathway to compliance with the Bacteria TMDL (6a), which is to eliminate 100% of anthropogenic non-stormwater discharges and accompanying bacteria loads from storm drain outfalls to the receiving water by 2021. Strategies by Participating Agency were presented in Section 4.1 and include the following:

- **City of Oceanside**
    - Illicit discharge strategies
        - Irrigation runoff control
        - Sanitary sewer line inspections
        - Slip lining sanitary sewer pipes
        - Illicit discharge/bacteria source control
        - Sanitary sewer systems
    - Existing development strategies
        - Water conservation outreach
- **City of Vista**
    - Illicit discharge strategies
        - Identification and reporting
        - Dry weather flow control
        - Trash collection events
    - Existing development strategies
        - Inspections
- **County of San Diego**
    - Illicit discharge strategies
        - Investigation and elimination
    - Existing development strategies
        - Water conservation/partnering
        - Outreach/source control

Progress made toward achievement of the interim Permit-term watershed numeric goals was measured using water quality and program activity data collected during 2015-2016. The Participating Agencies are making progress toward achieving each of their Permit-term goals.

The WQIP requires implementation of an adaptive management process, used to evaluate whether updates to priorities, assessments of and adjustments to goals, updates to strategies to meet the latest goals, and/or updates to the MAP are necessary. This process may be triggered when new information becomes available, including results of routine monitoring and special studies, new regulatory drivers, results of program effectiveness assessments and progress towards numeric goals, and recommendations from the public and/or Regional Board. With the acceptance of the WQIP in February 2016, the Participating Agencies have been officially implementing the WQIP for less than a year. Therefore, it is too early in the implementation process to have significant feedback necessary to drive the adaptive management process. Continued and further implementation of strategies and collection of additional monitoring and programmatic data is necessary for an evaluation that leads to meaningful adaptive management. Therefore, no changes to the WQIP are recommended at this early stage of implementation.

7 References

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APPENDIX 1

Crosswalk of Permit Requirements and Annual Report References

Appendix 1 – Crosswalk of Permit Requirements and Annual Report References

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix: Appendix 2 Jurisdictional Information	WQIP Appendix: Appendix 3 Numeric Goals	WQIP Appendix: Appendix 4 Monitoring	WQIP Appendix: Appendix 5 Adaptive Management
Provision A						
A.4.a.(2)	If ***exceedance(s) of water quality standards persist in receiving waters*** notwithstanding implementation of this Order, the Copermittees must comply with the following procedures: (2) Upon a **determination** by either the Copermittees or the San Diego Water Board that discharges from the MS4 are **causing or contributing to a new exceedance** of an applicable water quality standard **not addressed** by the Water Quality Improvement Plan, the Copermittees must submit the following updates to the Water Quality Improvement Plan pursuant to Provision F.2.c ***or as part of the Water Quality Improvement Plan Annual Report*** required under Provision F.3.b, unless the San Diego Water Board directs an earlier submittal:	Section 5.2			X	X
	(a) The water quality improvement ***strategies being implemented that are effective and will continue to be implemented***,	Section 5.2	X			
	(b) ***Water quality improvement strategies (i.e. BMPs, retrofitting projects, stream and/or habitat rehabilitation projects, adjustments to jurisdictional runoff management programs, etc.) that will be implemented*** to reduce or eliminate any pollutants or conditions that are causing or contributing to the exceedance of water quality standards,	Section 5.2				X
	(c) ***Updates to the schedule for implementation*** of the existing and additional water quality improvement strategies, and	Section 5.2				X
	(d) ***Updates to the monitoring and assessment program*** to track progress toward achieving compliance with Provisions A.1.a, A.1.c and A.2.a of this Order;	Section 5.2				X
Provision B						
B.5.a.	a. The **priority water quality conditions** and potential **water quality improvement strategie**s included in the Water Quality Improvement Plan pursuant to Provisions B.2.c and B.2.e ***may be re-evaluated by the Copermittees as needed during the term of this Order as part of the Water Quality Improvement Plan Annual Report***. Re-evaluation and recommendations for modifications to the priority water quality conditions and potential water quality improvement strategies **must be provided in the Report of Waste Discharge**, and must consider the following: (1) Achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the water quality improvement strategies identified in the Water Quality Improvement Plan; (2) New information developed when the requirements of Provisions B.2.a-c have been re-evaluated; (3) Spatial and temporal accuracy of monitoring data collected to inform prioritization of water quality conditions and implementation strategies to address the highest priority water quality conditions; (4) Availability of new information and data from sources other than the jurisdictional runoff management programs within the Watershed Management Area that informs the effectiveness of the actions implemented by the Copermittees; (5) San Diego Water Board recommendations; and (6) Recommendations for modifications solicited through a public participation process.	Section 5.2			X	X
B.5.b.	b. The water quality improvement goals, strategies and schedules, included in the Water Quality Improvement Plan pursuant to Provisions B.3, ***must be reevaluated and adapted as new information becomes available*** to result in more effective and efficient measures to address the highest priority water quality conditions identified pursuant to Provision B.2.c. ***Re-evaluation of and modifications to the water quality improvement goals, strategies and schedules must be provided in the Water Quality Improvement Plan Annual Report***, and must consider the following:	Section 5.2		X		X
	(1) Modifications to the **priority water quality conditions** based on Provision B.5.a;	Section 5.2				X
	(2) Progress toward **achieving interim and final numeric goals** in receiving waters and MS4 discharges for the highest priority water quality conditions in the Watershed Management Area,	Section 4.2				
	(3) Progress toward achieving outcomes according to established schedules;	Section 4.2				
	(4) New policies or regulations that may affect identified numeric goals;					X
	(5) Measurable or demonstrable reductions of non-storm water discharges to and from each Copermittee's MS4;	Section 3.2			X	
	(6) Measurable or demonstrable reductions of pollutants in storm water discharges from each Copermittee's MS4 to the MEP;	Section 3.2			X	
	(7) New information developed when the requirements of Provisions B.2.b and B.2.d have been re-evaluated;	Section 5.1			X	X
	(8) Efficiency in implementing the Water Quality Improvement Plan;	Section 5.1	X			X
	(9) San Diego Water Board recommendations; and	Section 5.1				X
	(10) Recommendations for modifications solicited through a public participation process.	Section 5				X

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix 2 Jurisdictional Information	Appendix 3 Numeric Goals	Appendix 4 Monitoring	Appendix 5 Adaptive Management
B.5.c.	c. The water quality improvement monitoring and assessment program, included in the Water Quality Improvement Plan pursuant to Provision B.4, ***must be reevaluated and adapted when new information becomes available***. Re-evaluation and recommendations for modifications to the monitoring and assessment program, pursuant to the requirements of Provision D, ***may be provided in the Water Quality Improvement Plan Annual Report***, but must be provided in the Report of Waste Discharge.	Section 5.1 Section 5.2			X	X
Provision D						
D.1.e.(2)(c)	**Sediment Quality Monitoring** (c) The Copermittees must incorporate a ***Sediment Monitoring Report as part of the Water Quality Improvement Plan Annual Report*** in accordance with the schedule contained in the Sediment Monitoring Plan, unless otherwise directed in writing by the San Diego Water Board Executive Officer. The Sediment Monitoring Report must contain the following information: (i) Analysis: An evaluation, interpretation and tabulation of the water and sediment monitoring data, including interpretations and conclusions as to whether applicable Receiving Water Limitations in this Order have been attained at each sample station; (ii) Sample Location Map: The locations, type, and number of samples must be identified and shown on a site map; and (iii) California Environmental Data Exchange Network: A statement certifying that the monitoring data and results have been uploaded into the California Environmental Data Exchange Network (CEDEN).	N/A			X	
D.2.b.(iv)	**Dry Weather MS4 Outfall Discharge Monitoring** (iv) Each Copermittee must document ***removal or re-prioritization of the highest priority persistent flow MS4 outfall monitoring stations identified under Provision D.2.b.(2)(a) in the Water Quality Improvement Plan Annual Report***. Persistent flow MS4 outfall monitoring stations that have been removed must be replaced with the next highest prioritized major MS4 outfall in the Watershed Management Area within its jurisdiction, unless there are no remaining qualifying major MS4 outfalls within the Copermittee's jurisdiction in the Watershed Management Area.	Section 3.2.1			X	
D.4.b.(1)(a)(ii)	**Non-Storm Water Dischargers Reduction Assessments** (a) Each Copermittee must assess and report the ***progress of its illicit discharge detection and elimination program***, required to be implemented pursuant to Provision E.2, toward effectively prohibiting non-storm water and illicit discharges into the MS4 within its jurisdiction as follows: (ii) Based on the data collected pursuant to Provisions D.2.b, the ***assessments required under <u>Provision D.4.b.(1)(c)</u> must be included in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3).***	Section 3.2.1			X	
D.4.b.(1)(b)	(b) Based on the transitional dry weather MS4 outfall discharge field screening monitoring required pursuant to Provision D.2.a.(2), each Copermittee must assess and report the following: (i) Identify the known and suspected controllable sources (e.g. facilities, areas, land uses, pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area; (ii) Identify sources of transient and persistent flows within the Copermittee's jurisdiction in the Watershed Management Area that have been reduced or eliminated; and (iii) Identify modifications to the field screening monitoring locations and frequencies for the MS4 outfalls in its inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges pursuant to Provision D.2.b.	Section 3.2 Section 5.2			X	X

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix: Appendix 2 Jurisdictional Information	WQIP Appendix: Appendix 3 Numeric Goals	WQIP Appendix: Appendix 4 Monitoring	WQIP Appendix: Appendix 5 Adaptive Management
D.4.b.(1)(c)	(c) Based on the **dry weather MS4 outfall discharge field screening monitoring** required pursuant to Provision D.2.b.(1), each Copermittee must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(1)(b); (ii) Based on the data collected and applicable NALs in the Water Quality Improvement Plan, rank the MS4 outfalls in the Copermittee's jurisdiction according to potential threat to receiving water quality, and produce a prioritized list of major MS4 outfalls for follow-up action to update the Water Quality Improvement Plan, with the goal of eliminating persistent flow non-storm water discharges and/or pollutant loads in order of the ranked priority list through targeted programmatic actions and source investigations; (iii) For the highest priority major MS4 outfalls with persistent flows that are in exceedance of NALs, identify the known and suspected sources within the Copermittee's jurisdiction in the Watershed Management Area that may cause or contribute to the NAL exceedances; (iv) Each Copermittee must analyze the data collected pursuant to Provision D.2.b, and utilize a model or other method, to calculate or estimate the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction identified as having persistent dry weather flows during the monitoring year. These calculations or estimates must be updated annually. [a] Each Copermittee must calculate or estimate the annual non-storm water volumes and pollutant loads collectively discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall; [b] Each Copermittee must annually identify and quantify (i.e. volume and pollutant loads) sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters.	Section 3.2.1			X	X
	(v) Each Copermittee must review the data collected pursuant to Provision D.2.b and findings from the assessments required pursuant to Provision D.4.b.(1)(c)(i)-(iv) at least once during the term of this Order to: [a] Identify reductions and progress in achieving reductions in non-storm water and illicit discharges to the Copermittee's MS4 in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction, with an estimate, if possible, of the non-storm water volume and/or pollutant load reductions attributable to specific water quality strategies implemented by the Copermittee; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittee in the Watershed Management Area toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters within its jurisdiction. (vi) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(1)(c)(i)-(v).	Section 3.2.1 Section 5.1 Section 5.2			X	X
D.4.b.(2)(a)	**Storm Water Pollutant Discharge Reduction Assessments** (a) The Copermittees must assess and report the ***progress of the water quality improvement strategies, required to be implemented pursuant to Provisions B and E, toward reducing pollutants in storm water discharges*** from the MS4s within the Watershed Management Area as follows: (ii) Based on the data collected pursuant to Provisions D.2.c, the ***assessments required under Provision D.4.b.(2)(c) must be included in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).	Section 3.2.2 Section 5.1			X	X
D.4.b.(2)(b)	(b) Based on the transitional wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.a.(3) the Copermittees must assess and report the following: (i) The Copermittees must analyze the monitoring data collected pursuant to Provision D.2.a.(3), and utilize a watershed model or other method, to calculate or estimate the following for each monitoring year: [a] The average storm water runoff coefficient for each land use type within the Watershed Management Area; [b] The volume of storm water and pollutant loads discharged from each of the Copermittee's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch; [c] The total flow volume and pollutant loadings discharged from the Copermittee's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and [d] The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch.(ii) Identify modifications to the wet weather MS4 outfall discharge monitoring locations and frequencies necessary to identify pollutants in storm water discharges from the MS4s in the Watershed Management Area pursuant to Provision D.2.c.(1).	Section 3.2.2 Section 5.1			X	X

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix: Appendix 2 Jurisdictional Information	WQIP Appendix: Appendix 3 Numeric Goals	WQIP Appendix: Appendix 4 Monitoring	WQIP Appendix: Appendix 5 Adaptive Management
D.4.b.(2)(c)	(c) Based on the wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.c the Copermittees must assess and report the following: (i) The assessments required pursuant to Provision D.4.b.(2)(b); (ii) Based on the data collected and applicable SALs in the Water Quality Improvement Plan, analyze and compare the monitoring data to the analyses and assumptions used to develop the Water Quality Improvement Plans, including strategies developed pursuant to Provision B.3, and evaluate whether those analyses and assumptions should be updated as a component of the adaptive management efforts pursuant to Provision B.5 for follow-up action to update the Water Quality Improvement Plan; (iii) The Copermittees must review the data collected pursuant to Provision D.2.c and findings from the assessments required pursuant to Provisions D.4.b.(2)(c)(i)-(ii) at least once during the term of this Order to: [a] Identify reductions or progress in achieving reductions in pollutant concentrations and/or pollutant loads from different land uses and/or drainage areas discharging from the Copermittees' MS4s in the Watershed Management Area; [b] Assess the effectiveness of water quality improvement strategies being implemented by the Copermittees within the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters within the Watershed Management Area to the MEP, with an estimate, if possible, of the pollutant load reductions attributable to specific water quality strategies implemented by the Copermittees; and [c] Identify modifications necessary to increase the effectiveness of the water quality improvement strategies implemented by the Copermittees in the Watershed Management Area toward reducing pollutants in storm water discharges from the MS4s to receiving waters in the Watershed Management Area to the MEP. (iv) Identify data gaps in the monitoring data necessary to assess Provisions D.4.b.(2)(c)(i)-(iii).	Section 3.2.2 Section 5.1			X	X
D.4.b.(2)(d)	(d) The Copermittees must evaluate all the data collected pursuant to Provision D.2.c, and incorporate new outfall monitoring data into time series plots for each long-term monitoring constituent for the Watershed Management Area, and perform statistical trends analysis on the cumulative long-term wet weather MS4 outfall discharge water quality data set.	Section 3.2.2			X	
D.4.c.	**Special Studies Assessments** c. The Copermittees must ***annually evaluate the results and findings from the special studies developed and implemented pursuant to Provision D.3***, and assess their relevance to the Copermittees' efforts to characterize receiving water conditions, understand sources of pollutants and/or stressors, and control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters in the Watershed Management Area. The Copermittees must ***report the results of the special studies assessments applicable to the Watershed Management Area, and identify any necessary modifications or updates to the Water Quality Improvement Plan based on the results in the Water Quality Improvement Plan Annual Reports*** required pursuant to Provision F.3.b.(3).	Section 3.3			X	X
D.4.d.	Integrated Assessment of Water Quality Improvement Plan d. As part of the ***iterative approach and adaptive management process*** required for the Water Quality Improvement Plan pursuant to Provision B.5, the Copermittees in each Watershed Management Area must integrate the data collected pursuant to Provisions D.1-D.3, the findings from the assessments required pursuant to Provisions D.4.a-c, and information collected during the implementation of the jurisdictional runoff management programs required pursuant to Provision E to assess the effectiveness of, and identify necessary modifications to, the Water Quality Improvement Plan as follows:	Section 5.1 Section 5.2			X	X
D.4.d.(1)	(1) The Copermittees ***must re-evaluate the priority water quality conditions and numeric goals for the Watershed Management Area, as needed, during the term of this Order pursuant to Provision B.5.a.*** The re-evaluation and recommendations for modifications to the priority water quality conditions, and/or numeric goals and corresponding schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The priority water quality conditions and numeric goals for the Watershed Management Area must be reevaluated as follows: (a) Re-evaluate the receiving water conditions in the Watershed Management Area in accordance with Provision B.2.a; (b) Re-evaluate the impacts on receiving waters in the Watershed Management Area from MS4 discharges in accordance with Provision B.2.b; (c) Re-evaluate the identification of MS4 sources of pollutants and/or stressors in accordance with Provision B.2.d; (d) Identify beneficial uses of the receiving waters that are protected in accordance with Provision D.4.a; (e) Evaluate the progress toward achieving the interim and final numeric goals for protecting impacted beneficial uses in the receiving waters.	Section 5.2			X	X

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix 2 Jurisdictional Information	Appendix 3 Numeric Goals	Appendix 4 Monitoring	Appendix 5 Adaptive Management
D.4.d.(2)	(2) The Copermittees ***must re-evaluate the water quality improvement strategies for the Watershed Management Area during the term of this Order pursuant to Provision B.5.b.*** The re-evaluation and recommendations for modifications to the water quality improvement strategies and schedules ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. The water quality improvement strategies for the Watershed Management Area must be re-evaluated as follows: (a) Identify the non-storm water and storm water pollutant loads from the Copermittees' MS4 outfalls in the Watershed Management Area, calculated or estimated pursuant to Provisions D.4.b; (b) Identify the non-storm water and storm water pollutant load reductions, or other improvements to receiving water or water quality conditions, that are necessary to attain the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters; (c) Identify the non-storm water and storm water pollutant load reductions, or other improvements to the quality of MS4 discharges, that are necessary for the Copermittees to demonstrate that non-storm water and storm water discharges from their MS4s are not causing or contributing to exceedances of receiving water limitations; (d) Evaluate the progress of the water quality improvement strategies toward achieving the interim and final numeric goals identified in the Water Quality Improvement Plan for protecting beneficial uses in the receiving waters.	Section 5.2	X			X
D.4.d.(3)	(3) The Copermittees ***must re-evaluate and adapt the water quality monitoring and assessment program for the Watershed Management Area when new information becomes available to improve the monitoring and assessment program pursuant to Provision B.5.c.*** The re-evaluation and recommendations for modifications to the monitoring and assessment program ***may be provided in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, but must at least be provided in the Report of Waste Discharge pursuant to Provision F.5.b. Modifications to the water quality monitoring and assessment program must be consistent with the requirements of Provision D.1-D.3. The re-evaluation of the water quality monitoring and assessment program for the Watershed Management Area must consider the data gaps identified by the assessments required pursuant to Provisions D.4.a-b, and results of the special studies implemented pursuant to Provision D.4.c	Section 5.2			X	X
Provision E						
E.1.b.	**b.** With the first ***Water Quality Improvement Plan Annual Report*** *required pursuant to Provision F.3.b.(3),* ***each Copermittee must submit a statement certified by its Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative that the Copermittee has taken the necessary steps to obtain and maintain full legal authority*** within its jurisdiction to implement and enforce each of the requirements contained in this Order.	Cert Statement	X			
E.2.d.(4)	(4) Each Copermittee must submit a ***summary of the non-storm water discharges and illicit discharges and connections investigated and eliminated within its jurisdiction with each Water Quality Improvement Plan Annual Report required under Provision F.3.b.(3)*** of this Order.	Section 3.2.1.3			X	
E.8.c.	**c.** Each Copermittee must submit a ***summary of the annual fiscal analysis with each Water Quality Improvement Plan Annual Report required pursuant to Provision F.3.b.(3)***.		X			
Provision F						
F.1.b.(6)	(6) During implementation of the Water Quality Improvement Plan the Copermittees must ***correct any deficiencies in the Plan identified by the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report*** following a request by the Board to do so.	Section 5.1 Section 5.2				X
F.2.a.(2)	(2) Each Copermittee must update its jurisdictional runoff management program document to incorporate the requirements of Provision E concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the jurisdictional runoff management program document based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;***		X			X
F.2.a.(3)	(3) Each Copermittee must submit ***updates to its jurisdictional runoff management program, with the supporting rationale for the modifications, either in the Water Quality Improvement Plan Annual Report*** required pursuant to Provision F.3.b.(3), or as part of the Report of Waste Discharge required pursuant to Provision F.5.b	Section 5	X			X
F.2.b.(1)	(1) Each Copermittee must update its BMP Design Manual to incorporate the requirements of Provisions E.3.a-d concurrent with the submittal of the Water Quality Improvement Plan. Each Copermittee must ***correct any deficiencies in the BMP Design Manual based on comments received from the San Diego Water Board in the updates submitted with the Water Quality Improvement Plan Annual Report;***	Section 5.1	X			
F.2.b.(2)	(2) Any ***future updates to the BMP Design Manual*** made after it update pursuant to Provision F.2.b.(1) is completed must be consistent with the requirements of Provisions E.3.a-d and ***must be submitted as part of the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b; and		X			

Permit Provision	Permit Language	WQIP AR Section	WQIP Appendix			
			Appendix 2 Jurisdictional Information	Appendix 3 Numeric Goals	Appendix 4 Monitoring	Appendix 5 Adaptive Management
F.2.c.(1)(c)	(c) The Copermittees for each Watershed Management Area ***must submit 1) proposed updates to the Water Quality Improvement Plan and supporting rationale, and 2) recommendations received from the public and the Water Quality Improvement Consultation Panel and the rationale for the requested updates, either in the Water Quality Improvement Plan Annual Reports required pursuant to Provision F.3.b.(3)***, or as part of the Report of Waste Discharge required pursuant to Provision F.5.b.	Section 5.2				X
F.3.b.(3)(a-f)	(3) Water Quality Improvement Plan Annual Reports - The Copermittees for each Watershed Management Area must ***submit a Water Quality Improvement Plan Annual Report for each reporting period no later than January 31*** of the following year. The annual reporting period consists of two different periods: 1) July 1 to June 30 of the following year for the jurisdictional runoff management programs, 2) October 1 to September 30 of the following year for the monitoring and assessment programs. The Water Quality Improvement Plan Annual Reports must be made available on the Regional Clearinghouse required pursuant to Provision F.4. Each ***Annual Report must include the following***:	See below				
	(a) The receiving water and MS4 outfall discharge monitoring data collected pursuant to Provisions D.1 and D.2, summarized and presented in tabular and graphical form;	Section 3.1 Section 3.2			X	
	(b) The progress of the special studies required pursuant to Provision D.3, and the findings, interpretations and conclusions of a special study, or each phase of a special study, upon its completion;	Section 3.3			X	
	(c) The findings, interpretations and conclusions from the assessments required pursuant to Provision D.4;	Section 3			X	
	(d) The progress of implementing the Water Quality Improvement Plan, including, but not limited to, the following: (i) The **progress toward achieving the interim and final numeric goals** for the highest water quality priorities for the Watershed Management Area;	Section 4				
	(ii) The water quality improvement **strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods**;	Section 5.1 Section 5.2	X			X
	(iii) The water quality improvement strategies planned for implementation during the next reporting period;	Section 4.1	X			X
	(iv) Proposed modifications to the water quality improvement strategies, the public comments received and the supporting rationale for the proposed modifications;	Section 5	X			X
	(v) Previous modifications or updates incorporated into the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document and implemented by the Copermittees in the Watershed Management Area; and	Section 5.2	X			X
	(vi) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;	Section 5.2	X			X
	(e) A completed Jurisdictional Runoff Management Program Annual Report Form (contained in Attachment D to this Order or a revised form accepted by the San Diego Water Board) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative; and	Section 1	X			
	(f) Each Copermittee must provide any data or documentation utilized in developing the Water Quality Improvement Plan Annual Report upon request by the San Diego Water Board. Any Copermittee monitoring data utilized in developing the Water Quality Improvement Plan Annual Report must be uploaded to the California Environmental Data Exchange Network (CEDEN). Any Copermittee monitoring and assessment data utilized in developing the Water Quality Improvement Plan Annual Report must be available for access on the Regional Clearinghouse required pursuant to Provision F.4.	Section 1			X	
Attachment E						
Attachment E	Specific Monitoring and Assessment Requirements for each TMDL.TMDL monitoring and assessment results must be submitted as part of Water Quality Improvement Plan Annual Reports required under Provision F.3.b	Section 3.1.4			X	

APPENDIX 2

Jurisdictional Runoff Management Program Information

Appendix 2 – Jurisdictional Runoff Management Program Information

The following sections present agency-specific information for the San Luis Rey River Watershed Management Area (WMA), including:

- Annual Report Certifications – included to satisfy the requirements of 40 CFR 122.41(k), which requires that applications, reports, or information submitted to the San Diego Regional Water Quality Control Board (Regional Board), State Water Resources Control Board (SWRCB), or United States Environmental Protection Agency (USEPA) must be signed and certified by a principal executive officer or ranking elected official, or by a duly authorized representative of that person.

- Jurisdictional Runoff Management Program (JRMP) Annual Report Forms – the completed JRMP Annual Report form (Attachment D to the Permit).

- Jurisdictional Strategies – tables present the actual and planned jurisdictional strategies utilized by the Participating Agencies in the San Luis Rey River WMA to address the highest priority water quality condition (HPWQC) (i.e., bacteria). The tables may include strategies currently being implemented and/or planned for implementation, as well as optional jurisdictional strategies. Descriptions of the symbols used are as follows:

  ● = full implementation during the reporting period
  ◖ = partial implementation during the reporting period
  "×" = will not be implemented in the next reporting period

  Modified strategies are designated using "track changes" showing additions (underlined) and removals (strikeouts) of text and an explanation is provided in the "Rationale for Modification to the Strategy" column. New strategies are added as appropriate and are **bold**.

- Modifications to the Best Management Practice (BMP) Design Manual – originally submitted with the Water Quality Improvement Plan (WQIP); deficiencies in the BMP Design Manual noted by the Regional Board are corrected and submitted within this section, if applicable. Future updates will also be included in this section, when applicable.

- Modifications to the JRMP – Itemized in this section or may be provided as an attachment to the JRMP Annual Report Form.

1 County of San Diego

1.1 ANNUAL REPORT CERTIFICATION

County of San Diego

SARAH E. AGHASSI
DEPUTY CHIEF ADMINISTRATIVE OFFICER

LAND USE AND ENVIRONMENT GROUP
1600 PACIFIC HIGHWAY, ROOM 212, SAN DIEGO, CA 92101
(619) 531-6256 • Fax (619) 531-5476
www.sdcounty.ca.gov/lueg

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT SAN LUIS REY RIVER WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the County of San Diego has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 6th day of January, 2017, at the County of San Diego.

Sarah Aghassi
SARAH E. AGHASSI
Deputy Chief Administrative Officer

Date 1/6/17

1.2 ANNUAL REPORT FORM

ATTACHMENT D

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM

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JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

I. COPERMITTEE INFORMATION

I.A Copermittee Name: County of San Diego (PIN 255223)

I.B Copermittee Primary Contact Name: Todd Snyder

I.C Copermittee Primary Contact Information:
Address: 5510 Overland Avenue, Suite 410
City: San Diego County: San Diego State: California Zip: 92123
Telephone: (858) 694-3672 Fax: (858) 495-5623 Email:Todd.Snyder@sdcounty.ca.gov

II. LEGAL AUTHORITY

II.A Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
II.B A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES NO	☒ ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

III.A Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES NO	☒ ☐
III.B If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES NO	☒ ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

IV.A Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES NO	☒ ☐

IV.B.1 Number of non-storm water discharges reported by the public	286
IV.B.2 Number of non-storm water discharges detected by Copermittee staff or contractors	95
IV.B.3 Number of non-storm water discharges investigated by the Copermittee	375
IV.B.4 Number of sources of non-storm water discharges identified	115
IV.B.5 Number of non-storm water discharges eliminated	112
IV.B.6 Number of sources of illicit discharges or connections identified	85
IV.B.7 Number of illicit discharges or connections eliminated	84
IV.B.8 Number of enforcement actions issued	93
IV.B.9 Number of escalated enforcement actions issued	1

V. DEVELOPMENT PLANNING PROGRAM

V.A Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES NO	☒ ☐
V.B Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES NO	☒ ☐
V.C If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES NO	☒ ☐

V.D.1 Number of proposed development projects in review	925
V.D.2 Number of Priority Development Projects in review	237
V.D.3 Number of Priority Development Projects approved	96
V.D.4 Number of approved Priority Development Projects exempt from any BMP requirements	0
V.D.5 Number of approved Priority Development Projects allowed alternative compliance	0
V.D.6 Number of Priority Development Projects granted occupancy	62

V.E.1 Number of completed Priority Development Projects in inventory	410
V.E.2 Number of high priority Priority Development Project structural BMP inspections	691
V.E.3 Number of Priority Development Project structural BMP violations	170
V.E.4 Number of enforcement actions issued	170
V.E.5 Number of escalated enforcement actions issued	0

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

VI. CONSTRUCTION MANAGEMENT PROGRAM	
VI. A Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
VI.B.1 Number of construction sites in inventory	2,748
VI.B.2 Number of active construction sites in inventory	2,684
VI.B.3 Number of inactive construction sites in inventory	0
VI.B.4 Number of construction sites closed/completed during reporting period	1,124
VI.B.5 Number of construction site inspections	18,858
VI.B.6 Number of construction site violations	416
VI.B.7 Number of enforcement actions issued	590
VI.B.8 Number of escalated enforcement actions issued	38

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM	
VII.A Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
VII.B.1 Number of facilities or areas in inventory	a. 263	b. 1,779	c. 150	d.110
VII.B.2 Number of existing development inspections	a. 1,885	b. 974	c. 38	d.468
VII.B.3 Number of follow-up inspections	a. 23	b. 131	c. 12	d.165
VII.B.4 Number of violations	a. 46	b. 279	c. 31	d.346
VII.B.5 Number of enforcement actions issued	a. 28	b. 130	c. 10	d.0
VII.B.6 Number of escalated enforcement actions issued	a.0	b.1	c.0	d.0

VIII. PUBLIC EDUCATION AND PARTICIPATION	
VIII.A Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
VIII.B Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

IX. FISCAL ANALYSIS	
Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Sarah Aghassi
Signature

10/26/16
Date

SARAH E. AGHASSI
Print Name

LAND USE AND ENVIRONMENT GROUP
DEPUTY CHIEF ADMINISTRATIVE OFFICER
Title

(619) 531-5451
Telephone Number

SARAH.AGHASSI@SDCOUNTY.CA.GOV
Email

ATTACHMENT D.1

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FORM BY WATERSHED

JRMP ANNUAL REPORT ATTACHMENT D.1 by WATERSHED

Fiscal Year 2015-2016

			SANTA MARGARITA	SAN LUIS REY	CARLSBAD	SAN DIEGUITO	PENASQUITOS	SAN DIEGO RIVER	SAN DIEGO BAY	TIJUANA RIVER	JURISDICTION TOTALS
			*(902.00)	*(903.00)	*(904.00)	*(905.00)	*(906.00)	*(907.00)	*(908.00, 909.00, 910.00)	*(911.00)	
IV.	**ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM**										
IV.B.1	Number of non-storm water discharges reported by the public		12	46	30	40	2	78	72	6	286
IV.B.2	Number of non-storm water discharges detected by Copermittee staff or contractors		9	11	7	14	1	28	24	1	95
IV.B.3	Number of non-storm water discharges investigated by the Copermittee		15	57	37	51	3	106	99	7	375
IV.B.4	Number of sources of non-storm water discharges identified		4	22	17	11	1	30	28	2	115
IV.B.5	Number of non-storm water discharges eliminated		4	21	16	10	1	30	28	2	112
IV.B.6	Number of sources of illicit discharges or connections identified		4	14	16	8	0	18	23	2	85
IV.B.7	Number of illicit discharges or connections eliminated		4	14	15	8	0	18	23	2	84
IV.B.8	Number of enforcement actions issued		4	21	17	9	1	23	16	2	93
IV.B.9	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	1	1
V.	**DEVELOPMENT PLANNING PROGRAM**										
V.D.1	Number of proposed development projects in review		27	219	109	189	0	158	183	40	925
V.D.2	Number of Priority Development Projects in review		2	53	30	53	0	43	50	6	237
V.D.3	Number of Priority Development Projects approved		4	23	11	21	0	20	11	6	96
V.D.4	Number of approved Priority Development Projects exempt from any BMP requirements		0	0	0	0	0	0	0	0	0
V.D.5	Number of approved Priority Development Projects allowed alternative compliance		0	0	0	0	0	0	0	0	0
V.D.6	Number of Priority Development Projects granted occupancy		2	16	5	8	0	18	12	1	62
V.E.1	Number of completed Priority Development Projects in inventory		12	89	54	85	0	66	93	11	410
V.E.2	Number of high priority Priority Development Project structural BMP inspections		1	100	70	273	0	110	82	55	691
V.E.3	Number of Priority Development Project structural BMP violations		1	43	31	53	0	24	8	10	170
V.E.4	Number of enforcement actions issued		1	43	31	53	0	24	8	10	170
V.E.5	Number of escalated enforcement actions issued		0	0	0	0	0	0	0	0	0
VI.	**CONSTRUCTION MANAGEMENT PROGRAM**										
VI.B.1	Number of construction sites in inventory		63	637	397	636	2	438	513	62	2748
VI.B.2	Number of active construction sites in inventory		60	622	393	627	2	424	496	60	2684
VI.B.3	Number of inactive construction sites in inventory		0	0	0	0	0	0	0	0	0
VI.B.4	Number of construction sites closed/completed during reporting period		20	314	137	235	1	175	219	23	1124
VI.B.5	Number of construction site inspections		245	3655	4473	3934	3	2868	3361	319	18858
VI.B.6	Number of construction site violations		1	50	55	38	0	64	205	3	416
VI.B.7	Number of enforcement actions issued		1	66	64	66	0	104	286	3	590
VI.B.8	Number of escalated enforcement actions issued		1	6	8	9	0	3	9	2	38
VII.	**EXISTING DEVELOPMENT MANAGEMENT PROGRAM**										
VII.B.1	Number of facilities or areas in inventory	a. Municipal	8	23	27	34	4	63	82	22	263
		b. Commercial	154	315	196	210	2	466	410	26	1779
		c. Industrial	15	4	5	22	0	67	36	1	150
		d. Residential	12	11	11	22	1	15	21	17	110
VII.B.2	Number of existing development inspections	a. Municipal	48	181	239	244	41	421	561	150	1885
		b. Commercial	106	155	115	102	0	180	309	7	974
		c. Industrial	1	5	5	12	0	2	13	0	38
		d. Residential	17	55	67	107	2	109	77	34	468
VII.B.3	Number of follow-up inspections	a. Municipal	0	3	0	0	0	2	14	4	23
		b. Commercial	7	10	10	13	0	22	65	4	131
		c. Industrial	1	3	0	2	0	0	6	0	12
		d. Residential	3	22	30	43	0	34	24	9	165
VII.B.4	Number of violations	a. Municipal	0	7	0	1	0	5	26	7	46
		b. Commercial	15	21	25	16	0	51	140	11	279
		c. Industrial	0	7	0	4	0	0	20	0	31
		d. Residential	4	47	59	85	0	70	50	31	346
VII.B.5	Number of enforcement actions issued	a. Municipal	0	2	0	0	0	3	19	4	28
		b. Commercial	10	13	11	7	0	21	65	3	130
		c. Industrial	0	2	0	2	0	0	6	0	10
		d. Residential	0	0	0	0	0	0	0	0	0
VII.B.6	Number of escalated enforcement actions issued	a. Municipal	0	0	0	0	0	0	0	0	0
		b. Commercial	0	0	0	0	0	0	0	1	1
		c. Industrial	0	0	0	0	0	0	0	0	0
		d. Residential	0	0	0	0	0	0	0	0	0

ATTACHMENT D.2

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM ANNUAL REPORT FISCAL ANALYSIS

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FISCAL ANALYSIS COMPONENT

1.1. Introduction

This section presents an estimated annual budget for the County's runoff management programs for FY 2015-16.

1.2. Fiscal Analysis Methods

This section continues to utilize the methodologies and standards established in *Fiscal Analysis Method* submitted by the Copermittees in January 2009.

1.3. Fiscal Analysis Results

As shown the County estimated its total FY 2015-16 expenditures at $27,414,216. This fiscal analysis addresses each of the County's Runoff Management Program elements (jurisdictional, watershed, and regional activities) for the current reporting period (FY 2015-16). Expenditures are described by department and major program area. They represent an estimate of the expenditures that the County incurred in meeting its compliance obligations for FY 2015-16. They should not be interpreted as either budgeted or actual expenditures. Because stormwater program expenditures are distributed throughout a considerable number of County programs, a single consolidated "budget" does not exist for the program as a whole. As such, these figures should be considered best estimates of stormwater-related expenditures.

1.3.1 Expenditures

1.3.1.1. Jurisdictional

Table 1.1 presents the County's estimated jurisdictional expenditures for FY 2015-16.

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
1	**ADMINISTRATION**	**$6,840,583**	These costs correspond to the DPW WPP development, administrative oversight, and assessment of the County's stormwater programs. The WPP is responsible for the development of new and augmented County stormwater programs, regulatory reporting, and program assessment. Some administrative costs are associated with other specific functions shown below, but are included here because they could not be separated out.
2	**DEVELOPMENT PLANNING**	**$1,109,654**	
A	**Land Use Planning**	$0	Expenditures not reported for FY 2015-16; included in other elements.
B	**Environmental Review**	$0	Expenditures not reported for FY 2015-16; included in other elements.
C	**Development Project Approval and Verification**	**$1,109,654**	
C1	**Public Projects (CIP)**	$824,219	
	Project Planning and Engineering	$570,229	Costs include: preparing and reviewing plans and specifications for stormwater BMPs, and SWPPP/WPCP review. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$15,000	
	BMP Implementation	$238,990	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
C2	**Private Projects**	$285,435	
	Permitting and Licensing	$285,435	This cost covers PDS plan reviews at permitted sites. Total costs are estimated as fixed percentages of annual plan-checking fees.
3	**CONSTRUCTION**	**$4,500,593**	
A	**Public Projects (CIP)**	$2,886,893	Costs include: BMP compliance inspections during construction, and implementation of construction phase BMPs. These costs apply to DPW, DPR, and DGS.
	Compliance Inspection and Enforcement	$1,613,880	
	BMP Implementation	$1,273,013	
B	**Private Projects**	$1,613,700	
	Compliance Inspection and Enforcement	$1,613,700	This cost primarily covers DPW and PDS construction inspections at permitted sites. Total costs are estimated as fixed percentages of inspection program fees.
4	**MUNICIPAL**	**$7,572,297**	
A	**Administration**	$267,805	Expenditures associated with the administrative oversight of the stormwater programs, regulatory reporting, and program assessment of municipal facilities by the DPW - Watershed Protection Program.
B	**Streets, Roads, and Highways Element**	$2,256,091	
	Administration	$291,160	Founded road operations activities include: culvert inspections and cleaning;

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	Maintenance Inspections	$1,890,813	increased culvert waste disposal costs, street sweeping, installation and maintenance of BMPs and road structures, and the placement of additional controls. 10% of the Maintenance and Inspections and BMP Implementation is reported as Administration cost.
	BMP Implementation	$74,118	
	Other	$0	
C	**MS4 Element**	$1,530,000	
	Administration	$191,000	The combined costs shown here apply across (1) DPW Flood Control -- conversion of existing concrete lined channels to natural bottom channels, updating flood control master plans, increased maintenance of flood control systems, and construction and maintenance of regional treatment BMPs; and (2) DPW Flood Control MS4 Operation & Maintenance -- maintenance on flood control facilities throughout the unincorporated areas of the County, exclusive of facilities within road rights-of-way (included in 4.B above). Other includes the cost of disposal of debris removed from MS4.
	Maintenance Inspections	$1,046,900	
	BMP Implementation	$290,500	
	Other	$2,500	
D	**Solid Waste Facilities Element**	$406,618	
	Administration	$35,047	Costs include Regional Board stormwater permit fees, consultant costs associated with stormwater upgrade and repair projects, and office staff time.
	Maintenance Inspections	$16,922	Costs include staff time to perform site inspections.
	BMP Implementation	$79,149	Costs include stormwater consultant site inspections, sampling/testing and BMP materials.
	Other (construction)	$275,500	Drainage improvement projects and BMP site maintenance projects.
E	**Wastewater Facilities Element**	$187,000	
	Administration	$10,000	This includes costs associated with JRMP report, the sanitary sewer system and facilities including: pump stations, sewage treatment plants and Spring Valley Operations facility. Also includes the cost of BMP design, acquisition,
	Maintenance Inspections	$127,000	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$50,000	maintenance and monitoring, for wastewater Capital Improvement Projects, and Major maintenance projects, and at various wastewater facilities.
	Other	$0	
F	**Road Stations Element**	$919,867	
	Administration	$83,624	This includes DPW road station operations related to Permit compliance. The Administration cost is determined as 10% of the total costs of maintenance and Inspections and BMP Implementation as reported by the DPW Roads Divisions.
	Maintenance Inspections	$799,414	
	BMP Implementation	$36,829	
	Other	$0	
G	**Fleet Maintenance Element**	$11,722	
	Administration	$1,036	This includes costs associated with operation of the County's fleet maintenance and fueling facilities.
	Maintenance Inspections	$7,392	
	BMP Implementation	$3,294	
	Other	$0	
H	**Municipal Airfields Element**	$338,110	These costs involve site inspections, annual reporting, and maintenance of BMPs at airports, including oversight of tenant operations. The BMP implementation item includes Palomar asphalt cap repairs.
	Administration	$12,737	
	Maintenance Inspections	$0	
	Compliance Inspection and Enforcement	$0	
	BMP Implementation	$300,623	
	Other (sampling and analysis)	$24,750	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
I	**Parks & Recreational Facilities Element**	$1,214,562	
	Administration	$121,362	This includes: coordinating all training requirements, preparing and reviewing reports, and overseeing the overall implementation of the stormwater program for DPR.
	BMP Implementation	$991,603	This includes costs associated with implementation of BMPs at County parks.
	Compliance Inspection and Enforcement	$101,597	Costs are for DPR enforcement of stormwater requirements at County parks.
	Other	$0	
J	**Office Buildings & Other Municipal Facilities Element**	$297,867	
	Administration	$0	DGS conducts a variety of storm water activities including: inspections and clean-up of County-owned, occupied, and leased facilities and vacant lands; maintenance and signage of storm drain inlet inserts and trash dumpsters; placement of inlet filters; maintenance of coverage and containment improvements for on-site supplies and materials; parking lot sweeping and controlled parking lot power washing; and application of erosion and sediment control measures. These costs are exclusive of fleet maintenance and fueling operations.
	Maintenance Inspections	$99,808	
	BMP Implementation	$198,059	
	Other	$0	
	Management of Pesticides, Herbicides, & Fertilizers	$142,656	
	Administration	$142,656	Integrated Pest Control Program within the Department of Agriculture, Weights and Measures (AWM) performs eradication and control of invasive weeds. This program also provides weed control on roadsides, airports, flood control channels,
	Maintenance Inspections	$0	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
	BMP Implementation	$0	sewage treatment plants and inactive landfills. It also provides structural pest control to facilities owned and operated by the county.
	Other	$0	
5	**INDUSTRIAL and COMMERCIAL**	**$1,575,635**	
	Administration	$253,047	DPW and AWM conduct inspections of a variety of businesses in the unincorporated County, provide regulatory oversight of mobile businesses, and conduct follow-up and enforcement of stormwater violations.
	Compliance Inspection and Enforcement	$1,245,279	
	Educational Outreach	$77,309	
	Other expenditures	$0	
6	**RESIDENTIAL**	**$1,205,386**	
	Compliance Inspection and Enforcement	$688,453	DPW conducts complaint investigations for residential sources in the unincorporated County, and conduct follow-up and enforcement of stormwater violations. DPW also operates a regional hotline.
	Educational Outreach	$516,933	Several County departments coordinate and provide outreach to the residential sector and schoolchildren in support of Permit Section D.5 requirements. Costs reported here correspond to DPW only. Funded activities include developing pollution prevention content and providing direct outreach to various target audiences within the general residential and schoolchildren target audiences.
7	**IDDE**	**$321,523**	

Table 1.1 – Estimated Jurisdictional Expenditures for FY 2015-16

	Jurisdictional Worksheet Component		Explanation/Notes
		$321,523	DPW conducts monitoring programs, assesses scientific data, and provides technical and scientific support to other County program staff. They also provide support for all technical and scientific aspects of JRMP development and implementation. These costs are exclusive of the regional monitoring program which is addressed separately under regional costs.
8	**EDUCATION**	**$0**	Education costs are included in other sections as applicable.
9	**PUBLIC PARTICIPATION**	**$0**	Public participation costs are included in other sections as applicable.
10	**SPECIAL INVESTIGATIONS**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.
11	**NON-EMERGENCY FIREFIGHTING**	**$0**	Expenditures not reported for FY 2015-16; included in other elements.
		$23,125,671	

1.3.1.2 Watershed

Table 1.2 presents the County's estimated watershed expenditures for FY 2015-16.

Table 1.2 – Estimated Watershed Expenditures for FY 2015-16

	Santa Margarita WMA	San Luis Rey WMA	Carlsbad WMA	San Dieguito WMA	Peñasquitos WMA	San Diego River WMA	San Diego Bay WMA	Tijuana WMA
Administration	$37,583	$201,492	$82,653	$113,035	$75,309	$105,117	$37,583	$75,309
Cost Share Contribution	$0	$62,494	$46,204	$8,885	$1,062	$68,970	$6,659	$2,346
Watershed Activities	$626,917	$119,390	$14,860	$171,640	$26,423	$125,705	$111,491	$80,300
Other	$0	$0	$0	$0	$0	$0	$0	$0
Total Estimated Watershed Costs	**$664,500**	**$383,376**	**$143,717**	**$293,560**	**$102,794**	**$299,792**	**$155,733**	**$157,955**

1.3.1.3 Regional

Table 1.3 presents the County's estimated regional expenditures for FY 2015-16. This includes only those expenditures associated with the Copermittees' adopted Regional Budget and Work Plan. Other costs associated with regional participation (meeting attendance, etc.) are included within the jurisdictional expenditures presented above.

Table 1.3 – Estimated Regional Expenditures for FY 2015-16

Regional Programs	County Costs
Administration	$0
Cost Share Contribution	$2,087,118
Regional Activities	$0
Other	$0
Total Estimated Regional Costs	**$2,087,118**

1.3.1.4 Total Expenditures

Table 1.4 presents the County's total estimated expenditures for FY 2015-16 (jurisdictional, watershed, and regional).

Table 1.4 – Total Estimated County Expenditures for FY 2015-16

Component / Sub-component	Estimated Expenditures
Jurisdictional	
Administration	$6,840,583
Development Planning	$1,109,654
Construction	$4,500,593
Municipal	$7,572,297
Industrial And Commercial	$1,575,635
Residential	$1,205,386
IDDE	$321,523
Education	$0
Public Participation	$0
Special Investigations	$0
Non-emergency Firefighting	$0
Jurisdictional Total	**$23,125,671**
Watershed	
Santa Margarita WMA	$664,500
San Luis Rey WMA	$383,376
Carlsbad WMA	$143,717
San Dieguito WMA	$293,560
Peñasquitos WMA	$102,794
San Diego River WMA	$299,792
San Diego Bay WMA	$155,733
Tijuana WMA	$157,955
Watershed Total	**$2,201,427**
Regional	**$2,087,118**

Total Estimated County Costs ***$27,414,216***

1.3.2 Funding Source

Table 1.5 shows the major sources of funding for the County's urban runoff management programs in FY 2015-16, and describes the legal restrictions applicable to the use of each.

Table 1.5 – Legal Restrictions on the Use of Program Funding

Funding Source	Legal Restrictions
General Fund	There are no restrictions on the use of general fund for County water quality programs and activities except that they must be used only for the purposes for which they are budgeted and allocated by the County Board of Supervisors.
Flood Control District Fees	Revenue generated from these fees must be expended for activities related to flood and storm management.
Developer Deposits / Permit Fees	Deposits / fees may be used only to fund activities related to the work for which the permits are issued.
Gas Tax	Gas Tax is collected by the state and allocated to local government for transportation-related work including maintenance of existing transportation systems and construction of new transportation facilities. These funds may not be used for other purposes.
Sanitary District Fees	Sanitary District Fees are used for work related to the maintenance of sewer lines, pump stations, force mains, and several treatment plants that serve the unincorporated areas. They may be used only for such maintenance-related purposes within the respective sewer district for which they are collected.
Other Funding Sources	Other funding sources collectively account for a relatively small portion of ongoing expenditures. However, all funding for the County's stormwater compliance programs is expended within applicable legal restrictions and limitations.

1.4. Conclusions and Recommendations

The figures presented here are an estimate of the expenditures that the County incurred to meet its compliance obligations for FY 2015-16. For the reasons explained above, they should be considered only best estimates of stormwater-related expenditures.

1.3 JURISDICTIONAL STRATEGIES

Table A2-1. County of San Diego, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Engage the public, jurisdictional staff, and other agency staff to proactively identify and report illicit discharges.						
IDDE 1	Utilize municipal personnel and contractors to identify and report illicit discharges and connections.	●	●	A/P		• IDDE Program
IDDE 2	Utilize municipal personnel and Contractors to monitor stormwater outfalls for discharges of potential ICIDs.	●	●	A/P		• Part of the IDDE Program
IDDE 3	Updated focused training for County Field Staff.	●	●	A/P		• Updated training for BMP Design Manual and Stormwater Implementers
IDDE 4	Facilitate public reporting of illicit discharges and connections via Water Quality Hotline (i.e., telephone and email).	●	●	A/P		• Bilingual hotline, dedicated e-mail address, and multiple online reporting tools
IDDE 5	Bilingual hotline answered by a live operator (I Love a Clean San Diego) to provide better customer service.	●	●	A/P		• Bilingual hotline operated by ILACSD
IDDE 6	Coordinate with upstream entities to prevent illicit discharges from upstream sources entering into the storm drain system.	●	●	A/P		• If illicit connections are identified as part of an IDDE investigation, investigation will be conducted to define and eliminate the source. If determined to be from an upstream entity coordination will occur.

Table A2-1. County of San Diego, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
IDDE 7	Refer homeless issue complaints to Sheriff or appropriate jurisdictions.	●	●	A/P		• Collaborate with multi-departmental group to address homeless encampments
2. Develop and implement approaches to address the impacts of septic systems within the watershed.						
IDDE 8	Address septic system failures where observed.	●	●	A/P		• Suspected septic discharges are reported to DEH HIRT Response line when they occur after hours and DEH Land and Water Quality Division during normal hours. All complaints resolved during 15-16.
IDDE 9	Implement practices and procedures to address spills with the potential to enter the MS4.	●	●	A/P		• NOV issued by DEH for failing septic systems when effluent could reach the storm drain. Prompt follow up and mitigation is implemented. Such cases are rare; <5 in 15-16.
IDDE 10	Coordinate spill response with responsible sewer agencies.	●	●	A/P		• Major DEH role is to inform the public of risks associated with sewer spills, conducting sampling, reporting, posting signs, etc.
IDDE 11	Implement practices and procedures to prevent/limit infiltration of seepage from sanitary sewers	●	●	A/P		• If illicit connections are identified as part of an IDDE investigation, investigation will be conducted to define and eliminate the source.
IDDE 12	Collect effluent on the ground (EOG), sanitary sewer overflow (SSO) data	●	●	A/P		• Approximately 87 EOG complaints related to septic systems and 14 SSO events recorded and responded to.

Table A2-1. County of San Diego, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
3. Enforce prohibitions related to illicit discharges and connections.						
IDDE 13	Develop and implement a strategy for investigating and addressing illicit discharges and connections.	●		N/A		• One time. Focused, collaborative investigations with Planning and Science staff of high priority outfalls.
IDDE 14	Impose legal authority to ensure all illicit discharges and connections that are identified are eliminated.	●	●	A/P		• Ongoing.
4. Other Related Programs and Activities						
IDDE 15	Maintain stormwater conveyance map to facilitate implementation of the IDDE program.	●	●	A/P		• Updated as needed.

Table A2-2. County of San Diego, Development Planning Program Strategies

Number	San Luis Rey River Development Planning Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Provide updated materials and enhanced outreach to convey land development requirements.						
DP 1	Update BMP Design Manual procedures to specify stormwater requirements applicable to development and redevelopment projects, identify and design appropriate BMPs, establish maintenance criteria, and establish where implemented alternative compliance options.	◖		A/P		• In Development. Updated to reflect the Regional Model BMP DM with additional changes to incorporate County implementation practices. BMP DM became effective on February 26, 2015.
DP 2	Conduct internal (staff) training on the updated BMP Manual	●		A		• One time. BMP Manual training conducted when required. JRMP required internal training is conducted every fiscal year.
DP 3	Hold external land development workshops targeting the development community	●		A		• One time. The County conducts external training regularly and after release of new guidance documents
DP 4	Update County codes, ordinances, and stormwater design standards consistent with the permit and the updated BMP Manual	●		A		• One time. The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated permit and the inclusion of applicant-implement offsite alternative compliance. WPO update became effective on February 26, 2016.

Table A2-2. County of San Diego, Development Planning Program Strategies

Number	San Luis Rey River Development Planning Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
2. Implement a BMP compliance program to ensure proper design and maintenance planning.						
DP 5	Implement a program that ensures that all structural and Low Impact Development (LID) BMPs are designed, constructed and maintained on Priority Development and Redevelopment Projects.	●	●	A/P		• Structural BMPs and LID BMPs are designed and constructed per the BMP Design Manual. In addition, Structural BMPs are tracked for maintenance through inspections and self-verification letters. LID BMPs that are installed as a result of implementation of the BMP Design Manual are proposed to be inspected
3. Enforce post construction requirements related to new and redevelopment.						
DP 6	In addition to requirement for all development projects, implement or require implementation of onsite structural BMPs to control pollutants and manage hydromodification for PDPs.	●	●	A/P		• The County BMP DM requires all PDPs to implement PC and HMP BMPs. These requirements are captured in the WPO and County's BMP DM.
DP 7	Impose legal authority to ensure all development and redevelopment projects are in compliance with all post construction requirements.	●	●	A/P		• The Watershed Protection Ordinance was updated in FY16 to include modifications necessary as the result of the updated permit and the inclusion of applicant-implement offsite alternative compliance.

Table A2-3. County of San Diego, Construction Management Program Strategies

Number	San Luis Rey River Construction Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Improve data tracking methods for construction inventories and inspections where necessary.						
CM 1	Maintain, update, and prioritize a watershed-based inventory of all projects issued local permits that allow soil disturbing activities.	●	●	A		• Projects that are issued local permits that allow soil disturbance activities are part of the inventory that is watershed-based.
2. Ensure that minimum BMPs are designated and required for construction projects.						
CM 2	Require implementation of BMPs that are site specific, seasonally appropriate and appropriate to the construction phase, year round.	●	●	A/P		• Every project requires implementation of site specific construction BMPs, seasonably appropriate and appropriate to the construction phase.
CM 3	Make updates to County ordinances related to construction; reference to existing grading ordinance	●		A		• One time. County ordinances are updated with subsequent Construction General Permit updates; the Watershed Protection Ordinance will be updated as necessary as a result of the future Grading Ordinance Update.
3. Enforce Construction Management Requirements						
CM 4	Impose legal authority to ensure inventoried construction projects are in compliance with all requirements.	●	●	A/P		• The Watershed Protection Ordinance is the current legal authority to insure inventoried construction projects are in compliance with all requirements.
CM 5	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) within five (5) calendar days of issuing escalated enforcement to a construction site that poses a significant threat to water quality as a result of violations or other noncompliance		●	A/P		• County implemented the ERP as described in the JRMP.

Table A2-3. County of San Diego, Construction Management Program Strategies

Number	San Luis Rey River Construction Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
4. Provide enhanced outreach and coordination to convey construction requirements.						
CM 6	Provide internal staff training related to construction storm water management.	●	●	A/P		• The County conducts construction stormwater training annually and it targets construction inspectors in DPW-PDCI, PDS-Building, and CIP Inspectors in DPW and DGS.

Table A2-4. County of San Diego, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Improve data tracking methods for existing development inventories where necessary.						
ED 1	Maintain and update a watershed-based inventory of existing development (i.e., commercial, industrial, and municipal facilities and residential areas).	●	●	A/P		• Database is continually updated to increase accuracy and efficiency.
ED 2	Improve the tracking of watershed based inventories via consolidated database	●				• See ED 1
2. Develop and implement approaches to address the impacts of improper water use and irrigation runoff.						
ED 3	Collaborate with partner agencies and groups to promote non-County sponsored incentive programs for BMP retrofits, including rain barrels, smart controllers, soil sensors, turf replacement, etc.	●	●	A/P		• The County continues to collaborate with and promote the efforts of partner agencies incentive programs.
ED 4	Promote incentive program for BMP retrofits (e.g. water smart irrigation controllers, turf replacements programs, residential landscape evaluation program).	●				• The County continues to collaborate with and promote the efforts of partner agencies incentive programs.
3. Improve and/or continue existing pet waste programs.						
ED 5	Pet waste management and outreach in County Parks.	●	●	A/P		• Mutt-mitt dispensers are installed and maintained in many County parks, providing people who are walking their dogs with waste disposal bags to use to pick up after their pets.

Table A2-4. County of San Diego, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
4. Improve trash management strategies within the watershed.						
ED 6	Sponsor Trash Collection Events (public outreach and participation).	●	●	A/P		• The County sponsors ILACSD to establish cleanup sites at the Coastal Cleanup Day and Creek to Bay events.
5. Improve and implement existing outreach programs to target key sources and pollutants.						
ED 7	Develop, improve, distribute outreach materials.	●	●	A/P		• Improved outreach materials through a focused Community-based Social Marketing approach. Continual improvement of existing materials, including translation into Spanish.
ED 8	Give outreach presentations to elementary, middle, and high school students	●	●	A/P		• Offer presentations to elementary, middle, and high schools serving unincorporated communities.
ED 9	Outreach to mobile landscaping service providers	●	●	A/P		• Pesticide Regulation Program collaboration with the California Department of Pesticide Regulation on a pilot program to offer workshops for maintenance gardeners. Two workshops were held where attendees were provided training materials and concluded with a pesticide certification exam. Attendees at both workshops had high success rates for the exam.
ED 10	Educational Workshops on Integrated Pest Management, manure management and others as needed	●	●	A/P		• Various workshops presented throughout the year by County staff including UCCE, FHA and contractors.
ED 11	Conduct Effectiveness Survey's on Education & Outreach programs	●	●	A/P		• Surveys to determine the efficacy of watershed education to unincorporated elementary, middle, and high schools serving unincorporated communities

Table A2-4. County of San Diego, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
ED 12	Create an Equestrian BMP Handbook		●	A/P		• Handbook created in FY2014-15. Handbook will be revised in FY2016-17 to encompass additional BMPs and be more user friendly.
ED 13	Conduct over irrigation outreach pilot study	●	●	A/P		• Community-based Social Marketing pilot study on the effectiveness of irrigation runoff prevention materials.
ED 14	Conduct Homeowners Associations Outreach and Coordination Pilot Study	◖	◖	A/P		• HOA Outreach materials in draft format. Additional development will take place in FY2016-17.
ED 15	Implement a public education and participation program to promote and encourage development of programs, management practices and behaviors that reduce the discharge of pollutants in storm water prioritized by high risk behaviors, pollutants of concern, and target audiences.	●	●	A/P		• The County completes numerous education and public participation programs for a diverse target audiences. See JRMP.
6. Enhance existing stormwater conveyance system maintenance program.						
ED 16	Implement a schedule or operation and maintenance activities for the stormwater conveyance system and related structures.	●	●	A/P		• Stormwater maintenance is referred to appropriate departments when needed.
7. Develop and implement targeted programs to address issues in residential areas.						
ED 17	Promote and encourage implementation of designated BMPs in residential areas.	●	●	A/P		• Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas. All Residential Management Areas were inspected in FY15-16

Table A2-4. County of San Diego, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
ED 18	Conduct focused residential inspections based on strategic assessments.	◖	◖	A/P		• Focused, collaborative investigations with Planning and Science staff of high priority outfalls. 20% per year, all within 5 years.
ED 19	Implement a schedule of operation and maintenance for County paved and unpaved roads.	●	●	A/P		• County Road Crews employ a schedule for maintenance of County Roads.
ED 20	Conduct inspections of inventoried existing development to ensure compliance	◖	◖	A/P		• Through implementation of strategies described in the JRMP the County encourages the use of BMPs in residential areas. 20% per year, all within 5 years.
ED 21	Improve inspections data tracking through mobile phone applications		●	A/P		• In pilot testing phase, modifications based on pilot testing to increase effectiveness
8. Additional strategies to address Existing Development						
ED 22	Designate a minimum set of BMPs required for all existing development inventories, including special event venues. The designated minimum BMPs must be specific to facility or area types and pollutant generating activities, as appropriate.	●	●	A/P		• JRMP establishes minimum BMPs for all land use types.
ED 23	Require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types and pollutant generating activities, as appropriate.	●	●	A/P		• JRMP establishes minimum BMPs for all land use types.

Table A2-4. County of San Diego, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
ED 24	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	●	●	A/P		• 1. 450 Facilities received the Agricultural Water Quality Best Management Practices for Pesticides through annual registration notifications. 2. Inspections were conducted at 83 Commercial Ag Facilities.
ED 25	Enforce legal authority established for all inventoried existing development to achieve compliance	●	●	A/P		• See JRMP for details.
ED 26	Update county ordinance related to existing development; reference to existing guidance documents	●		A		• One time. Watershed Protection Ordinance and BMP Design Manuals were updated.
ED 27	Identify candidate areas of existing development for stream, channel, and/or habitat rehabilitation projects and facilitate implementation of such projects.	●		A		• NA
ED 28	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	●	●	A/P		• County implemented the ERP as described in the JRMP.

Table A2-4. County of San Diego, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
ED 29	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) any persons required to obtain coverage under the statewide Industrial General Permit and Construction General Permit and failing to do so, within five (5) calendar days from the time the Copermittee become aware of the circumstances.	●	●	A/P		• County implemented the ERP as described in the JRMP.

Table A2-5. County of San Diego, Optional Strategies*

Number	San Luis Rey River Existing Development Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
OPT-3	Implement a program for on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	◖				Not triggered. Partially implemented in FY 2016. Under the Local Area Management Plan (LAMP) for onsite wastewater treatment systems the treatment systems with supplemental treatment are required to be permitted annually. The annual operating permit will define the monitoring and maintenance requirements as specified by the manufacturer and/or qualified professional who designed the system. The LAMP ordinance can be found at: http://www.sandiegocounty.gov/content/dam/sdc/deh/lwqd/RWQCB%20Approved%20LAMP%20Final%202-24-15.pdf
OPT-5	Implement Sustainable Landscapes Program to encourage landscape retrofits.	◖				Not triggered. Partially implemented in FY 2016.
OPT-6	Implement an incentive program for BMP Retrofits (Public-Private Partnerships - a County sponsored program to offer incentives for rain barrel installation, downspout disconnects from the stormwater system, etc.)	◖				Not triggered. Partially implemented in FY 2016.
OPT-7	Implement trash capture program (e.g., retrofit storm drain intakes with trash capture devices)	◖				Not triggered. Partially implemented in FY 2016. The County of San Diego is in process of conducting several studies to develop Baseline Trash Generation Rates.

Table A2-5. County of San Diego, Optional Strategies*

Number	San Luis Rey River Existing Development Management Program Strategies - County of San Diego	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
OPT-8	Implement a Green Streets Retrofits Program	◖				Not triggered. Partially implemented in FY 2016. Design standards and specifications have been developed. Green streets are now being used to meet compliance for all retrofit and/or redeveloped road projects that in the Capital Improvement Projects plan. Pursuing Grant Funding
OPT-10	Implement an alternative compliance program to enable "offsite" compliance for new and redevelopment projects.	◖				Not triggered. Partially implemented in FY 2016. Currently applicant implemented offsite alternative compliance is available for use by the development community. The Water Quality Equivalency (WQE) provides the currency for structural BMPs and some natural system management practices (NSMPs). Additional work on the WQE will be conducted during FY17. The County is not currently pursuing a credit system but is participating as a stakeholder on the City of San Diego TAC and as a member of the Western Riverside Coalition of Governments (WRCOG) discussion on offsite alternative compliance.

*Included optional strategies for the SLR watershed are those whose implementation was begun but not triggered. For a full list of optional strategies see the corresponding appendix of strategies in the SLR WQIP.

1.4 MODIFICATIONS TO BMP DESIGN MANUAL

The County of San Diego BMP Design Manual (BMP DM) provides guidance for land development and public improvement projects to comply with the 2013 Municipal Separate Storm Sewer System (MS4) Permit (Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100). This Manual replaces County of San Diego Standard Urban Stormwater Mitigation Plan (SUSMP). It is focused on project design requirements and related post-construction requirements, not on the construction process itself. No modifications to the BMP DM have been made since its publication on February 2016. The BMP DM is available online on the County of San Diego's website:

http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/DevelopmentandConstruction/BMP_Design_Manual.html.

1.5 MODIFICATIONS TO THE JRMP

The County's Jurisdictional Runoff Management Program (JRMP) was prepared in response to new regulatory requirements adopted by the Regional Water Quality Control Board. The purpose of the JRMP document is to guide implementation of programs and strategies to reduce pollutants discharged from the County's storm drain system to receiving waters. No modifications were made to the JRMP during the 2015-2016 fiscal year. The JRMP is accessible from the Project Clean Water website at:

http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=105:jurmp-plan&catid=34

2 City of Oceanside

2.1 ANNUAL REPORT CERTIFICATION

CITY OF OCEANSIDE
WATER UTILITIES DEPARTMENT

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT

SAN LUIS REY RIVER WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the City of Oceanside has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-0001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 13th day of January, 2017, at the City of Oceanside.

M.A. Lahsaiezadeh

Mo Lahsaiezadeh, Ph.D., REHS
Environmental Officer
City of Oceanside

300 NORTH COAST HIGHWAY • OCEANSIDE, CA 92054 • TELEPHONE 760-435-5800 • FAX 760-435-5821

2.2 ANNUAL REPORT FORM

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM
ANNUAL REPORT FORM
FY 2015-2016

I. COPERMITTEE INFORMATION			
Copermittee Name: **City of Oceanside**			
Copermittee Primary Contact Name: **Mo Lahsaiezadeh**			
Copermittee Primary Contact Information: **ID 245793**			
Address: **300 N COAST HWY**			
City: **OCEANSIDE**	County: **SAN DIEGO**	State: **CA**	Zip: **92054**
Telephone: **760-435-5803**	Fax: **760-435-5821**	Email: **mlahsaie@ci.oceanside.ca.us**	

II. LEGAL AUTHORITY		
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	**YES** **NO**	☒ ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	**YES** **NO**	☒ ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE		
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	**YES** **NO**	☐ ☒
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	**YES** **NO**	☐ ☒

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM		
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	**YES** **NO**	☒ ☐

Number of non-storm water discharges reported by the public	75
Number of non-storm water discharges detected by Copermittee staff or contractors	73
Number of non-storm water discharges investigated by the Copermittee	129
Number of sources of non-storm water discharges identified	58
Number of non-storm water discharges eliminated	51
Number of sources of illicit discharges or connections identified	60
Number of illicit discharges or connections eliminated	57
Number of enforcement actions issued	48
Number of escalated enforcement actions issued	14

V. DEVELOPMENT PLANNING PROGRAM		
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	**YES** **NO**	☒ ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	**YES** **NO**	☒ ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	**YES** **NO**	☒ ☐

Number of proposed development projects in review	49
Number of Priority Development Projects in review	36
Number of Priority Development Projects approved	3
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	17

Number of completed Priority Development Projects in inventory	134
Number of high priority Priority Development Project structural BMP inspections	85
Number of Priority Development Project structural BMP violations	39
Number of enforcement actions issued	12
Number of escalated enforcement actions issued	0

VI. CONSTRUCTION MANAGEMENT PROGRAM	
Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Number of construction sites in inventory	41
Number of active construction sites in inventory	38
Number of inactive construction sites in inventory	3
Number of construction sites closed/completed during reporting period	11
Number of construction site inspections	1350
Number of construction site violations	140
Number of enforcement actions issued	40
Number of escalated enforcement actions issued	4

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM				
Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐			
	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	161	945	71	21
Number of existing development inspections	55	202	28	12
Number of follow-up inspections	0	14	3	0
Number of violations	0	14	3	0
Number of enforcement actions issued	0	1	0	0
Number of escalated enforcement actions issued	0	0	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION	
Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

IX. FISCAL ANALYSIS	
Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

X. CERTIFICATION

I [☐ Principal Executive Officer ☐ Ranking Elected Official ☒ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

M.A. Lahsaiezadeh
Signature

Oct 31, 2016
Date

MO LAHSAIEZADEH
Print Name

ENVIRONMENTAL OFFICER
Title

760-435-5803
Telephone Number

MLAHSAIE@CI.OCEANSIDE.CA.US
Email

City of Oceanside

Jurisdictional Runoff Management Program

Annual Report Fiscal Year 2015-2016

ID # 245793

Attachment 1

INTRODUCTION

The information included in this Attachment is intended to supplement the data presented in the City of Oceanside's Jurisdictional Runoff Management Program (JRMP) annual report form for the 2015-2016 Fiscal Year (FY15-16). Each section below corresponds to the sections presented in the JRMP report template from Attachment D. of Order No. R9-2013-0001. The information presented herein provides context to the report information, including a brief description of the data sources and data compilation methods where needed.

The City of Oceanside's summary of the required annual Fiscal Analysis can be found on page 4 of this Attachment.

I. COPERMITTE INFORMATION

The required information is presented on page 1 of the report form.

II. LEGAL AUTHORITY

The City of Oceanside established and continued to implement its legal authority within its jurisdiction to control pollutant discharges into and from its MS4 to comply with Order No. R9-2013-0001 during FY15-16. A Duly Authorized Representative has certified that the City of Oceanside maintains adequate legal authority, and a certifying signature is provided in Section X of the report form.

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE

During FY15-16, no updates were made to the City's Jurisdictional Runoff Management Program document, nor were updates required by the San Diego Regional Water Quality Control Board (SD-RWQCB). The City's JRMP was last updated and submitted to the SD-RWQCB in June 2015, as required under Provision F.2.a. of Order R9-2013-0001.

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

During FY15-16 the City of Oceanside continued to implement its program to actively detect and eliminate illicit discharges and connections to its MS4 to comply with Order No. R9-2013-0001.

The data presented in Section IV were compiled from various City divisions to accurately reflect the City's cumulative effort to identify and eliminate non-stormwater and illicit discharges throughout FY15-16. The data were summarized from the following sources:

- Discharges reported by the public and the associated response by City Code Enforcement officers.
- Discharges observed by City staff and contractors during compliance inspections performed pursuant to Provisions E.3.e.(3), E.4.d., and E.5.c.
- Discharges identified through the City's Dry Weather MS4 Outfall Discharge Monitoring program, performed pursuant to Provisions D.2.b. and E.2.c-d.
- Discharges of potentially hazardous substances reported by the public and their associated responses by the City of Oceanside Fire Department.

V. DEVELOPMENT PLANNING PROGRAM

During FY15-16 the City of Oceanside continued to implement a development planning program that complies with Order No. R9-2013-0001.

During FY15-16, the SD-RWQCB required the Copermittees to update their BMP Design Manuals pursuant to the timelines specified in Provision F.2.b., to allow for concurrent submittal of the Manual with the Water Quality Improvement Plans. To comply with this Provision, the City of Oceanside made jurisdictional-specific updates to the San Diego Regional Model BMP Design Manual that became effective on February 16, 2016. The City of Oceanside made its updated jurisdictional BMP Design Manual available to the public both on the County's Regional Clearinghouse (Project Clean Water) and the City's website.

The data presented in Section V summarize the City's Priority Development Project (PDP) inventory tracking and BMP inspection program for FY15-16.

VI. CONSTRUCTION MANAGEMENT PROGRAM

The City of Oceanside continued to implement its construction management program in FY15-16 to comply with Order No. R9-2013-0001.

The data presented in Section VI summarize the City's construction site inventory and inspection program activity for FY15-16.

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

The City of Oceanside continued to implement its existing development management program in FY15-16 to comply with Order No. R9-2013-0001.

The data presented in Section VII summarize the City's existing development facility inventory and inspection program activity for FY15-16. The inspection data include both initial and follow-up compliance inspections.

VIII. PUBLIC EDUCATION AND PARTICIPATION

During FY15-16 the City of Oceanside continued to implement its public education and public participation components to comply with Order No. R9-2013-0001.

IX. FISCAL ANALYSIS

A summary of the City's annual Fiscal Analysis performed pursuant to Provision E.8.b-c. can be found on page 4 of this Attachment. The Fiscal Analysis includes the City's expenditures to implement its jurisdictional programs to comply with Order No. R9-2013-0001, and also includes annual costs for cooperative regional and watershed-based programs.

X. CERTIFICATION

The City of Oceanside JRMP Annual Report form has been certified by a Duly Authorized Representative. Please see page 2 of the report form for signature.

Fiscal Analysis

Program Funding

The City of Oceanside secures funding for the implementation of the storm water program through the Water Utilities, Public Works Departments, and Engineering Divisions in the City. To secure adequate funding, the Water Utilities Department collects a Clean Water Program surcharge. The surcharge is based on the customer's water consumption, so the surcharge is also designed as an incentive for individuals to conserve water. During FY15-16, the surcharge was $0.11 per unit of water from July – December 2015, then was increased to $0.12 per unit of water from January to June 2016. Total revenue for FY15-16 generated though the surcharge fee was $1,048,015.93. In addition, the Clean Water Program received $20,500 via a Gas Tax fund. This totals $1,068,515.93 for revenue directly available to the Clean Water Program.

The City Engineering Division as part of the Development Services Department secures funding from development-related programs. The Engineering Division receives funding through fees assessed on developers for grading plan checks and inspections and water quality plan checks and inspections.

Funding for Public Works tasks related to water quality protection, including channel maintenance and storm drain inlet cleaning, are obtained by Flood Control Fees. Enterprise funds are used to fund for Code Enforcement and Solid Waste programs. Street Sweeping is funded by and Enterprise Fund.

Expenditure and Budget Reporting

During FY15-16 approximately $2,447,925 was expended amongst the departments and divisions for the implementation of and tasks that support the Clean Water Program. Table 1 below provides a summary of the City of Oceanside expenditures during FY15-16.

Table 1: City of Oceanside Stormwater Expenditure Summary

Category	Cost
Administration	$187,710
Development Planning	$215,000
Construction	$130,624
Municipal	$1,318,063
Industrial & Commercial	$137,398
Residential, Education & Public Participation	$95,699
IDDE	$57,699
Special Investigations	$104,094
Watershed Participation	$52,555
Regional Participation	$149,083
Total	**$2,447,925**

2.3 JURISDICTIONAL STRATEGIES

Table A2-6. City of Oceanside, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - City of Oceanside	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Engage the public, jurisdictional staff, and other agency staff to proactively identify and report illicit discharges.						
IDDE 1	Utilize municipal personnel to identify and report illicit discharges and connections.	●	●	A		
IDDE 2	Utilize municipal personnel and contractors to monitor stormwater outfalls for discharges of potential illicit discharges and connections.	●	●	A		
IDDE 3	Utilize water department meter readers to document irrigation runoff, with a focus on residential areas.	●		A		Meter readers completed Residential Management Area (neighborhood-based) inspections in response to drought restrictions for landscape irrigation, and documented irrigation runoff for follow-up by Code Enforcement.
IDDE 4	Facilitate public reporting of illicit discharges and connections via telephone, ~~and~~ email and online request portal.	●	●	A	Modification to reflect City's use of online request portal for public ICID reporting.	The City utilizes an online request portal (PublicStuff) to allow the public to create a request and track progress toward completion.
IDDE 5	Educate the public regarding illegal discharges/ dumping.	●	●	A		Educational door hangers used during irrigation runoff response and non-stormwater MS4 outfall investigations.

Table A2-6. City of Oceanside, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - City of Oceanside	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
IDDE 6	Coordinate with upstream entities to prevent illicit discharges from upstream sources from entering the MS4.	●		A		Annual voluntary agricultural area inspections in east Oceanside are completed by City staff to prevent illicit discharges in to the San Luis Rey River.
2. Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.						
IDDE 7	Implement practices and procedures to prevent and address spills with the potential to enter the MS4.	●	●	A		In FY16-17 the City will implement a unified inspection program for FOG, solid waste, recycling, and stormwater
IDDE 8	Slip line sewer pipes to prevent exfiltration from sanitary sewers to the MS4.	●	●	A		Citywide, the City completed approximately 4000 feet of CIPP sewer line rehabilitation in FY 15-16 under its CIP program.
IDDE 9	CCTV 100% of City VCP sewer lines to identify infiltration, exfiltration, and needed pipe repair or replacement.	◖	◖	A		Citywide, during FY 15-16, the City televised approximately 80 miles of sewer lines under its CIP program. And additional 19 mi. were televised by City crews.

Table A2-6. City of Oceanside, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - City of Oceanside	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
3. Actively enforce prohibitions related to illicit discharges and connections.						
IDDE 10	Investigate and eliminate illicit discharges and connections.	●	●	A		Two of the five non-stormwater persistently flowing MS4 outfalls listed in the SLR WQIP are now classified as dry and will be reprioritized. Code Enforcement completed drought response, overwatering and illegal discharge investigations throughout FY 15-16. All complaints go to code enforcement.
IDDE 11	Enforce legal authority to ensure all illicit discharges and connections identified are eliminated within timeframes established in the MS4 Permit.	●	●	A		Tied in with IDDE-10 narrative.

Table A2-7. City of Oceanside, Development Planning Program Strategies

Number	San Luis Rey River Development Planning Program Strategies - City of Oceanside	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
4. Implement a post construction BMP compliance program to ensure proper construction and maintenance.						
DP 1	Implement a program that ensures that all structural BMPs are designed, constructed, and maintained on PDPs.	●	●	A		All high priority TCBMP sites in the City were inspected in FY 15-16, and 17 self-certification forms were sent to TCBMP owners/operators.
DP 2	Inspect all high priority structural BMPs annually (prior to the rainy season).	●	●	A		All 45 high priority structural BMP sites in the City were inspected in FY15-16 prior to the rainy season. (27 inspections across 15 sites in SLR WMA specifically)

Table A2-8. City of Oceanside, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - City of Oceanside	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Develop and implement approaches to address the impacts of improper water use and irrigation runoff.						
ED 1	Promote rain barrel incentive programs.	●	●	A		The City continued to promote and advertise the rain barrel rebate program through the San Diego County Water Authority.
ED 2	Continued enforcement of drought-related restrictions on landscape irrigation frequency	●	N/A	A		May not be applicable moving forward; restrictions have been lifted at this time. The City returned to Level 1 Drought Watch in July 2016.
ED 3	Relay information to residents, businesses and municipal staff regarding water agency-sponsored turf replacement programs	●	●	A		Notification when rebate programs are available. Turf removal rebate programs sponsored by water districts ran out of funding in summer of 2015. Oceanside Municipal Golf Course turf replacement project was completed in FY 15-16.
2. Improve and/or continue existing pet waste programs.						
ED 4	Install and maintain SLR Bike Trail Pet Waste Dispensers.	●	●	A		Pet waste bag dispensers were maintained for public use along the SLR Bike Trail in FY 15-16.
3. Improve trash management strategies within the watershed.						
ED 5	Coordinate Trash Collection Events (public outreach/ participation).	●	●	A		The City coordinates the San Luis Rey River Cleanup Event in March every year. A total of four sites along the river are staffed by City employees for this event.

Table A2-8. City of Oceanside, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - City of Oceanside	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
4. Improve and implement existing outreach programs to target key sources and pollutants.						
ED 6	Distribute watershed based outreach posters.	●	●	A		
ED 7	Provide pollution prevention and water conservation presentations at elementary schools.	●	●	A		Water conservation calendar contests were held across Oceanside schools in FY15-16 to promote conservation education. School presentations on smart water use are planned for FY16-17. Project SWELL curriculum continues to be implemented at Oceanside schools as staff time and resources allow.
ED 8	Educational Workshops (e.g., landscape irrigation and maintenance, agricultural).	●	●	A		Three homeowners landscape workshops are held annually in the City to promote water efficient landscape practices and methods to mimic watershed functions on a local scale.
5. Develop and implement targeted programs to address issues in residential areas.						
ED 9	Implement residential irrigation runoff study.	X	●	P		Phase I of a residential runoff reduction and monitoring study began in the Loma Alta Watershed due to TMDL alternative. Phase I will be implemented in San Luis Rey Watershed in FY16-17 as funding and staff resources are available.
ED 10	Conduct residential management area focused inspections.	●	●	A		Tie back to IDDE-3

Table A2-8. City of Oceanside, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - City of Oceanside	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
ED 11	Conduct inspections of inventoried existing development including residential areas to ensure compliance. Each area/site is inspected once every five years (minimum) and 20% of all industrial, commercial, and municipal sites are inspected on-site annually.	●	●	A		City staff completed 96 inspections of existing development in the City's jurisdiction of the San Luis Rey WMA in FY 15-16.
6. Other BMPs/Activities						
ED 12	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties.	●	●	A		Refer back to ED 11 above – existing development inspections addresses BMP implementation.

Table A2-9. City of Oceanside, Optional Strategies

Number	San Luis Rey River Existing Development Management Program Strategies - City of Oceanside	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
OPT-1	Implement an ozone water treatment system to treat MS4 discharge water.	X				Not triggered.
OPT-2	CCTV of VCP pipe.	●	●	A		Available funding and approval by City Council.
OPT-3	Implement incentive programs…	●	●	A		Staff resources were available and partnership funding provided for incentive items.
OPT-4	Implement alternative compliance program…	X				Not triggered; no activity.
OPT-5	Structural BMPs	X				Not triggered.
OPT-6	Habitat restoration and rehabilitation.	X				Not triggered.

2.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

No modifications to the BMP Design Manual have been made since the WQIP was approved. The current City of Oceanside's BMP Design Manual is posted on the City's website, and the link to this page is listed on Project Clean Water.

2.5 MODIFICATIONS TO THE JRMP

No modifications to the City of Oceanside's JRMP have been made since the WQIP was approved. The current City's JRMP is posted on the City's website, and the link to this page is listed on Project Clean Water.

3 City of Vista

3.1 ANNUAL REPORT CERTIFICATION

CITY OF VISTA
CALIFORNIA

STATEMENT OF CERTIFICATION AND LEGAL AUTHORITY ESTABLISHMENT

SAN LUIS REY RIVER WATERSHED MANAGEMENT AREA, WATER QUALITY IMPROVEMENT PLAN FISCAL YEAR 2015-2016 ANNUAL REPORT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations [40 CFR 122.22(d)].

I also certify that the City of Vista has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements within Order No. R9-2013-001 as amended by Orders R9-2015-0001 and R9-2015-0100.

Executed on the 11th day of January, 2017 at the City of Vista.

Greg Mayer
City Engineer

P: 760-639-6111 | cityofvista.com | F: 760-639-6112
200 Civic Center Drive, Vista, California 92084-6275

3.2 ANNUAL REPORT FORM

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM – City of Vista, San Luis Rey WMA
ANNUAL REPORT FORM

FY 2015-16

I. COPERMITTEE INFORMATION			
Copermittee Name: City of Vista (Permit No. R9-2013-0001, amended by R9-2015-0001: PIN 270704)			
Copermittee Primary Contact Name: Cheryl Filar			
Copermittee Primary Contact Information:			
Address: 200 Civic Center Drive			
City: Vista	County: San Diego	State: CA	Zip: 92084
Telephone: 760-643-5412	Fax: 760-639-6112	Email: cfilar@cityofvista.com	

II. LEGAL AUTHORITY	
Has the Copermittee established adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
A Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative has certified that the Copermittee obtained and maintains adequate legal authority?	YES ☒ NO ☐

III. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM DOCUMENT UPDATE	
Was an update of the jurisdictional runoff management program document required or recommended by the San Diego Water Board?	YES ☐ NO ☒
If YES to the question above, did the Copermittee update its jurisdictional runoff management program document and make it available on the Regional Clearinghouse?	YES ☐ NO ☐

IV. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM	
Has the Copermittee implemented a program to actively detect and eliminate illicit discharges and connections to its MS4 that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Number of non-storm water discharges reported by the public	2
Number of non-storm water discharges detected by Copermittee staff or contractors	3
Number of non-storm water discharges investigated by the Copermittee	5
Number of sources of non-storm water discharges identified	4
Number of non-storm water discharges eliminated	4
Number of sources of illicit discharges or connections identified	4
Number of illicit discharges or connections eliminated	4
Number of enforcement actions issued	5
Number of escalated enforcement actions issued	0

V. DEVELOPMENT PLANNING PROGRAM	
Has the Copermittee implemented a development planning program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Was an update to the BMP Design Manual required or recommended by the San Diego Water Board?	YES ☒ NO ☐
If YES to the question above, did the Copermittee update its BMP Design Manual and make it available on the Regional Clearinghouse?	YES ☒ NO ☐
Number of proposed development projects in review	3
Number of Priority Development Projects in review	3
Number of Priority Development Projects approved	3
Number of approved Priority Development Projects exempt from any BMP requirements	0
Number of approved Priority Development Projects allowed alternative compliance	0
Number of Priority Development Projects granted occupancy	0
Number of completed Priority Development Projects in inventory	3
Number of high priority Priority Development Project structural BMP inspections	26
Number of Priority Development Project structural BMP violations	3
Number of enforcement actions issued	1
Number of escalated enforcement actions issued	0

FY 2015-16

VI. CONSTRUCTION MANAGEMENT PROGRAM

Has the Copermittee implemented a construction management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

Number of construction sites in inventory	3
Number of active construction sites in inventory	3
Number of inactive construction sites in inventory	0
Number of construction sites closed/completed during reporting period	0
Number of construction site inspections	108
Number of construction site violations	13
Number of enforcement actions issued	11
Number of escalated enforcement actions issued	0

VII. EXISTING DEVELOPMENT MANAGEMENT PROGRAM

Has the Copermittee implemented an existing development management program that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

	Municipal	Commercial	Industrial	Residential
Number of facilities or areas in inventory	2	19	1	n.a.
Number of existing development inspections	2	2	1	5
Number of follow-up inspections	0	0	0	3
Number of violations	0	1	0	5
Number of enforcement actions issued	0	1	0	5
Number of escalated enforcement actions issued	0	0	0	0

VIII. PUBLIC EDUCATION AND PARTICIPATION

Has the Copermittee implemented a public education program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐
Has the Copermittee implemented a public participation program component that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

IX. FISCAL ANALYSIS

Has the Copermittee attached to this form a summary of its fiscal analysis that complies with Order No. R9-2013-0001?	YES ☒ NO ☐

X. CERTIFICATION

I [☒ Principal Executive Officer ☐ Ranking Elected Official ☐ Duly Authorized Representative] certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

[signature]
Signature

11-30-16
Date

GREG MAYER
Print Name

CITY ENGINEER
Title

760-643-5408
Telephone Number

gmayer@cityofvista.com
Email

Attachment A.

Jurisdictional Runoff Management Program Annual Report – San Luis Rey WMA: Support Data and Supplemental Information

Information provided in this attachment is presented in order of program element, as identified in the Annual Report Form.

1 Copermittee Information

The City of Vista's jurisdictional area resides within two watershed management areas (WMAs), the Carlsbad WMA and the San Luis Rey WMA. Approximate land area within each WMA is summarized in Table 1-1. As required by regional stormwater permit (San Diego Region Water Quality Control Board, Order No. 99-2013-0001) the City summarizes annual activities for these WMAs in two separate annual reports.

Table 1-1. City of Vista Jurisdictional Area within Watershed Management Areas

Watershed Management Area	Acres
Carlsbad	10,968
San Luis Rey	700
City of Vista Total	*11,668*

2 Legal Authority

Revisions to Vista Municipal Code (VMC) Chapter 13.18 *Stormwater Management and Discharge Control Program* were completed and adopted by City Council toward the end of the previous reporting period (on June 9, 2015). During Fiscal Year 2015-16, the City of Vista replaced its former Standard Urban Stormwater Mitigation Plan (SUSMP) document with the new *City of Vista BMP Design Manual.* This new manual describes stormwater site design, treatment, and hydromodification management requirements for new and redevelopment projects. The manual became effective February 16, 2016 and is available on the City's Land Development resources website at:

http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms

The *City of Vista BMP Design Manual* has undergone minor revisions since its implementation, as follows:

Date	Document Section(s)	Summary of Update
June 2016	Section 1.4.3	Added local 'green street' exemption consistent with Order No. R9-2013-0001
	Section 6.3.7	Removed text from title of section; section content unchanged
	Section 7.2	Clarified property owner as responsible party to conduct maintenance
	Section 8.1.1	Updated titles for forms and checklists
	Section 8.2.1	Updated titles for forms and checklists
	Section 8.2.1.1	Clarified use of O&M Plan template
	Section 8.2.2	Clarified requirements for construction plans
February 2016	New document	Replaced 2011 Standard Urban Stormwater Mitigation Plan with BMP Design Manual

3 Jurisdictional Runoff Management Program Document Update

The City completed an update to its Jurisdictional Runoff Management Plan (JRMP) during the previous reporting period, Fiscal Year 2014-15. The San Luis Rey Water Quality Improvement Plan (WQIP) was accepted by the San Diego Regional Water Quality Control Board (RWQCB) on February 12, 2016. However, revisions to the Carlsbad WQIP had not been accepted by the RWQCB, and acceptance is anticipated by the end of calendar year 2016. Following acceptance of the Carlsbad WQIP, the City anticipates initiating minor revisions to its JRMP to reflect strategies and goals identified in the accepted WQIPs.

Sections 4 through 7 discuss inspections related to various program components and are also numerically summarized by component on the Annual Report Form. Please note that multiple violations can be cited on one enforcement action; therefore, the total number of enforcement actions will often not equal the number of violations observed.

4 Illicit Discharge Detection and Elimination Program

Illicit Discharge Detection and Elimination Program activities are summarized in Section IV on the Annual Report Form. The City's jurisdictional area within the San Luis Rey WMA is approximately 700 acres. As a result of this relatively small area, only 5 cases of non-stormwater discharges were reported and investigated. These cases were related to existing development and are summarized in Section 7 of this attachment.

5 Development Planning Program

Three Priority Development Project (PDP) sites were under construction during the reporting year in San Luis Rey WMA. Once granted occupancy, BMPs at these sites will be added to the inspection inventory.

Prior to the rainy season, the City is required to annually inspect all structural BMPs at PDP sites designated as high priority. Criteria considered for designation of high priority sites included the following:

- PDP sites where 'follow-up' inspections were required following initial inspections conducted during the summer of 2014 or 2015
- PDP sites that did not return adequate materials for 2015 annual certification process
- City-owned PDP sites

Two of the three PDP sites within the San Luis Rey WMA were inspected during the reporting period. Of the 26 BMPs inspected at these sites, three violations were observed at one site, resulting in one written warning. PDP sites were inspected throughout the summer season, considered a 'Program Year'. In early Fiscal Year 2016-17, an additional 33 PDP sites throughout the City are anticipated to be inspected. As a result, cumulatively for the Program Year throughout both the San Luis Rey WMA and Carlsbad WMA, an anticipated 57 PDP sites (45 percent of the PDP site inventory) will have structural BMPs inspected.

6 Construction Management Program

City staff continued to implement the construction management program that underwent improvements in previous fiscal years (i.e., updated forms, checklists, and procedures). All construction sites are considered high priority, and therefore are inspected monthly during the dry season and weekly during the rainy season. Attachment B provides a summary of construction site enforcement actions within the San Luis Rey WMA.

Table 6-1. Number of Active and Inactive Construction Sites in San Luis Rey WMA, FY 2015-16

	ACTIVE SITE[1]:Priority Level			INACTIVE SITE[2]: Priority Level			
Watershed	**High**	**Medium**	**Low**	**High**	**Medium**	**Low**	*TOTAL SITES*
San Luis Rey	3	-	-	-	-	-	3

[1]Active Site: Site was actively under construction during reporting period

[2] Inactive Site: Site that ceased conducting construction activities and was incomplete

Table 6-2. Number of Construction Site Inspections Completed by Month in San Luis Rey WMA, FY 2015-16

Month	Inspections Performed at Site by Priority				Total Sites Closed[2] or Completed
	High Priority	Medium Priority	Low Priority	TOTAL INSPECTIONS	
July	4	-	-	4	0
August	3	-	-	3	0
September	4	-	-	4	0
October[1]	12	-	-	12	0
November[1]	14	-	-	14	0
December[1]	13	-	-	13	0
January[1]	12	-	-	12	0
February[1]	11	-	-	11	0
March[1]	16	-	-	16	0
April[1]	13	-	-	13	0
May	3	-	-	3	0
June	3	-	-	3	0
TOTAL	**108**	**0**	**0**	**108**	**0**

[1]Indicates wet season

[2]Closed sites include sites that discontinued construction during the reporting period, were stabilized and no longer inspected

7 Existing Development Management Program

As in the previous reporting period, City staff prioritized existing development inspections on facilities that were likely to require filing a notice of intent for the statewide General Industrial Permit. This allowed City staff to focus inspections on facilities with a potential for pollutant discharges to the storm drain system, while also educating local businesses about the recently updated permit. The San Luis Rey WMA has 22 existing development facilities (industrial, commercial, municipal) in its inventory, of which 5 facilities, or 23 percent of inventory, were inspected (see Section VII of Annual Report Form). During the reporting period, no facilities in the San Luis Rey WMA were referred to the RWQCB regarding General Industrial Permit non-filer status.

City staff conducted IDDE complaint investigations (Table 7-1) and dry weather major outfall inspections to support stormwater pollution prevention in existing residential development areas (Table 7-2). With anticipated approval of the Carlsbad WQIP in late 2016, at that time the City plans to initiate a parcel-based existing development inspection program. A parcel-based program will facilitate efficient and effective inspections of multi-tenant industrial and commercial properties, while also establishing a city-wide inventory of Residential Management Areas (RMAs) to support future inspections.

During the reporting period, City staff were not called to any sanitary sewer spills within the San Luis Rey WMA. The Sanitary Sewer Overflow Response Plan was updated in June 2016, and maintenance activities associated with the sanitary sewer system (repairs, televise lines, etc.) focused on areas outside of the San Luis Rey WMA where sanitary sewer infrastructure is older. Existing development facilities expected to contribute Fats, Oils, and Grease (FOG) were inspected reduced the potential for FOG-related sanitary system overflow events (Table 7-3). Portions of the San Luis Rey WMA are believed to have septic systems instead of direct connection to the sanitary sewer system. Consistent with strategies identified in the San Luis Rey WQIP (strategies ED 6, ED 7, ED 9) during the upcoming reporting period the City will develop an inventory of septic systems within Vista's portion of the San Luis Rey WMA. Outreach and education regarding septic system maintenance is anticipated to follow.

Storm drain inlet maintenance activities are summarized in Table 7-4. Street sweeping frequencies were maintained throughout the City, with high and moderate rated roadways being swept twice a month and low rated roadways being swept monthly. Not specific to the San Luis Rey WMA, the following events supported stormwater pollution prevention at existing development facilities within the City:

- Two Christmas tree collection locations were active between December 26 and January 11. Approximately 31 tons of debris was collected.
- Multiple site-specific trash and debris cleanups were conducted in the City, removing approximately 8.5 tons of debris.
- Through coordination with I Love a Clean San Diego (ILACSD), supported 14 Certified Oil Collection Centers within the City and conducted two oil filter exchange events. ILACSD also updated the Waste Free SD website (www.wastefreesd.org) with sites local to Vista.
- Continued operation of the Household Hazardous Waste facility that serves member cities of Carlsbad, Encinitas, Escondido, Solana Beach, and San Marcos. During the reporting year, approximately 2,600 Vista residents utilized the facility, donating over 259,500 pounds of hazardous waste.

Table 7-1. Summary of All Stormwater Compliance Cases Initiated in San Luis Rey WMA, FY 2015-16

Case Type	Case Count
IDDE	5*
Structural BMPs	2
Total	*7*

*One reported case was unfounded upon investigation

Table 7-2. Summary of Residential-based Stormwater Compliance Cases Initiated in San Luis Rey WMA, FY 2015-16

Residential Pollutant Type	Case Count
Irrigation Water	1
Pool Water	2
Sediment	1
Total	*4*

Table 7-3. Summary of Fats, Oils, and Grease (FOG) Facility Inspections in San Luis Rey WMA, FY 2015-16

Inspection Type	Total
FOG Inspections Conducted	8
Followup Inspections Required	0

Table 7-4. Summary of Storm Drain Inlet Maintenance in San Luis Rey WMA, FY 2015-16

Structure Type	Inventory	Inspected	Cleaned	Debris Removed
Inlets	33	33	7	0.5 cubic yards

8 Public Education and Outreach

Education and outreach activities are typically not differentiated between watersheds that Vista's jurisdictional area contributes to (San Luis Rey WMA and Carlsbad WMA). As such, Tables 8-1 and 8-2 present summaries of all notable education and outreach activities within the City during the reporting period.

Although outside of the San Luis Rey WMA, targeted outreach and education was conducted in association with the Phase 1 of the Paseo Santa Fe Streetscape Improvement Project in the Carlsbad WMA. The project reduced a four-lane roadway to two lanes and also enhanced a pedestrian-friendly environment. The project features stormwater structural BMPs, including pervious pavers, silva cells, and Clearwater inlet BMPs. As a component to Proposition 84 grant funding for this project, outreach materials were distributed, as well as surveys and focused business site inspections were conducted. A technical memorandum will be completed by the end of 2016, summarizing outcomes and 'lessons learned' that may guide future outreach efforts.

Table 8-1. Summary of Outreach Events

Outreach Opportunity	Description	Details
Green Machine	Outdoor education for elementary children, coordinated by San Diego County Office of Education.	Multiple events
Splash Science Lab	Science and chemistry education for children, coordinated by San Diego County Office of Education.	Multiple events
Presentations to schools	I Love a Clean San Diego support for motor oil presentations to automotive classes at Vista High School	5 presentations ~100 students
Presentations to schools	I Love a Clean San Diego support for watershed and stormwater pollution presentations at multiple middle schools and high schools	13 presentations ~360 students
Used Oil Filter Collection Events	Hosted oil waste/recycling and education events at automotive retail store in Vista.	Autozone O'Reilly's Auto Parts
Carlsbad WQIP Public Workshop	Public workshop to present plan development process and highlights.	July 7, 2015
Composting Workshop	Clean Green Vista and City of Vista workshop at Alta Vista Gardens.	July 18, 2015
Industrial General Permit Workshop	Informational workshop hosted by Vista Chamber of Commerce and Tory Walker Engineering. City of Vista promoted and attended event.	July 30, 2015
Vista Summer Fun Fest & Safety Fair	Enviroscape watershed model and interaction with residents.	August 8, 2015
National Prescription Drug Take Back Day	Prescription drug collection event at Walgreens.	September 26, 2015
Rainy Season Informative Letters	Letters sent to owners and developers with open grading permits to inform of preparations for upcoming rainy season.	October 2015
Our Vista Magazine	Advertise Christmas tree recycling program and sites.	Winter 2015
Landscape Workshop	Presented by Vista Irrigation District	November 14, 2015
Creek to Bay Cleanup: Buena Creek Cleanup Event	Support and promote cleanup site for annual Creek to Bay Cleanup event.	April 23, 2016
San Diego County Apartment Association Rental Housing Education Conference	Staff support for region's "Think Blue" campaign booth, educating rental housing staff about water quality and pollution prevention	April, 19, 2016
National Prescription Drug Take Back Day	Prescription drug collection event at Walgreens.	April 30, 2016
Vista Strawberry Festival	I Love a Clean San Diego support for Enviroscape watershed model and interaction with residents	May 29, 2016
Shredding and e-waste Event	Shredding and electronic waste collection event at Civic Center.	June 11, 2016

Table 8-2. Summary of Municipal Education Activities

Workshop/Training	Audience	Attendees	Location	Host	Date (s)
ESRI – GIS User Conference (2 annual events)	Engineering staff GIS users	Multiple staff & days	San Diego	ESRI	July 2015 & June 2016
Workshop: "Stormwater Design Requirements are Changing"	Land Development Staff and Construction Inspection Staff	6	San Diego	Construction Management Association (CMAA)	July 23, 2015
Water Quality Equivalency (WQE) Public Workshop	Stormwater Staff	2	San Diego	County of San Diego	July 28, 2015
Public Works Annual Training	Public Works Staff	60	Vista Corporate Yard Meeting Room	Stormwater Staff, Public Works	October 7, 2015
CASQA Annual Conference	Stormwater Professionals	2	Monterrey	CASQA	October 19-21, 2015
Model BMP Design Manual Workshop	Stormwater and Land Development Staff	7	San Diego	County of San Diego	November 5 and 10, 2015
Stormwater Performance Assessment: Inspection, Testing, and Monitoring	Municipal employees	3	Webcast	Forester University	March 3, 2016
Spotlight on Vista Employee Newsletter	Municipal employees	City-wide	Vista	Stormwater Staff	March/April 2016 issue
Treatment Control BMP Workshop	Stormwater Staff	3	San Diego	City of San Diego and Regional Water Quality Control Board	April 21, 2016
San Diego Hydrology Model (SDHM) Workshop	Land Development Staff	2	San Diego	County of San Diego, American Public Works Association (APWA)	May 3, 2016
Stormwater Permit Compliance Workshop (Industrial General Permit)	Stormwater Staff	2	San Marcos	Filtrexx, Alta Environmental	May 31, 2016
Qualified Industrial Storm Water Practitioner (QISP)	Stormwater Staff	2	Vista	State Water Resources Control Board	June 2016

9 Fiscal Analysis

The Standardized Fiscal Analysis Method and Format (Fiscal Analysis Method) was collaboratively developed and adopted by the Copermittees in January 2009 in accordance with Sections G, J.1.a(3)(k), and J.1.c(1)(d) of NPDES Order No. R9-2007-0001. The Fiscal Analysis Method document was submitted to the San Diego RWQCB on January 31, 2009, as Attachment 1 of the Regional Urban Runoff Management Plan (RURMP) Annual Report for FY 2007-08. In this Annual Report, the Standardized Method for reporting budgets is utilized. The Standardized Method allows for categorization of expenditures by permit component.

The City's Jurisdictional Urban Runoff Management Program is primarily funded by the City's Enterprise Fund, although the City's General Fund and other sources support some elements of it, such as land development. The City continues to pursue and utilize funding from grant sources, such as state grant Prop 84 funds and, more recently, state Prop 1 grant funds to complete phases 2 and 3 of a green street project initiated with Prop 84 funds. The City will also continue to pursue other state funds as part of watershed collaboration efforts.

The City continues to use the fiscal reporting methodology developed by the copermittees in 2009. Moreover, in conformance with the Regional Standards, the individual jurisdictional components are tracked, as well as watershed and regional expenditures. For fiscal year 2015-16, the City performed the analysis according to the Standardized Fiscal Analysis Method, which is consistent with requirements under the 2013/15 municipal discharge permit. Table 10.1 contains results of this analysis.

Although annual reporting is now divided by watershed, Vista is providing a jurisdiction-wide fiscal analysis, because it is difficult to separate various program components by watershed. However, because most of Vista's developed area is located in the Carlsbad WMA, it is estimated that 95 percent, or $4.4 million, of the FY 2015/16 expenditures supported activities undertaken in this area; for the area of Vista located in the San Luis Rey WMA, it is estimated that five percent, or $232,878 was spent.

The majority of the City's Water Quality Protection Program administration and core programs, such as industrial and commercial inspections, as well as infrastructure maintenance and cleaning are funded by enterprise funds. These funds are generated from sewer utilities within the City of Vista and the Buena Sanitation District. Approximately 58 percent of the program is funded by the City of Vista's enterprise fund, 36 percent is supported by the general fund, and six percent is supported by state-appropriated funds, as well as state grant funds (Table 9-2).

Table 9-1. Expenditure Summary

JURISDICTIONAL COMPONENTS	
ADMINISTRATION	$ 770,315
DEVELOPMENT PLANNING	$ 527,720
CONSTRUCTION	$ 1,069,880
MUNICIPAL	$ 1,877,770
INDUSTRIAL AND COMMERCIAL	$ 67,542
RESIDENTIAL	$ 35,858
IDDE	$ 52,662
EDUCATION	$ 39,938
PUBLIC PARTICIPATION	$ 138
SPECIAL INVESTIGATIONS	$ 21,002
GRANTS (Green Street Project/Prop 84: $106,487; Cal Recycle Used Oil Payment; $14,202 for education and outreach)	$ 120,689
Jurisdictional Total	$ 4,583,514

WATERSHED	
Carlsbad	$ 31,094
San Luis Rey	$ 14,325
WQIP Development: Staff Support	$ 7,455
Watershed Total	$ 52,874

REGIONAL	
Copermitttee Cost Share of Regional Budget	$ 32,484
Staff Support	$ 2,882
Regional Total	$ 35,366

TOTAL COST	***$ 4,671,754***

Table 9-2. Summary of Funding Sources

FUNDING BY SOURCE		
GENERAL FUND	$	1,686,892
STORMWATER FEE	$	-
PERMIT FEES	$	-
DEVELOPER DEPOSITS AND FEES	$	
REGISTRATION AND INSPECTION FEES	$	-
FLOOD CONTROL FEES	$	-
FRANCHISE FEES	$	-
GAS TAX	$	
UTILITY TAX	$	-
ROAD FUND	$	-
ENTERPRISE FUNDS	$	2,691,231
TRUST FUNDS	$	-
SPECIAL ASSESSMENT DISTRICTS	$	
STATE APPROPRIATED FUNDS	$	172,942
GRANT FUNDS	$	120,689
OTHER	$	-
TOTAL FUNDING		**$4,671,754**

Attachment B.

Summary of Construction Site Enforcement Actions – San Luis Rey WMA:

12/07/15	Adobe Estates	1980 N. Santa Fe Ave	San Luis Rey	HIGH	Correction Notice	☐ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Rep fen
10/12/15	Serra Subdivision - Shea Homes - Detached Condos	2025 E. Vista Way	San Luis Rey	HIGH	Correction Notice	☐ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Clea area
03/01/16	Serra Subdivision - Shea Homes - Detached Condos	2025 E. Vista Way	San Luis Rey	HIGH	Correction Notice	☐ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Stre
04/29/16	Serra Subdivision - Shea Homes - Detached Condos	2025 E. Vista Way	San Luis Rey	HIGH	Correction Notice	☐ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Clea trac
07/15/15	Vista Ridge	521 & 535 Bobier Dr.	San Luis Rey	HIGH	Correction Notice	☑ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Clea leak con
08/25/15	Vista Ridge	521 & 535 Bobier Dr.	San Luis Rey	HIGH	Correction Notice	☑ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Sha drip

10/27/15	Vista Ridge	521 & 535 Bobier Dr.	San Luis Rey	HIGH	Correction Notice	☐ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Offs
12/08/15	Vista Ridge	521 & 535 Bobier Dr.	San Luis Rey	HIGH	Correction Notice	☐ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Wac inst
01/04/15	Vista Ridge	521 & 535 Bobier Dr.	San Luis Rey	HIGH	Correction Notice	☐ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Clea
01/20/16	Vista Ridge	521 & 535 Bobier Dr.	San Luis Rey	HIGH	Correction Notice	☐ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Stee pall
06/08/16	Vista Ridge	521 & 535 Bobier Dr.	San Luis Rey	HIGH	Correction Notice	☐ BMP Missing/ Ineffective ☑ BMP Maintenance ☐ No REAP/ Documents ☐ Discharge/Tracking (TC 1/2 & NS 6)	Corrected	Rep area inle mai

3.3 JURISDICTIONAL STRATEGIES

Table A2-10. City of Vista, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Engage the public, jurisdictional staff, and other agency staff to proactively identify and report illicit discharges.						
IDDE 1	Utilize municipal personnel and contractors to identify and report illicit discharges and connections.	●	●	A/P		• 5 IDDE cases in SLR for FY 2015-16, including: 1 municipal, 1 residential irrigation unconfirmed, 2 residential pool water discharge, 1 residential sediment
IDDE 2	Coordinate with Vista Irrigation District to identify and report ICIDs (e.g., over-irrigation).	●	●	A/P		• Met with VID on 6/18/2015 to discuss programs and coordination. Focus on water conservation programs and irrigation runoff. • City staff contacts VID on confirmed over-irrigation complaints.
IDDE 3	Facilitate public reporting of illicit discharges and connections via Water Quality Hotline (i.e., telephone and email).	●	●	A/P		• Hotline printed on all outreach materials and freebees distributed at outreach events. • Materials at outreach events: Summer Fun Fest--8/8/2015; Public Works Training--10/7/2015; Employee Spotlight Newsletter-- 02/02/2016.
IDDE 4	Educate the public regarding illegal discharges/ dumping.	●	●	A/P		• April 2016 – New residential BMP brochure and stormwater poster (bi-lingual) distributed. • Promoted Household Hazardous Waste (HHW) collection facility at Summer Fun Fest outreach event (8/8/2015), distributing brochures about proper HHW disposal. • Supported creek cleanup event in Carlsbad WMA for Creek to Bay Cleanup Day (4/23/2016).

Table A2-10. City of Vista, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
IDDE 5	Coordinate with adjacent entities to prevent illicit discharges from upstream sources from entering the MS4.	●	●	A/P		• No applicable discharges or compliance cases to report for this period within SLR WMA. • Within the Carlsbad WMA, city staff coordinate with other agencies (typically County of SD) on compliance cases when discharges are sourced from upstream and outside city jurisdiction.
IDDE 6	Coordinate with neighboring jurisdictions to investigate results of outfall inspections.	●	●	A/P		• No applicable discharges or cases to report for this period. • Vista and Oceanside staff have initiated discussion regarding outfall in Loma Alta (Carlsbad WMA) with persistent flow and runoff from Vista properties. Similarly, worked with County on complaints that bordered limits of each jurisdiction.
2. Develop and implement approaches to address the impacts of septic systems within the watershed.						
IDDE 7	Investigate and eliminate identified sources of illicit discharges and connections.	●	●	A/P		See IDDE 1.
IDDE 8	Develop inventory of septic systems within Vista's portion of the SLR watershed.	X	●	P		• To be initiated in FY 2016-17
IDDE 9	Implement practices and procedures to address spills with the potential to enter the MS4.	●	●	A/P		• Coordinate all private lateral sewer spill responses with Wastewater staff. No spills in SLR this reporting period. • Create compliance cases in Cityworks to track resolution of spill response. See IDDE 1 for summary of cases. • Conduct existing facility inspections to prevent spills and pollutants from impacting stormwater. See ED 20.

Table A2-10. City of Vista, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
IDDE 10	Investigate and eliminate identified sources of illicit discharges and connections.	●	●	A/P		• Of 5 IDDE compliance cases initiated this reporting period, 4 had discharge source eliminated (5th case was unconfirmed irrigation discharge). • 4 major outfalls in SLR (SLR-01, SLR-02, SLR-03, SLR-04): • SLR-01 is a persistent flow site. Upstream investigations and review of development plans suggests this flow ~1gpm is due to perforated foundation drain pipes that discharge groundwater at Guajome Academy. Water quality data and persistent flow monitoring already completed for the 2015-2016 monitoring year. Currently awaiting lab results. • SLR-02 has been observed dry during all site visits. • SLR-03 is a persistent flow site of inconclusive upstream source. Outfall was not flowing during first of two planned sampling efforts. During the second visit, flow was present and sampled. Upstream investigation suggests a leaking fire hydrant may be the source, about which VID was notified to initiate repair. Repair scheduled for September 6, 2016. In addition, a special study has commenced for SLR-03 outfall, which includes continuous flow monitoring and bacteria grab samples. • SLR-04 exhibited flow during one of the transitional flow monitoring visits. Upstream investigation concluded the source was irrigation runoff, which ceased. The site has been dry during all other dry monitoring visits.

Table A2-10. City of Vista, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
IDDE 11	Update Sanitary Sewer Overflow Response Plan (SSORP) and reporting procedures.	●	X	A		• The City's SSORP was updated in June 2016 to be streamlined and easier to use.
IDDE 12	Increase coordination between storm water and sanitary sewer programs.	●	●	A/P		• Private lateral sewer overflow response is coordinated with Stormwater and Wastewater staff. Crews notify Stormwater staff if on scene of spill. • Stormwater staff work with Wastewater engineer to issue appropriate stormwater code (VMC Chapter 13.18) violation notice, wastewater lateral repair notice, and/or citation.
IDDE 13	Implement public sanitary sewer system maintenance consistent with current Sewer System Management Plan.	●	●	A/P		• Completed bi-annual self-audit of SSMP in June 2016. • Zero spills in the SLR basin for FY 2015-16.
3. Implement monitoring programs to provide new information to refine the prioritization of drainage areas.						
IDDE 14	Special Study #1: Conduct assessment of baseline flows at select outfalls with persistent flows[a]	◖	●	A/P		• Initiated contract for study in FY 2015-16; will be conducting monitoring in SLR during end of summer 2016 (currently in place; FY 2016-17)
IDDE 15	Special Study #2: Assess hydraulic connectivity to lower San Luis Rey River.[b]	X	●			• Planned for FY 2016-17

Table A2-10. City of Vista, Illicit Discharge Detection and Elimination Program Strategies

Number	San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
4. Actively enforce prohibitions related to illicit discharges and connections.						
IDDE 16	Investigate and eliminate identified sources of illicit discharges and connections.	●	●	A/P		See IDDE 1
IDDE 17	Implement Enforcement Response Plan to require minimum BMPs to prevent and/or eliminate illicit discharges	●	●	A/P		• Stormwater Standards Manual and VMC Chapter 13.18 are used as basis of requirements, violations, and enforcement actions. All complaints investigated, support data/photos, and enforcement actions are documented in Cityworks as compliance cases. Existing facility inspections also used to proactively confirm minimum BMPs being implemented.
5. Other Related Programs and Activities.						
IDDE 18	Maintain MS4 map to facilitate implementation of the IDDE program.	●	●	A/P		• Cityworks (GIS-based) software used to track all inspections, work orders, investigations, and compliance cases—inclusive of IDDE cases. • Staff are evaluating ability to incorporate outfall monitoring data and visual assessments in Cityworks (FY2016-17).

a. Conduct assessment of baseline flow and bacteria discharges during dry weather at 3 major outfalls with persistent flow. Collect flow and water chemistry data. Outfall sites include: 1) Carlsbad Watershed, Agua Hedionda Focus Area Site #AH-01; 2) Carlsbad Watershed, Buena Vista Focus Area Site #BV-12; 3) San Luis Rey Watershed, Site #SLR-03.

b. Conduct assessment of hydraulic connectivity between Vista's existing development discharges in San Luis Rey. Assess discharges in context of Guajome Lake and adjacent wetlands, and connectivity to Lower San Luis Rey River during both wet and dry weather conditions.

Table A2-11. City of Vista, Development Planning Program Strategies

Number	San Luis Rey River Development Planning Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Provide updated materials and enhanced outreach to convey land development requirements.						
DP 1	Establish criteria designating priority development projects for new and redevelopment consistent with the Permit.	●	●	A		• Vista Municipal Code Chapter 13.18 (Stormwater Management and Discharge Control Program) revised and presented to City Council for adoption on June 9, 2015. • The City of Vista Stormwater Standards Manual was revised in June 2015 to include minimum BMPs for dischargers, enforceable through VMC Chapter 13.18. • The City of Vista BMP Design Manual presents requirements for land development projects and replaced former SUSMP documents in February 2016. Minor revisions to text, checklists, and project submittal forms have occurred since then. • Continued minor updates/revisions to BMP Design Manual forms to facilitate accurate and complete project submittals/evaluations.
DP 2	Update BMP design manual procedures to specify storm water requirements applicable to development and redevelopment projects, identify and design appropriate BMPs, establish maintenance criteria.	●	NA	A		• The City of Vista BMP Design Manual presents requirements for land development projects and replaced former SUSMP documents in February 2016. Minor revisions to text, checklists, and project submittal forms have occurred since then.
DP 3	Internal staff training on updated BMP design manual.	◖	●	A/P		• City staff participated in development meetings, regional workgroup meetings, and public workshops related to preparation and implementation of the BMP Design Manual. • Initiated preparation of staff training presentation of the BMP Design Manual. Training of CIP, Land Development, and inspection staff planned for early FY 2016-17.

Table A2-11. City of Vista, Development Planning Program Strategies

Number	San Luis Rey River Development Planning Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
DP 4	Educate developers /applicants regarding new requirements.	●	●	A/P		• Developers and applicants will be educated regarding the new requirements on an ongoing basis (e.g., through the submittal review process and through pre-construction meetings).
2. Implement a Watershed Management Area Analysis to develop watershed specific requirements for structural BMP implementation and identify a list of candidate projects that could be used as alternative compliance options for Priority Development Projects.						
DP 5	Develop and implement a Watershed Management Area Analysis to develop watershed specific requirements for structural BMP implementation	●	●	A/P		• WMAA was conducted for SLR WMA and completed in October 2014. The analysis examines the watershed and suggests optional candidate projects that will provide water quality benefits. As the watershed programs evolve, the analysis will be consulted to determine candidate projects on an as-needed basis.
3. Implement a post construction BMP compliance program to ensure proper construction and maintenance.						
DP 6	Implement a program that ensures that all structural BMPs are designed, constructed, and maintained on PDPs.	●	●	A/P		• Land Development staff review project plans for compliance. Contractor reviews SWQMP. • Land Development inspectors oversee project construction, including BMPs. • Stormwater staff and Land Development inspectors conduct joint structural BMP occupancy inspection of sites prior to release of bonds.

Table A2-11. City of Vista, Development Planning Program Strategies

Number	San Luis Rey River Development Planning Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
DP 7	Inspect all high-priority structural BMPs annually prior to the rainy season.	●	●	A/P		• All BMP inspections for summer 2015 were done prior to July 1, 2015 (completed prior to this reporting year). • BMP inspections for Summer 2016 were conducted both before and after July 1, 2016 (in FY 2015-16 and FY 2016-17) • There are three PDP BMP sites (27 structural BMPs) in SLR: o 2 sites (26 BMPs) were inspected during reporting year o Of 26 BMPs inspected, 3 had violations that require staff follow-up.
DP 8	Require implementation of source control, LID, and on-site structural controls for all priority development projects.	●	●	A/P		• Intake forms for standard and PDP SWQMPs provide instructions to address Source Controls, LID, and structural BMPs.
DP 9	Enforce legal authority to ensure all development projects are in compliance with all post construction requirements.	●	●	A/P		• Within the SLR Watershed, 2 cases were initiated for BMP-related investigations. Both cases involved review of project plans at the same site. No violations resulted.
DP 10	Update codes, ordinances, and stormwater design standards consistent with permit and BMP Manual.					See DP1

Table A2-12. City of Vista, Construction Management Program Strategies

Number	San Luis Rey River Construction Management Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Improve data tracking methods for construction inventories and inspections where necessary.						
CM 1	Maintain, update, and prioritize a watershed-based inventory of all projects issued local permits that allow soil disturbing activities.	●	●	A		• Sites issued a grading permit are tracked in the Cityworks system (a GIS-based database). • An Excel spreadsheet is used to track inventoried construction sites, their watershed locations, inspection results, and enforcement actions.
CM 2	Maintain and update a watershed-GIS-based inventory of construction sites and associated site inspection documentation.	X	●	P		• See CM 1. • City staff plan to explore the ability to integrate inspection documents (photos, reports, etc.) with the GIS-based Cityworks system.
2. Ensure that minimum BMPs are designated and required for construction projects.						
CM 3	Require submittal of pollution control plan, construction BMP plan, and/or erosion and sediment control plan for projects requiring local permits involving soil disturbance activities.	●	●	A/P		• Projects requiring local permits for soil disturbing activities are required to submit construction BMP sheets or erosion and sediment control plans. • Construction BMP installation is discussed at pre-construction meetings. • On site inspectors have the authority to require additional BMPs if necessary.
CM 4	Review and confirm that the submitted plan is in compliance.	●	●	A/P		• Staff review BMP sheets and erosion and sediment control plans, provide comments, and confirm corrections are made.
CM 5	Implement or require implementation of BMPs that are site-specific, seasonally appropriate, and appropriate to the construction phase year round.	●	●	A/P		• Site inspection frequency varies by season to ensure site compliance with changing site and seasonal conditions.

Table A2-12. City of Vista, Construction Management Program Strategies

Number	San Luis Rey River Construction Management Program Strategies - City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
CM 6	Inspect construction sites at an appropriate frequency to require and confirm compliance with local permits and ordinances, as well as the MS4 Permit requirements.	●	●	A/P		• All construction sites are considered to be a high threat to water quality. As such, active inventoried sites were inspected weekly during the wet season and monthly during the dry season.
CM 7	Enforce legal authority to ensure inventoried construction projects are in compliance with all requirements.	●	●	A/P		• All enforcement actions are written and city staff continued to exercise its legal authority to ensure sites are in compliance with all requirements.

a. Wet Season = Minimum Weekly, Dry Season = Minimum Monthly

Table A2-13. City of Vista, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
1. Improve data tracking methods for existing development inventories where necessary.						
ED 1	Maintain and update a watershed-based inventory of existing development (i.e., commercial, industrial, and municipal facilities and residential areas).	◖	◖	A/P		• Business sites (Industrial and Commercial facilities) and municipal facilities are inventoried in GIS. Cityworks interfaces with GIS, and is used to document inspections, work orders, and compliance cases associated with those facilities. • The SLR WQIP was not approved until late in the reporting year, and approval of the Carlsbad WQIP is not anticipated until mid-FY 2016-17. The City will establish residential management areas when able to do so with consistency between the two watersheds across the jurisdiction. • During the reporting period, outfall monitoring and complaint case response occurred in the SLR watershed, most of which is predominately residential land uses.
2. Develop and implement approaches to address the impacts of improper water use and irrigation runoff.						
ED 2	Develop and distribute outreach materials targeting over-irrigation.	●	●			• New stormwater brochure (April 2016) developed and targeted for residential pollutant sources includes reference to over-irrigation. • One residential over-irrigation complaint case responded to during reporting period. Response used as opportunity to educate resident about over-irrigation.
ED 3	Promote inter- and/or multi-agency water conservation and incentive programs.					• See IDDE 2 for coordination with VID. • See ED 34 for water conservation-related activities.

Table A2-13. City of Vista, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
3. Improve and/or continue existing pet waste programs.						
ED 4	Expand pet waste program based on municipal and residential area inspections.	X	●	P		• No new stations were installed in SLR WMA during the period. • Parks staff will be replacing old stations throughout the city as needed.
4. Improve trash management strategies within the watershed.						
ED 5	Sponsor Trash Collection Events (public outreach/part).	●	●	A/P		• Creek to Bay Cleanup April 23, 2016 • Distribute Household Hazardous Waste collection site brochure at Summer Fun Fest August 8, 2015
5. Develop and implement approaches to address the impacts of septic systems within the watershed.						
ED 6	Develop and distribute outreach materials targeting septic system maintenance.	X	●	P		• Anticipated in FY 2016-17, consistent with implementation timeline and likely to follow septic system inventory assessment in strategy ED 7.
ED 7	Develop inventory of septic systems within Vista's portion of the SLR Watershed (see also IDDE 8).	X	●	P		• Anticipated in FY 2016-17, consistent with implementation timeline.
ED 8	Develop and distribute outreach materials targeting sewer lateral maintenance.	●	●	A/P		• New FOG brochure and poster developed in April 2016. Distributed during FOG inspections.
ED 9	Undertake next phase of sewer exfiltration study.	X	●	P		• Anticipated in FY 2016-17, consistent with implementation timeline.
ED 10	Continue citywide sanitary sewer rehabilitation and repair programs.	●	●	A/P		• Current sanitary sewer repair programs are focused in portions of the Buena Sanitation District that are outside of the SLR WMA. Last year, approximately 4 miles of pipeline rehabilitation was completed.

Table A2-13. City of Vista, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
ED 11	Conduct FOG inspections to decrease private lateral spills.	●	●	A/P		• 8 FOG inspections were conducted in SLR WMA during reporting period. None required follow-up.
6. Improve and implement existing outreach programs to target key sources and pollutants.						
ED 12	Develop, improve, and distribute outreach materials.	●	●	A/P		• April 2016 – redesigned residential brochure and poster, also redesigned FOG brochure and poster. Distribution will occur as opportunities arise.
ED 13	Implement outreach per JRMP (see Table 10-2)					• Outreach, education, and training events are summarized in the City's Jurisdictional Runoff Management Program Annual Report Form, Attachment A.
ED 14	Educational Workshops (e.g., IPM, manure management).	●	●	A/P		• Industrial General Permit – cooperative with Vista Chamber & Tory Walker (July 30, 2015) • Public works training – operations yard pollution prevention and MS4/JRMP overview (October 7, 2015). • Parks staff with pesticide applicator licenses maintain 20 hours of training every two years for license.
7. Enhance existing MS4 maintenance programs.						
ED 15	Implement a schedule of operation and maintenance activities for the MS4 and related structures.	●	●	A/P		• Public Works regularly maintains the MS4 and related structures in accordance with several variables, including high-impact areas, weather, etc.

Table A2-13. City of Vista, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
8. Develop and implement targeted programs to address issues in residential areas.						
ED 16	Implement an oversight program to promote designated BMPs in residential areas.	●	●	A/P		• Outfall inspections and monitoring contribute to residential area oversight in predominant residential land use: o Sampling is conducted at 2 persistently flowing outfalls, twice per monitoring season. o Visual inspections are conducted at 4 major outfalls, twice per monitoring season. • 4 of the 5 IDDE cases in SLR during the reporting period were related to residential areas. See IDDE 1 for summary. • New residential BMP brochure and poster (bi-lingual) produced and printed for distribution. • Promoted HHW collection facility at Summer Fun Fest outreach event (August 8, 2015), distributing brochures about proper HHW disposal.
ED 17	Develop targeted outreach materials for priority residential issues and BMPs.	●	X	A		• April 2016 – new residential BMP brochure and stormwater poster (bi-lingual)

Table A2-13. City of Vista, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
ED 18	Outreach to and coordination with homeowners associations.	●	●	A/P		• Stormwater staff supported a regional outreach booth at the 42nd annual Rental Housing Education Conference & Expo on 4/19/2016. Emphasis was to educate property owners and managers about stormwater BMPs. • Targeted outreach and coordination with HOAs is anticipated next fiscal year, consistent with the implementation timeline, through designation of residential management areas within the city. Results from outfall monitoring may also contribute to this effort.
9. Improve existing inspections programs to more efficiently target key sources.						
ED 19	Implement a schedule of operation and maintenance for public streets, unpaved roads, paved roads, and paved highways.	●	●	A/P		• Continued to implement street sweeping schedule consistent with past reporting periods.
ED 20	Conduct inspections of inventoried existing development to ensure compliance. Each area/activity inspected once every five years.	●	●	A/P		• Existing Development Inspection Summary for SLR: • Inventory – 2 MUNI, 19 COM, 1 IND, n.a. RES • Inspections – 2 MUNI, 2 COM, 1 IND, 5 RES
10. Actively enforce stormwater and urban runoff requirements for existing development.						
ED 21	Designate and require minimum BMPs for all inventoried existing development.	●	●	A/P		• Established minimum BMPs in City of Vista Stormwater Standards Manual (June 2015).
ED 22	Enforce legal authority to ensure inventoried existing development facilities and/or areas are in compliance with all minimum BMP requirements.	●	●	A/P		• 1 COM inspection found 1 violation • 0 violations found at MUNI and IND inspections • 5 IDDE compliance cases (see IDDE 1)

Table A2-13. City of Vista, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
11. Develop and implement a strategy to identify and facilitate retrofit opportunities in areas of existing development.						
ED 23	As an optional strategy, develop retrofit projects in areas of existing development.	◖	X	P		• The city has budgeted to conduct a soil infiltration feasibility study in FY 2016-17. Results of this effort are anticipated to help guide strategic structural BMP projects and retrofit efforts. • This optional strategy will be implemented if/when triggers identified in the WQIP are met.
ED 33	Evaluate MS4 maintenance program for target areas and potential retrofit opportunities.	◖	●	P		• Soil infiltration feasibility study is budgeted for FY 2016-17 (see ED 23).
ED 34	Investigate incentives for BMP retrofits, such as weather-based irrigation controllers, in partnership with water agency(ies).	●	●	P		• Rather than using traditional turf, artificial turf was installed at the warmup/practice field at Vista Sports Park in May 2015. • Given drought conditions and water use restrictions by VID, irrigation systems throughout city were programmed for limited watering schedules. Activities not in SLR, but within the city include: • Multiple city-owned landscape areas had irrigation systems replaced, including Civic Center property, East Broadway, and Vista Village Drive (Carlsbad WMA). • 1 acre of turf was removed and replaced with drought tolerant plants at Brengle Terrace Park (Carlsbad WMA). Total cost was $149k, with a Metropolitan Water District rebate of $48k awarded for the project. • August 2016, Raintree Park scheduled for replacement of turf with artificial turf (Carlsbad WMA).

Table A2-13. City of Vista, Existing Development Management Program Strategies

Number	San Luis Rey River Existing Development Management Program Strategies City of Vista	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments
12. Improve coordination between agencies. See strategies ED 3, ED5.						
13. Other BMPs/Activities						
ED 24	Develop and distribute outreach materials targeting sediment control.	●	●	A/P		• Sediment and erosion control BMP brochure is handed out with every grading and building permit enquiry at front desk. Typically order ~250 brochures printed per year.

3.4 MODIFICATIONS TO THE BMP DESIGN MANUAL

See 3.2 JRMP Annual Report form – Attachment A.

3.5 MODIFICATIONS TO THE JRMP

See 3.2 JRMP Annual Report form – Attachment A.

4 Caltrans

4.1 ANNUAL REPORT CERTIFICATION

DEPARTMENT OF TRANSPORTATION
DISTRICT 11
4050 TAYLOR STREET, M.S. 120
SAN DIEGO, CA 92110
PHONE (619) 688-0100
FAX (619) 688-4237
TTY 711
www.dot.ca.gov

Serious drought.
Help save water!

January 4, 2017

STATEMENT OF CERTIFICATION

San Luis Rey River Watershed Management Area Water Quality Improvement Plan 2015-2016 Annual Report

I certify, under penalty of law, that this Water Quality Improvement Plan Annual Report submittal and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

BRUCE L. APRIL
Deputy District Director, Environmental

1/6/17
Date

4.2 JURISDICTIONAL STRATEGIES

Table A2-14. Caltrans, Illicit Discharge Detection and Elimination Program Strategies

San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments*
1. Engage the public, jurisdictional staff, and other agency staff to proactively identify and report illicit discharges.					
Utilize ~~municipal~~ Caltrans personnel and contractors to identify and report illicit discharges and connections.	●	●	A		The *Illegal Connection, Illicit Discharge (IC/ID) and Illegal Dumping Response Plan* (CTSW-RT-13-999.02) was submitted to the SWRCB in December 2013. The plan describes procedures and BMPs used to protect its MS4 and stormwater quality from potential pollutant loading due to the illicit deposition of solid or liquid materials to Caltrans' right of way. NPDES Permit Section E.2.h.4)b)ii), Page 47.
Facilitate public reporting of illicit discharges and connections via telephone and email.	●	●	A		
Educate the public regarding illegal discharges/dumping.	●	●	A		
Coordinate with upstream entities to prevent illicit discharges from upstream sources from entering the MS4.	●	●	A		
Annual training for appropriate staff on implementation of ICID and Illegal Dumping Response Plan.	●	●	A		

Table A2-14. Caltrans, Illicit Discharge Detection and Elimination Program Strategies

San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments*
Develop and implement procedures for educating the public with respect to ICIDs and illegal dumping.	●	●	A		
2. Develop and implement approaches to address the impacts of septic systems within the watershed.					
Investigate and eliminate illicit discharges and connections.	●	●	A		
3. Develop and implement approaches to reduce the impacts of public and private sanitary sewer systems within the watershed.					
Implement practices and procedures to address spills with the potential to enter the MS4.	●	●	A		
Investigate and eliminate illicit discharges and connections.	●	●	A		
4. Implement monitoring programs to provide new information to refine the prioritization of drainage areas.					
Develop Comprehensive TMDL Monitoring Plan.	●	●	A		Caltrans submitted the Comprehensive TMDL Monitoring Plan to the State Board on January 1, 2015. State Board staff provided review and comment within the reporting period, and Caltrans submitted a revised plan to State Board staff in June 2016.
TMDL Reach Prioritization	●	●	A		
Perform Tier 1 Monitoring.	●	●	A		Four sites performed monitoring in District 11 during the reporting period at Tier 1 sites.

Table A2-14. Caltrans, Illicit Discharge Detection and Elimination Program Strategies

San Luis Rey River Illicit Discharge Detection and Elimination Program Strategies - Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments*
5. Actively enforce prohibitions related to illicit discharges and connections.					
Investigate and eliminate illicit discharges and connections.	●	●	A		The *Illegal Connection, Illicit Discharge (IC/ID) and Illegal Dumping Response Plan* (CTSW-RT-13-999.02) was submitted to the SWRCB in December 2013. The plan describes procedures and BMPs used to protect its MS4 and stormwater quality from potential pollutant loading due to the illicit deposition of solid or liquid materials to Caltrans' right of way.
6. Other Related Programs and Activities.					
Develop and Implement an ICID and Illegal Dumping Response Plan.	●	●	A		
Develop and implement procedures for investigating, remediating, and eliminating illicit connections and discharges.	●	●	A		
Develop and implement procedures for the prevention of illegal dumping.	●	●	A		

* Information source is Caltrans Annual Report, Fiscal Year 2015-2016

Table A2-15. Caltrans, Development Planning Program Strategies

San Luis Rey River Development Planning Program Strategies - Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments*
1. Implement a post construction BMP compliance program to ensure proper construction and maintenance.					
Implement a program that ensures that all structural BMPs are designed, constructed, and maintained.	●	●	A		Create a new website application (CT Portal) dedicated for reporting all structural BMPs that were designed, constructed and maintained.
Inspect all high priority structural BMPs annually.	●	●	A		
Maintain an inventory of structural BMPs.			A		
Stormwater Treatment BMP Technology Report and Stormwater Monitoring and BMP Development Status Report in Annual Report.	●	●	A		*Stormwater Monitoring and BMP Development Status Report: Fiscal Year 2015-2016 Update*, September 2015, which provides an update on the status of stormwater treatment technology studies, source control studies (including erosion control studies), and stormwater quality characterization
2. Enforce post construction requirements related to new and redevelopment.					
Enforce legal authority to ensure all development projects are in compliance with all post construction requirements.	●	●	A		

* Information source is Caltrans Annual Report, Fiscal Year 2015-2016

Table A2-16. Caltrans, Construction Management Program Strategies

San Luis Rey River Construction Management Program Strategies - Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments*
1. Ensure that minimum BMPs are designated and required for construction projects.					
Implement or require implementation of BMPs that are site specific, seasonally appropriate, and appropriate to the construction phase year round.	●	●	A		Caltrans continued to track new and/or emerging post-construction stormwater treatment technologies
Develop and implement new construction guidance as needed to comply with new Statewide Construction General Permit (CGP).	●	●	A		Full implementation of the CGP occurred in this fiscal year.
2. Provide enhanced outreach and coordination to convey construction requirements.					
Provide internal staff training related to construction storm water management.	●	●	A		During the fiscal year, construction stormwater classes were offered to Construction personnel on stormwater topics.
Provide public education and outreach targeting the construction industry.	●	●	A		

* Information source is Caltrans Annual Report, Fiscal Year 2015-2016

Table A2-17. Caltrans, Existing Development Management Program Strategies

San Luis Rey River Existing Development Program Strategies - Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments*
1. Improve data tracking methods for existing development inventories where necessary.					
2. Improve trash management strategies within the watershed.					
Implement "Don't Trash California" campaign.	●	●	A		Caltrans collects trash through several activities that District Maintenance personnel perform on a regular basis. These activities include storm drain maintenance, roadway sweeping, District crew/California Conservation Corps (CCC) trash collection, and the Adopt-A-Highway Program, and public education emphasizing trash and litter prevention.
Implementation of Adopt-A-Highway Statewide Program through coordination with local organizations.	●	●	A		The Caltrans Adopt-A-Highway Program provides an avenue for individuals, organizations, or businesses to help maintain sections of roadside for various activities including litter removal within California's State Highway System.
Report and evaluate trash and litter activities.	●	●	A		
3. Improve and implement existing outreach programs to target key sources and pollutants.					
Implement and annually evaluate public education program.	●	●	A		The Division of Maintenance helps sponsor the California Statewide Litter Collection, Enforcement and Beautification Day event held in the spring on or around Earth Day each year. Caltrans staff volunteers to collect litter and raise public awareness of the issue. Caltrans participates in supporting the California "Keep California Beautiful" campaign with Caltrans' "Protect Every Drop" campaign.

Table A2-17. Caltrans, Existing Development Management Program Strategies

San Luis Rey River Existing Development Program Strategies - Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments*
Implement “Don’t Trash California” campaign.	●	●	A		
Co-sponsor CASQA’s Water Quality Newsflash.	●	●	A		
Implementation of Adopt-A-Highway Statewide Program through coordination with local organizations.	●	●	A		Adopt-A-Highway is a cooperative program between organizations with volunteers to collect trash along the highways, and be recognized for their contribution to keeping the environment and highways clean.
Implementation of Statewide Storm Drain Stenciling Program.	●	●	A		
4. Enhance existing maintenance programs.					
Implement a schedule of operation and maintenance activities.	●	●	A		The Division of Construction staff continued providing the coordinates of treatment BMPs to facilitate transfer to the Division of Maintenance using a designated handoff form. The Division of Maintenance uses its Integrated Maintenance Management System (IMMS) to track maintenance records of treatment BMPs as provided by the Districts.
5. Improve existing inspections programs to more efficiently target key sources.					
Implement a schedule of operation and maintenance for highways.	●	●	A		The Division of Construction staff continued providing the coordinates of treatment BMPs to facilitate transfer to the Division of Maintenance using a designated handoff form. The Division of Maintenance uses its Integrated Maintenance Management System (IMMS) to track maintenance records of treatment BMPs as provided by the Districts.

Table A2-17. Caltrans, Existing Development Management Program Strategies

San Luis Rey River Existing Development Program Strategies - Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments*
Implement highway maintenance activities as required.	●	●	A		Year- End Performance Report FY 2015-2016, A Summary of Maintenance Activity Storm Water Compliance Reviews, September 2015 (CTSW-RT-15-321.04.4), which summarizes the stormwater compliance reviews of Maintenance activities.
6. Actively enforce stormwater and urban runoff requirements for existing development.					
Develop and implement Facility Pollution Prevention Plans.	●	●	A		Year- End Performance Report FY 2015-2016, A Summary of Maintenance Activity Storm Water Compliance Reviews, September 2015, which summarizes the stormwater compliance reviews of Maintenance activities. Caltrans is required to develop a Facility Pollution Prevention Plan (FPPP) for each of its maintenance facilities. Each FPPP describes the activities conducted at the facility and the BMPs to reduce or eliminate the discharge of pollutants in stormwater runoff from the facility. All FPPPs will be updated or revised as needed during each year.
7. Develop and implement a strategy to identify and facilitate retrofit opportunities in areas of existing development.					
Develop a strategy to identify opportunities and facilitate the implementation of retrofit projects in areas of existing development.	●	●	A		

Table A2-17. Caltrans, Existing Development Management Program Strategies

San Luis Rey River Existing Development Program Strategies - Caltrans	FY15-16	FY16-17	Actual / Planned	Rationale for Modification to the Strategy	Comments*
8. Improve coordination between agencies.					
Develop and implement a Municipal Coordination Plan.	●	●	A		Caltrans' Municipal Coordination Plan was under development during the reporting period. In the interim, the Districts participated in municipal coordination activities by attending meetings, taking part in special studies, and collaborating with local agencies. District staff attended meetings statewide with municipal stormwater permittees to coordinate public education and outreach, regional planning, and other related activities.
9. Other BMPs/Activities					
Implement and evaluate the Vegetation Controls Program.	●	●	A		

* Information source is Caltrans Annual Report, Fiscal Year 2015-2016

APPENDIX 3

Water Quality Improvement Plan Numeric Goals

Appendix 3 Water Quality Improvement Plan Numeric Goals

Compliance with the Bacteria Total Maximum Daily Load (TMDL) may be demonstrated via several methods. The pathways that may be used to demonstrate progress toward the interim and final TMDL goals in the San Luis Rey River Watershed Management Area (WMA or Watershed) are presented below in Table A3-1 and Table A3-2, respectively. These tables, along with additional details regarding these pathways, can be found in Sections 3.1.1 (for interim pathways) and 3.1.2 (for final pathways) of the San Luis Rey Water Quality Improvement Plan (WQIP).

Table A3-1. Pathways to Achieve Required Interim TMDL Goals

Pathway	Title	Interim Target	Metric	Values to be met		
				Indicator	Dry	Wet
1 OR	Meet bacteria allowable exceedance frequency of receiving water objectives	No exceedances of the interim receiving water limitations;	Exceedance frequencies as measured in receiving waters.	Total Coliform[a]	4.7% AEF[c]	45% AEF
				Fecal Coliform	12.6% AEF	44% AEF
				Enterococcus	16% AEF	47% AEF
2 OR	No discharge from stormwater drain outfalls	No direct or indirect discharge from the Participating Agencies' storm drain outfalls to the receiving water;	Assessment of presence/ absence of flow and connectivity with receiving water.	No discharge from storm drain outfalls to receiving waters.		
3 OR	Reduce loads at storm drain outfalls	The pollutant load reductions for discharges from the Participating Agencies' storm drain outfalls are greater than the required load reduction;	Pollutant load reductions.	Total Coliform	19.07% reduction	2.81% reduction
				Fecal Coliform	19.55% reduction	1.56% reduction
				Enterococcus	43.69% reduction	5.85% reduction
4	Implement WQIP and use adaptive management	The Participating Agencies develop and implement an accepted WQIP.[b]	Implementation of jurisdictional strategies	Implementation of jurisdictional strategies as developed in accepted Plan and designed to meet interim goals 1, 2 and/or 3.		

a. Receiving water limitations for total coliform only apply to beaches.

b. The accepted Plan must provide reasonable assurance that the interim TMDL compliance requirements in Attachment E of the Permit will be met via implementation, must be accepted by the Regional Board, and must be fully implemented by the Participating Agencies.

c. AEF - allowable exceedance frequency is the percent of samples that can exceed the single sample maximum of geometric mean and still be in compliance; the AEF is calculated based on bacteria concentration measurements from a reference beach.

Table A3-2. Pathways to Achieve Required Final TMDL Goals

Compliance Pathway	Final Target	Final Metric	Measurement: Indicator	Dry Weather			Wet Weather	
1 OR	No exceedances of the final allowable exceedance frequency in the receiving water;	Bacteria concentrations (MPN or CFU/100 ml) and exceedance frequencies in receiving waters;		SSM[a]	GM[b]	AEF[c]	SSM	AEF
			Total Coliform	10,000	1,000	0%	10,000	22%
			Fecal Coliform	400	200	0%	400	22%
			Enterococcus	104	35	0%	104	22%
2 OR	No direct or indirect discharge from the Participating Agencies' storm drain outfalls to the receiving water;	Assessment of presence/absence of flow and connectivity with receiving water;	Flow observations or measurements.					
3 OR	There are no exceedances of the final allowable exceedance frequencies at the Participating Agencies' storm drain outfalls;	Bacteria concentrations (MPN or CFU/100 ml) and exceedance frequencies in discharges;		Dry			Wet	
				SSM	GM	AEF[d]	SSM	AEF[e]
			Total Coliform[f]	10,000	1,000	0%	10,000	22%
			Fecal Coliform	400	200	0%	400	22%
			Enterococcus	104[g] 61[h]	35	0%	104[g] 61[h]	22%
4 OR	The pollutant load reductions for discharges from the Participating Agencies' storm drain outfalls are greater than or equal to the final required load reductions;	Load reductions in discharges are greater than or equal to required load reductions. The calculation requires an understanding of the baseline load[i], which can be used to estimate a target load reduction[j];		Percent Reduction (Dry)			Percent Reduction (Wet)	
			Total Coliform	38.13%			5.62%	
			Fecal Coliform	39.09%			3.12%	
			Enterococcus	87.38%			11.69%	
5 OR	Exceedances of the final allowable exceedance frequencies in the receiving water are due to loads from natural sources and pollutant loads from the Participating Agencies' storm drain outfalls are not causing or contributing to the exceedances;	Microbial source tracking results as measured in the receiving water downstream of storm drain outfalls;	Microbial source tracking results show anthropogenic markers are below the limits of reporting for most receiving water samples at the time of the bacteria exceedance(s).					
6	The Participating Agencies develop and implement an accepted Water Quality Improvement Plan that includes a watershed model or other watershed analytical tool(s).	Implementation of jurisdictional strategies designed to meet goals. Use an adaptive management approach to improve implementation of jurisdictional strategies to reach goals.	Implementation of jurisdictional strategies as outlined in the Water Quality Improvement Plan, and of the required monitoring and assessment program.					

a. SSM = single sample maximum or the highest allowable concentration of bacteria contained in one discreet sample.
b. GM = geometric mean calculated based on multiple samples over a given time frame as defined by the Ocean Plan.
c. AEF = allowable exceedance frequency is the percent of samples that can exceed the single sample maximum of geometric mean and still be in compliance; the AEF is calculated based on the presence of bacteria loading from natural sources.
d. For dry weather days, the dry weather bacteria densities must be consistent with the single sample maximum REC-1 water quality objectives in the Ocean Plan for discharges to beaches and the Basin Plan for discharges to creeks and creek mouths.
e. The 22% single sample maximum allowable exceedance frequency only applies to wet weather days.
f. Total coliform effluent limitations only apply to storm drain outfalls that discharge to the Pacific Ocean Shorelines and creek mouths listed in Table 6.0 of Attachment E of Order R9-2013-0001.
g. This enterococcus effluent limitation applies to storm drain discharges to segments of areas of the Pacific Ocean Shoreline listed in Table 6.0 of Attachment E of Order R9-2013-0001.
h. This enterococcus effluent limitation applies to storm drain discharges to segments of areas of creeks or creek mouths listed in Table 6.0 of Attachment E of Order R9-2013-0001.
i. The baseline loads for the lower watershed were determined through modeling and are presented in Appendix 3C.
j. The baseline fecal coliform load (1993 water year) equals 6,186 x 10^{12} MPN resulting in a target load reduction of 723 x 10^{12} MPN for wet weather.

The watershed goals identified by the Participating Agencies in the San Luis Rey River WMA to demonstrate progress toward compliance with the Bacteria TMDL at the mouth of the San Luis Rey River are presented below in Table A3-3 (dry weather) and Table A3-4 (wet weather). The goals outlined in these tables are based on TMDL compliance pathways. The Participating Agencies also outlined goals for the Lower San Luis Rey River, which are intended to improve water quality at storm drain outfalls and receiving waters. These goals are presented in Table A3-5 (dry weather) and Table A3-6 (wet weather) below. Each of the following four tables, along with additional details regarding these goals, can be found in Section 3.1.3 of the San Luis Rey River WQIP.

Table A3-3. Watershed Management Area Numeric Dry Weather Goal for Bacteria TMDL – San Luis Rey Hydrologic Unit at the San Luis Rey River Mouth

Compliance Pathway	Title	Metric[a]	Baseline	Final Outcome	1st Permit Term 2013 – 2018	2nd Permit Term 2018 – 2023: TMDL Interim Compliance Date April 4, 2020[b]	2nd Permit Term 2018 – 2023: TMDL Final Compliance Date April 4, 2021
1; or	No Discharge from MS4	Discharge from MS4 outfall	To be established during FY 15-16 monitoring	Elimination of flow from MS4 discharges	Flow eliminated from 25% of outfalls or cumulative flow from storm drain outfalls reduced by 25 %	Flow eliminated from 50% of outfalls or cumulative flow from storm drain outfalls reduced by 50 %	Flow eliminated from 100%[c] of outfalls or cumulative flow from storm drain outfalls reduced by 100 %[c]
2; or	Meet TMDL Limits in Receiving Water	Bacteria concentrations & exceedance percentage in receiving waters	Not applicable	Achievement of WQOs or allowed exceedance percentage for bacteria	None	Bacteria concentrations at the compliance point identified in the Monitoring and Assessment Plan are below the applicable WQO (e.g., 400 mpn/100mL single sample maximum for Fecal Coliform)[j] or TMDL allowed exceedance percentage[d] of 4.7% for Total Coliform; 4% for Fecal Coliform; 16% for *Enterococcus*	Bacteria concentrations at the compliance point identified in the Monitoring and Assessment Plan are below the applicable WQO or TMDL allowed exceedance percentage[e] of 0% for Total Coliform, Fecal Coliform and *Enterococcus*
3; or	MS4 Discharge Meets TMDL Limits	Bacteria concentrations & exceedance percentage in MS4 discharges					
4;	MS4 Discharge Load Reduction	Load reductions in MS4 discharges	10.0×10^{12} MPN during Water Year 1993 (based on TMDL modeling)[f]	Reach mandatory reduction of dry weather bacteria loading from MS4 discharges identified in Attachment E	Loads[g] are reduced by 9.5% for Total Coliform; 9.8% for Fecal Coliform; 21.8% for Enterococcus from MS4 outfalls	Loads[h] are reduced by 19.07% for Total Coliform (TC), 19.55% for Fecal Coliform (FC), 43.69% for *Enterococcus (Ent)* from the MS4 outfalls	Loads[i] are reduced by 38.13% for Total Coliform (TC), 39.09% for Fecal Coliform (FC), 87.38% *for Enterococcus (Ent)* from the MS4 outfalls
5; or	Exceedance due to Natural Sources	Exceedances due to natural sources, and MS4 outfall loads not causing or contributing to exceedances	To be established during FY 14-15 monitoring	Elimination of anthropogenic fecal markers from MS4 discharges	Number of MS4 outfalls with human fecal markers detected are reduced by 25%	Number of MS4 outfalls with anthropogenic fecal markers detected are reduced by 50%	Number of MS4 outfalls with anthropogenic fecal markers detected are reduced by 100% and storm drain outfall loads are not causing or contributing to exceedances.
6	Water Quality Improvement Plan (WQIP)	Implement WQIP	Not Applicable	Implementation of the WQIP in accordance with Attachment E of Permit	Implement WQIP supported by a reasonable assurance as accepted by the San Diego Water Board	Submit and fully implement WQIP, accepted by the San Diego Water Board, which provides reasonable assurance that interim TMDL compliance requirements will be achieved by the interim compliance dates	Develop and implement WQIP as follows: (i) incorporate BMPs required under Permit Provision 6.b.(2)(c) in WQIP (ii) Include analysis to demonstrate that implementation of BMPs required by Provision 6.b.(2)(c) achieves compliance with Specific Provisions 6.b.(3)(a), 6.b.(3)(b), 6.b.(3)(c), 6.b.(3)(d), and/or 6.b.(3)(e) (iii) The results analysis must be accepted San Diego Water Boards as part of the WQIP (iv) Responsible Copermittee continue to implement the BMPs in (i), AND (v) Responsible Copermittee continue to perform specific monitoring and assessments from Provision 6.d to demonstrate compliance with Specific Provisions 6.b.(3)(a), 6.b.(3)(b), 6.b.(3)(c), 6.b.(3)(d), 6.b.(3)(e), and/or 6.b.(3)(f)
	a. Eliminate anthropogenic dry weather flows from storm drain outfalls	% reduction of flow or number of outfalls with persistent flows	To be established FY 15-16 using dry weather flow measurements.	Effectively eliminate anthropogenic dry weather flow from storm drain outfalls to receiving water.	Reduce by 20% the aggregate flow or the number of persistently flowing outfalls.	Reduce by 75% the aggregate flow or the number of persistently flowing outfalls.	Eliminate 100% anthropogenic dry weather discharges and accompanying bacteria loads from storm drain outfalls to the receiving water.

a. In accordance with Permit Provisions 6.b.(3)(a)-(e) and 6.c.(3)(a)-(g) of Attachment E to Order R9-2013-0001.

b. Request moving Interim TMDL Compliance Date from April 4, 2017 (per Attachment E, 6.c(1)) to April 4, 2020 to allow adequate time to investigate and mitigate bacteria sources, and monitor progress and adjust implementation through the adaptive management process.

c. Goal of 100% flow elimination in accordance with Provision 6.b.(3)(a).

d. Interim dry weather Allowable Exceedance Percentages were calculated based on half the value of the existing 30-day Geometric Mean of exceedance percentages based on beach sample data from 2004 through 2010: ; Annual Bacteria TMDL Monitoring Report is included in Appendix I of the Transitional Monitoring and Assessment Report for the San Luis Rey River Watershed Management Area (2012-2014). From this report, the San Luis Rey River watershed compliance reduction milestones/existing and interim and final exceedance frequencies are provided in Table 1–2 on page 1 – 8 (specifically, footnote "a" under the table). The interim and existing exceedance frequency calculation methodology is summarized in Section 2.4 on page 2-6 of the document.

e. Final dry weather Allowable Exceedance Percentages are from Tables 6.2a, 6.2b, and 6.2c of Attachment E to Order No.R9-2013-0001.

f. Value derived from table on page A33 of Attachment A to TMDL Resolution No.R9-2010-0001 for the San Luis Rey River watershed; monthly value translated in annual load for watershed by multiplying by 12. Baseline load for County of San Diego was calculated as a proportion of County land area to that of the overall watershed, i.e. approximately 48%Values calculated as half of the interim goals.

g. Values taken from Table 6.6 of Attachment E to Order R9-2013-0001: Anticipated load reductions for WQIP strategies were modeled using Fecal Coliform (FC) as a surrogate for all Fecal Indicator Bacteria as noted in WQIP Appendices 3C and 3F, therefore target FC load reductions were set according to the largest required indicator bacteria reduction (among TC, FC and *Ent*) to be conservative; *Enterococcus* was the highest reduction at 43.69%.

h. Values taken from Table 6.3 of Attachment E to Order R9-2013-0001: Anticipated load reductions for WQIP strategies were modeled using Fecal Coliform (FC) as a surrogate for all Fecal Indicator Bacteria as noted in WQIP Appendices 3C and 3F, therefore target FC load reductions were set according to the largest required indicator bacteria reduction (among TC, FC and *Ent*) to be conservative; *Enterococcus* was the highest reduction at 87.38%.

i. Goal of 100% of exceedances demonstrated to be due to natural sources in accordance with Provision 6.b.(3)(e).

Table A3-4. Watershed Management Area Numeric Wet Weather Goal for Bacteria TMDL – San Luis Rey Hydrologic Unit at San Luis Rey River Mouth

Compliance Pathway	Title	Metric[a]	Baseline	Final Outcome	1st Permit Term 2013 – 2018	2nd Permit Term 2018 – 2023	3rd Permit Term 2023 – 2028	4th Permit Term 2028 – 2033
							Meet TMDL Interim Compliance Date April 4, 2028[b]	Meet TMDL Final Compliance Date April 4, 2031
1; or	No Discharge from MS4	Discharge from MS4 outfalls	To be established during FY 15-16 monitoring	Elimination of flow[l] from MS4 discharges	Flow eliminated from 10% of outfalls or cumulative flow from storm drain outfalls reduced by 10%	Flow eliminated from 25% of outfalls or cumulative flow from storm drain outfalls reduced by 25%	Flow eliminated from 50% of outfalls or cumulative flow from storm drain outfalls reduced by 50%	Flow eliminated from 100%[c] of outfalls or cumulative flow from storm drain outfalls reduced by 100 %[c]
2; or	Meet TMDL Limits in Receiving Water	Bacteria concentrations & exceedance percentage in receiving waters	Not applicable	Achievement of allowed exceedance percentage for bacteria	None	None	Bacteria concentrations are below the applicable WQO (e.g., 400 mpn/100mL single sample maximum for Fecal Coliform)[n] or TMDL allowed exceedance percentage[d] of 45% for Total Coliform; 44% for Fecal Coliform; 47% for *Enterococcus*	Bacteria concentrations are below the applicable WQO or TMDL allowed exceedance percentage[e] of 22% for Total Coliform, Fecal Coliform and *Enterococcus*
3; or	MS4 Discharge Meets TMDL Limits	Bacteria concentrations & exceedance percentage in MS4 discharges						
4; or	MS4 Discharge Load Reduction	Load reductions in MS4 discharges	3,835 x 10^{12} MPN during Water Year 1993 (based on modeling)[f]	Reach mandatory reduction of dry weather bacteria loading from MS4 discharges identified in Attachment E	Loads[g] are reduced by 0.70% for Total Coliform; 0.39% for Fecal Coliform; 1.5% for Enterococcus from MS4 outfalls	Loads[h] are reduced by 1.4% for Total Coliform; 0.78% for Fecal Coliform; 2.9% for Enterococcus from MS4 outfalls	Loads[i] are reduced by 2.81% for Total Coliform; 1.56% for Fecal Coliform; 5.85% for Enterococcus from MS4 outfalls	Loads[j] are reduced by 5.62% for Total Coliform; 3.12% for Fecal Coliform; 11.69% for Enterococcus from MS4 outfalls
5; or	Exceedance due to Natural Sources	Exceedances due to natural sources, and MS4 outfall loads not causing or contributing to exceedances	To be established during FY 14-15 monitoring	Elimination of anthropogenic fecal markers from MS4 discharges	Number of MS4 outfalls with human fecal markers detected are reduced by 10%	Number of MS4 outfalls with human fecal markers detected are reduced by 25%	Number of MS4 outfalls with anthropogenic fecal markers detected are reduced by 50%	Number of MS4 outfalls with anthropogenic fecal markers detected are reduced by 100%[k] and storm drain outfall loads are not causing or contributing to exceedances.

Table A3-4. Watershed Management Area Numeric Wet Weather Goal for Bacteria TMDL – San Luis Rey Hydrologic Unit at San Luis Rey River Mouth

Compliance Pathway	Title	Metric[a]	Baseline	Final Outcome	1st Permit Term 2013 – 2018	2nd Permit Term 2018 – 2023	3rd Permit Term 2023 – 2028	4th Permit Term 2028 – 2033
							Meet TMDL Interim Compliance Date April 4, 2028[b]	Meet TMDL Final Compliance Date April 4, 2031
6	Water Quality Improvement Plan (WQIP)[l]	Implement WQIP	Not Applicable	Implementation of the WQIP in accordance with Attachment E of Permit	Implement WQIP supported by a reasonable assurance as accepted by the San Diego Water Board	Implement WQIP supported by a reasonable assurance as accepted by the San Diego Water Board	Submit and fully implement WQIP, accepted by the San Diego Water Board, which provides reasonable assurance that interim TMDL compliance requirements will be achieved by the interim compliance dates	Develop and implement WQIP as follows: (i) incorporate BMPs required under Permit Provision 6.b.(2)(c) in WQIP (ii) Include analysis to demonstrate that implementation of BMPs required by Provision 6.b.(2)(c) achieves compliance with Specific Provisions 6.b.(3)(a), 6.b.(3)(b), 6.b.(3)(c), 6.b.(3)(d), and/or 6.b.(3)(e) (iii) The results analysis must be accepted San Diego Water Boards as part of the WQIP (iv) Responsible Copermittee continue to implement the BMPs in (i), AND (v) Responsible Copermittee continue to perform specific monitoring and assessments from Provision 6.d to demonstrate compliance with Specific Provisions 6.b.(3)(a), 6.b.(3)(b), 6.b.(3)(c), 6.b.(3)(d), 6.b.(3)(e), and/or 6.b.(3)(f)
	a. Focus on programmatic BMPs and use adaptive management to increase effectiveness	% bacterial load reduction	3,835 x 10^{12} MPN during Water Year 1993	Reduce bacteria loads from baseline by at least 10% from storm drain outfalls to meet TMDL required load reductions.	Implement programmatic (non-structural) BMPs to achieve source reduction of bacteria loads from the storm drain outfalls.	Reduce bacteria loads by 2% from the storm drain outfalls through continued implementation of programmatic BMPs and, based on adaptive management, focus and enhance efforts where needed.	Reduce bacteria loads by an additional 4% (total 6%) from the storm drain outfalls by continued implementation of programmatic BMPs.	Reduce bacteria loads by an additional 4% (at least 10% total) from the storm drain outfalls by continued implementation of programmatic BMPs.
	b. Structural BMPs[m] (as needed and as funding is available)	% bacterial load reduction based on quantitative model	3,835 x 10^{12} MPN during Water Year 1993	Reduce baseline bacteria loads by 1.7% from storm drain outfalls to receiving water to meet TMDL required load reductions.	Reduce by 0.3% the baseline bacteria loads from distributed BMPs constructed between 2003 and 2009 during redevelopment.	Reduce bacteria loads by an additional 0.5% (total 0.8%) through participation in the public private partnership program. Begin planning & design for additional long-term structural BMPs.	Reduce bacteria loads by an additional 0.6% (total 1.4%) through additional participation in the public private partnership program and reduction through BMPs required through redevelopment (3.2 %); Continue planning & permitting for long-term structural BMPs.	Reduce bacteria loads by 0.3% (total 1.7%). Construct distributed and regional structural BMPs if necessary to meet goal.

a. In accordance with Permit Provisions 6.b.(3)(a)-(e) and 6.c.(3)(a)-(g) of Attachment E to Order R9-2013-0001.
b. Request moving Interim TMDL Compliance Date from April 4, 2021 (per Attachment E, 6.c(1)) to April 4, 2028 to allow adequate time to investigate and mitigate bacteria sources, and monitor progress and adjust implementation through the adaptive management process.
c. Goal of 100% flow elimination in accordance with Provision 6.b.(3)(a).
d. Interim wet weather Allowable Exceedance Percentages are from Tables 6.5 of Attachment E to Order No.R9-2013-0001.
e. Final wet weather Allowable Exceedance Percentages are from Tables 6.2a, 6.2b, and 6.2c of Attachment E to Order No.R9-2013-0001.
f. Value from modeled baseline load as indicated in Appendix 3C of the WQIP.
g. Values calculated as half of the 2nd Permit Term goals.
h. Values calculated as half of the interim goals
i. Values taken from Table 6.6 of Attachment E to Order R9-2013-0001: Anticipated load reductions for WQIP strategies were modeled using Fecal Coliform (FC) as a surrogate for all Fecal Indicator Bacteria as noted in WQIP Appendices 3C and 3F, therefore target FC load reductions were set according to the largest required indicator bacteria reduction (among TC, FC and *Ent*) to be conservative; *Enterococcus* is the controlling indicator.
j. Values taken from Table 6.3 of Attachment E to Order R9-2013-0001: Anticipated load reductions for WQIP strategies were modeled using Fecal Coliform (FC) as a surrogate for all Fecal Indicator Bacteria as noted in WQIP Appendices 3C and 3F, therefore target FC load reductions were set according to the largest required indicator bacteria reduction (among TC, FC and *Ent*) to be conservative; *Enterococcus* is the controlling indicator.
k. Goal of 100% of exceedances demonstrated to be due to natural sources in accordance with Provision 6.b.(3)(e).
l. To meet the final wet weather target load reduction of 11.69% for Fecal Coliform, the County through quantitative modeling has demonstrated a 10% reduction from programmatic BMPs and a 1.7% reduction from structural BMPs. Progress will be monitored and adjustments through adaptive management will be used to update the plan.
m. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance. The implementation of strategies to achieve goals will depend upon approval of funding in future annual budgets.

Table A3-5. Dry Weather Watershed Goals for Lower San Luis Rey River[a]

Title [b]	Number	Metric	Baseline	Interim Numeric Goals Permit Term 2013 – 2018	Final Numeric Goals Permit Term 2018 – 2023 (April 4, 2021)
Reduce bacteria contributions from persistent dry weather flowing outfalls	1; or	Presence/absence of dry weather flow at persistent flowing outfalls [c]	Establish during transitional monitoring or FY15-16 monitoring and update annually as needed	Effectively eliminate flow from 20% of persistently flowing outfalls	Effectively eliminate anthropogenic flow from 100% of outfalls
	2	Dry weather flow at persistent flowing outfalls [c]	Establish during transitional monitoring or FY15-16 monitoring and update annually as needed	Reduce by 20%, the aggregate flow from persistently flowing outfalls	Reduce by 100%, the aggregate flow from persistently flowing outfalls

a. West of Interstate 15
b. The goals may be adapted as monitoring data is collected and analyzed.
c. Flow is defined as all dry weather flows except groundwater, other exempt, or other permitted non-stormwater flows

Table A3-6. Wet Weather Watershed Goals for Lower San Luis Rey River[a]

Title [b]	Metric	Baseline[c]	Interim Numeric Goals Permit Term 2013 – 2018	Interim Numeric Goals Permit Term 2018 – 2023	Interim Numeric Goals Permit Term 2023 - 2028	Final Numeric Goals Permit Term 2028-2033 (April 4, 2031)
Reduce bacteria contributions from outfalls during wet weather	Bacteria load reductions per acre at key outfalls or bacteria concentration in the lower River	Fecal coliform: $2.44*10^{10}$ MPN/storm/acre Enterococcus: $1.18*10^{11}$ MPN/storm/acre	Reduce bacteria loads cumulatively or at key outfalls[d] by 0.3% or meet Bacteria WQOs in the lower River[f].	Reduce bacteria loads cumulatively or at key outfalls[d] by 1.3% or meet Bacteria WQOs in the lower River[f].	Reduce bacteria loads cumulatively or at key outfalls[d] by 6.0% or meet Bacteria WQOs in the lower River[f].	Reduce bacteria loads cumulatively or at key outfalls[d] by 11.9%[e] or meet Bacteria WQOs in the lower River[f].

a. West of Interstate 15
b. The goals may be adapted as monitoring data is collected and analyzed.
c. Refer to Appendix 3K for baseline determination methodology.
d. The five selected key drainage areas are the wet weather storm drain outfall monitoring locations identified in Table 3-1 and Figure 3-1 of Attachment 4A-5 to the Monitoring and Assessment Plan as MS4-SLR1 through MS4-SLR5. The selected key drainage areas are all typical drainages that are representative of the San Luis Rey Watershed Management Area.
e. This final load reduction goal of 11.9% was arrived at by adding the mean difference between the Enterococcus load reduction requirements to meet the stream freshwater standards and those to meet the ocean standards in Attachment E of the Permit (0.16%), to the required final load reductions for San Luis Rey River at the Pacific Ocean Shoreline (11.69%), see Table 3-8. The modeling was designed to meet the receiving water limits in the river; no dilution was assumed.
f. Meet the water quality objectives for freshwater Single Sample Maxima of 400 MPN/100 mL for Fecal Coliform and 61 MPN/100 mL for *Enterococcus* at the two stream monitoring locations identified in Table 4-5 of the WQIP. Bacteria loads will be measured in the freshwater section of the stream.

Caltrans Numeric Goals

Caltrans storm water flows are not included in the Municipal Stormwater Permit; however, Caltrans is subject to similar requirements through its own stormwater permit (State Water Resources Control Board [SWRCB], 2012). Caltrans has voluntarily contributed to the WQIP effort to provide a consistent and subwatershed-wide approach to meeting applicable TMDL requirements. The baseline strategies are continuously implemented and augmented as resources become available. Attachment IV to the Caltrans Stormwater Permit outlines a methodology for prioritizing stream segments included in TMDLs to which Caltrans is subject. The Permit establishes best management practice (BMP) implementation requirements, evaluated in terms of compliance units. Caltrans is expected to achieve 1,650 compliance units per year through the implementation of retrofit BMPs, cooperative implementation, and post-construction treatment beyond Permit requirements.

Impaired reaches throughout the state will be prioritized on the basis of several factors, including, but not limited to, percent reduction needed, Caltrans drainage area contributing to the reach, and proximity to receiving waters. Reaches with metals TMDLs will likely be prioritized. This prioritization list is currently under negotiation between Caltrans Head Quarters and the State Board.

Areas under Caltrans' jurisdiction include roadways, land adjacent to roadways, and facilities. Caltrans' jurisdictional strategies specifically focus on BMP implementation to reduce known pollutants within these areas. Caltrans' strategies vary from those of other Participating Agencies (in both type and name) to best address freeway characterization discharges from its right-of-way. Strategies include programs developed by Caltrans Headquarters for statewide execution and District 11 implementation. Caltrans' implementation of strategies with the watershed is dependent on legislative approval. For Bacteria TMDLs, Caltrans is expected to eliminate dry weather flows by implementing control measures to ensure effective prohibition (Provision B.2 of the Stormwater Permit). For wet weather flows, Caltrans is expected to implement control measures or BMPs to prevent discharge of bacteria from the right-of-way; this can be source control and preemptive activities such as street sweeping, cleanup of illegal dumping, and public education on littering. Implementation of these controls is per the TMDL prioritization list.

APPENDIX 4

Monitoring and Assessment Results

Appendix 4 Monitoring and Assessment

The purpose of this appendix is to provide the monitoring and assessment results for the 2015-2016 monitoring year for the San Luis Rey River Watershed Management Area (WMA or Watershed). Whereas Section 3 of this Annual Report focuses on the highest priority water quality condition (HPWQC) in the WMA (i.e., bacteria), this appendix will present all of the receiving water and storm drain outfall monitoring data collected during the 2015-2016 monitoring year, including the priority water quality conditions (PWQCs). The PWQCs for the watershed include nitrogen, phosphorus, total dissolved solids (TDS), and toxicity during wet and dry weather and eutrophic conditions, chloride, and the Index of Biotic Integrity (IBI) during dry conditions. Also described below are monitoring programs required by the Permit for which no data were collected during the 2015-2016 monitoring year because the monitoring requirement has been met, or will be met in future years of the Permit term. Caltrans is not a Participating Agency for the monitoring and assessment program described in this section, as Caltrans is regulated under a separate permit from the State Water Resource Control Board (SWRCB).

4.1 Receiving Water Monitoring

Receiving water monitoring in the San Luis Rey River WMA during the 2015-2016 monitoring year was limited to participation in the Southern California Stormwater Monitoring Coalition (SMC) and Hydromodification Management Program (HMP) regional monitoring programs. Total maximum daily load (TMDL) monitoring and lower San Luis Rey River Water Quality Improvement Plan (WQIP) goals monitoring for indicator bacteria was also conducted in receiving waters during 2015-2016. Receiving water results collected under these programs are summarized below.

The receiving water assessments required by Provision D.4.a will be addressed in the Regional Monitoring and Assessment Report (RMAR), which will be submitted to the Regional Board in December 2017 with the Report of Waste Discharge (ROWD) in accordance with Provision D.4.a.1.(b).

4.1.1 *Long Term Receiving Water Monitoring*

Due to dry conditions and lack of flow, long-term monitoring has not yet been conducted at the long-term monitoring station (LTMS), SLR-MLS, which is the historical mass loading station located on the lower San Luis Rey River. The most recent receiving water quality data from SLR-MLS were collected during the 2012-2013 monitoring year. Detailed results for all monitored analytes can be found in the Transitional Monitoring and Assessment Program Report for the San Luis Rey River Watershed Management Area (2012-2014) (WESTON, 2015a). SLR-MLS will be monitored during the 2016-2017 monitoring year or when sufficient flow occurs. A map showing the location of the SLR-MLS is presented in Figure A4-1.

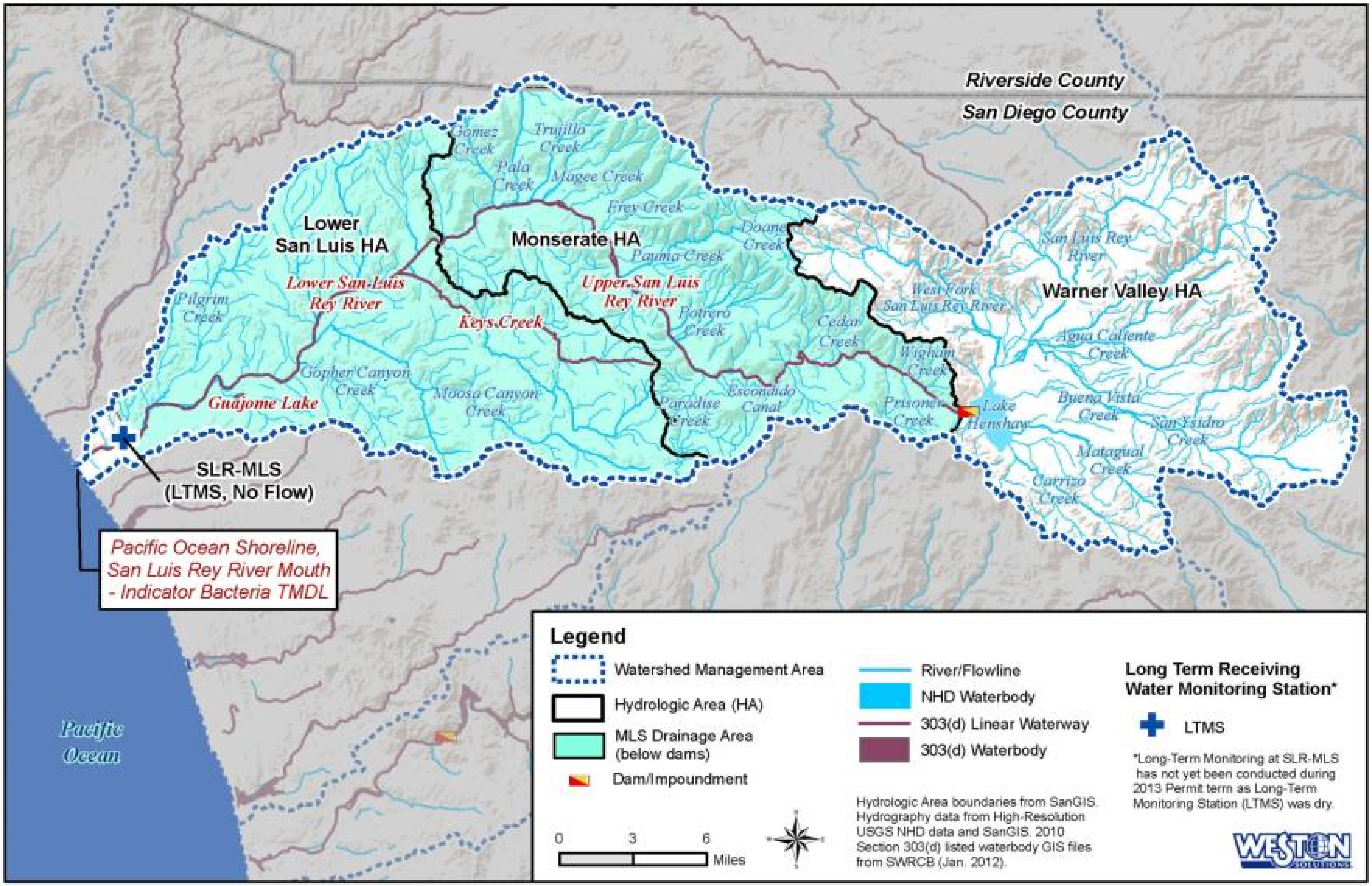

Figure A4-1. Long-Term Receiving Water Monitoring Location in the San Luis Rey River WMA

4.1.2 *Bight Regional Monitoring Program*

The Bight regional monitoring program is a multi-agency collaborative effort to assess the ecological condition of the Southern California Bight (from the Mexican border to Point Conception) from a regional perspective. The core program consists of monitoring of sediment chemistry, sediment toxicity, and benthic infauna.

Sediment quality monitoring was conducted during the summer of 2013 at a total of 22 sites in nine estuaries and lagoons in the San Diego region. San Luis Rey River Estuary has been disconnected from the ocean in recent years due to dry conditions, and therefore does not meet sediment quality objective requirements and was excluded from monitoring under the Bight 2013 Program. During the current Permit term, the Participating Agencies are participating in the planning for the Bight 2018 monitoring program. The Participating Agencies will update the Regional Board of the status of the San Luis Rey River Estuary prior to the California Bight 2018 Study.

4.1.3 *Sediment Quality Monitoring*

Sediment quality monitoring is designed to assess compliance with the sediment quality receiving water limits applicable to enclosed bays and estuaries in accordance with the State Board's Water Quality Control Plan for Enclosed Bays and Estuaries of California–Part I Sediment Quality (Sediment Control Plan) (SWRCB, 2009).

The sediment sampling conducted in the estuaries and lagoons in the San Diego Region as a part of the Bight Program contributes to fulfillment of sediment quality monitoring requirements of the Permit. Follow-up sampling and additional studies are needed for sites not characterized as unimpacted or likely unimpacted.

As mentioned in Section 4.1.2, San Luis Rey River Estuary was excluded from monitoring under the Sediment Control Plan since it does not fit the criteria for sediment quality objective monitoring.

4.1.4 *Stormwater Monitoring Coalition Regional Monitoring*

Since 2001, the Participating Agencies have partnered with regulated stormwater municipalities in southern California, the Regional Boards of Southern California and the Southern California Coastal Water Research Project (SCCWRP) to form the SMC. The goal of the SMC is to develop the technical information necessary to better understand stormwater mechanisms and impacts and develop the tools to improve stormwater quality through programmatic decision-making (SMC, 2016).

The Participating Agencies are continuing to participate in the SMC Regional Freshwater Stream Bioassessment Monitoring Program (SMC Regional Bioassessment Program). In 2015, a new five-year SMC program began that extended the initial survey to answer key management questions about the impacts of stormwater on stream conditions. Several modifications were made to the previous surveys to emphasize detection of trends and to address data gaps. Specifically, monitoring of high-priority stressors (i.e., habitat, nutrients, and ionic composition) was continued, whereas monitoring of low-priority stressors (i.e., water column metals, pyrethroids, and toxicity) was discontinued. Flow regime (hydrologic state checklist derived from Gallart et al. [2010] and water level loggers), vertebrate occurrence, and new stressors of interest (i.e., sediment pyrethroids and toxicity) were added to the list of monitored parameters, although sediment sampling has been deferred until further action by the SMC Executive Committee. In addition, the physical habitat assessment has been enhanced with hydromodification screening (modified from Bledsoe et al., 2010) at unarmored or partially armored condition sites and a channel engineering checklist at all condition sites. The hydromodification screening and channel engineering checklist will be conducted at trend sites at least once during the five-year study. The trend sites were selected from previously sampled sites under earlier probabilistic surveys in order to estimate changes in regional conditions over time, and the condition sites were selected from a new probabilistic sample draw in order to estimate current regional conditions.

The 2015-2016 monitoring year was the second under the updated 2015-2019 SMC Regional Bioassessment Program. Within the SMC Program, the San Diego Region is divided into several strata, and the San Luis Rey River WMA is in the Northern San Diego stratum along with the Santa Margarita River WMA. In the San Luis Rey River WMA portion of the stratum, two condition sites were monitored during 2016, 903M20165 in Guajome Tributary in the Mission hydrologic subarea (HSA) (903.11) and 903M20166 in Moosa Creek in the Bonsall HSA (903.12) (Table A4-1, Figure A4-2).

Table A4-1. 2016 Bioassessment Monitoring Locations in the San Luis Rey River WMA

Site ID	Site Type	Land Use	Date Sampled	Latitude	Longitude
903M20165 – Guajome Tributary	Condition	Agricultural	6/7/2016	33.27586	-117.18406
903M20166 – Moosa Creek	Condition	Urban	5/2/2016	33.23989	-117.23664

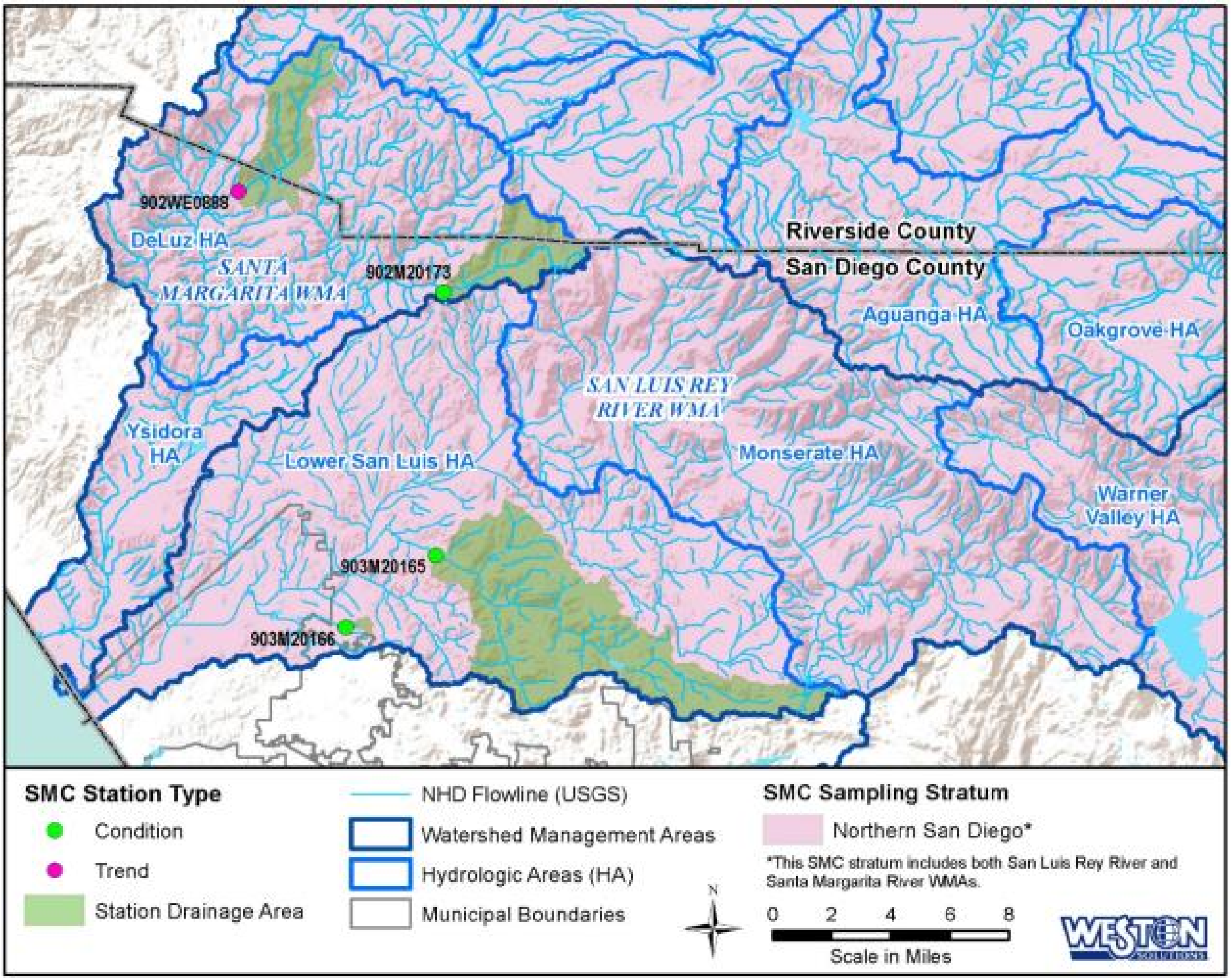

Figure A4-2. SMC Regional Monitoring Program Locations, Northern San Diego Stratum

Laboratory analyses included benthic macroinvertebrate (BMI) taxonomy by Ecoanalysts Inc., BMI taxonomic QC analysis by the California Department of Fish and Wildlife (CDFW) Aquatic Bioassessment Laboratory, benthic algae taxonomy by California State University – San Marcos (soft algae and diatoms), and chemistry analyses by Weck Laboratories, Inc. and PHYSIS Environmental Laboratories, Inc. Samples were collected following the protocols outlined in the Bioassessment Survey of the Stormwater Monitoring Coalition (SCCWRP, 2015). BMI data analyses included a taxonomic listing of all BMIs identified in the surveys and calculation of the biological metrics listed in the California Stream Bioassessment Procedure (CSBP). Additionally, the calculation of the California Stream Condition Index (CSCI), an index that rates the overall BMI community quality, was performed. The CSCI is a newly developed analytical tool, finalized in 2013 (Mazor et al., 2016), that is applicable statewide in California and is now being utilized in place of the IBI to assess the health of freshwater streams. The CSCI combines a predictive multi-metric index (pMMI) (a measure of ecological structure) with a predictive observed to expected (O/E) ratio index (a measure of taxonomic completeness), and also incorporates local watershed geology and climate factors. The predictive components of the CSCI scoring tool allow for comparisons of the site being scored to a subset of other sites in California that the CSCI determines to be most similar. Algal data analyses included a taxonomic listing of all taxa identified and calculation of algal metrics and three algal IBIs (Fetscher et al., 2014 and SCCWRP, 2014). These data are typically available in February of the year following the survey (i.e., February 2017).

Bioassessment monitoring results for the Guajome Tributary and Moosa Creek locations are presented in Table A4-2 (CSCI scores). Table A4-3 shows the physical habitat assessment scores, and chemistry results are presented in Table A4-4. Additional data are provided in Attachment 4A, including the Taxonomic Listing of Benthic Macroinvertebrates (4A-1), Ranked Abundance of Benthic Macroinvertebrates (4A-2), and CSCI Metrics (4A-3). Results are summarized below, and more detailed results will be available in the interim and final reports developed by the SMC Workgroup. Interim reports are expected every one to two years, and the final report produced under the 2015-2019 Workplan is anticipated in Spring 2021 (SCCWRP, 2015).

Whereas data related to bacteria in the WMA are not collected under the SMC Regional Bioassessment Program, data are collected for chloride, nitrogen, and phosphorus, which are PWQCs for the watershed. Chloride and total phosphorus were above water quality objectives (WQOs) at both locations, and total nitrogen was above the WQO at the Guajome Tributary location.

4.1.4.1 Guajome Tributary

The CSCI score for the Guajome Tributary location, 903M20166, indicated that the benthic community is very likely altered. The score was in the upper portion of the very likely altered range (almost within the likely altered range) (Table A4-2). Taxa richness was below the predicted taxonomic richness at this location (Attachment 4A-3). The BMI community was dominated by chironomid midges *Tanytarsus sp.* and *Micropsectra sp.* and the crustacean class *Ostracoda* (24%, 21%, and 18% of the composition of the sample, respectively) (Attachment 4A-2). The numbers of several types of taxa that tend to decrease in response to impairment were below predicted numbers (the site-specific predicted numbers are those expected if the site was healthy) (Attachment 4A-3). Physical habitat quality as measured by the California Rapid Assessment Method (CRAM) score was moderate (Table A4-3).

Chemistry data was collected for physical and general chemistry, periphyton (ash-free dry mass [AFDM] and chlorophyll-a), and nutrients. Results indicated that chloride, sulfate, total nitrogen, and total phosphorus were above WQOs. The total phosphorus concentration was only slightly above the WQO. All other parameters met WQOs, where applicable, although conductivity (specific conductance) was elevated (Table A4-4). High specific conductance may have an effect on BMI. Specific conductance is a measurement of the ability of water to conduct electricity where dissolved ions (i.e., Na^+, Ca^{+2}, SO_4^{-2}, etc.) serve as the conductor (SWRCB Fact Sheet-3.1.3.0(EC)V2e) (2004). As such, specific conductance is related to TDS content. Although the effect of elevated TDS on BMI is variable among different taxa and not well understood, a number of studies have demonstrated a correlation between changes in conductivity/TDS with both altered BMI (Minshall and Minshall, 1978) and algal communities (Leland and Porter, 2000). Results from the first SMC five year report suggest that elevated TDS is a condition common to the entire region, affecting 76% of stream miles in Southern California (SMC, 2015).

4.1.4.2 Moosa Creek

At the Moosa Creek location, 903M20165, the CSCI score indicated that the benthic community is very likely altered. The score was in the upper portion of the very likely altered range (almost within the likely altered range) (Table A4-2). Taxa richness was below the predicted taxonomic richness at this location (Attachment 4A-3), and the BMI community was dominated by the crustacean *Hyalella sp.* (52% of the composition of the sample) (Attachment 4A-2). The numbers of several types of taxa that tend to decrease in response to impairment were below predicted numbers (Attachment 4A-3). Physical habitat quality as measured by the CRAM score was in the upper portion of the moderate range (Table A4-3).

Chemistry results indicated that dissolved oxygen was below the WQO (did not meet WQOs) and chloride, sulfate, and total phosphorus were above their respective WQOs. All other parameters met WQOs, where applicable, although specific conductance was elevated (Table A4-4).

Table A4-2. 2016 CSCI Scores for the San Luis Rey River WMA

Station Code	Count	E	Mean_O	OoverE	MMI	CSCI
903M20165 – Guajome Tributary	537	7.62	5.55	0.73	0.45	0.59
903M20166 – Moosa Creek	666	7.61	5.70	0.75	0.35	0.55

Count - the total number of organisms in the sample.
E-the sum of all capture probabilities >0.5 at a site (# of common taxa).
Mean_O - The number of common taxa observed at a site.
OoverE - O/E as calculated.
MMI - the pMMI score, a minimum threshold has not been established, but low values should be considered indicative of degradation.
CSCI - the CSCI score, calculated as the average of the O/E and the pMMI. CSCI scores indicate benthic communities that are very likely altered (scores of 0.00 to 0.62), likely altered (0.63 to 0.79), possibly intact (0.80 to 0.91), or likely intact (above 0.92).

Table A4-3. 2016 Physical Habitat Assessment Scores for the San Luis Rey River WMA

Physical Habitat Measures	Guajome Tributary	Moosa Creek
	903.11	903.12
	903M20166	903M20165
	5/2/2016	6/7/2016
Elevation (feet)	106	70
CRAM Physical Habitat Score*	61	72
Canopy Cover (% of reach)	89%	83%
Macroalgal Cover (% of reach)	2%	3%
Substrate Composition		
Fines	8%	3%
Sand	60%	53%
Gravel	0%	1%
Cobble	1%	0%
Boulder	0%	1%
Roots	20%	32%
Wood	11%	10%
Consolidated Sediment	0%	0%
Bedrock	0%	0%
Concrete	0%	0%
Water Quality		
Temperature (C)	12.24	19.62
pH	7.87	7.49
Specific Conductance (µS/cm)	3,143	2,777
Salinity (ppt)	1.65	1.45
Alkalinity (mg/L)**	370	400
Dissolved Oxygen (mg/L)	8.62	4.29
Turbidity (NTU)	0.2	4.2

*CRAM score is 25-100; <50 = low, 50-75 = moderate, >75 = high
**May be measured in the field or laboratory. Laboratory result is reported.

Table A4-4. 2016 Chemistry Results for the San Luis Rey River WMA

Analyte	Units	Water Quality Objectives (WQOs)	WQO References	Guajome Tributary	Moosa Creek
				903.11	903.12
				903M20166	903M20165
				5/2/2016	6/7/2016
Physical Chemistry					
Temperature	Celsius			12.24	19.62
pH	pH units	6.5-9.0	Basin Plan	7.87	7.49
Specific Conductance	µS/cm			3,143	2,777
Salinity	ppt			1.65	1.45
Alkalinity	mg/L			370	380
Dissolved Oxygen	mg/L	<5.0	Basin Plan	8.62	**4.29**
Turbidity	NTU	20	Basin Plan	0.2	4.2
Periphyton					
Ash-Free Dry Weight	g/m^2			4.329	138.2742
Chlorophyll-a	mg/m^2			<1	56.6
General Chemistry					
Chloride	mg/L	250	Basin Plan	**300**	**350**
Sulfate	mg/L	250	Basin Plan	**830**	**490**
Total Suspended Solids	mg/L			5	12
Total Hardness	mg $CaCO_3$/L			1130	840
Nutrients					
Ammonia as N	mg/L	(a)	USEPA Freshwater Criteria	0.063J	0.052J
Nitrate + Nitrite as N	mg/L	(b)	Basin Plan	46	0.029J
Orthophosphate as P	mg/L			0.098	0.12
Total Kjeldahl Nitrogen	mg/L			<0.05	0.37
Total Nitrogen	mg/L	N:P Ratio of 10:1	Basin Plan	**46**	0.4
Total Phosphorus	mg/L	0.1 (flowing waters)	Basin Plan	**0.11**	**0.31**

<-Results less than the method detection limit.
NS - Not sampled.
(a) Water Quality Benchmark is based on the criterion continuous concentration (CCC) using water temperature and pH as described in the USEPA, 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, EPA-822-R-13-001, April 2013.
(b) Water Quality Benchmark is based on the MUN beneficial use as described in the Basin Plan, 1994 (with amendments effective on or before April 4, 2011). MUN beneficial use does not apply to these stations (waterbodies listed as exempt).
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Bold/shaded values do not meet water quality benchmarks.

4.1.5 *Regional Hydromodification Monitoring Program (HMP)*

Hydromodification is the potential alteration and erosion of creeks, streams, and natural habitats that may be associated with urbanization of the tributary watershed. A regional Hydromodification Management Plan has been developed to manage increased runoff discharge rates and durations and address impacts to beneficial uses and stream habitat (County of San Diego, 2011). A regional HMP was also developed to evaluate the criteria established in the Hydromodification Management Plan. While no monitoring sites were located within the San Luis Rey River WMA, the Hydromodification Management Plan criteria will apply to future development in the WMA, and therefore the results of this monitoring are applicable.

The 2011 HMP represents a five-year monitoring program that involved channel sediment transport assessments, and continuous flow monitoring of pre-project, post-project, and reference conditions. An iterative and phased approach was used in implementation of each year of monitoring. The fifth and final year of monitoring was completed in 2015-2016. Results of the HMP are presented in the *Effectiveness Assessment of the San Diego Hydromodification Management Plan,* which is available online at:
http://www.projectcleanwater.org/attachments/article/75/2016_LDW_HMPrpt.pdf.

The results of the HMP indicate that the Hydromodification Management Plan is working as planned. Sediment rating curves were developed based on extensive wet weather monitoring data collected from the 2011-2012 to 2015-2016 wet weather seasons. Analysis of these curves shows that the Plan's channel susceptibility tools appropriately define flow rates that initiate the movement of channel and bank materials (ESA et al., 2016). As shown by monitoring of stream cross sections, no major changes in channel stability were observed to occur within the nine monitored channel sites that were located throughout the San Diego Region. Wet weather data from 2015-2016 indicated that a constructed best management practice (BMP) system worked as designed to prevent hydromodification across a wide range of geomorphically significant conditions. Collectively, this shows that the Plan provides for the protection of the beneficial uses of receiving waters from the effect of hydromodification from new and redevelopment. Based on these findings, the HMP effectiveness assessment monitoring is completed and no additional monitoring is recommended (ESA et al., 2016).

4.1.6 *Total Maximum Daily Load Monitoring*

In February 2010, the San Diego Regional Water Quality Control Board (Regional Board) adopted Resolution No. R9-2010-0001, *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)* (Bacteria TMDL) (Regional Board, 2010). This TMDL amendment to the Water Quality Control Plan for the San Diego Region (Basin Plan) (Regional Board, 1994) includes one segment within the San Luis Rey River WMA, the Pacific Ocean Shoreline at the San Luis Rey River Mouth. The TMDL was approved by the SWRCB in December 2010; by the Office of Administrative Law on April 4, 2011; and by the United States Environmental Protection Agency (USEPA) on June 22, 2011. The TMDL became effective under state law on April 4, 2011, the date of Office of Administrative Law approval. The responsible Agencies within the WMA that are regulated under the Permit include the Cities of Oceanside and Vista and the County of San Diego. The compliance requirements and monitoring and reporting requirements of the TMDL have been incorporated into Attachment E.6 of the 2013 Permit.

The goal of the Bacteria TMDL is to achieve the pollutant load reductions necessary to restore and protect the designated beneficial use of water contact recreation (REC-1), as it is designated within the Basin Plan. The purpose of the TMDL monitoring program is to assess progress toward achieving compliance with interim and final TMDL water quality based effluent limitations (WQBELs). Wet and dry weather sampling is conducted each year at the compliance point. The data generated is used to address the following questions:

- Are TMDL numeric targets for indicators being met at the compliance monitoring location?
- Are levels of bacteria decreasing at the compliance monitoring location?

Sampling was conducted for the 2015–2016 compliance monitoring year (October 1, 2015 through September 30, 2016) during wet and dry weather at receiving water monitoring site OC-100, located at Oceanside City Beach at the mouth of the San Luis Rey River (Table A4-5, Figure A4-3). This was the third year of monitoring in compliance with Provision 6.d of Attachment E of the Permit. A summary of the monitoring conducted is presented in Table A4-6. Samples were analyzed for the indicator bacteria compliance constituents (total coliform, fecal coliform, and *Enterococcus*) in accordance with the requirements of Attachment E.6 of the Permit.

Table A4-5. 2015-2016 Bacteria TMDL Beach Monitoring Location for the San Luis Rey River WMA

Site ID	Site Name	Site Description	Latitude	Longitude
OC-100	Oceanside City Beach at the mouth of the San Luis Rey River	Pacific Ocean Shoreline	32.20156	-117.39220

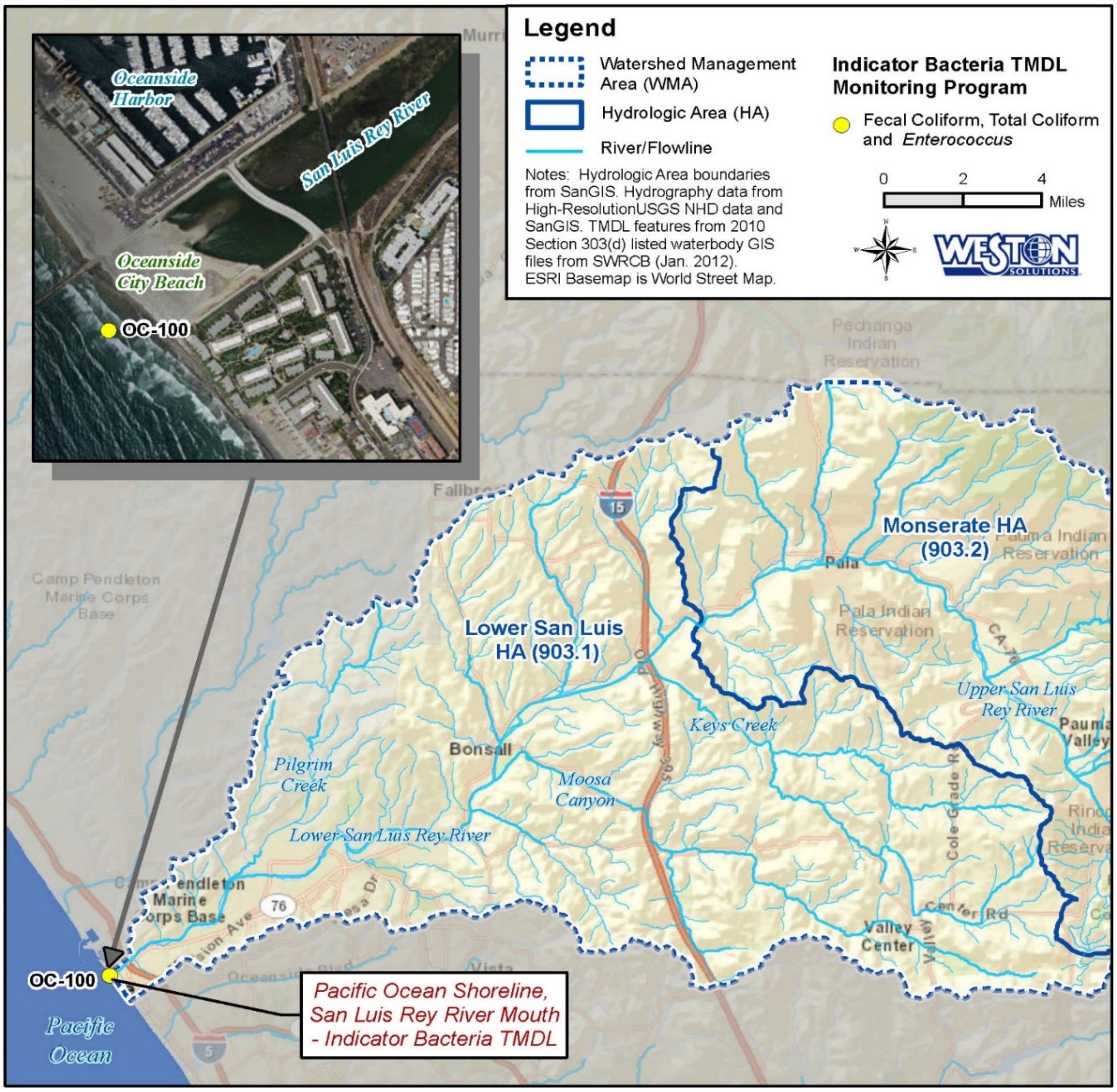

Figure A4-3. Bacteria TMDL Compliance Monitoring Location in the San Luis Rey River WMA

Table A4-6. 2015-2016 Bacteria TMDL Beach Monitoring Summary for the San Luis Rey River WMA

Season	Date Range	Event Type	Event Frequency	Monitoring Location	Samples Per Site Per Event[a]	Total Number of Samples
2015-2016 Wet Season	10/01/2015-04/30/2015	Wet	Three storm events	OC-100	1	3
	10/01/2015-03/30/2016	Dry	Monthly			6
	04/01/2016-04/30/2016	Dry	Weekly[b]			5
2016 Dry Season	05/01/2016-09/30/2016	Dry	Weekly[b]			25

[a] Quality assurance (QA) or replicate samples are not included in the count.
[b] A minimum of 5 samples are collected in a 30-day period.

Table A4-7 presents the exceedance rates for each indicator bacteria at OC-100. Progress toward achieving WQBELs, in terms of interim and final receiving water limitations, are presented in Table A4-8 for each analyzed constituent. Interim WQBELs are not required to be achieved until 2020 for dry weather and 2028 for wet weather, while final WQBELS must be achieved by 2021 for dry weather and 2031 for wet weather. Based on the sampling data from the 2015-2016 monitoring year, receiving water limitations that have been achieved are indicated by (●), whereas goals that have not been achieved are indicated by (X).

In summary, the only exceedances observed at OC-100 were for the wet season single-sample maximum for *Enterococcus*. This outcome was due to a measured concentration of 220 colony-forming units per 100 milliliters (CFU/100 mL) during one monitored wet weather event, resulting in an arithmetic mean of 104.67 CFU/100 mL for the three monitored events, which was applied to all of the unmonitored days with qualifying precipitation (i.e., greater than 0.1 inch within 24 hours). Had the arithmetic mean been lower by just 1 CFU/100 mL, the single-sample wet season exceedance frequency would have been 10% and would have been in compliance with the single-sample wet season allowable exceedance frequency. *Enterococcus* concentrations during the remaining two wet weather events were below the receiving water limitation of 104 most probable number (MPN)/100 mL[1]. All other interim and final WQBELs are currently being met.

Table A4-7. 2015–2016 Bacteria TMDL Monitoring Exceedance Frequency Results

Segment	Monitoring Location	Bacteria TMDL Constituent	2016 Dry Season Geometric Mean (CFU/100mL)	2015-2016 Wet Season Geometric Mean (CFU/100mL)	2015-2016 Wet Season Single-Sample Maximum (CFU/100mL)
Pacific Ocean Shoreline	OC-100	*Enterococcus*	0%	0%	75%
		Fecal Coliform	0%	0%	0%
		Total Coliform	0%	0%	0%

CFU - colony-forming units per 100 milliliters.

Table A4-8. 2015–2016 General Progress Toward Bacteria TMDL Interim and Final WQBELs

Monitoring Location	Bacterial TMDL Constituent	2015-2016 Dry Season Geometric Means		2015-2016 Wet Season Geometric Means		2015-2016 Wet Season Single-Sample Maximum	
		Interim	Final	Interim	Final	Interim	Final
OC-100	*Enterococcus*	●	●	●	●	X	X
	Fecal Coliform	●	●	●	●	●	●
	Total Coliform	●	●	●	●	●	●

● = Numeric targets are met; X= Numeric targets are not yet met.

Additional details are presented in the TMDL report provided as Attachment 4B to this appendix. California Environmental Data Exchange Network (CEDEN) data submittals can be found in Attachment K of this appendix.

[1] The Permit identifies receiving water limitations in MPN/100 mL; the laboratory methods provide results in CFU. CFU and MPN units are comparable.

4.1.7 *Lower San Luis Rey River Goal Monitoring*

To evaluate progress toward achieving goals for the lower San Luis Rey River, receiving water monitoring to measure bacteria concentrations was conducted during the 2015-2016 monitoring year at one in-stream site, SLR25 (Olive Hill). A second in-stream site, Benet Bridge (MLS), was dry and was not sampled for the duration of the monitoring year. Both sites are located along the San Luis Rey River, west of Interstate-15, with SLR25 located upstream of Benet Bridge (Table A4-9, Figure A4-4).

Table A4-9. 2015-2016 Lower San Luis Rey River Bacteria Monitoring Locations

Site ID	Site Name	Jurisdiction	Latitude	Longitude
Benet Bridge* (MLS)	Benet Road Bridge over San Luis Rey River	City of Oceanside	33.22065	-117.35825
SLR25 (Olive Hill)	Camino Del Rey Bridge over San Luis Rey River	County of San Diego	33.28802	-117.22313

*Station was dry throughout the 2015-2016 monitoring year.

The lower San Luis Rey River location SLR25 was sampled monthly during dry weather from February through September 2016, and once within 24 hours after a storm event in February 2016. Samples were analyzed for the indicator bacteria compliance constituents (fecal coliform, *Enterococcus*) in accordance with the Lower San Luis Rey River Bacteria Monitoring Plan (Attachment 4A-7 to the WQIP). Samples were also analyzed for *E. coli*, which is not a constituent of the indicator bacteria TDML and is not listed in the Lower San Luis Rey River Bacteria Monitoring Plan. USEPA's 2012 Recreational Water Quality Criteria recommends using *Enterococcus* and *E. coli* as indicators of fecal contamination for fresh water and *Enterococcus* for marine water (USEPA, 2012). Therefore, collection of *E. coli* data in advance of these anticipated changes provides historical data moving forward under revised recreational water quality standards developed in accordance with the USEPA guidelines. While the *E. coli* results are not presented here, the analytical data can be found in the laboratory reports provided in Attachment 4C to this appendix and will be uploaded to the CEDEN. CEDEN data submittals can be found in Attachment K to this appendix.

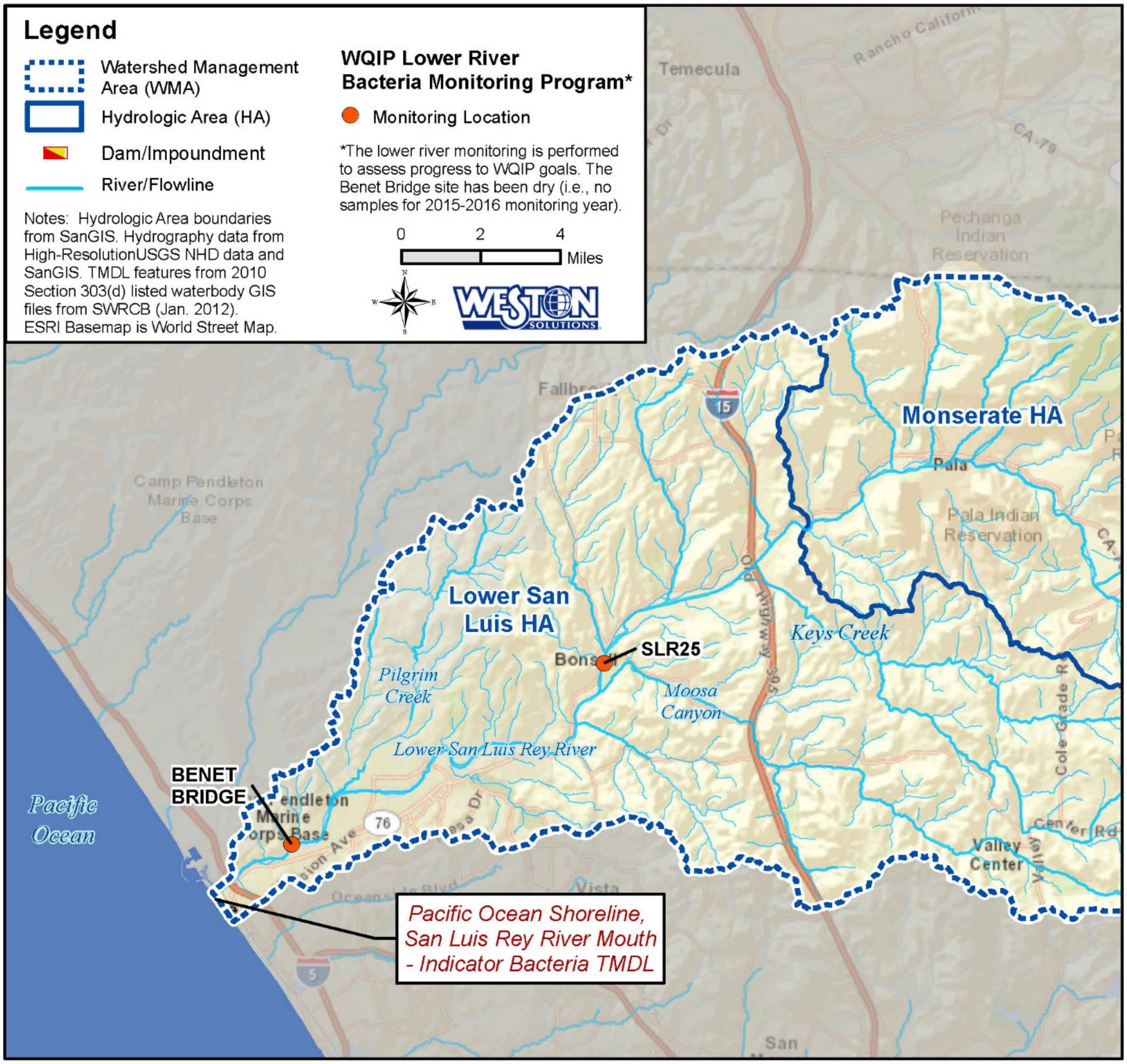

Figure A4-4. Bacteria WQIP Monitoring Locations in the Lower San Luis Rey River WMA

Individual dry and wet weather event data for *Enterococcus* and fecal coliform indicator bacteria are presented in Table A4-10 and Table A4-11, respectively, and exceedance rates are shown in Table A4-12 for results compared to freshwater single sample maximum (SSM) WQOs. *Enterococcus* results from the single wet weather event were above the WQO, whereas the fecal coliform concentration was below the WQO. Exceedance frequencies for the eight monitored dry weather events were 100% for *Enterococcus* and 13% (one event) for fecal coliform. These data will be used to inform progress by the Participating Agencies in achieving the lower San Luis Rey River bacteria goals. Supporting data are provided as Attachment 4C to this appendix.

Table A4-10. 2015-2016 Lower San Luis Rey River Bacteria Dry Weather Monitoring Event Results

Date	*Sample Results (CFU/100 mL)	
	Enterococcus (CFU/100 mL)	Fecal Coliform (CFU/100 mL)
SSM WQO	**61**	**400**
2/11/2016	**70e**	20
3/3/2016	**110e**	8e
4/6/2016	**63**	7e
5/4/2016	**80e**	16e
6/2/2016	**510**	**510**
7/7/2016	**820e**	53
8/4/2016	**600e**	45
9/1/2016	**180e**	20e

*Note: **Bolded/shaded** values indicate exceedances of WQOs based on comparison of results with the single sample maximum (SSM) indicator bacteria objective.
e - Estimated value, plate count falls outside recommended reporting limits per USEPA method guidelines.
CFU - colony-forming units per 100 milliliters

Table A4-11. 2015-2016 Lower San Luis Rey River Bacteria Wet Weather Monitoring Event Results

Date	*Sample Results (CFU/100 mL)	
	Enterococcus (CFU/100 mL)	Fecal Coliform (CFU/100 mL)
SSM WQO	**61**	**400**
2/1/2016	**5,600**	250

*Note: **Bolded/shaded** values indicate exceedances of WQOs based on comparison of results with the single sample maximum (SSM) indicator bacteria objective.
CFU - colony-forming units per 100 milliliters

Table A4-12. 2015-2016 Lower San Luis Rey River Bacteria Results Summary

Analyte		Number of Events	*Enterococcus* (CFU/100 mL)		Fecal Coliform (CFU/100 mL)	
Station	Station		Total Exceedance	Percent Exceedance	Total Exceedance	Percent Exceedance
SSM WQO			**61**		**400**	
SLR25	Dry	8	8	100%	1	13%
	Wet	1	1	100%	0	0%

CFU - colony-forming units per 100 milliliters

4.2 Storm Drain Outfall Monitoring

As part of the WQIP process, the Participating Agencies in the San Luis Rey River WMA have developed a program to monitor discharges from storm drain outfalls during dry and wet weather that meets the requirements of Provisions D.2.b and D.2.c of the Permit. The purpose of storm drain outfall monitoring is to evaluate the potential impacts from storm drain outfall discharges on the beneficial uses of a receiving waterbody during dry and wet weather conditions. In addition, under dry conditions, the program is used to assess the ability of jurisdictional and watershed programs to effectively eliminate non-stormwater discharges to receiving waters. The data generated are used to identify pollutants in discharges, guide pollutant source identification efforts, and track progress towards achieving numeric goals set forth in the WQIP.

During the 2013-2014 monitoring year, the inventory of major storm drain outfalls discharging directly to a receiving water was developed in accordance with Provision D.2.a.(1) of the Permit, and refinements were made during the 2014-2015 monitoring year. The major storm drain outfalls currently included in the storm drain outfall discharge monitoring station inventory for the WMA are shown in Figure A4-5. Dry weather storm drain outfall monitoring locations are also shown in Figure A4-5. Wet weather storm drain outfall monitoring locations are shown on a separate map with their associated drainage areas in Section 4.2.5.

The number of major outfalls monitored under each element of storm drain outfall monitoring by each Participating Agency in the WMA is provided in Table A4-13. In accordance with Provision D.2.b.(1) of the Permit, Participating Agencies with fewer than 125 major storm drain outfalls in their inventory must conduct field screening at 80% of these major outfalls twice per monitoring year (October 1st through September 30th). The number of major outfalls monitored per year is subject to change based on new information, updates to the storm drain outfall inventories, changes in transient or persistent flow classifications, and/or changes or updates to the priority water quality conditions over the life of the WQIP.

Table A4-13. Number of Major Storm Drain Outfalls Monitored per Participating Agency

Participating Agency	Number of Storm Drain Outfalls Monitored Per Year		
	Field Screening (Provision D.2.b(1))	Dry Weather Monitoring (Provision D.2.b(2))	Wet Weather Monitoring (Provision D.2.c)
County of San Diego	21	5*	2
City of Oceanside	36	5*	2
City of Vista	4	2	1

*Three outfalls in the City of Oceanside and one County outfall were dry or ponded with insufficient water for sampling during monitoring visits; therefore, analytical samples were not collected at four outfalls that had been identified for persistent flow storm drain outfall discharge monitoring.

Program descriptions, monitoring results, and assessments conducted during the 2015-2016 monitoring year under the Storm Drain Outfall Monitoring Program are presented in the following subsections. Methodology is described in greater detail in the WQIP Monitoring and Assessment Plan (MAP).

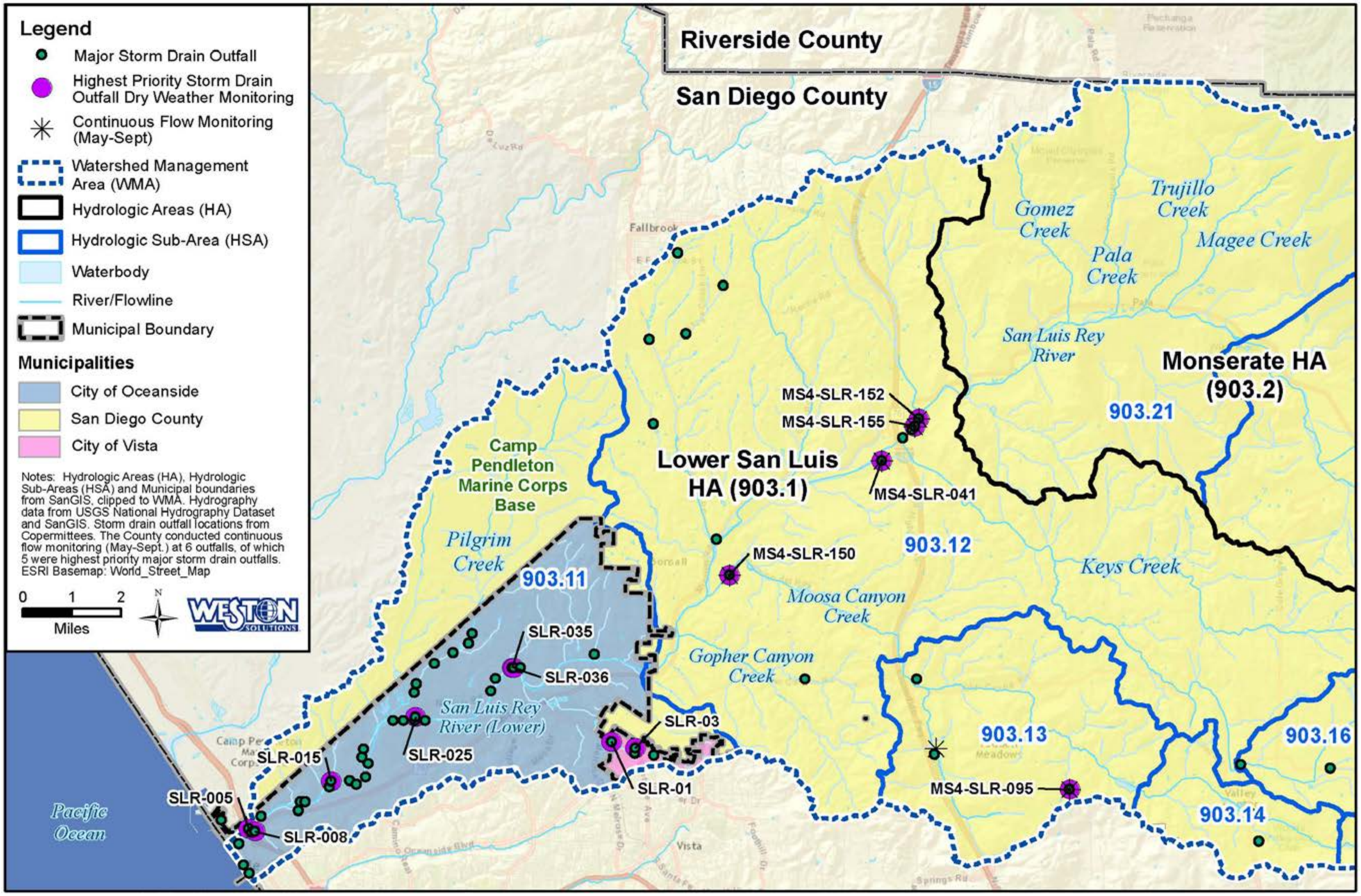

Figure A4-5. Major Storm Drain Outfall Inventory and Dry Weather Analytical Monitoring Station Locations in the San Luis Rey River WMA

4.2.1 *Dry Weather Field Screening and Outfall Prioritization*

Field screening is visual monitoring of major storm drain outfalls as outlined in Table D-5 of the Permit. Field screening is conducted to identify non-stormwater and illicit discharges, determine which discharges are transient and which are persistent, and prioritize those discharges that will be investigated and eliminated. This program is designed to assess the effectiveness of jurisdictional programs to effectively prohibit non-stormwater discharges. Each Participating Agency performs field screening of a certain number of outfalls on an annual basis to maintain an up-to-date inventory of persistently flowing outfalls and to initiate follow-up investigations that identify and mitigate the source(s). The data collected during field screening are one of the sources of information for the Participating Agencies' Illicit Discharge Detection and Elimination (IDDE) Programs (see Section 4.2.4).

The required frequency of field screening varies from once to twice per year depending on the number of major outfalls within the jurisdiction, in accordance with Provision D.2.a.(2)(a) of the Permit. The number of storm drain outfall stations included in dry weather field screening and the total number of visual observations conducted by each Participating Agency during the 2015-2016 monitoring year are shown in Table A4-14. Some source investigations were performed during routine visits and are included in the routine visits column, while others were conducted as separate follow-up visits and are included in the source investigations column.

Table A4-14. Number of Visual Observations Conducted During the 2015-2016 Monitoring Year

Participating Agency	Number of Major Storm Drain Outfall Stations Visited	Number of Routine Visits[1]	Number of Separate Source Investigations	Number of Additional Visits for Other Programs[2]
County of San Diego	21	48	41[3] (6 outfalls)	70 visits (16 stations)
Oceanside	36	72	NA[4]	NA
Vista	4	8	NA[4]	NA

[1] Includes persistent flow monitoring events.

[2] Includes flow data but may not include all visual observations typically conducted during a routine field screening visit.

[3] Six source investigations were associated with SLR-045, a storm drain outfall of less than 36 inches in diameter with persistent non-storm water flow.

[4] Source investigations were performed during persistent flow monitoring events.

Participating Agencies recorded numerous visual observations regarding outfall and flow characteristics including flow conditions (flowing, ponded, dry, or tidal), whether or not the flow reached the receiving water, whether or not there was a non-storm water flow source, potential non-storm water sources, whether the flow source was eliminated, evidence of obvious illicit connections or illicit discharges (IC/IDs), whether trash was present and relative amount, and whether there was evidence of illegal dumping. The complete set of visual observations recorded during dry weather field screening visits are provided in Attachment 4D to this appendix, and CEDEN data submittals can be found in Attachment K. The field screening trash assessment results for the San Luis Rey River WMA are summarized in Table A4-15. There was no trash or a low presence of trash during the majority (83%) of the trash assessments at visited outfalls.

Table A4-15. Dry Weather Field Screening Trash Assessments for the San Luis Rey River WMA

Participating Agency	HSA	No Trash Present	Trash Present		
			Low (<50 pieces)	Medium (50 to 400 pieces)	High (>400 pieces)
County of San Diego	903.12	4	26	2	0
	903.13	2	5	0	0
	903.14	0	6	0	0
	903.16	0	4	0	0
SUB-TOTAL		**6**	**41**	**2**	**0**
City of Oceanside	903.11	9	43	19	1
SUB-TOTAL		**9**	**43**	**19**	**1**
City of Vista	903.11	7	1	0	0
SUB-TOTAL		**7**	**1**	**0**	**0**
GRAND TOTAL		**22**	**85**	**21**	**1**

A summary of the flow conditions (i.e., flowing, ponded, dry, or tidal) at the outfall stations during the 2015-2016 field visits is shown in Figure A4-6, where the stacked bars represent the number of observations in each flow category by jurisdiction. The observations included in this figure are routine visits and follow-up source identification visits to the outfall, but do not include additional visits for other programs. Given that some outfalls were visited more than once, the number of observations is greater than the number of actual storm drain outfalls monitored.

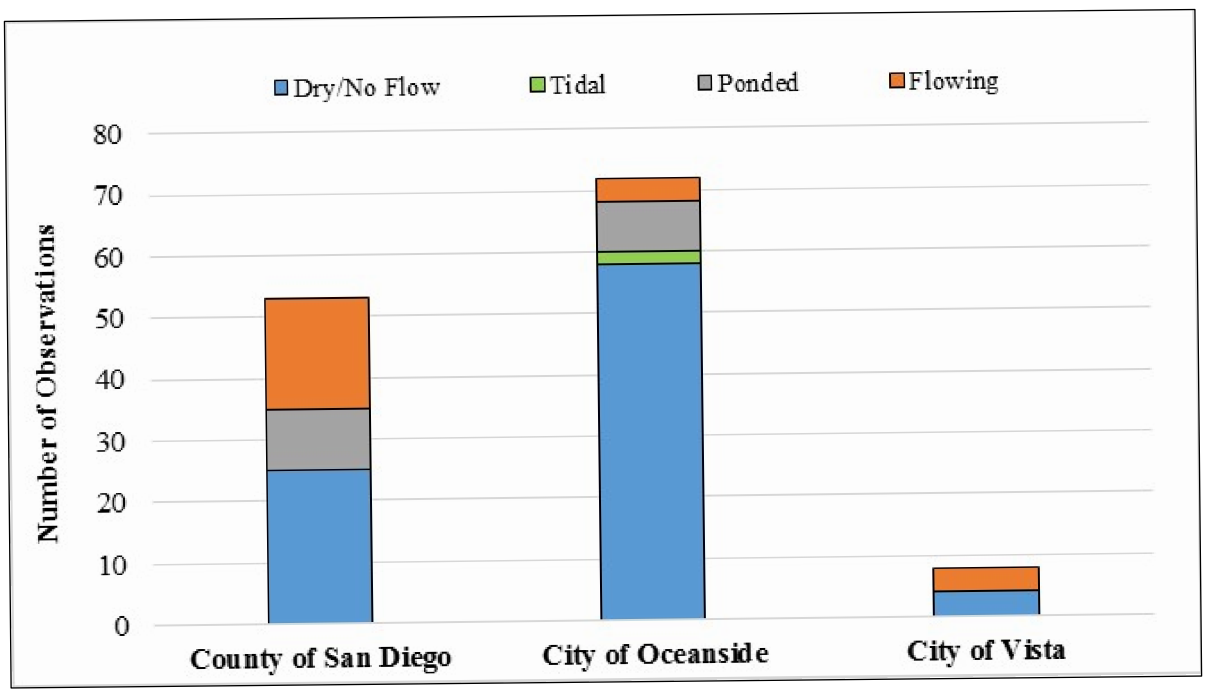

Figure A4-6. Dry Weather Field Screening Flow Observations at Storm Drain Outfall Stations by Participating Agency

During dry weather field screening, Participating Agencies estimated flow at stations where flow was present, as required by Table D-5. Eighty-one % of observations made by the City of Oceanside, 50% made by the City of Vista, and 47% made by the County of San Diego indicated dry conditions. A compilation of flow estimations (n=26) recorded by the Participating Agencies, in gallons per minute (gpm), is presented in Figure A4-7. More than half of the flow rates were low, with 14 of 26 estimations categorized as less than five gpm. The observations included in this figure include routine visits and follow-up source identification visits to the outfalls, but do not include additional visits for other programs.

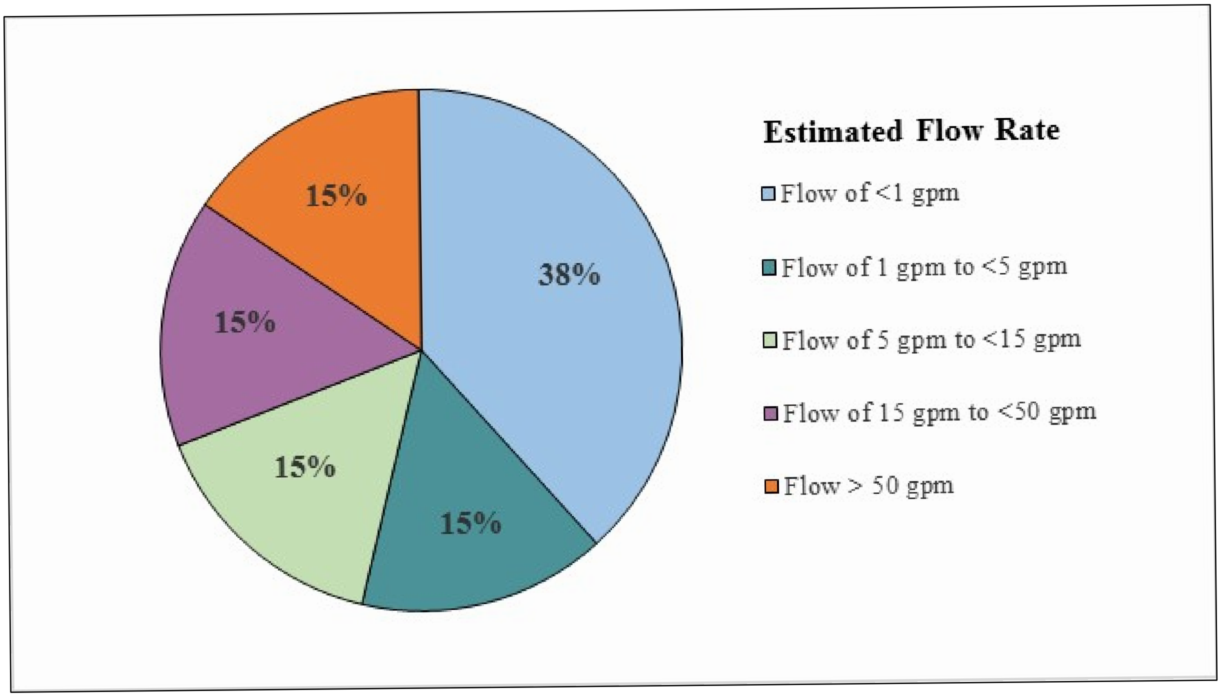

Figure A4-7. Outfall Flow Rate Estimations

Where an illicit discharge is observed during outfall screening, investigations are performed in an effort to locate the source and eliminate the discharge. In cases where flow sources are known due to historical data, this is listed on the field sheet and the upstream area is briefly checked for additional sources. In cases where discharges are observed, but no obvious illicit discharge was identified as the source, appropriate documentation is recorded, and the locations are prioritized with others for follow-up.

Based on these field screening visits and available historical data, the Participating Agencies determined the flow status of each major storm drain outfall as persistent, transient, or dry. As defined in the Permit, flow status for a given outfall is "dry" if no flowing or standing water is observed at the outfall over three most recent visits, and "persistent" flow is defined as presence of flowing or standing water upon three most recent visits. Otherwise, the outfall status is classified as "transient." The numbers of storm drain outfalls in each category are shown by Participating Agency and HSA in Table A4-16, and the flow determinations are shown with the locations of the storm drain outfalls in Figure A4-8. Overall, since the prior monitoring year (WESTON, 2016a), the number of dry/no flow outfalls has increased by four, the number of transient outfalls have decreased by six, and the number of persistent outfalls has increased by four. The two outfalls previously classified as undetermined are now known to be persistent, and have become highest priority outfalls for 2016-2017 non-stormwater persistent flow monitoring.

Table A4-16. 2015-2016 Dry Weather Storm Drain Outfall Flow Determinations for the San Luis Rey River WMA

Participating Agency	HSA	Persistent	Transient	Dry/No Flow	Grand Total
County of San Diego	903.12	5	4	4	13
	903.13	2	0	1	3
	903.14	0	0	3	3
	903.16	0	0	2	2
SUB-TOTAL		**7**	**4**	**10**	**21**
Oceanside	903.11	3	8	25	36
SUB-TOTAL		**3**	**8**	**25**	**36**
Vista	903.11	2	0	2	4
SUB-TOTAL		**2**	**0**	**2**	**4**
GRAND TOTAL		**12**	**12**	**37**	**61**

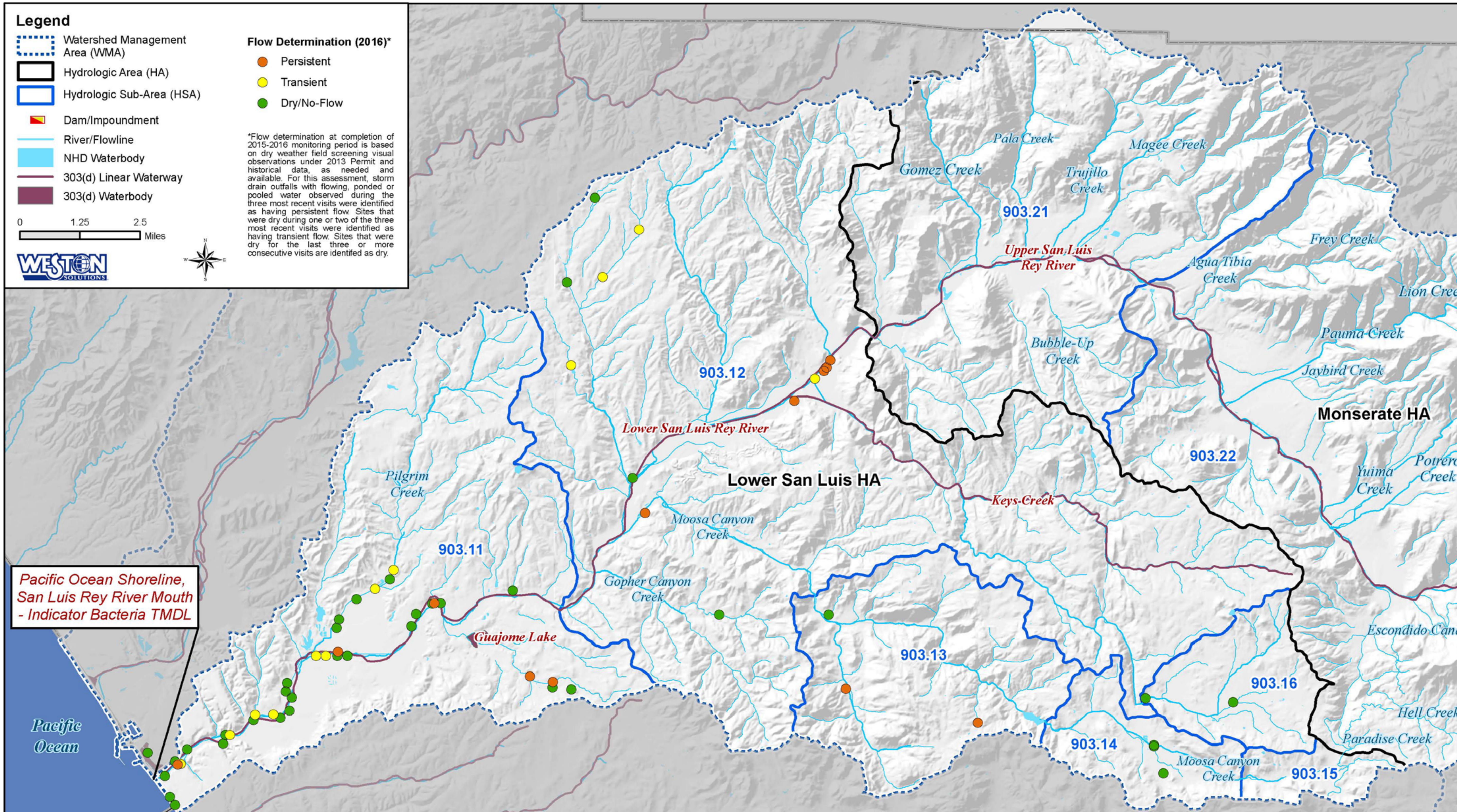

Figure A4-8. 2015-2016 Dry Weather Field Screening Locations with Flow Determinations for the San Luis Rey River WMA

The list of prioritized outfalls based on field screening results is maintained and updated as program implementation develops and monitoring occurs. Prioritization is based on non-stormwater flow status and the potential threat to receiving water quality. These prioritized outfalls were originally outlined in the San Luis Rey River Watershed Storm Drain Outfall Monitoring Plan (Storm Drain Outfall Monitoring Plan), Attachment 4A-5 to the WQIP. The City of Oceanside listed five highest priority outfalls in the Storm Drain Monitoring Plan, two of which were not named. During the 2015-2016 monitoring year, the City of Oceanside added a sixth outfall (SLR-025) due to dry conditions at the several of the initial five highest priority outfalls.

The highest priority outfalls for each jurisdiction during 2015-2016 are summarized in Table A4-17. Section 4.2.3.2 provides changes to the stations planned for 2016-2017 persistent flow monitoring.

Table A4-17. Highest Priority Outfalls during the 2015-2016 Monitoring Year

Participating Agency	HSA	Station	Latitude (NAD83)	Longitude (NAD83)	Dates Sampled	
County of San Diego	903.12	MS4-SLR-041	33.31787	-117.16385	Not Sampled*	
		MS4-SLR-150	33.2837	-117.21707	1/19/2016	6/14/2016
		MS4-SLR-152	33.33031	-117.15101	12/8/2015	6/14/2016
		MS4-SLR-155	33.32802	-117.15234	12/8/2015	6/14/2016
	903.13	MS4-SLR-095	33.22145	-117.09704	1/19/2016	6/14/2016
City of Oceanside	903.11	SLR-005	33.20741	-117.38491	Dry	Dry
		SLR-008	33.20678	-117.38284	Dry	Dry
		SLR-015	33.22183	-117.3563	3 visits - dry or ponded	
		SLR-025	33.24105	-117.32679	2/16/2016	8/29/2016
		SLR-035	33.25572	-117.29312	Dry	Dry
		SLR-036	33.25582	-117.29243	2/16/2016	8/2/2016
City of Vista	903.11	SLR-01	33.23424	-117.25785	8/4/2016	8/16/2016
		SLR-03	33.23253	-117.24958	8/24/2016	9/19/2016

*MS4-SLR-041 was not sampled because it was dry on the first visit and not enough ponded water was available to sample on the second visit. As flowing or ponded water was found at MS4-SLR-041 during additional visits (resulting in persistent flow determination), the outfall will remain a highest priority outfall for the County of San Diego for the 2016-2017 monitoring year. MS4-SLR-156 was substituted for sampling on 01/19/2016 but is not a high priority persistent flow site. These additional sample data can be found in Attachment 4K to this appendix and will be uploaded to CEDEN.

Based on the additional visual observations from 2015-2016 field screening monitoring, the updated status of the 2015-2016 highest priority outfalls are shown in Table A4-18.

Table A4-18. Highest Priority Dry Weather Storm Drain Outfall Station Status after 2015-2016 Monitoring Year

Participating Agency	Station ID	2015-2016 Priority (Y/N)	2015-2016 Results
County of San Diego	MS4-SLR-041	Yes	Persistent
County of San Diego	MS4-SLR-095	Yes	Persistent
County of San Diego	MS4-SLR-150	Yes	Persistent
County of San Diego	MS4-SLR-152	Yes	Persistent
County of San Diego	MS4-SLR-155	Yes	Persistent
City of Oceanside	SLR-005	Yes	Dry/No-Flow
City of Oceanside	SLR-008	Yes	Transient
City of Oceanside	SLR-015	Yes	Transient
City of Oceanside	SLR-025	Yes	Persistent
City of Oceanside	SLR-035	Yes	Dry/No-Flow
City of Oceanside	SLR-036	Yes	Persistent
City of Vista	SLR-01	Yes	Persistent
City of Vista	SLR-03	Yes	Persistent

4.2.2 *Highest Priority Storm Drain Outfall Dry Weather Monitoring*

The purpose of highest priority storm drain outfall dry weather monitoring is to evaluate the potential contribution from storm drain outfall discharges on receiving water quality during dry weather conditions and to assess the ability of programs to effectively eliminate non-stormwater discharges to waterbodies or waterways.

The 2015-2016 monitoring year was the first year of dry weather storm drain outfall analytical sampling under the WQIP MAP. Dry weather storm drain outfall monitoring was conducted at the highest priority outfalls identified for each jurisdiction in the WMA (Table A4-17, Figure A4-5). Sampling was conducted between December 8, 2015 and September 19, 2016, and two sampling events were conducted at each outfall with flowing water or sufficient standing water. Three of the outfalls under the jurisdiction of the City of Oceanside were dry during both visits, and one was dry or ponded during three visits. These outfalls were not sampled. In addition, one of the outfalls under the jurisdiction of the County of San Diego was dry during the first persistent flow monitoring visit and did not have enough ponded water to sample during the subsequent monitoring visit. This outfall was also not sampled. Sampling was conducted in accordance with the procedures described in the WQIP MAP. In-situ measurements were made for pH, temperature, conductivity, dissolved oxygen, and turbidity. Grab samples were collected and analyzed for constituents contributing to the HPWQC, 303(d) List impairments, TMDLs, stormwater action levels (NALs), and those listed in Table D-7 of the Permit. Grab samples were also collected from receiving waters to which the sampled outfalls were discharging and analyzed for total hardness, a measurement needed to compare concentrations of metals to NALs that are hardness-dependent (see footnote *a* in Table A4-19). Visual observations were also recorded.

Analytical results for samples collected during dry weather at the highest priority outfalls are summarized by Participating Agency in Table A4-19 through Table A4-21. Results are compared to NALs, where available. In accordance with Table C-4 of the Permit, indicator bacteria concentrations are compared to instantaneous maximum value (IM) NALs, and the remaining constituent concentrations, including general and physical chemical constituents, nutrients, and total and dissolved metals, are compared to maximum daily action level (MDAL) NALs, where available. Results are presented below by Participating Agency. Laboratory and field data collected for the Highest Priority Storm Drain Outfall Dry Weather Monitoring will be uploaded to CEDEN and data submittals are provided in Attachment K of this appendix.

4.2.2.1 County of San Diego

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform (i.e., the HPWQC in the WMA) indicated that the highest concentrations were measured at MS4-SLR-150 in the Bonsall HSA (903.12) for all three indicator bacteria. *Enterococcus* concentrations were above the IM in all samples except one each from MS4-SLR-095 in the Moosa HSA (903.13) and MS4-SLR-150. Fecal coliform concentrations were above the IM in both samples from MS4-SLR-150 and one sample from MS4-SLR-152, also located in the Bonsall HSA (903.12) (Table A4-19).

The only existing MDALs that relate to PWQC in the WMA are for total nitrogen and total phosphorus, and each of these PWQC concentrations was measured above the MDAL except total nitrogen in one of two samples from MS4-SLR-095 and total phosphorus in one of two samples form MS4-SLR-152.

Other constituents in exceedance of MDALs are listed below. Unless noted, exceedances occurred in both samples collected at the outfall.

- MS4-SLR-095: dissolved oxygen (one sample) (below the MDAL indicates impairment), turbidity (one sample), total iron, total manganese, dissolved manganese.
- MS4-SLR-150: dissolved oxygen (one sample) (below the MDAL indicates impairment), turbidity (one sample), total iron (one sample), total manganese (one sample), dissolved manganese (one sample).
- MS4-SLR-152: total iron (one sample).
- MS4-SLR-155: total manganese (one sample).

The remaining constituents were below applicable MDALs, where available.

4.2.2.2 City of Oceanside

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform indicated that the highest concentrations were measured at SLR-036 for *Enterococcus* and at SLR-025 for fecal coliform. Both outfalls are located in the Mission HSA (903.11). Concentrations were above the *Enterococcus* IM in all samples and were above the fecal coliform IM in all samples except one from outfall SLR-036 (Table A4-20).

The only existing MDALs that relate to PWQC in the WMA are for total nitrogen and total phosphorus, and each of these PWQC concentrations was measured above the MDAL except total phosphorus in one of two samples form SLR-036, which was measured at the MDAL.

Other constituents in exceedance of MDALs are listed below. Unless noted, exceedances occurred in both samples collected at the outfall.

- SLR-025: total manganese (one sample).
- SLR-036: total manganese, dissolved copper (one sample), dissolved manganese (one sample).

The remaining constituents were below applicable MDALs, where available.

4.2.2.3 City of Vista

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform indicated that all concentrations measured at SLR-01 were below IMs and all concentrations measured at SLR-03 were above IMs (Table A4-21). Both outfalls are located in the Mission HSA (903.11).

The only existing MDALs that relate to PWQC in the WMA are for total nitrogen and total phosphorus. At SLR-01, total phosphorus was above the MDAL in one sample. At SLR-03, all samples were above the MDALs for total nitrogen and total phosphorus.

Other constituents in exceedance of MDALs are listed below. Unless noted, exceedances occurred in both samples collected at the outfall.

- SLR-01: total iron, total manganese, dissolved manganese.
- SLR-03: turbidity (one sample), total iron, total manganese, dissolved manganese.

The remaining constituents were below applicable MDALs, where available.

Table A4-19. 2015-2016 Dry Weather Storm Drain Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – County of San Diego

Analyte	Units	Maximum Daily Action Level (MDAL)	MS4-SLR-095 (903.13)		MS4-SLR-150 (903.12)		MS4-SLR-152 (903.12)		MS4-SLR-155 (903.12)	
			1/19/2016	6/14/2016	1/19/2016	6/14/2016	12/8/2015	6/14/2016	12/8/2015	6/14/2016
Physical Chemistry										
Dissolved Oxygen	mg/L	5	6.22	**3.9**	**1.33**	7	10.11	6.57	8.91	9.47
pH	pH units	6.5-8.5	7.85	7.61	8.41	7.73	8.37	8.31	8.4	8.3
Specific Conductivity	µS/cm		3,350	3,320	1,860	1,500	2,440	2,290	4,300	4,600
Temperature	Celsius		15.57	18.54	14.55	20.25	16.26	20.48	16.34	19.32
Turbidity	NTU	20	7.8	**26.7**	**47.5**	8.68	5.45	0	4.38	7.9
General Chemistry										
Chloride	mg/L		590	520	180	230	300	270	510	580
Hardness as $CaCO_3$	mg/L		1,450	1,290	395	313	787	739	1,650	1,710
MBAS	mg/L	0.5	<0.5	<0.5	0.4	<0.5	<0.5	<0.5	<0.5	<0.5
Total Dissolved Solids	mg/L		2,090	2,020	860	786	1,520	1,420	2,930	3,220
Total Suspended Solids	mg/L		2.9	2.1	55	3.2	NA	2.6	NA	13.6
Nutrients										
Ammonia as N	mg/L		<0.1	0.12	17	1.12	0.13	0.12	0.17	0.26
Nitrate + Nitrite as N	mg/L		1.84	0.63	0.13	0.63	16.2	7.72	7.02	5.22
Nitrate as N	mg/L		1.84	0.62	0.09	0.53	16.2	7.72	7.02	5.22
Nitrite as N	mg/L		<0.01	0.01	0.04	0.1	<0.01	0.008	<0.01	<0.01
Total Nitrogen	mg/L	1	**4.4**	0.9	**47.9**	**3.9**	**16.2**	**8**	**7.7**	**6.4**
Total Kjeldahl Nitrogen	mg/L		2.6	0.3	47.8	3.3	<0.5	0.3	0.3	1.2
Orthophosphate	mg/L		0.14	0.25	5.7	0.24	0.12	0.07	0.27	0.3
Dissolved Phosphorus	mg/L		0.12	<0.05	5.3	0.2	0.12	0.09	0.44	0.14
Total Phosphorus	mg/L	0.1	**0.17**	**0.26**	**6.8**	**0.27**	**0.12**	0.09	**0.6**	**0.32**
Total Metals										
Cadmium	µg/L		<2	<1	0.2	<1	0.05	<1	0.4	<2
Chromium	µg/L		7	0.4	7	0.6	0.05	0.4	0.2	<2
Chromium III	µg/L		NA	0.4	NA	0.6	<0.22	0.4	<0.22	<1
Chromium VI	µg/L	16	0.32	<1	<0.02	<1	0.052	<1	0.051	<1
Copper	µg/L		5	1	11	12	6	2	4	4
Iron	µg/L	300	**374**	**367**	**929**	102	**531**	41	99	224
Lead	µg/L		<2	0.4	0.8	0.2	0.5	0.5	0.4	<2
Manganese	µg/L	50	**126**	**340**	**179**	27	30	7	28	**51**
Nickel	µg/L		12	2	13	2	2	7	2	5
Selenium	µg/L		0.4	0.2	2	1	1	2	7	13
Silver	µg/L		<2	<1	<1	<1	<1	<1	<1	<2
Zinc	µg/L		10	8	30	18	7	8	4	9
Dissolved Metals										
Cadmium	µg/L	(a)(b)	<2	<1	0.09	<1	0.9	<1	0.1	<2
Chromium	µg/L		0.2	<1	<1	0.2	<1	<1	<1	<2
Chromium III	µg/L	(a)(b)	NA	<1	NA	0.2	<0.22	<1	<0.22	<2
Chromium VI	µg/L	16	0.38	<1	0.056	<1	0.029	<1	0.028	<1
Copper	µg/L	(a)	0.8	0.4	7	7	1	1	6	3
Iron	µg/L	300	12	76	14	33	<10	<10	4	<20
Lead	µg/L	(a)	<2	<1	<1	0.08	<1	<1	0.1	<2

Table A4-19. 2015-2016 Dry Weather Storm Drain Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – County of San Diego

Analyte	Units	Maximum Daily Action Level (MDAL)	MS4-SLR-095 (903.13)		MS4-SLR-150 (903.12)		MS4-SLR-152 (903.12)		MS4-SLR-155 (903.12)	
			1/19/2016	6/14/2016	1/19/2016	6/14/2016	12/8/2015	6/14/2016	12/8/2015	6/14/2016
Manganese	µg/L	50	**104**	**323**	**113**	22	2	3	4	6
Nickel	µg/L	(a)(b)	0.6	1	2	0.8	0.4	0.8	3	3
Selenium	µg/L		0.2	0.1	2	1	1	1	7	13
Silver	µg/L	(a)	<2	<1	<1	<1	<1	<1	<1	<2
Zinc	µg/L	(a)	2	2	6	8	3	1	4	2
Fecal Indicator Bacteria										
Enterococcus	MPN/100 mL	61 (c)	<2	**1,700**	<200#	**2,300**	**220**	**2,100**	**80**	**140**
Fecal Coliform	MPN/100 mL	400 (c)	<20	<200	**22,000**	**13,000**	300	**1,700**	20	200
Total Coliform	MPN/100 mL		300	30,000	240,000	500,000	1,300	35,000	5,000	2,400

< - Results are less than the reporting limit.

NA - Not analyzed.

J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.

(a) Water Quality Benchmark for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The CCC was applied to dry weather results with the exception of Silver for which the CMC was applied as there is no CCC.

(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.

(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with Rec-1 beneficial use (Table C-4 of 2013 Permit).

- Reporting limit greater than Instantaneous Maximum benchmarks.

Bolded/shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum for the Fecal Indicator Bacteria.

Table A4-20. 2015-2016 Dry Weather Storm Drain Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – City of Oceanside

Analyte	Units	Maximum Daily Action Level (MDAL)	SLR-025 (903.11)		SLR-036 (903.11)	
			2/16/2016	8/29/2016	2/16/2016	8/2/2016
Physical Chemistry						
Dissolved Oxygen	mg/L	5	9.21	5.59	9.5	7.46
pH	pH units	6.5-8.5	8.06	8	8.21	7.75
Specific Conductivity	µS/cm		5,809	3,443	4,088	6,377
Temperature	Celsius		18.00	23.64	18.72	25.67
Turbidity	NTU	20	2.53	8.4	1.34	1.71
General Chemistry						
Chloride	mg/L		1,000	500	600	1,500
Hardness as $CaCO_3$	mg/L		1,600	920	1,300	1,900
MBAS	mg/L	0.5	<0.2	0.06	<0.08	<0.05
Total Dissolved Solids	mg/L		3,500	2,000	2,400	5,600
Total Suspended Solids	mg/L		6	9	5	6
Nutrients						
Ammonia as N	mg/L		<0.1	0.079J	<0.1	44
Nitrate as N	mg/L		1.5	1.2	4.5	14
Nitrite as N	mg/L		<0.1	<0.1	<0.1	0.08J
Total Nitrogen	mg/L	1	**4.1**	**2.7**	**5.6**	**250**
Total Kjeldahl Nitrogen	mg/L		2.6	1.5	1.1	230
Orthophosphate	mg/L		0.52	0.56	0.17	0.26
Dissolved Phosphorus	mg/L		0.62	0.66	0.22	0.25
Total Phosphorus	mg/L	0.1	**0.52**	**0.73**	0.1	**0.32**
Total Metals						
Cadmium	µg/L		<2	<0.25	<2	<2
Chromium	µg/L		<20	0.7	<20	<20
Copper	µg/L		25	14	6.4J	64
Iron	µg/L	300	78	290	140	<50
Lead	µg/L		<10	0.3J	<10	<10
Manganese	µg/L	50	5.9J	**55**	**300**	**54**
Nickel	µg/L		7.2J	3.1	5.2J	0.88J
Selenium	µg/L		5.1	2.4	7.3	2.9J
Silver	µg/L		<10	<0.25	<10	<10
Zinc	µg/L		NA	15	NA	6.8J
Dissolved Metals						
Cadmium	µg/L	(a)(b)	<2	<0.25	<2	<2
Chromium	µg/L		<20	<0.5	<20	<20
Chromium III	µg/L	(a)(b)	<20	0.7J	<20	<20
Chromium VI	µg/L	16	<1	<1	<1	0.41J
Copper	µg/L	(a)	23	11	7.1J	**43**
Iron	µg/L	300	<50	<50	<50	<50
Lead	µg/L	(a)	<10	<0.5	<10	<10
Manganese	µg/L	50	2.7J	41	**260**	27
Nickel	µg/L	(a)(b)	6J	2.6	5.2J	<20
Selenium	µg/L		6.5	2.6	8	2.4J

Table A4-20. 2015-2016 Dry Weather Storm Drain Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – City of Oceanside

Analyte	Units	Maximum Daily Action Level (MDAL)	SLR-025 (903.11)		SLR-036 (903.11)	
			2/16/2016	8/29/2016	2/16/2016	8/2/2016
Silver	µg/L	(a)	<10	<0.25	<10	<10
Zinc	µg/L	(a)	NA	6.1	NA	4.4J
Fecal Indicator Bacteria						
Enterococcus	MPN/100 mL	61 (c)	**3,200**	**2,020**	**75**	**19,600**
Fecal Coliform	MPN/100 mL	400 (c)	**50,000**	**130,000**	40	**2,300**
Total Coliform	MPN/100 mL		110,000	>1,600,000	5,000	>1,600,000

< - Results are less than the reporting limit.

NA - Not analyzed.

J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.

(a) Water Quality Benchmark for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The CCC was applied to dry weather results with the exception of Silver for which the CMC was applied as there is no CCC.

(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.

(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with Rec-1 beneficial use (Table C-4 of 2013 Permit).

Bolded/shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum for the Fecal Indicator Bacteria.

Table A4-21. 2015-2016 Dry Weather Storm Drain Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – City of Vista

Analyte	Units	Maximum Daily Action Level (MDAL)	SLR-01 (903.11)		SLR-03 (903.11)	
			8/4/2016	8/16/2016	8/24/2016	9/19/2016
Physical Chemistry						
Dissolved Oxygen	mg/L	5	7.8	6.4	7.5	6.85
pH	pH units	6.5-8.5	7.36	7.31	7.86	8.09
Specific Conductivity	µS/cm		4,016	3,901	1,417	2,350
Temperature	Celsius		23.86	22.22	22.30	20.90
Turbidity	NTU	20	6.72	10.9	18.5	**50**
General Chemistry						
Chloride	mg/L		990	1,000	250	440
Hardness as $CaCO_3$	mg/L		1,050	1,130	402	575
MBAS	mg/L	0.5	<0.05	<0.05	0.16	0.058
Total Dissolved Solids	mg/L		2,700	2,800	1,100	1,300
Total Suspended Solids	mg/L		13	20	200	7
Nutrients						
Ammonia as N	mg/L		<0.1	<0.1	0.17	0.14
Nitrate + Nitrite as N	mg/L		<0.1	<0.1	0.45	0.98
Nitrate as N	mg/L		<0.1	<0.1	0.4	0.94
Nitrite as N	mg/L		<0.1	<0.1	<0.1	<0.1
Total Nitrogen	mg/L	1	0.48	0.76	**1.5**	**1.8**
Total Kjeldahl Nitrogen	mg/L		0.48	0.76	1	0.77
Orthophosphate	mg/L		0.027	0.045	0.22	0.17
Dissolved Phosphorus	mg/L		0.031	0.022	0.23	0.17
Total Phosphorus	mg/L	0.1	0.061	**0.11**	**0.37**	**0.21**
Total Metals						
Cadmium	µg/L		<0.1	<0.1	<0.1	0.15
Chromium	µg/L		0.64	0.35	5.1	5.5
Chromium III	µg/L		0.47	<0.22	5	5.3
Chromium VI	µg/L	16	0.17	0.16	0.11	0.22
Copper	µg/L		1.6	0.72	16	17
Iron	µg/L	300	**580**	**370**	**4,600**	**4,300**
Lead	µg/L		0.21	<0.2	3	5.9
Manganese	µg/L	50	**820**	**590**	**140**	**160**
Nickel	µg/L		7	1.7	4.4	5
Selenium	µg/L		1.2	0.83	2.4	7.2
Silver	µg/L		<0.2	<0.2	<0.2	<0.2
Zinc	µg/L		<5	<5	45	95
Dissolved Metals						
Cadmium	µg/L	(a)(b)	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L		<0.2	<0.2	<0.2	0.22
Chromium III	µg/L	(a)(b)	<0.22	<0.22	<0.22	<0.22
Chromium VI	µg/L	16	0.2	0.12	0.15	0.17
Copper	µg/L	(a)	1.1	<0.5	2.2	2.2
Iron	µg/L	300	<10	<10	17	<10
Lead	µg/L	(a)	<0.2	<0.2	<0.2	<0.2

Table A4-21. 2015-2016 Dry Weather Storm Drain Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – City of Vista

Analyte	Units	Maximum Daily Action Level (MDAL)	SLR-01 (903.11)		SLR-03 (903.11)	
			8/4/2016	8/16/2016	8/24/2016	9/19/2016
Manganese	µg/L	50	**97**	**140**	**77**	**29**
Nickel	µg/L	(a)(b)	6.6	1.3	1.6	1.5
Selenium	µg/L		1.2	0.74	2.3	6.7
Silver	µg/L	(a)	<0.2	<0.2	<0.2	<0.2
Zinc	µg/L	(a)	<5	<5	6.6	7.5
Fecal Indicator Bacteria						
Enterococcus	MPN/100 mL	61 (c)	<10	20	**2,700**	**>2,420**
Fecal Coliform	MPN/100 mL	400 (c)	<20	20	**24,000**	**30,000**
Total Coliform	MPN/100 mL		2,300	7,000	30,000	160,000

< - Results are less than the reporting limit.

NA - Not analyzed.

J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.

(a) Water Quality Benchmark for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The CCC was applied to dry weather results with the exception of Silver for which the CMC was applied as there is no CCC.

(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.

(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with Rec-1 beneficial use (Table C-4 of 2013 Permit).

Bolded/shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum for the Fecal Indicator Bacteria.

4.2.3 *Storm Drain Outfall Dry Weather Monitoring Data Assessments*

Provision D.4.b.(1).(c)(i-vi) of the Permit requires the storm drain dry weather outfall monitoring data assessments summarized in Table A4-22. The information necessary to demonstrate compliance with each Provision is outlined in the following discussion. In instances where compliance has been demonstrated in previous sections of this Annual Report, those sections are referenced.

Table A4-22. Storm Drain Outfall Dry Weather Monitoring Data Assessments

Assessment	Components	Provision(s)
WQIP Annual Report		
Identify known and suspected controllable sources.	Identify known and suspected controllable sources (e.g., facilities, areas, land uses, pollutant generating activities) of transient and persistent flows.	D.4.b.(1)(b)(i)
Identify sources that have been reduced or eliminated.	Identify sources of transient and persistent flows that have been reduced or eliminated.	D.4.b.(1)(b)(ii)
Identify necessary modifications to monitoring locations and frequencies.	Identify necessary modifications to monitoring locations and frequencies necessary to identify and eliminate sources of persistent flows.	D.4.b.(1)(b)(iii)
Rank and prioritize non-stormwater discharges.	Rank persistently flowing outfalls according to potential threat to receiving water quality.	D.4.c.(1)(c)(ii)
	Produce/update prioritized list of outfalls.	
Identify sources contributing to NAL exceedances.	Identify known and suspected sources that may cause or contribute to exceedances.	D.4.b.(1)(c)(iii)
Estimate volumes and loads of non-stormwater discharges.	Analyze data collected as part of the Permit-required dry weather outfall monitoring. Use a model or other method to calculate and estimate collective persistent non-stormwater discharge volumes and pollutant loads. Specific calculations/estimates include: 1) Annual non-stormwater volumes and loads discharged from the Copermittee's major storm drain outfalls to receiving waters within its jurisdiction, with an estimate of the percent contribution from each known source for each storm drain outfall. 2) Annual identification and quantification (by volume and pollutant load) of sources of discharged non-stormwater not subject to the Copermittee's legal authority.	D.4.b.(1)(c)(iv)
Identify data gaps.	Identify data gaps in the monitoring data necessary to fulfill assessment requirements.	D.4.b.(1)(c)(vi)

Table A4-22. Storm Drain Outfall Dry Weather Monitoring Data Assessments

Assessment	Components	Provision(s)
Once during Permit Term		
Evaluate progress in achieving non-stormwater volume and load reductions.	Identify reductions and progress in achieving reductions.	D.4.c.(1)(c)(v)
	Assess the effectiveness of WQIP improvement strategies, with estimates of volume and load reductions attributed to specific strategies when possible.	
	Identify modifications necessary to increase the effectiveness of WQIP strategies.	

4.2.3.1 Provision D.4.b.(1)(b)

The dry weather storm drain outfall discharge field screening monitoring assessments that were first required by Provision D.4.b.(1)(b)(i-iii) during the transitional monitoring period (2013-2014 and 2014-2015 monitoring years) are required to be continued by Provision D.4.b.(1)(c)(i). The assessments related to (i) and (ii) are described in Section 4.2.4 below. To comply with (iii), the data collected under the dry weather storm drain outfall discharge field screening monitoring program (Sections 4.2.1 and 4.2.2) were assessed, and no modifications to field screening monitoring locations or frequencies are planned for 2016-2017 in the San Luis Rey River WMA.

4.2.3.2 Provision D.4.b.(1)(c)(ii)

In addition to continuing the assessments required by Provision D.4.b.(1)(b)(i-iii), the 2015-2016 monitoring year is the first requiring analytical monitoring of dry weather storm drain outfall discharge samples, and the first requiring the assessments of Provision D.4.b.(1)(c)(ii-v).

Provision D.4.b.(1)(c)(ii) requires the prioritization of major storm drain outfalls within each Copermittee's jurisdiction based on the dry weather storm drain outfall monitoring data. These data were presented in Section 4.2.1, and the analytical data collected at the highest priority outfalls for each jurisdiction during 2015-2016 are presented in Table A4-19 through Table A4-21 in Section 4.2.2. Based on the 2015-2016 monitoring results, the City of Oceanside is updating its outfall prioritization due to changes in outfall flow determinations. SLR-005 and SLR-035, which were dry for three consecutive visits, will be replaced on the list of five highest priority outfalls. SLR-007 will be added to the highest priority outfall list, and SLR-025 which was added during 2015-2016 will serve as the other replacement in the top five for 2016-2017. No re-prioritizations are planned for 2016-2017 by the City of Vista or County of San Diego in the San Luis Rey River WMA. Although the flow determination changed for two outfalls from persistent to transient, these high priority outfalls selected for analytical monitoring in 2015-2016 will continue to be monitored until one of the conditions of Provision D.2.b.(2)(b)(ii) have been met (i.e., three consecutive dry visits, no exceedance of NALs, or identified as a discharge authorized under a separate National Pollutant Discharge Elimination System [NPDES] permit). When an outfall fulfills one of these criteria or the threat to water quality has been reduced (per Provision D.2.b.(2)(b)(iii)), it will be replaced with the next highest priority outfall on the Copermittee's list for the WMA. Monitored outfalls with updated flow determinations are shown in Table A4-18.

4.2.3.3 Provision D.4.b.(1)(c)(iii)

This Provision requires further investigation into sources at the highest priority outfalls with persistent flows exceeding NALs. The highest priority outfalls are listed for each jurisdiction in Table A4-17, and the analytical results collected at these outfalls are presented in Table A4-19 through Table A4-21.

These highest priority outfalls were a specific focus for IDDE investigations during the 2015-2016 monitoring year. The results from these investigations are presented in Section 4.2.4.2. The majority of the sources were recorded as "suspected", while three were identified as "known". The most common suspected source of non-stormwater flows was runoff from over-irrigation, which has been acknowledged as a source associated with several types of pollutants including nutrients, bacteria, pesticides, and sediment (Regional Board, 2013). The 2015-2016 highest priority storm drain outfall dry weather monitoring results showed exceedances of NALs for the HPWQC and PWQCs *Enterococcus*, fecal coliform, total nitrogen, and total phosphorus. Agricultural runoff was also suspected at two County outfalls with total nitrogen and total phosphorus exceedances. Concentrations of iron and manganese were also above NALs at some outfalls, and groundwater seepage in addition to over-irrigation were suspected as sources of flows at many of the outfalls. Groundwater can be a natural source of these minerals, and over-irrigation can contribute to rising groundwater and groundwater seepage. In cases where groundwater is a suspected source of non-stormwater flow, it is generally not possible to use standard field screening techniques to discern naturally occurring groundwater from other infiltrated water sources. This type of source investigation would require significant time, resources, and effort, and may not result in conclusive delineation of non-stormwater runoff sources. There was one NAL exceedance for dissolved copper at a monitored outfall in the watershed. Non-stormwater flow source at this outfall has been traced to a detention basin outlet on multiple occasions. Groundwater spring influence was discovered during the 2015-2016 monitoring year, which may contribute a substantial portion of the continuing discharge observed. Details regarding source investigations are provided in Section 4.2.4.2, including the sources identified in Table A4-30 through Table A4-32.

4.2.3.4 Provision D.4.b.(1)(c)(iv)

Persistent non-stormwater flow was identified by each of the Participating Agencies in the San Luis Rey River WMA. Since persistent flow was observed, the Participating Agencies are required to calculate or estimate the non-stormwater volumes and pollutant loads collectively discharged from these persistently flowing outfalls to receiving waters, and estimate percent contributions from each known source for each outfall. The Participating Agencies are also required to identify and quantify (i.e., volume and pollutant loads) sources of non-stormwater discharge not subject to the Participating Agency's legal authority that are discharged from the major storm drain outfalls, with persistent flow, to downstream receiving waters. Assessment methodology and results are summarized below and are described in greater detail in Attachment 4E. Suspected sources were included in this assessment.

4.2.3.4.1 Discharge Volumes from Persistently Flowing Major Storm Drain Outfalls

For each major storm drain outfall with persistent flow during the 2015-2016 monitoring year, the non-stormwater discharge was modeled by multiplying the total number of dry weather days for the month by a unique instantaneous flow rate for the outfall for that month. The number of dry weather days (i.e., less than 72 hours since rain event of 0.1 inches or more) for each calendar month was determined using rainfall data from the County of San Diego Alert Station 67-Oceanside. For months with field visits, the instantaneous flow measurement recorded for that visit was applied to the month, and if there were multiple field visits within a given month these were averaged and applied to the month (averages included instantaneous flow measurements and zero flow for dry/tidal/ponded conditions). For months where no outfall-specific data were available, the average of all instantaneous flow measurements for the outfall was applied to that month. The annual non-stormwater discharge for each major storm drain outfall represents the sum of cumulative monthly flows. These non-stormwater discharge volumes should be considered rough estimates that are based on limited field observations and measurements. When feasible, instantaneous flow measurements are based on the area-velocity method, which applies measured flow depth, width, and velocity. Velocity is often measured using a float. Although multiple velocity measurements may be collected to overcome inherent variability and a roughness factor may be applied to address friction, the float method represents a rough estimation tool for velocity. Where site conditions limit accurate collection of area-velocity field measurements, non-stormwater discharge may be estimated either using a volumetric flow rate method (e.g., filling a container of known volume in a measured interval of time), or best professional judgement based on field observations.

The County of San Diego collected continuous flow monitoring data at five major storm drain outfalls, and for these outfalls, the continuous flow data were used rather than the instantaneous flow measurements provided by field visits. The continuous flow datasets were adjusted to exclude wet weather days and the subsequent 72-hour wet periods and then were used to calculate the cumulative monthly discharge for the period when flow was monitored. For months with no continuous flow data, but available visual observation flow data, the monthly discharge was calculated using the approach described above. For months with no outfall-specific flow data, an average of the daily discharge values using the continuous flow dataset was applied to the days of that month.

Table A4-23 presents the estimated annual non-stormwater volume and the average annual discharge calculated for major storm drain outfalls with persistent non-stormwater flows, by Participating Agency.

Table A4-23. 2015-2016 Non-stormwater Flow Estimates for Major Storm Drain Outfalls with Persistent Flow

Participating Agency	No. Persistently Flowing Major Storm Drain Outfalls	Annual Non-Storm Water Discharge (cf)	Annual Average Discharge by Outfall (cf/outfall)
County of San Diego	7	5,945,734	849,391
City of Oceanside	3	322,363	107,454
City of Vista	2	65,122 to 100,061	32,561 to 50,031*

cf – cubic feet

*Range based on SLR-03 discharge for August-September 2016 (56 dry days) since IC/ID discovery, and continuous discharge for the year (298 dry days) to represent the most conservative result, given that the start date of the leak is unknown. Repair work is scheduled. Follow-up assessment is ongoing.

4.2.3.4.2 Pollutant Loads for Persistent Flow Outfalls

Pollutant loads were calculated based on whether analytical monitoring data were available for a major storm drain outfall. Loads were calculated as follows:

- Major Storm Drain Outfalls with Parameter-Specific Monitoring Data (High Priority Outfalls): The annual load represents the product of the outfall-specific annual discharge volume and the mean of the measured pollutant concentrations for the major storm drain outfall if two samples were collected.

- Other Persistent Flow Outfalls: Where site-specific monitoring data were not available for a persistently flowing outfall, the pollutant load was calculated by taking the product of the outfall-specific annual discharge volume and the mean pollutant concentration from all the dry weather monitoring events for the jurisdiction for the parameter.

For each persistently flowing outfall, estimates of annual non-stormwater pollutant loads are provided for each monitored constituent. Table A4-24 provides the pollutant load estimates for the County of San Diego outfalls; City of Oceanside outfalls are presented in Table A4-25, and City of Vista in Table A4-26. Two estimates of pollutant loads are provided for the City of Vista's SLR-03 as it is unknown when the illicit discharge began. These estimates represent the range of potential pollutant loading for the monitoring year based on assuming leak beginning in August 2016 (56 dry days) when it was discovered, or a continuous discharge for the year (298 dry days).

Table A4-24. Estimated Annual Non-Storm Water Pollutant Loads for 2015-2016 Monitoring Year Persistently Flowing Major Storm Drain Outfalls in County of San Diego

Parameter	Unit	MS4-SLR-041	MS4-SLR-095	MS4-SLR-097	MS4-SLR-150	MS4-SLR-152	MS4-SLR-154	MS4-SLR-155
Discharge	*cf*	*6,632*	*50,310*	*0**	*28,994*	*592,655*	*11,590*	*5,255,553*
Analytical Data		*No Sample*	*Two Samples*	*No Sample**	*Two Samples*	*Two Samples*	*No Sample*	*Two Samples*
General Chemistry								
Chloride	kg	74.65	790.67	0.00	168.31	4782.90	130.46	81107.14
MBAS	kg	0.05	0.36	0.00	0.27	4.20	0.09	37.21
Total Dissolved Solids	kg	348.51	2927.62	0.00	675.69	24669.68	609.04	457622.86
Total Suspended Solids	kg	2.49	3.56	0.00	23.89	43.63	4.34	2023.96
Nutrients								
Ammonia as N	kg	0.45	0.12	0.00	7.44	2.10	0.78	32.00
Dissolved Phosphorus	kg	0.15	0.10	0.00	2.26	1.76	0.26	43.16
Nitrate + Nitrite as N	kg	0.92	1.76	0.00	0.31	200.71	1.62	910.78
Nitrate as N	kg	0.92	1.75	0.00	0.25	200.71	1.61	910.78
Nitrite as N	kg	0.00	0.01	0.00	0.06	0.11	0.01	0.74
Orthophosphate	kg	0.17	0.28	0.00	2.44	1.59	0.29	42.41
Total Kjeldahl Nitrogen	kg	1.32	2.07	0.00	20.98	4.62	2.30	111.62
Total Nitrogen	kg	2.24	3.78	0.00	21.26	203.06	3.91	1049.18
Total Phosphorus	kg	0.20	0.31	0.00	2.90	1.76	0.35	68.46
Total Metals								
Cadmium	kg	0.0001	0.0011	0.0000	0.0003	0.0046	0.0002	0.1042
Chromium	kg	0.0004	0.0053	0.0000	0.0031	0.0038	0.0007	0.0893
Chromium III	kg	0.0001	0.0006	0.0000	0.0005	0.0043	0.0001	0.0454
Chromium VI	kg	0.0001	0.0006	0.0000	0.0002	0.0046	0.0001	0.0410
Copper	kg	0.0011	0.0043	0.0000	0.0094	0.0671	0.0018	0.5953
Iron	kg	0.0626	0.5278	0.0000	0.4232	4.7997	0.1094	24.0345
Lead	kg	0.0001	0.0010	0.0000	0.0004	0.0084	0.0002	0.1042
Manganese	kg	0.0185	0.3319	0.0000	0.0846	0.3105	0.0323	5.8784
Nickel	kg	0.0011	0.0100	0.0000	0.0062	0.0755	0.0018	0.5209
Selenium	kg	0.0006	0.0004	0.0000	0.0012	0.0252	0.0011	1.4882
Silver	kg	0.0001	0.0011	0.0000	0.0004	0.0084	0.0002	0.1116
Zinc	kg	0.0022	0.0128	0.0000	0.0197	0.1259	0.0039	0.9673

Table A4-24. Estimated Annual Non-Storm Water Pollutant Loads for 2015-2016 Monitoring Year Persistently Flowing Major Storm Drain Outfalls in County of San Diego

Parameter	Unit	MS4-SLR-041	MS4-SLR-095	MS4-SLR-097	MS4-SLR-150	MS4-SLR-152	MS4-SLR-154	MS4-SLR-155
Discharge	*cf*	*6,632*	*50,310*	*0**	*28,994*	*592,655*	*11,590*	*5,255,553*
Analytical Data		*No Sample*	*Two Samples*	*No Sample**	*Two Samples*	*Two Samples*	*No Sample*	*Two Samples*
Dissolved Metals								
Cadmium	kg	0.0001	0.0011	0.0000	0.0002	0.0117	0.0002	0.0819
Chromium	kg	0.0001	0.0005	0.0000	0.0003	0.0084	0.0002	0.1116
Chromium III	kg	0.0001	0.0007	0.0000	0.0002	0.0051	0.0001	0.0826
Chromium VI	kg	0.0001	0.0006	0.0000	0.0002	0.0044	0.0001	0.0393
Copper	kg	0.0006	0.0009	0.0000	0.0057	0.0168	0.0011	0.6697
Iron	kg	0.0037	0.0627	0.0000	0.0193	0.0839	0.0065	1.0417
Lead	kg	0.0001	0.0011	0.0000	0.0002	0.0084	0.0002	0.0819
Manganese	kg	0.0135	0.3042	0.0000	0.0554	0.0420	0.0237	0.7441
Nickel	kg	0.0003	0.0011	0.0000	0.0011	0.0101	0.0005	0.4465
Selenium	kg	0.0006	0.0002	0.0000	0.0012	0.0168	0.0010	1.4882
Silver	kg	0.0001	0.0011	0.0000	0.0004	0.0084	0.0002	0.1116
Zinc	kg	0.0007	0.0028	0.0000	0.0057	0.0336	0.0011	0.4465
Fecal Indicator Bacteria								
Enterococcus	MPN	1.56E+09	1.21E+10	0.00E+00	9.85E+09	1.95E+11	2.72E+09	1.64E+11
Fecal Coliform	MPN	8.76E+09	7.84E+08	0.00E+00	1.44E+11	1.68E+11	1.53E+10	1.64E+11
Total Coliform	MPN	1.91E+11	2.16E+11	0.00E+00	3.04E+12	3.05E+12	3.34E+11	5.51E+12

cf – cubic feet kg – kilogram MPN – most probable number

*Pollutant load estimates are zero as outfall was ponded during field screening, resulting in stormwater volume estimate of zero for monitoring year.

Table A4-25. Estimated Annual Non-Storm Water Pollutant Loads for 2015-2016 Monitoring Year Persistently Flowing Major Storm Drain Outfalls in City of Oceanside

Parameter	Unit	SLR-007	SLR-025	SLR-036
Discharge	*cf*	*0**	*8,234*	*314,129*
Analytical Data		*No Sample**	*Two Samples*	*Two Samples*
General Chemistry				
Chloride	kg	0.00	174.87	9339.89
MBAS	kg	0.00	0.02	0.29
Total Dissolved Solids	kg	0.00	641.21	35580.54
Total Suspended Solids	kg	0.00	1.75	48.92
Nutrients				
Ammonia as N	kg	0.00	0.02	195.92
Dissolved Phosphorus	kg	0.00	0.15	2.09
Nitrate + Nitrite as N	kg			
Nitrate as N	kg	0.00	0.31	82.28
Nitrite as N	kg	0.00	0.01	0.58
Orthophosphate	kg	0.00	0.13	1.91
Total Kjeldahl Nitrogen	kg	0.00	0.48	1027.83
Total Nitrogen	kg	0.00	0.79	1136.80
Total Phosphorus	kg	0.00	0.15	1.87
Total Metals				
Cadmium	kg	0.0000	0.0001	0.0089
Chromium	kg	0.0000	0.0012	0.0890
Chromium III	kg			
Chromium VI	kg			
Copper	kg	0.0000	0.0045	0.3131
Iron	kg	0.0000	0.0429	0.7338
Lead	kg	0.0000	0.0006	0.0445
Manganese	kg	0.0000	0.0071	1.5744
Nickel	kg	0.0000	0.0012	0.0270
Selenium	kg	0.0000	0.0009	0.0454
Silver	kg	0.0000	0.0006	0.0445
Zinc	kg	0.0000	0.0035	0.0605
Dissolved Metals				
Cadmium	kg	0.0000	0.0001	0.0089
Chromium	kg	0.0000	0.0012	0.0890
Chromium III	kg	0.0000	0.0012	0.0890
Chromium VI	kg	0.0000	0.0001	0.0040
Copper	kg	0.0000	0.0040	0.2228
Iron	kg	0.0000	0.0058	0.2224
Lead	kg	0.0000	0.0006	0.0445
Manganese	kg	0.0000	0.0051	1.2765
Nickel	kg	0.0000	0.0010	0.0676
Selenium	kg	0.0000	0.0011	0.0463
Silver	kg	0.0000	0.0006	0.0445

Table A4-25. Estimated Annual Non-Storm Water Pollutant Loads for 2015-2016 Monitoring Year Persistently Flowing Major Storm Drain Outfalls in City of Oceanside

Parameter	Unit	SLR-007	SLR-025	SLR-036
Discharge	*cf*	*0**	*8,234*	*314,129*
Analytical Data		*No Sample**	*Two Samples*	*Two Samples*
Zinc	kg	0.0000	0.0014	0.0391
Fecal Indicator Bacteria				
Enterococcus	MPN	0.00E+00	6.09E+09	8.75E+11
Fecal Coliform	MPN	0.00E+00	2.10E+11	1.04E+11
Total Coliform	MPN	0.00E+00	1.99E+12	7.14E+13

cf – cubic feet kg – kilogram MPN – most probable number
*Pollutant load estimates are zero as outfall was ponded during field screening resulting in stormwater volume estimate of zero for monitoring year.

Table A4-26. Estimated Annual Non-Storm Water Pollutant Loads for 2015-2016 Monitoring Year Persistently Flowing Major Storm Drain Outfalls in City of Vista

Parameter	Unit	SLR-01	SLR-03 (Two Scenarios)	
Discharge	*cf*	*57,326*	*7,796**	*42,735***
Analytical Data		*Two Samples*	*Two Samples*	*Two Samples*
General Chemistry				
Chloride	kg	1615.17	76.16	417.49
MBAS	kg	0.04	0.02	0.13
Total Dissolved Solids	kg	4464.04	264.91	1452.14
Total Suspended Solids	kg	26.78	22.85	125.25
Nutrients				
Ammonia as N	kg	0.08	0.03	0.19
Dissolved Phosphorus	kg	0.04	0.04	0.24
Nitrate + Nitrite as N	kg	0.08	0.16	0.87
Nitrate as N	kg	0.08	0.15	0.81
Nitrite as N	kg	0.08	0.01	0.06
Orthophosphate	kg	0.06	0.04	0.24
Total Kjeldahl Nitrogen	kg	1.01	0.20	1.07
Total Nitrogen	kg	1.01	0.36	2.00
Total Phosphorus	kg	0.14	0.06	0.35
Total Metals				
Cadmium	kg	0.0001	0.0000	0.0001
Chromium	kg	0.0008	0.0012	0.0064
Chromium III	kg	0.0005	0.0011	0.0062
Chromium VI	kg	0.0003	0.0000	0.0002
Copper	kg	0.0019	0.0036	0.0200
Iron	kg	0.7711	0.9824	5.3850
Lead	kg	0.0003	0.0010	0.0054
Manganese	kg	1.1444	0.0331	0.1815

Table A4-26. Estimated Annual Non-Storm Water Pollutant Loads for 2015-2016 Monitoring Year Persistently Flowing Major Storm Drain Outfalls in City of Vista

Parameter	Unit	SLR-01	SLR-03 (Two Scenarios)	
Discharge	*cf*	*57,326*	*7,796**	*42,735***
Analytical Data		*Two Samples*	*Two Samples*	*Two Samples*
Nickel	kg	0.0071	0.0010	0.0057
Selenium	kg	0.0016	0.0011	0.0058
Silver	kg	0.0002	0.0000	0.0001
Zinc	kg	0.0041	0.0155	0.0847
Dissolved Metals				
Cadmium	kg	0.0001	0.0000	0.0001
Chromium	kg	0.0002	0.0000	0.0002
Chromium III	kg	0.0002	0.0000	0.0001
Chromium VI	kg	0.0003	0.0000	0.0002
Copper	kg	0.0011	0.0005	0.0027
Iron	kg	0.0081	0.0024	0.0133
Lead	kg	0.0002	0.0000	0.0001
Manganese	kg	0.1924	0.0117	0.0641
Nickel	kg	0.0064	0.0003	0.0019
Selenium	kg	0.0016	0.0010	0.0054
Silver	kg	0.0002	0.0000	0.0001
Zinc	kg	0.0041	0.0016	0.0085
Fecal Indicator Bacteria				
Enterococcus	MPN	2.03E+08	5.65E+09	3.10E+10
Fecal Coliform	MPN	2.43E+08	5.96E+10	3.27E+11
Total Coliform	MPN	7.55E+10	2.10E+11	1.15E+12

*Assumes Continuous discharge for August-September 2016 (56 dry days)

**Assumes Continuous discharge for the year (298 dry days)

cf – cubic feet kg – kilogram MPN – most probable number

Dry weather visual observation and field investigation data regarding known and/or suspected sources of non-stormwater discharges were used to estimate percent contributions from each known or suspected source for each persistent flow outfall in accordance with Provision D.4.b.(1)(c)(iv)(a). These results are provided in Table A4-27. During field investigations, agricultural run-off was identified as a primary source of non-stormwater discharges (approximately 90%) for two persistent flow outfalls. Agricultural irrigation runoff is not within the jurisdiction of Participating Agencies. This type of runoff is regulated by a State Agricultural Waiver, which expired in February 2014, and a Waste Discharge Requirement Permit will eventually be issued to replace it. As a source not subject to the Participating Agencies' legal authority, this source is identified and quantified per Provision D.4.b.(1)(c)(iv)(b). The stormwater volume and pollutant loads for the agricultural runoff source is provided in Attachment 4E to this Appendix.

Table A4-27. 2015-2016 Dry Weather Assessment of Discharge by Flow Source for Persistently Flowing Major Storm Drain Outfalls

Participating Agency	Major Storm Drain Outfall	Annual Dry Weather Discharge (cf)	Estimated Percent of Non-Stormwater Discharge from Suspected Flow Sources						Notes
			Non-Jurisdictional: Agricultural Runoff	Source Unknown	Irrigation	Vehicle Washing	Uncontrollable Source: Groundwater/ Springs	Leaking Fire Hydrant	
County of San Diego	MS4-SLR-041	6,632			95%	5%			
	MS4-SLR-095	50,310			50%		50%		
	MS4-SLR-097	0		No Data					
	MS4-SLR-150	28,994			100%				
	MS4-SLR-152	592,655	90%		5%	5%			Non-jurisdictional agricultural runoff was identified (suspected) as the only flow source for several upstream drainages. Near the outfall, other potential non-stormwater flow sources were observed.
	MS4-SLR-154	11,590		No Data					Not a designated highest priority site for 2015-2016 monitoring year.
	MS4-SLR-155	5,255,553	90%		10%				Non-jurisdictional agricultural runoff was identified (suspected) as the only flow source for several upstream drainages.
City of Oceanside	SLR-007	0		No Data					Not a designated highest priority site for 2015-2016 monitoring year. Persistent flow monitoring planned for 2016-2017.
	SLR-025	8,234			100%				
	SLR-036	314,129					100%		Rising groundwater identified as a known source. No other sources were identified during field investigations.
City of Vista	SLR-01	57,326					100%		Source suspected to be groundwater seepage based upon previous investigations.
	SLR-03	7,796 to 42,735						100%	Source is suspected to be from a fire hydrant leak. Repair work is scheduled and follow-up ongoing.

cf – cubic feet

4.2.3.5 Provision D.4.b.(2)(c)(v)

This Provision requires the Participating Agencies to review the data collected under the dry weather storm drain outfall monitoring program in order to identify pollutant reduction progress, assess water quality improvement strategy effectiveness, and identify modifications necessary to increase effectiveness. This assessment is required once during the Permit term and will be provided in the San Luis Rey River WMA chapter of the RMAR, which is scheduled for submittal to the Regional Board in December 2017.

4.2.3.6 Provision D.4.b.(2)(c)(vi)

No gaps have been identified in the monitoring data. Because the 2015-2016 monitoring year was the first year of monitoring under the WQIP MAP and the first year requiring the assessments outlined in Provision D.4.b.(1)(c)(ii-iv), the collection of additional data may be necessary before the Participating Agencies are able to identify data gaps.

4.2.4 *Illicit Discharge Detection and Elimination Program Data and Assessment*

In order to reduce pollutant loading into local receiving waters, each Participating Agency implements a program to reduce non-stormwater flows into its storm drain system. These programs are designed to meet the requirements of the Permit related to IDDE. Each Participating Agency's IDDE Program is one of the primary components of their Jurisdictional Runoff Management Program (JRMP).

Each Participating Agency's IDDE Program seeks to address and reduce the potential contribution of pollutants from stormwater and non-stormwater discharges. The IDDE Programs seek to achieve the following goals:

- Controlling the contribution of pollutants to and the discharges from the storm drain system within its jurisdiction,
- Effectively prohibiting non-stormwater discharges to the storm drain system, and
- Reducing the discharge of pollutants in stormwater to the maximum extent practicable.

In pursuit of these goals, and in addition to the programmatic elements of the IDDE Programs, the Participating Agencies prioritize outfalls and sources, conduct follow-up investigations, and seek to identify sources of non-stormwater discharges on the basis of the following:

- Field screening visual observations at major storm drain outfalls,
- Non-stormwater monitoring at prioritized persistent flow outfalls, and
- Reports or notifications of illicit discharges, illicit connections, or other sources of non-stormwater flow from hotlines or other sources.

In addition to outfall monitoring and associated source investigations, the IDDE programs also include the following components to prevent, identify, and eliminate IC/IDs:

- Educating the local community about prohibited discharges and how to prevent them. During the 2015-2016 fiscal year, this outreach program included working closely with water utilities to educate communities about outdoor water conservation, including preventing irrigation runoff.

- Operating a public complaint phone hotline and website and investigating the complaints received.
- Inspecting industrial/commercial and municipal facilities, construction sites, and residential areas. In addition to identifying and eliminating IC/IDs where applicable, inspectors also proactively educate responsible parties about how to avoid IC/IDs, such as cleaning outdoor areas by sweeping instead of hosing them off.
- Maintaining the storm drain system and sewer system, which provide opportunities to identify unpermitted connections to the storm drain system, cross connections, and other potential sources of IC/IDs.

Much of the IDDE program information is described in more detail in Section 4 of the Annual Report and is reported in the JRMP Annual Report form provided as Attachment D to the Permit. The form includes a series of questions related to the central elements of the JRMP programs being implemented by each Participating Agency. The IDDE section includes quantification of the activities of the program in the previous reporting year, such as the number of non-stormwater discharges identified or eliminated, per the requirement of Permit Section II.E.2.D.4. The JRMP Annual Report forms for each Participating Agency are provided in Appendix 2.

4.2.4.1 Dry Weather Storm Drain Outfall Source Identification Results

The Participating Agencies prioritized the outfalls under their jurisdictions in the San Luis Rey River Watershed based on these field screening results and analysis of the collected outfall flow data. Extensive field investigations and discharge reconnaissance visits looking for illicit discharges in upstream areas were then conducted to identify and eliminate sources of flow to these priority outfalls. Illicit discharges or connections contributing non-stormwater flow may be subject to enforcement; however, many sources of non-stormwater flow can be terminated with education or technical assistance.

Source investigations for storm drain outfall monitoring broadly categorize identified sources as “controllable” and “uncontrollable.” Uncontrollable sources include natural sources such as groundwater and springs. Controllable and uncontrollable sources are further classified as known and suspected. All but three sources were categorized as suspected; two known sources were groundwater and one was irrigation. Table A4-28 summarizes the controllable flow sources investigated by each Participating Agency during the 2015-2016 monitoring year. It is important to note that more than one source may contribute flow to a single outfall. In cases where flow was observed at the outfall, but the source was not directly observed or otherwise definitively identified, Participating Agencies may have identified the sources as “suspected” rather than “known.” Suspected sources may require additional investigation to identify them more specifically before they can be reduced or eliminated. Table A4-29 summarizes the uncontrollable flow sources investigated by each Participating Agency during 2015-2016.

Table A4-28. Known and Suspected Controllable Sources of Flows in the San Luis Rey WMA

Participating Agency	Known Controllable Sources				Suspected Controllable Sources				
	Commercial Washing Activities	Irrigation Runoff	Vehicle Washing	Other	Irrigation Runoff	Commercial Washing Activities	Residential Vehicle Washing	Residential Impervious Surface Washing	Other
County of San Diego					34[1]		2		3 (illicit connections)
City of Oceanside		1			1				
City of Vista									1 (leaking hydrant)[2]

Note:
[1] Does not include agricultural irrigation runoff. See notes of Table A4-23 for further detail.
[2] Repair work to be scheduled, follow-up ongoing.

Table A4-29. Known and Suspected Uncontrollable Sources of Flows in the San Luis Rey WMA

Participating Agency	Known Uncontrollable Source			Suspected Uncontrollable Source			
	Groundwater	Springs	Tidal	Groundwater	Agricultural Runoff	Springs	Other
County of San Diego				4	10[1]		
City of Oceanside	2					1	1 (detention basin seepage)
City of Vista				1			

. **Note:**
[1] Agricultural irrigation runoff is not within the jurisdiction of the Participating Agencies, and this type of runoff is regulated by a State Agricultural Waiver which was included in Resolution No. R9-2007-0104, Amendment to the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Revised Conditional Waivers of Waste Discharge Requirements for Specific Types of Discharge within the San Diego Region. This waiver expired in February 2014 and a Waste Discharge Requirement Permit will replace it.

The most common source of non-stormwater flow found during the Participating Agencies' investigations was irrigation runoff, a controllable source. This flow source includes over-watering of residential and commercial landscaping. The flow category of "irrigation runoff" in Table A4-28 and Table A4-29 and in Figure A4-9 do not include irrigation runoff from agricultural areas, which is regulated by the Regional Board under a separate program and is outside of the jurisdiction of the Participating Agencies. Agricultural runoff was among the suspected sources during 10 investigations involving two outfalls. Figure A4-9 shows the known or suspected flow sources identified during the 2015-2016 monitoring year through the Participating Agencies' outfall flow investigations by monitoring program staff.

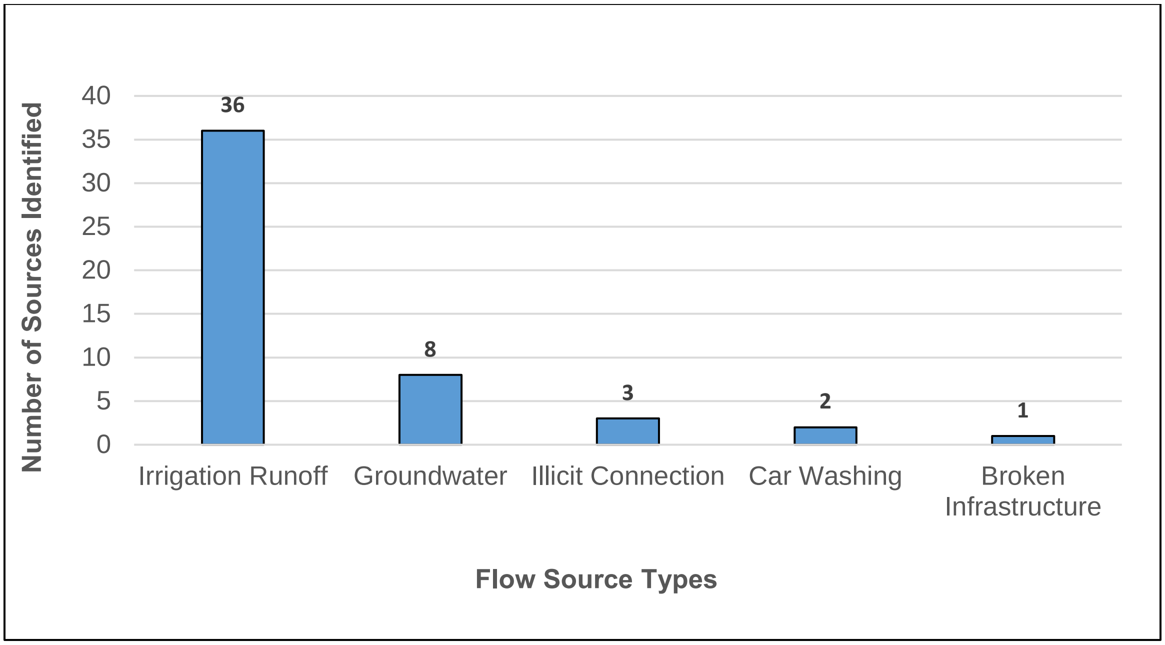

Figure A4-9. Known or Suspected Flow Sources Identified for Participating Agencies' Outfalls

More detail about source investigations and associated source elimination activities at the highest priority outfalls is provided in Appendix 2 and in Table A4-30 through Table A4-32 below.

4.2.4.2 Outfall Investigation Details for Participating Agencies

Within the San Luis Rey WMA, the City of Oceanside conducted five non-stormwater flow source investigations upstream of its two priority outfalls and found over-irrigation as the source for flows at one of the outfalls; see Table A4-30 for further details on their investigations. The City of Vista conducted four non-stormwater flow source investigations upstream of two of its priority outfalls and did not find over-irrigation as a source flow; instead it found groundwater seepage, which is an allowable discharge, and a leaking fire hydrant as sources of flow. See Table A4-31 for further details on the City of Vista's investigations. The County of San Diego conducted 35 non-stormwater flow source investigations upstream of its five highest priority outfalls, and six investigations at a non-major storm drain outfall SLR-045 (less than 36 inches in diameter) with persistent non-stormwater flow and evidence of human indicator bacteria source(s) based on the Microbial Source Tracking study results (see Attachment 4J). The six outfalls have also been fitted with continuous flow monitoring equipment to more precisely track and characterize the non-stormwater flows at those locations throughout the dry season (May through September). The County found numerous sources of flow into the stormwater system draining to these outfalls, with over-irrigation being the most common source suspected. For further details about the County's investigations, including upstream assessments of flow sources for the six outfalls see Table A4-32.

Table A4-30. City of Oceanside Non-stormwater Flow Source Investigation Summary for FY 2015-2016

Participating Agency	Site	High Priority	# Site Visits	Land Use	Sampled (Y/N)	Type	Source(s)	Action/Notes	Enforcement (Y/N), type	Eliminated (Y/N)
City of Oceanside	SLR-025	Yes	2	Residential	Y	Known, suspected unpermitted discharge	Irrigation Runoff	Upstream flow tracking	Yes, verbal/written warning	Partially
City of Oceanside	SLR-036	Yes	3	Residential	Y	Known allowable discharge	Groundwater seepage	Upstream flow tracking	No	No

Table A4-31. City of Vista Non-stormwater Flow Source Investigation Summary for FY 2015-2016

Participating Agency	Site	High Priority	# Site Visits	Land Use	Sampled (Y/N)	Type	Source(s)	Action/Notes	Enforcement (Y/N), type	Eliminated (Y/N)
City of Vista	SLR-01	Yes	2	Mixed	Y	Suspected allowable	Groundwater seepage	Upstream flow tracking	No	No
City of Vista	SLR-03	Yes	2	Residential	Y	Suspected unpermitted discharge	Leaking fire hydrant	Coordination with Vista Irrigation District to repair hydrant	No	No

Table A4-32. County of San Diego Non-stormwater Flow Source Investigation Summary for FY 2015-2016

Participating Agency	Site	Land Use	Type	Source(s)	Action/Notes	Enforcement (Y/N), type	Eliminated (Y/N)
County of San Diego	MS4-SLR-152	Residential, Agricultural	Suspected unpermitted discharge	Residential Vehicle Washing, Irrigation Runoff, Agricultural Runoff, Over-irrigation	Coordination with Ag and ED staff,	Yes, unknown	No
County of San Diego	MS4-SLR-152A	Agricultural, Residential	Suspected unpermitted discharge	Agricultural runoff	Unknown	Reported to enforcement	No
County of San Diego	MS4-SLR-152B	Agricultural	Suspected unpermitted discharge	Agricultural runoff/Illicit connection	Illicit connection discovered	Reported to enforcement	No
County of San Diego	MS4-SLR-152C	Residential	Suspected unpermitted discharge	Residential runoff	Unknown	Reported to enforcement	No
County of San Diego	MS4-SLR-152D	Residential	Suspected unpermitted discharge	Residential runoff	Ponded water	Reported to enforcement	No
County of San Diego	MS4-SLR-152E	Residential	Suspected unpermitted discharge	Residential runoff	Ponded water	Reported to enforcement	No
County of San Diego	MS4-SLR-152F	Residential	Suspected unpermitted discharge	Residential runoff	Ponded water	Reported to enforcement	No
County of San Diego	MS4-SLR-152G	Residential	Unknown	Residential runoff	Site dry	Unknown	No
County of San Diego	MS4-SLR-152H	Agricultural	Suspected unpermitted discharge	Agricultural runoff/Illicit connection	8” pipe discharging	Reported to enforcement	No
County of San Diego	MS4-SLR-041	Residential	Suspected unpermitted discharge	Residential runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-041A	Residential	Suspected unpermitted discharge	Residential runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-041B	Residential	Suspected unpermitted discharge	Residential runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-041C	Residential	Suspected unpermitted discharge	Residential runoff	Over irrigation, car washing	Reported to enforcement	No
County of San Diego	MS4-SLR-041D	Residential	Suspected unpermitted discharge	Residential runoff	Site damp	Reported to enforcement	No
County of San Diego	MS4-SLR-041E	Residential	Suspected unpermitted discharge	Residential runoff	Over irrigation, suspected illicit connection	Reported to enforcement	No
County of San Diego	MS4-SLR-095	Residential, gold course	Suspected unknown	Groundwater, over irrigation	Site flowing	Reported to enforcement	No
County of San Diego	MS4-SLR-095A	Residential, golf course	Suspected unknown	Groundwater, over irrigation	Site flowing	Reported to enforcement	No
County of San Diego	MS4-SLR-095B	Residential, golf course	Suspected unknown	Groundwater, over irrigation	Site flowing	Reported to enforcement	No
County of San Diego	MS4-SLR-095C	Residential, golf course	Unknown	Unknown	Site dry	Unknown	No
County of San Diego	MS4-SLR-095D	Residential, golf course	Unknown	Unknown	Site damp	Unknown	No
County of San Diego	MS4-SLR-095E	Residential, golf course	Unknown	Groundwater, over irrigation	Unknown	Reported to enforcement	No
County of San Diego	MS4-SLR-095F	Residential, golf course	Unknown	Unknown	Site dry	Unknown	No
County of San Diego	MS4-SLR-150	Residential	Suspected unpermitted discharge	Residential runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-150A	Residential	Suspected unpermitted discharge	Residential runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-150B	Residential	Suspected unpermitted discharge	Residential runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-150C	Residential	Suspected unpermitted discharge	Residential runoff	Ponded	Reported to enforcement	No
County of San Diego	MS4-SLR-150D	Residential	Suspected unpermitted discharge	Residential runoff	Over irrigation	Reported to enforcement	No

Table A4-32. County of San Diego Non-stormwater Flow Source Investigation Summary for FY 2015-2016

Participating Agency	Site	Land Use	Type	Source(s)	Action/Notes	Enforcement (Y/N), type	Eliminated (Y/N)
County of San Diego	MS4-SLR-155	Residential, agricultural	Suspected unpermitted discharge	Irrigation runoff, agricultural runoff	Flow behind weir	Reported to enforcement	No
County of San Diego	MS4-SLR-155A	Residential, agricultural	Suspected unpermitted discharge	Irrigation runoff, agricultural runoff	Ponded	Reported to enforcement	No
County of San Diego	MS4-SLR-155B	Residential, agricultural	Suspected unpermitted discharge	Agricultural runoff/Illicit connection	Ponded	Reported to enforcement	No
County of San Diego	MS4-SLR-155C	Residential, agricultural	Suspected unpermitted discharge	Irrigation runoff, agricultural runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-155D	Residential, agricultural	Suspected unpermitted discharge	Irrigation runoff, agricultural runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-155E	Residential, agricultural	Suspected unpermitted discharge	Irrigation runoff, agricultural runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-155F	Residential, agricultural	Suspected unpermitted discharge	Irrigation runoff, agricultural runoff	Over irrigation	Reported to enforcement	No
County of San Diego	MS4-SLR-155G	Residential, agricultural	Suspected unpermitted discharge	Agricultural runoff/Illicit connection	8” illicit connection	Reported to enforcement	No
County of San Diego	SLR-045*	Commercial, golf course	Suspected unpermitted discharge	Irrigation runoff	Over irrigation	Reported to enforcement	No
County of San Diego	SLR-045A	Commercial, golf course	Suspected unpermitted discharge	Irrigation runoff	Over irrigation	Reported to enforcement	No
County of San Diego	SLR-045B	Commercial, golf course	Suspected unpermitted discharge	Irrigation runoff	Over irrigation	Reported to enforcement	No
County of San Diego	SLR-045C	Commercial, golf course	Suspected unpermitted discharge	Irrigation runoff	Site dry	Reported to enforcement	No
County of San Diego	SLR-045D	Commercial, golf course	Suspected unpermitted discharge	Irrigation runoff	Over irrigation	Reported to enforcement	No
County of San Diego	SLR-045E	Commercial, golf course	Suspected unpermitted discharge	Irrigation runoff	Over irrigation	Reported to enforcement	No

*SLR-045 is not a major storm drain outfall (less than 36 inches in diameter). The County monitors flows at this persistent outfall to assess progress toward WQIP goals, and the outfall was an IDDE investigation site this monitoring year.

4.2.5 *Storm Drain Outfall Wet Weather Monitoring*

Storm drain outfall wet weather monitoring was conducted at five outfalls in the San Luis Rey River WMA. Five stations representative of storm water discharges from Residential, Commercial, Industrial, and typical Mixed-use land uses were selected from the inventory of major storm drain outfalls, and at least one station was selected for each Participating Agency within the WMA. Three outfalls were located in the Mission HSA, and two in the Bonsall HSA. The storm drain outfall wet weather monitoring stations for the San Luis Rey River WMA are presented in Table A4-33 and are shown with corresponding land uses in Figure A4-10. The outfall names for the wet weather monitoring stations differed from the jurisdictional station names in the Participating Agencies' inventories; therefore, both station identifiers are given in Table A4-33. This is the first year of wet weather storm drain outfall monitoring in accordance with the WQIP MAP. The prior two years of wet weather monitoring were under the transitional monitoring program with a different list of analytical parameters. However, the locations of outfalls MS4-SLR-1 and MS4-SLR-2 have not been adjusted since the second year of transitional monitoring (2014-2015), and the locations of outfalls MS4-SLR-3, MS4-SLR-4, and MS4-SLR-5 have been unchanged since transitional monitoring began (2013-2014). Therefore, two monitoring years of wet weather storm drain outfall monitoring data have now been collected at MS4-SLR-1 and MS4-SLR-2, and three years of data have been collected at MS4-SLR-3, MS4-SLR-4, and MS4-SLR-5.

Table A4-33. Storm Drain Outfall Wet Weather Monitoring Stations in the San Luis Rey River WMA

Storm Drain Outfall Name	Jurisdictional Identifier	Jurisdiction	HSA Name/No.	Latitude	Longitude
MS4-SLR-1	SLR-036	City of Oceanside	Mission/903.11	33.25583	-117.29243
MS4-SLR-2	SLR-016	City of Oceanside	Mission/903.11	33.22186	-117.34984
MS4-SLR-3	SLR-03	City of Vista	Mission/903.11	33.232546	-117.249591
MS4-SLR-4	MS4-SLR-150	County of San Diego	Bonsall/903.12	33.283702	-117.217033
MS4-SLR-5	MS4-SLR-041	County of San Diego	Bonsall/903.12	33.317871	-117.163833

Sampling at the storm drain outfall wet weather monitoring locations in the San Luis Rey River WMA was conducted between December 11, 2015 and January 31, 2016. The rainfall statistics for the monitored event at each outfall, based on nearby Alert station gauges, are presented in Table A4-34. The highest event volume was observed at MS4-SLR-5 in the Bonsall HSA, and the highest peak flow was observed at MS4-SLR-2 in the Mission HSA. The lowest event volume and peak flow were observed at MS4-SLR-4 in the Bonsall HSA. Wet weather storm drain outfall flow data are presented in Attachment 4F to this appendix.

Table A4-34. 2015-2016 Rainfall Statistics for Storm Drain Outfall Wet Weather Monitoring Events in the San Luis Rey River WMA

Date	Outfall Name/ Jurisdictional Identifier	Total Rain (in)	Duration (hours)	Intensity (in/hour)	Antecedent Dry Days	Event Volume (cf)	Peak Flow (cfs)
01/05/2016	MS4-SLR-1/ SLR-036	1.20	7.55	0.16	13	33,644	9.54
01/05/2016	MS4-SLR-2/ SLR-016	1.20	7.55	0.16	13	76,181	14.6
01/31/2016	MS4-SLR-3/ SLR-03	0.55*	7.60*	0.07*	19	30,585*	6.75*
12/11/2015	MS4-SLR-4/ MS4-SLR-150	0.28	3.13	0.09	12	18,516	8.06
01/31/2016	MS4-SLR-5/ MS4-SLR-041	0.68	14.3	0.05	19	84,099	13.4

in – inches cf – cubic feet cfs – cubic feet per second
*Intermittent flow not associated with sampling activities was observed between 02:30 and 04:00 (peak of 0.88 cfs; discharge of 1,520 cf).

Monitoring was conducted in accordance with the WQIP MAP. Grab samples were collected and analyzed for pH, temperature, conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria. Composite samples were collected and analyzed for constituents contributing to the HPWQC, 303(d) List impairments, TMDLs, and stormwater action levels (SALs). A receiving water sample was also collected and analyzed for hardness, where feasible. Observational and hydrologic data were also recorded.

Analytical results for samples collected at the five wet weather storm drain outfall monitoring locations are summarized in Table A4-35. Bacteria concentrations are compared to SSM effluent limitations from the Bacteria TMDL, and results for the remaining required constituents, including general and physical chemical constituents, nutrients, and total and dissolved metals, are compared to SALs, where available.

Bacteriological results for *Enterococcus*, fecal coliform, and total coliform (i.e., the HPWQC within the WMA) indicated that the highest concentrations were measured at MS4-SLR-1, located in the Mission HSA (903.11). Concentrations of *Enterococcus* and fecal coliform in wet weather discharges from all five outfalls were above the SSMs specified in the Bacteria TMDL (WQBELs discharging to freshwater creeks with REC-1 beneficial use). The only existing SALs that relate to PWQC in the WMA are for nitrate/nitrite as N and total phosphorus, and the only PWQC concentration measured above one of these SALs was total phosphorus at MS4-SLR-5. Turbidity was also above the SAL at this location. No other constituent concentrations were above the corresponding SALs, where available.

It should be noted that the drainage area of MS4-SLR-5 is located almost entirely within the footprint of the Highway Fire, which burned the area in May 2014. Potential effects of wild fires on water quality may include elevated concentrations of constituents associated with sediment transport (e.g., total suspended solids [TSS] and turbidity), organic contaminants, metals, and nutrients. Data collected at MS4-SLR-5 for the 2014-2015 monitoring year, approximately six months following the fire, indicated that the fire affected water quality at this station, as the turbidity values and concentrations of TSS, total phosphorus, total Kjeldahl nitrogen (TKN), and several metals at this outfall were much higher than those at the other outfalls located in the San Luis Rey River WMA and much higher than those measured at this location during 2013-2014 (WESTON, 2015a). As shown in Table A4-35, concentrations of these constituents remained elevated compared to the other outfalls in the WMA and the concentrations measured prior to the fire, including exceedances of SALs for turbidity and total phosphorus.

Laboratory and field data collected for the Storm Drain Outfall Wet Weather Monitoring will be uploaded to CEDEN and data submittals are provided in Attachment K of this appendix.

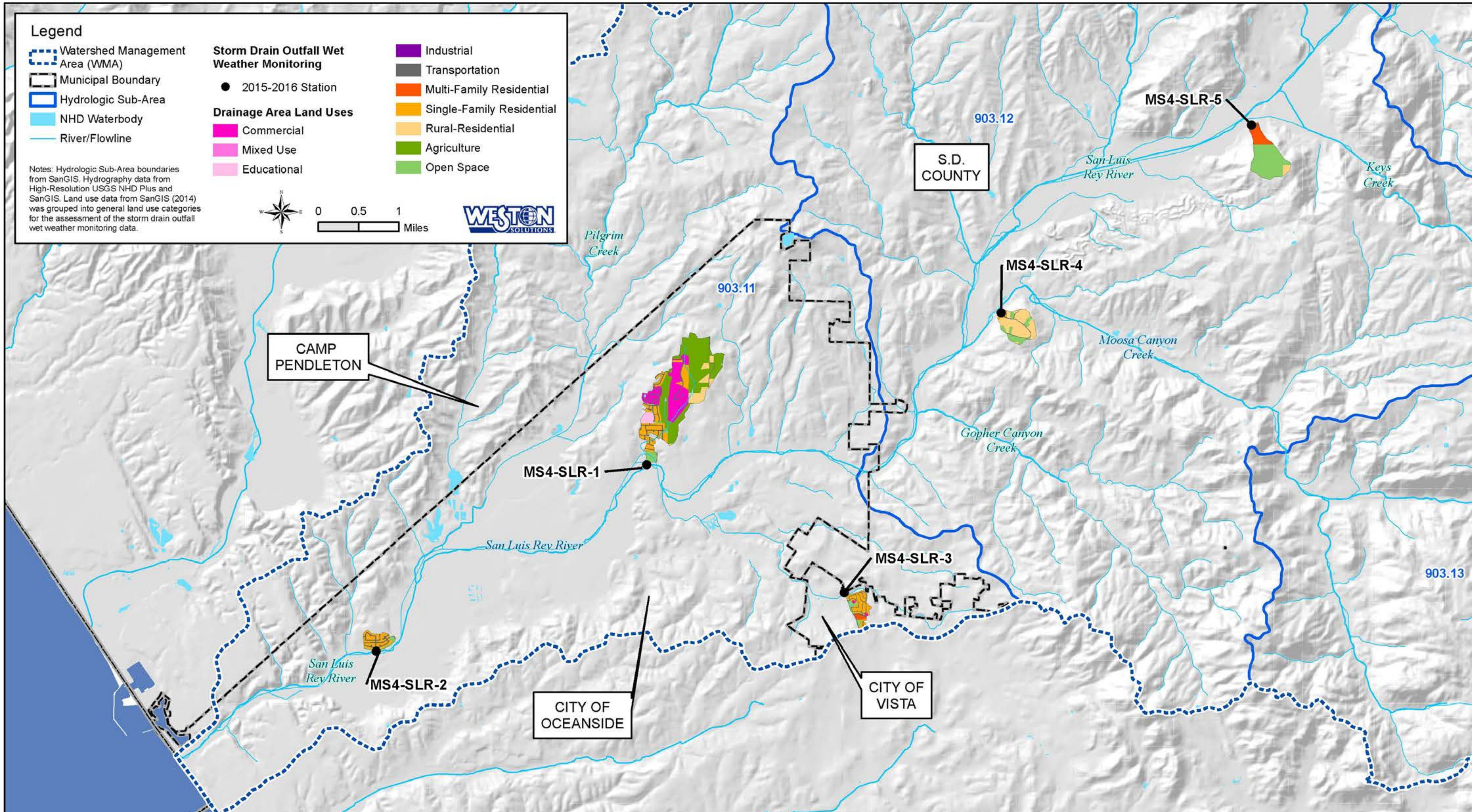

Figure A4-10. 2015-2016 Storm Drain Outfall Wet Weather Monitoring Locations and Drainage Areas in the San Luis Rey River WMA

Table A4-35. 2015-2016 Storm Drain Outfall Wet Weather Monitoring Analytical Results in the San Luis Rey River WMA

Analyte	Units	Single Sample Maximum[1]	Stormwater Action Level (SAL)[2]	MS4-SLR-1 (903.11)	MS4-SLR-2 (903.11)	MS4-SLR-3 (903.11)	MS4-SLR-4 (903.12)	MS4-SLR-5 (903.12)
				SLR-036	SLR-016	SLR-03	MS4-SLR-150	MS4-SLR-041
				1/5/2016	1/5/2016	1/31/2016	12/11/2015	1/31/2016
Bacteriological								
Enterococcus	MPN/100 mL	61		**100,000**	**32,000**	**11,000**	**350**	**2,200**
Fecal Coliform	MPN/100 mL	400		**34,000**	**4,400**	**800**	**500**	**2,400**
Total Coliform	MPN/100 mL			60,000	60,000	5,400	1,600	2,400
Physical Chemistry								
Dissolved Oxygen	mg/L			11.27	10.2	9.64	10.19	10.01
pH	pH units			8.2	9.39	6.79	7.8	8.2
Salinity	PPT			0.04	0.26	0.11	0.05	0.06
Specific Conductivity	µS/cm			94	511	238	105	129
Temperature	Celsius			9.61	13.9	15.81	14.5	15.36
Turbidity	NTU		126	14	15.3	35.5	85.9	**216.9**
General Chemistry								
Ammonia as N	mg/L			0.1	0.41	<0.10	0.36	0.19
Chloride	mg/L			21	26	92	12	15
Dissolved Phosphorus	mg/L			0.21	0.3	0.13	0.35	0.14
Nitrate/Nitrite as N	mg/L		2.6	0.695	1.442	1.021	0.68	2.135
Nitrate as N	mg/L			0.67	1.4	1	0.64	2.1
Nitrite as N	mg/L			0.025J	0.042J	0.021J	0.040J	0.035J
Orthophosphate as P	mg/L			0.23	0.34	0.17	0.39	0.17
Total Dissolved Solids	mg/L			100	120	340	84	170
Total Hardness	mg/L			57	48.8	156	46.8	149
Total Kjeldahl Nitrogen	mg/L			1	1.4	1.5	2.3	11
Total Nitrogen (calc.)	mg/L			1.70	2.84	2.52	2.98	13.14
Total Phosphorus	mg/L		1.46	0.39	0.36	0.28	0.64	**2.2**
Total Suspended Solids	mg/L			60	18	65	78	2,000
Total Metals								
Cadmium	µg/L		3	<0.1	<0.1	0.08J	0.045J	0.85
Copper	µg/L		127	6.3	6	15	25	41
Lead	µg/L		250	1.4	0.98	1.8	3.3	84
Selenium	µg/L			0.14J	0.15J	0.93	1	2.6
Zinc	µg/L		976	37	31	60	61	240
Dissolved Metals								
Cadmium	µg/L			<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	µg/L			<0.4	<0.4	0.96	<0.4	0.15J

[1] Single Sample Maximum Final Effluent Limitations from Table 6.2c. Regional Water Quality Control Board Order No. R9- 2013-0001, Attachment E.

[2] Storm Water Action Levels for Discharges from Storm Drain Outfalls to Receiving Waters, Table C-5. Regional Water Quality Control Board Order No. R9-2013-0001.

< - Results are less than the reporting limit.

J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Bold/shaded values do not meet Stormwater Action Levels.

4.2.6 *Storm Drain Outfall Wet Weather Monitoring Data Assessments*

Provision D.4.b.(2).(c) of the Permit requires the storm drain outfall wet weather monitoring data assessments summarized in Table A4-36. The information necessary to demonstrate compliance with each Provision is outlined in the following sections. In instances where compliance has been demonstrated in previous sections of this Annual Report, those sections are referenced.

Table A4-36. Storm Drain Outfall Wet Weather Monitoring Data Assessments

Assessment	Components	Provision(s)
WQIP Annual Report		
Estimate loads and volumes.	Calculate or estimate the average stormwater runoff coefficient for each land use type.	D.4.b.(2).(b)(i)(a)
	Calculate or estimate the volume of stormwater and pollutant loads discharged from each monitored storm drain outfall for each qualifying storm event.	D.4.b.(2).(b)(i)(b)
	Calculate or estimate the total volume and pollutant load discharged from the Copermittee's jurisdiction over the course of the wet season.	D.4.b.(2).(b)(i)(c)
	Calculate or estimate the percent contribution of stormwater volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major storm drain outfall or each major storm drain outfall for each qualifying storm event.	D.4.b.(2).(b)(i)(d)
	Identify necessary modifications to monitoring locations and frequencies necessary to identify pollutants in stormwater discharges.	D.4.b.(2).(b)(ii)
Evaluate WQIP analysis.	Using data and applicable SALs, evaluate and compare data collected to the analyses and assumptions used to develop the WQIP.	D.4.b.(2).(c)(ii)
	Evaluate whether analyses and assumptions should be updated as a component of the adaptive management efforts.	D.4.b.(2).(c)(ii)
Identify data gaps.	Identify data gaps in the monitoring data necessary to fulfill assessment requirements.	D.4.b.(2).(c)(iv)
Evaluate trends.	Evaluate data collected pursuant to D.2.c, incorporate new data into time-series plots for each long-term monitoring constituent and perform statistical trends analysis on cumulative long-term wet weather data set.	D.4.b.(2)(d)
Once during Permit Term		
Evaluate progress in achieving stormwater pollutant reductions.	Identify reductions and progress in achieving reductions from different land uses and/or drainage areas.	D.4.b.(2).(c)(iii)
	Assess the effectiveness of WQIP improvement strategies, with estimates of volume and load reductions attributed to specific strategies when possible.	
	Identify modifications necessary to increase the effectiveness of WQIP strategies.	

4.2.6.1 Provision D.4.b.(2)(b)

Provision D.4.b.(2)(c)(i) requires that the Copermittees continue to conduct the land-use based wet weather storm water outfall discharge monitoring assessment previously required by the transitional monitoring requirements of Provision D.4.b.(2)(b).

Since the wet weather storm drain outfall discharge monitoring station locations have not been modified, the general approach and land use data and groupings presented in the transitional monitoring and assessment report from the 2014-2015 monitoring year (WESTON, 2016a) are applicable to the 2015-2016 monitoring year. The technical approach and applicable equations can be found in the Transitional Wet Weather MS4 Monitoring Workplan (WESTON, 2015b). Assessment results are presented in detail by jurisdiction in Attachment 4G to this appendix. As more data are collected and incorporated into the assessment, the results are becoming increasingly representative of the variation in runoff coefficients and constituent concentrations associated with different land uses and wet weather conditions to generate a more robust prediction of jurisdictional loads based on land use.

Assessment results specific to 2015-2016 include pollutant volumes and loads at each outfall for the monitored event (Table A4-37) and for the monitoring year (Table A4-38). Updated land use event mean concentration (EMC) summary tables based on three monitoring years of data are included in the detailed assessment results provided as Attachment 4G to this Appendix.

In compliance with Provision D.4.b.(2)(b)(ii), the wet weather storm drain outfall discharge monitoring locations and frequencies were evaluated in order to identify recommended modifications that may be considered for implementation in the future. A review of the collective land use data associated with monitored storm drain outfall drainage areas was conducted to determine whether the WMA contains any categories of land use types not represented within the monitored storm drain outfall drainage areas. The results and recommendations were presented in the 2014-2015 Transitional Monitoring and Assessment Report submitted under the Permit (WESTON, 2016a) and remain unchanged since the monitored wet weather storm drain outfalls were the same during the 2014-2015 and 2015-2016 monitoring years.

The evaluation of monitoring frequency included a review of the monitoring data to determine how well the data from the single storm event monitored at each outfall represented the wet weather conditions on an annual basis. The total qualifying rainfall characterizing storms greater than 0.1 inch for 2015-2016 was 11.0 inches and 10.4 inches at the Oceanside and Fallbrook Alert precipitation stations, respectively. These rainfall values are comparable to the official regional rainfall average of 10.82 inches (Lindbergh Field). Wet weather events in the San Luis Rey River WMA were small to average in size, with rainfall totals of approximately 0.5 inch or less in 24 hours. A slightly higher frequency of wet weather days was recorded along the Pacific coastline compared to inland areas. At the Oceanside Alert station, three wet weather days had over one inch of recorded precipitation within 24 hours (September 15, 2015 and January 5-6, 2016); whereas, the Fallbrook Alert station only had two wet weather days (September 15, 2015 and January 5, 2016) with over one inch of recorded precipitation.

Table A4-37. 2015-2016 Wet Weather Storm Drain Outfall Discharge Pollutant Loads by Station for Monitored Event – San Luis Rey River WMA

Analyte	Units	SLR-036	SLR-016	SLR-03	MS4-SLR-150	MS4-SLR-041
		MS4-SLR-1	MS4-SLR-2	MS4-SLR-3	MS4-SLR-4	MS4-SLR-5
		(903.11)	(903.11)	(903.11)	(903.12)	(903.12)
Area	ac	480.79	43.84	57.34	95.15	125.83
Qualifying Measured Rainfall	in	1.2	1.2	0.55	0.28	0.68
Measured Outfall Runoff "C"		0.016	0.399	0.267	0.191	0.271
Event Volume	cf	33,644	76,181	30,585	18,516	84,099
Bacteriological						
Enterococcus	MPN	9.527E+11	6.903E+11	9.527E+10	1.835E+09	5.239E+10
Fecal Coliform	MPN	3.239E+11	9.492E+10	6.929E+09	2.622E+09	5.715E+10
Total Coliform	MPN	5.716E+11	1.294E+12	4.677E+10	8.389E+09	5.715E+10
General Chemistry						
Ammonia as N[1]	lbs	0.2100	1.950	0.0955	0.4161	0.9975
Chloride	lbs	44.11	123.7	175.7	13.87	78.75
Dissolved Phosphorus	lbs	0.4411	1.427	0.2482	0.4046	0.7350
Nitrate as N	lbs	1.407	6.658	1.909	0.7398	11.03
Nitrite as N	lbs	0.0525	0.1997	0.0401	0.0462	0.1838
Nitrate/Nitrite as N	lbs	1.460	6.858	1.949	0.7860	11.21
Orthophosphate	lbs	0.4831	1.6170	0.3246	0.4508	0.8925
Total Dissolved Solids	lbs	210.0	570.7	649.2	97.09	892.5
Total Hardness	lbs	119.7	232.1	297.9	54.10	782.3
Total Kjeldahl Nitrogen	lbs	2.100	6.658	2.864	2.659	57.75
Total Nitrogen (calculated)	lbs	3.560	13.516	4.813	3.445	68.96
Total Phosphorus	lbs	0.8191	1.712	0.5346	0.7398	11.55
Total Suspended Solids	lbs	126.0	85.60	124.1	90.16	10500
Total Metals						
Cadmium[1]	lbs	0.0001	0.0002	0.0002	0.0001	0.0045
Copper	lbs	0.0132	0.0285	0.0286	0.0289	0.2153
Lead	lbs	0.0029	0.0047	0.0034	0.0038	0.4410
Selenium	lbs	0.0003	0.0007	0.0018	0.0012	0.0137
Zinc	lbs	0.0777	0.1474	0.1146	0.0705	1.2600
Dissolved Metals						
Cadmium[1]	lbs	0.0001	0.0002	0.0001	0.0001	0.0003
Selenium[1]	lbs	0.0004	0.0010	0.0018	0.0002	0.0008

ac – acres in – inches cf – cubic feet MPN – most probable number lbs – pounds ND – not detected

Note 1: Where chemistry results were less than the RL, for load calculations purposes half the RL value was used for this constituent. Please refer to the 2015-2016 Wet Weather Storm Drain Outfall Discharge Monitoring Results Table for ND results.

Table A4-38. 2015-2016 Wet Weather Storm Drain Outfall Discharge Annual Pollutant Loads by Station for the San Luis Rey River WMA

Analyte	Units	SLR-036	SLR-016	SLR-03	MS4-SLR-150	MS4-SLR-041
		MS4-SLR-1	MS4-SLR-2	MS4-SLR-3	MS4-SLR-4	MS4-SLR-5
		(903.11)	(903.11)	(903.11)	(903.12)	(903.12)
Area	ac	480.80	43.80	57.30	95.20	125.80
Qualifying Measured Rainfall	in	10.99	10.99	10.44	10.44	10.44
Measured Outfall Runoff "C"		0.015	0.434	0.150	0.141	0.126
Annual Volume	cf	287,713	758,347	325,726	508,702	600,701
Bacteriological						
Enterococcus	MPN	8.147E+12	6.872E+12	1.015E+12	5.042E+10	3.742E+11
Fecal Coliform	MPN	2.770E+12	9.449E+11	7.379E+10	7.202E+10	4.082E+11
Total Coliform	MPN	4.888E+12	1.288E+13	4.981E+11	2.305E+11	4.082E+11
General Chemistry						
Ammonia as N[1]	lbs	1.796	19.41	1.017	11.43	7.125
Chloride	lbs	377.2	1231	1871	381.1	562.5
Dissolved Phosphorus	lbs	3.772	14.20	2.643	11.11	5.250
Nitrate as N	lbs	12.03	66.28	20.33	20.32	78.75
Nitrite as N	lbs	0.4490	1.988	0.4270	1.270	1.313
Nitrate/Nitrite as N	lbs	12.48	68.27	20.76	21.59	80.06
Orthophosphate	lbs	4.131	16.10	3.457	12.385	6.375
Total Dissolved Solids	lbs	1796	5681	6914	2668	6375
Total Hardness	lbs	1024	2310	3172	1486	5588
Total Kjeldahl Nitrogen	lbs	17.96	66.28	30.50	73.04	412.5
Total Nitrogen (calculated)	lbs	30.44	134.5	51.26	94.64	492.6
Total Phosphorus	lbs	7.005	17.04	5.694	20.32	82.50
Total Suspended Solids	lbs	1078	852.1	1322	2477	75000
Total Metals						
Cadmium[1]	lbs	0.0009	0.0024	0.0016	0.0014	0.0319
Copper	lbs	0.1132	0.2840	0.3050	0.7939	1.538
Lead	lbs	0.0251	0.0464	0.0366	0.1048	3.150
Selenium	lbs	0.0025	0.0071	0.0189	0.0318	0.0975
Zinc	lbs	0.6646	1.468	1.220	1.937	9.0000
Dissolved Metals						
Cadmium[1]	lbs	0.0009	0.0024	0.0010	0.0016	0.0019
Selenium[1]	lbs	0.0036	0.0095	0.0195	0.0064	0.0056

ac – acres   in – inches   cf – cubic feet   MPN – most probable number   lbs – pounds   ND – not detected

Note 1: Where chemistry results were less than the RL, for load calculations purposes half the RL value was used for this constituent. Please refer to the 2015-2016 Wet Weather Storm Drain Outfall Discharge Monitoring Results Table for ND results.

4.2.6.2 Provision D.4.b.(2)(c)[ii]

In addition to the land-based assessment presented in Section 4.2.6.1, the 2015-2016 monitoring year is the first requiring the additional assessments of Provision D.4.b.(2)(c)(ii-iv).

Provision D.4.b.(2)(c)(ii) requires the Copermittees to evaluate and compare data collected during 2015-2016 to the analyses and assumptions used to develop the WQIP and evaluate whether adaptive management is necessary for updates. The analytical results for samples collected at the five storm drain outfall wet weather monitoring locations in the San Luis Rey River WMA are summarized in Table A4-35 in Section 4.2.5. Results showed that indicator bacteria concentrations in wet weather discharges from all five monitored outfalls were above the single sample maximums specified in the Bacteria TMDL. The analyses and assumptions used to develop the WQIP resulted in the selection of bacteria as the HPWQC in the San Luis Rey River WMA and in the selection of the five outfalls monitored during wet weather. Because concentrations of indicator bacteria in wet weather discharges from each of these outfalls were above Bacteria TMDL targets, continued monitoring of these outfalls is consistent with the intentions of the WQIP and adaptive management for updates are not necessary at this time.

4.2.6.3 Provision D.4.b.(2)(c)[iii]

This Provision requires the Copermittees to review the data collected under the storm drain outfall wet weather monitoring program in order to identify pollutant reduction progress, assess water quality improvement strategy effectiveness, and identify modifications necessary to increase effectiveness. This assessment is required once during the Permit term and will be provided in the RMAR, which is scheduled for submittal to the Regional Board in December 2017.

4.2.6.4 Provision D.4.b.(2)(c)[iv]

No gaps have been identified in the monitoring data. Since the 2015-2016 monitoring year was the first year of monitoring under the WQIP MAP and the first year requiring the assessments outlined in Provision D.4.b.(2)(c)(ii-iii), the collection of additional data will be necessary before the Copermittees are able to identify data gaps.

4.2.6.5 Provision D.4.b.(2)(d)

This provision requires creation of time-series plots for long-term monitoring data collected under Provision D.2.c and a trend analysis on this cumulative long-term wet weather storm drain outfall discharge monitoring data set. This assessment will be addressed when sufficient data (i.e., at least three monitoring years are required for a statistical test) have been collected under the WQIP MAP.

4.3 Special Study Results

4.3.1 *San Diego Regional Reference Streams and Beaches Studies*

The Participating Agencies participated in the San Diego Regional Reference Streams and Beaches Studies from 2014 to 2016, which measured levels of indicator bacteria that account for natural sources to establish the background concentrations, or "reference conditions", for streams or beaches minimally disturbed by anthropogenic activities. This reference system approach results in allocation of allowable exceedance days based on frequencies of exceedance at reference sites with natural sources of bacteria. The results of these studies support the forthcoming re-evaluation of the Bacteria TMDL and numeric target development for future TMDLs. These studies were intended to provide data to support discussions of reasonable, accurate targets for indicator bacteria at Southern California streams and beaches.

4.3.1.1 Reference Streams Study

This study investigated concentrations of indicator bacteria, nutrients, metals, and conventional constituents occurring naturally at reference streams in minimally disturbed watersheds in Southern California during wet weather (during a storm and the three days following a storm) and dry weather conditions. Although additional constituents were analyzed, the main focus of the study was indicator bacteria. The study also sought to categorize exceedance frequencies for indicator bacteria by hydrologic, geomorphologic, biotic, and abiotic factors. Study questions included the following:

- How does the WQO exceedance frequency for indicator bacteria vary between wet weather, summer dry weather, and winter dry weather?
- How does indicator bacteria vary by stream landscape and site-specific factors, including:
  - Catchment size and geology?
  - Wet weather parameters such as size, timing of storm, and number of antecedent dry days?
  - Dry weather factors such as flow, stream physiochemical parameters (temperature, conductivity, and turbidity), chemical parameters (nutrients, organic carbon, metals, and conventional constituents) and trophic status, as measured by algal abundance?

The sampling locations selected for this study were chosen to meet reference screening criteria and represent varying watershed size and geology. Samples were collected during eight storm events at five locations, and dry weather samples were collected weekly at 10 intermittent stream locations in 10 watersheds in Southern California. Five locations were in San Diego County, three were in Orange County, and two were in Ventura County. In addition to indicator bacteria analysis, samples were collected biweekly and analyzed for nutrients, metals, and conventional constituents. Samples were also analyzed for the presence of human genetic marker in order to eliminate locations with potential human sources of fecal bacteria. The chosen "reference" streams had drainage areas that were at least 95% undeveloped, were relatively homogenous geologically, had year round flow or at least prolonged dry weather flow, did not include drainage areas affected by wildfires, were not included on the 303(d) list, and had no evidence of anthropogenic effects. Findings from the study included the following:

- Indicator bacteria concentrations measured during the study were generally below WQOs except for *Enterococcus*, and exceedance frequencies were highest during summer dry weather.
- Wet weather EMC exceedance frequencies were low except for *Enterococcus*. The number of events was not sufficient to determine whether relationships exist between exceedance frequencies and watershed size and/or geology.
- Temperature was the major factor associated with elevated summer dry weather concentrations of indicator bacteria, although TSS, nutrients, and organic carbon were

also positively correlated. No significant relationships between indicator bacteria concentrations and watershed size or geology were observed during dry weather.
- EMC fluxes (flux was calculated as the ratio of mass loading and watershed area) during wet weather were two to three times greater than during dry weather and were comparable to those described in previous studies.

Results are presented in greater detail in the Technical Report (Tiefenthaler et al., 2015, which is provided as Attachment 4H to this appendix.

4.3.1.2 Reference Beaches Study

The reference beaches study investigated concentrations of indicator bacteria occurring naturally at reference beaches during a period of prolonged drought. The goals of this study included the following:

- Quantify concentrations and exceedance frequencies for indicator bacteria at reference beaches during wet and dry weather (natural, background conditions), while evaluating the presence of human genetic marker to determine whether samples were contaminated by human sources.
- Quantify concentrations and exceedance frequencies for indicator bacteria at the associated, minimally-impacted estuary.

The chosen "reference" beaches had minimal human impact with open beaches and breaking waves, received freshwater runoff from a beach or estuary, and received runoff originating from undeveloped watersheds with over 93% open space. The two sites meeting these criteria were San Onofre Creek in San Diego County, which has an associated bar-built estuary, and Deer Creek in Los Angeles County, which has an associated mixing zone. Weekly dry weather sampling was conducted at both locations, and wet weather sampling was conducted over four days for one event at San Onofre Creek (only one storm event breached the creek mouth). Samples during each event were collected at the beach, creek, and the respective estuary or mixing zone. Findings from the study included the following:

- Indicator bacteria concentrations and exceedance frequencies during both winter and summer dry weather were low at both monitored beaches. This is consistent with results from previous studies of beaches with blocked estuary inlets or beaches with flowing creeks and no estuary.
- Indicator bacteria concentrations in the estuary or mixing zone associated with both beaches were one to three orders of magnitude greater than those at the corresponding beach, and were higher at San Onofre Creek than Deer Creek. Exceedance frequencies were also higher in the estuary associated with San Onofre Creek compared to the mixing zone associated with Deer Creek. This suggests that dry weather exceedance frequencies may have been greater if the estuary had been open to tidal exchange.
- At both study locations, no significant relationships between indicator bacteria and water temperature, salinity, or antecedent dry days were observed, but indicator bacteria concentrations decreased with the number of antecedent dry days at the San Onofre Creek beach and increased with the number of antecedent dry days in the associated

estuary. Significant positive correlations were found between total coliform concentrations and water temperature, salinity, and antecedent dry days and between *E. coli* and fecal coliform and salinity in the estuary associated with San Onofre Creek. This indicates that freshwater input from the creek dilutes bacteria concentrations. Regrowth of bacteria may have been a factor at this estuary.

- During the single monitored storm event, indicator bacteria exceedances were common in the San Onofre Beach creek and estuary samples, but exceedances were only observed at the beach on the day of the storm. Because all samples associated with this storm event were positive for human genetic marker, results could not be used to determine natural background exceedance frequencies. However, positive human marker results were rare throughout the study overall, indicating that the study locations may be suitable reference sites.

Results are presented in greater detail in the Technical Report (Tiefenthaler et al., 2016), which is provided as Attachment 4I to this appendix.

4.3.2 *San Luis Rey River Microbial Source Tracking Study*

A dry weather microbial source tracking (MST) study was conducted in the San Luis Rey River Watershed consisting of a preliminary outfall investigation, a storm drain network investigation, and an evaluation of potential remedial activities. Preliminary findings were reported in December 2015. These findings are summarized below and are provided as Attachment 4J to this appendix.

The preliminary outfall investigation involved inspections and sampling of storm drain outfalls in the sewered portions of the unincorporated area of San Diego County within the San Luis Rey River Watershed. Of the 130 outfalls investigated, 14 were flowing and were sampled. Human marker was detected at quantifiable levels in samples from three of these 14 flowing outfalls (human marker was detected at a level below the quantification limit at one additional outfall). In addition, dog marker was found in samples from four outfalls, and pig and ruminant markers were found in one sample. Concentrations of fecal coliform and/or *Enterococcus* were above WQOs in all but one sample.

The storm drain network investigation involved water sampling for outfalls positive for human marker during the preliminary outfall investigation and visual observations for all outfalls flowing during the preliminary outfall investigation. During the storm drain network investigation, indicator bacteria results were elevated in all water samples, but none were positive for genetic markers. Several sources of non-stormwater flow and bacteria were observed, but no potential human sources of bacteria were identified in the vicinity of flowing outfalls. In addition, no illicit connections or leaks were observed during the storm drain network investigation. Irrigation runoff was identified as the most common source of non-stormwater flow, and agriculture discharge was identified as the largest contributor to flow volume.

The evaluation of potential remedial activities resulted in prioritization of several actions to achieve compliance with the Permit during dry weather. These actions included notifying agricultural owners of their pollutant contributing flows and discussing compliance approaches with the Conditional Waiver of Discharges from Agricultural and Nursery Operations, implementing source control measures (e.g., public outreach, ordinance development and enforcement, wildlife access restriction devices, and storm drain cleaning), evaluating the effectiveness of source control measures and identifying remaining flowing outfalls requiring additional remediation, and eliminating remaining non-stormwater flows using structural BMPs (e.g., wet weather BMPs recommended in the San Luis Rey Comprehensive Load Reduction Plan [CLRP], pervious gutters, catch basin drywells, and green street-type bioretention swales).

Results from this preliminary MST study will be used to support Permit compliance and Bacteria TMDL implementation planning, and may potentially serve as the first step in future Natural Source Exclusion and/or Quantitative Microbial Risk Assessment (QMRA) work. "Next steps" identified in the preliminary MST investigation report include:

- Conduct follow-up outfall investigations.
- Investigate whether recycled water tests positive for human genetic markers, and determine which outfalls may contribute recycled water.
- Conduct the dry weather MST study in the septic served areas of the County of San Diego's jurisdiction in the San Luis Rey watershed.
- Continue to implement special studies that may potentially modify TMDL WQBELs during the TMDL reopener.
- Notify agriculture owners of their pollutant contributing flows and discuss compliance approaches with the Conditional Waiver of Discharges from Agricultural and Nursery Operations.
- Enhance source control measures.
- Develop an ongoing study evaluating the effectiveness of source control measures and monitoring the presence of non-stormwater flows.

The Dry Weather MST Study Preliminary Findings Report, which presents additional detail and presents results specific to each monitored outfall, is provided as Attachment 4J.

4.3.3 *Special Studies Assessments*

Provision D.4.c of the Permit requires an annual evaluation of special studies results to assess their relevance to the Participating Agencies' characterization of receiving water conditions, understand sources of pollutants and/or stressors, and control and reduce the discharges of pollutants from the storm drain outfalls to receiving waters. This Provision also requires the Participating Agencies to identify modifications and/or updates to the WQIP that are necessary based on special study results.

Results from the special studies outlined above supplement the bacteria data collected under Provisions D.1 (receiving water) and D.2 (storm drain outfalls). Results from these studies may be used in conjunction with data from other studies in re-assessing numeric targets related to bacteria. The Regional Reference Streams and Beaches Study provides a scientific basis for updating the "reference" conditions to be considered in evaluating compliance levels in the Bacteria TMDL, and will be useful in the re-evaluation of the Bacteria TMDL. The San Luis Rey River MST study will be used to support Permit compliance and Bacteria TMDL implementation planning, and may potentially serve as the first step in future Natural Source Exclusion and/or QMRA work. Once these re-evaluations occur, adaptive management may be utilized to modify the priorities of the WQIP.

4.4 Action Levels

The action levels for storm drain outfall samples utilized to evaluate the data collected in the San Luis Rey River WMA are presented in Table A4-39. Suggested analytical methods and reporting limits are presented in Attachment 4A-5d to the WQIP MAP.

Table A4-39. Action Levels for the San Luis Rey River WMA – Storm Drain Outfalls

Analyte	Benchmark Reference	Units	Action Level(s)				Notes
Non-Stormwater Action Levels for Discharges from Storm Drain Outfalls to Ocean Surf Zone							
			AMAL		IM		
Total coliform	Ocean Plan	MPN/100 mL	1000		10,000/1,000		For IM, total coliform density NAL is 1,000 MPN/100 mL when the fecal/total coliform ratio exceeds 0.1.
Fecal coliform	Ocean Plan	MPN/100 mL	200		400		For AMAL, fecal coliform density NAL is 200 MPN/100 mL during any 30 day period.
Enterococcus	Ocean Plan	MPN/100 mL	35		104		IM value has been set to the Basin Plan WQO for saltwater "designated beach areas".
Non-Stormwater Action Levels for Discharges from Storm Drain Outfalls to Bays, Harbors, and Lagoons/Estuaries							
			AMAL		IM		
Turbidity	Ocean Plan	NTU	75		225		
pH	Ocean Plan	Units	Within limit of 6.0-9.0 at all times				
Fecal coliform	Basin Plan	MPN/100 mL	200		400		AMAL is based on a minimum of not less than five samples for any 30-day period. For IM, the NAL is reached if more than 10 percent of the total samples exceed 400 MPN/100 ml during any 30 day period.
Enterococcus	Basin Plan	MPN/100 mL	35		104		IM value has been set to the Basin Plan WQO for saltwater "designated beach areas" and is not applicable to water bodies that are not designated with water contact recreation (REC-1) beneficial use.
Non-Stormwater Action Levels for Discharges from Storm Drain Outfalls to Inland Surface Waters							
			AMAL	MDAL	IM		
Dissolved Oxygen	Basin Plan	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters				
Turbidity	Basin Plan	NTU	-	20	See MDAL		
pH	Basin Plan	Units	Within limit of 6.5-8.5 at all times				
Fecal Coliform	Basin Plan	MPN/100 mL	200	-	400		AMAL is based on a minimum of not less than five samples for any 30-day period. For IM, the NAL is reached if more than 10 percent of total samples exceed 400 MPN/100 mL during any 20 day period.
Enterococcus	Basin Plan	MPN/100 mL	33	-	61		IM value has been set to the Basin Plan WQO for saltwater "designated beach areas" and is not applicable to water bodies that are not designated with water contact recreation (REC-1) beneficial use.
Total Nitrogen	Basin Plan	mg/L	-	1	See MDAL		
Total Phosphorus	Basin Plan	mg/L	-	0.1	See MDAL		
MBAS	Basin Plan	mg/L	-	0.5	See MDAL		
Iron	Basin Plan	mg/L	-	0.3	See MDAL		
Manganese	Basin Plan	mg/L	-	0.05	See MDAL		
Non-Stormwater Action Levels for Priority Pollutants							
			Freshwater		Saltwater		
			AMAL	MDAL	AMAL	MDAL	
Cadmium	CTR	µg/L	**	**	8	16	
Copper	CTR	µg/L	*	*	2.9	5.8	See footnote.
Chromium III	CTR	µg/L	**	**	-	-	
Chromium VI	CTR	µg/L	8.1	16	41	83	
Lead	CTR	µg/L	*	*	2.9	14	See footnote.

Table A4-39. Action Levels for the San Luis Rey River WMA – Storm Drain Outfalls

Analyte	Benchmark Reference	Units	Action Level(s)				Notes
Nickel	CTR	µg/L	**	**	6.8	14	See footnote.
Silver	CTR	µg/L	*	*	1.1	2.2	See footnote.
Zinc	CTR	µg/L	*	*	47	95	See footnote.
Stormwater Action Levels							
Turbidity	Order No. R9-2013-0001	NTU	126				
Nitrate & Nitrite (Total)	Order No. R9-2013-0001	mg/L	2.6				
Phosphorus (Total P)	Order No. R9-2013-0001	mg/L	1.46				
Cadmium (Total Cd) †	CTR	µg/L	3				See footnote.
Copper (Total Cu) †	CTR	µg/L	127				See footnote.
Lead (Total Pb) †	CTR	µg/L	250				See footnote.
Zinc (Total Zn) †	CTR	µg/L	976				See footnote.

* Action levels designated on a case by case basis.

** Action levels designated on a case by case basis, but calculated criteria are not to exceed MCLs under the CCR, Title 22, Division4, Chapter 15, Article 4 Section 64431.

The cadmium, Copper, Chromium (III), Lead, Nickel, Silver, and Zinc NALs for storm drain outfall discharges to freshwater receiving waters will be developed on a case-by-case basis on site-specific water quality data (receiving water hardness). For these priority pollutants, refer to 40 CFR 131.38(b)(2).

† Sampling must include a measure of receiving water hardness at each storm drain outfall. If a total metal concentration exceeds the corresponding metals SAL in the table, that concentration must be compared to the CTR and the USEPA 1-hour maximum concentration for the detected level of RW hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific metal exceeds that SAL, but does not exceed the applicable USEPA 1-hr maximum concentration criterion for the measured level of hardness, then the sample result will not be considered above the SAL for that measurement.

4.5 California Environmental Data Exchange Network Data Upload and Retrieval

Provision F.4.a.(6) of the Permit requires that monitoring data collected pursuant to Provision D (Monitoring and Assessment Program Requirements) must be uploaded to the CEDEN, a central location for finding and sharing information about California's waterbodies. CEDEN aggregates water quality, aquatic habitat, and wildlife health data and makes them accessible in downloadable forms at www.ceden.org.

Data in the CEDEN are searchable by date and by location, project, station, or parameter using the "Find Data" functionality of the CEDEN website. The data from the San Diego Region Copermittee Program can be retrieved by identifying the Program as "National Pollutant Discharge Elimination System (NPDES) Program" and Project as "San Diego Region NPDES", which is the parent Project name. Within this overall retrieval, the specific datasets described in this Annual Report can be identified using the project names listed in Table A4-40. Data are limited to those parameters that are currently storable in CEDEN (CEDEN does not currently accept calculated values, and therefore CSCI values cannot be submitted). SMC data are submitted to the SMC Program.

In accordance with the Permit, data collected during the 2015-2016 monitoring year will be submitted to CEDEN by January 31, 2017, and will become available from CEDEN once loaded by the Regional Data Center into the system during 2017. CEDEN data submittals and receipts are provided as Attachment K to this appendix.

Table A4-40. Project Names for CEDEN Data Retrieval

Project Code	Project Name
BacteriaTMDL_SLR	San Luis Rey River Bacteria TMDL Monitoring Program
MS4_WW_OFM	Wet Weather MS4 Outfall Monitoring
MS4_DW_OFSM	Dry Weather MS4 Outfall Field Screening and Discharge Monitoring
NPDES_RWM	NPDES Receiving Water Monitoring

Appendix 4 Monitoring and Assessment Results

Attachments: Provided Separately

Attachment A – SMC Regional Monitoring Program Data

Attachment B – Bacteria TMDL Monitoring Report

Attachment C – Microbial Source Tracking

Attachment D – Dry Weather Field Screening Data

Attachment E – Dry Weather Storm Drain Outfall Assessment

Attachment F – Wet Weather Storm Drain Outfall Flow Data

Attachment G – Wet Weather Storm Drain Outfall QA/QC Report

Attachment H – Wet Weather Storm Drain Outfall Assessment

Attachment I – Reference Streams Study

Attachment J – Reference Beaches Study

Attachment K – Wet Weather Epidemiology Study

Attachment L – CEDEN Data Submittals and Receipts

APPENDIX 5

Adaptive Management/Modifications

Appendix 5 Adaptive Management/Modifications

5.1 TRIGGERS FOR ADAPTIVE MANAGEMENT

The adaptive management process may include modifications to the priority water quality conditions, numeric goals, strategies, and schedules, and/or to the monitoring and assessment program outlined in the Water Quality Improvement Plan (WQIP). This appendix contains analyses and information in support of the adaptive management process. With the acceptance of the WQIP in February 2016, the Participating Agencies have been officially implementing the WQIP for less than a year. Therefore, it is too early in the implementation process to have significant feedback necessary to drive the adaptive management process. Only one year of monitoring data have been collected under the WQIP Monitoring and Assessment Plan (MAP), and additional monitoring years under the Permit term are necessary for feasible evaluation of the effectiveness of jurisdictional strategies. Minor modifications to the descriptions of strategies and schedules are provided in Appendix 2. No significant modifications to the MAP are warranted based on data collected during the 2015-2016 monitoring year. The results of the Permit-required assessments of these data are presented in Appendix 4.

5.1.1 Routine Monitoring Results

Results from routine monitoring programs may trigger updates to the WQIP, potentially prompting additions or changes to the strategies that are implemented. The evaluation of monitoring results occurs at two levels:

(1) comparison to receiving water limitations and determination of the influence of storm drain outfall discharges to any persistent exceedances, and
(2) comparison of dry and wet weather storm drain outfall discharge data to non-stormwater action levels (NALs) and stormwater action levels (SALs).

5.1.1.1 Receiving Water Limitations

The primary focus of this assessment is on conditions within receiving waters and their relationship to storm drain outfall discharges. An assessment methodology to determine whether discharges from storm drain outfalls are potentially sources of pollutants "causing or contributing" to "persistent" receiving water exceedances is currently being developed, and the results of the assessment will be presented in the San Luis Rey River Watershed Management Area (WMA) chapter of the Regional Monitoring and Assessment Report (RMAR) to be submitted with the Report of Waste Discharge (ROWD) in December 2017. Long-term receiving water monitoring, required once during the Permit cycle, has not yet not been conducted at the Long-term monitoring station in the WMA (SLR-MLS), which has been dry for the past two monitoring years. Therefore, the trigger for adaptive management pertaining to receiving water exceedances would be more appropriately addressed after the collection of the long-term monitoring data, but will be addressed regardless of the availability of new data in the next report deliverable, the RMAR, which is due prior to the 2016-2017 WQIP Annual Report.

5.1.1.2 Exceedances of NALs and/or SALs

The primary focus of this assessment is on exceedances of NALs or SALs in discharges from the storm drain system during dry and wet weather, respectively. NALs and SALs are incorporated into the WQIP in order to:

(1) support the development and prioritization of water quality improvement strategies,
(2) assess the effectiveness of the water quality improvement strategies, and
(3) support the detection and elimination of non-stormwater and illicit discharges to the storm drain system (NALs only).

Appendix 4 includes the results of the dry and wet weather storm drain outfall discharge monitoring programs and compares the data to applicable NALs or SALs included in Provision C of the Permit. A summary of these results is presented in Table A5-1, and the locations of the highest priority storm drain outfall dry weather monitoring locations and storm drain outfall wet weather monitoring locations are shown in Appendix 4 in Figures A4-5 and A4-10, respectively. Repeated exceedances for constituents that are not currently addressed by the WQIP may indicate that these constituents warrant further consideration. During the 2015-2016 monitoring year, the NALs most often exceeded in the San Luis Rey River WMA were consistent with those identified by the WQIP as priority water quality conditions, with the exception of iron and manganese.

The comparison of the storm drain outfall monitoring results to NALs and SALs may also be used to guide the adaptation of strategies. If the jurisdictional strategies outlined in Section 4 result in reductions in pollutant loads from outfalls with discharges in exceedance of NALs or SALs, an assessment of the effectiveness of these strategies could be made. To date, only one year of monitoring data have been collected in accordance with the MAP, and the Participating Agencies in the WMA have just begun to implement their jurisdictional strategies under the accepted WQIP intended to result in achievement of dry and wet weather interim goals for the term of the current Permit (see Annual Report Section 4). Additional data will be necessary before an assessment of the effectiveness of these strategies can be made.

Table A5-1. Exceedances of NALs and SALs during the 2015-2016 Monitoring Year in the San Luis Rey River WMA

Constituent	Outfalls with NAL Exceedances	Outfalls with SAL Exceedances[3,4]
Fecal Coliform[1]	MS4-SLR-150, MS4-SLR-152, SLR-025, SLR-036, SLR-03	MS4-SLR-041, MS4-SLR-150, SLR-016, SLR-036, SLR-03
Enterococcus[1]	MS4-SLR-095, MS4-SLR-150, MS4-SLR-152, MS4-SLR-155, SLR-025, SLR-036, SLR-03	MS4-SLR-041, MS4-SLR-150, SLR-016, SLR-036, SLR-03
Turbidity[1,2]	MS4-SLR-095, MS4-SLR-150, SLR-03	None
pH[1]	None	N/A
Cadmium[1,2]	None	None
Copper[1,2]	SLR-036	None
Chromium VI[1]	None	N/A
Lead[1,2]	None	None
Zinc[1,2]	None	None
Dissolved Oxygen[1]	MS4-SLR-095, MS4-SLR-150	N/A
Total Nitrogen[1]	MS4-SLR-095, MS4-SLR-150, MS4-SLR-152, MS4-SLR-155, SLR-025, SLR-036, SLR-03	N/A
Total Phosphorus[1]	MS4-SLR-095, MS4-SLR-150, MS4-SLR-152, MS4-SLR-155, SLR-025, SLR-036, SLR-01, SLR-03	N/A
MBAS[1]	None	N/A
Iron[1]	MS4-SLR-095, MS4-SLR-150, MS4-SLR-152, SLR-01, SLR-03	N/A
Manganese[1]	MS4-SLR-095, MS4-SLR-150, MS4-SLR-155, SLR-025, SLR-036, SLR-01, SLR-03	N/A
Nitrate + Nitrite (total)[2]	N/A	None
Phosphorus (Total P)[2]	N/A	MS4-SLR-041

N/A = not applicable. No NAL or SAL in Provision C.
1. Applicable to non-stormwater discharges from storm drain outfalls to inland surface waters.
2. Applicable for discharges of stormwater from storm drain outfalls to receiving waters.
3. Exceeds Single Sample Maximum Final Effluent Limitations (Bacteria TMDL).
4. Outfall station names shown are the Jurisdictional ID.

5.1.1.3 Special Studies Results

As part of the MAP, the Participating Agencies are engaged in special studies related to the highest priority water quality condition (HPWQC) for the watershed (i.e., bacteria). Results from the special studies outlined in Annual Report Section 3.3 and Appendix 4 Section 4.3 supplement the bacteria data collected under Provisions D.1 (receiving water) and D.2 (storm drain outfalls). As relevant data, conclusions, and lessons learned become available from these studies, the numeric goals, strategies, schedules, and the MAP may be impacted and may require modification. Additionally, lessons learned and study results from outside the watershed, especially those related to the bacteria impairments, may also be incorporated into the WQIP.

The Regional Reference Streams and Beaches Study provides a scientific basis for updating the "reference" conditions to be considered in evaluating compliance levels in the Bacteria Total Maximum Daily Load (TMDL), and will be useful in the re-evaluation of the Bacteria TMDL. The San Luis Rey River MST study will be used to support Permit compliance and Bacteria TMDL implementation planning, and may potentially serve as the first step in future Natural Source Exclusion and/or QMRA work. Once these re-evaluations occur, adaptive management may be utilized to modify the WQIP.

5.1.2 Regulatory Considerations

The purpose of this section is to summarize changes in the regulatory landscape including:

(1) new regulatory actions at the State or local level, and

(2) Regional Board recommendations that must be considered as part of the adaptive management process.

5.1.2.1 New Regulatory Actions

When new regulations or policies are adopted that impact watershed planning and implementation processes, modifications to the WQIP numeric goals, strategies, schedules, and/or MAP may be warranted, and, in some cases, required. For example, an update to the WQIP must be initiated no later than six months following approval of a TMDL Basin Plan Amendment by the Office of Administrative Law and the United States Environmental Protection Agency (USEPA). The trigger applies to TMDLs containing wasteload allocations assigned to Participating Agencies within the watershed during the term of the Order (see Provision F.2.c.(2)). Other examples of regulatory drivers that may trigger modifications to the WQIP include new state policies or plans (e.g., trash, toxicity, biological objectives, bacteria standards updates) and changes resulting from modifications to existing Permit requirements (e.g., as a result of revising a TMDL).

5.1.2.2 Regional Board Recommendations

In cases where the Regional Board makes recommendations for modifications to the WQIP or Jurisdiction Runoff Management Program (JRMP), these recommendations must be considered as part of the adaptive management process. No such recommendations were made during the 2015-2016 monitoring year.

5.1.3 Program Effectiveness Assessments/Progress Toward Numeric Goals

Strategies developed within the WQIP have been incorporated into Participating Agencies' monitoring programs through implementation of their JRMPs. Each Participating Agency is implementing programs that are focused on addressing bacteria in the watershed. As strategy implementation progresses, periodic refinements to the programs may provide additional focus on the specific water quality issues identified in the WQIP. Participating Agencies utilize various assessment methods to determine which program refinements are effective and which are not. In some cases, the program effectiveness assessment results may provide useful information leading to adaption of elements of the WQIP. Where new information is applicable and available, it may be used to modify numeric goals, strategies, schedules, and the MAP.

At this time, only one year of data have been collected in accordance with the MAP, and strategy implementation under the WQIP, accepted in February 2016, was less than a year. Initial results related to program effectiveness (Annual Report Section 4.2) indicate that the Participating Agencies have made progress towards achieving each of their dry and wet weather interim goals for the current Permit term and, in most cases, they are on track to achieve the identified goals during the Permit term. Additional data from subsequent monitoring years will be necessary to supplement this data before evaluations leading to adaptive management actions are feasible and modifications to strategies considered.

5.2 ADAPTIVE MANAGEMENT - CHANGES TO WATER QUALITY IMPROVEMENT PLAN ELEMENTS

The potential triggers that may result in adaptive management of the San Luis Rey River WMA WQIP's numeric goals, strategies, schedules, and/or MAP are outlined in Section 5.1. In general, priority and highest priority water quality conditions and numeric goals are established based on longer periods of record compared to a monitoring year and their assessment would most appropriately be conducted following the collection of sufficient data to make scientifically-based decisions. At earliest, such consideration may be given during the preparation of the ROWD, which is due to the Regional Board in December 2017.

The 2015-2016 monitoring year was the first under the accepted WQIP and MAP. As outlined in Section 5, receiving water and storm drain outfall discharge monitoring results from 2015-2016 support the identified priority and highest priority water quality conditions as provided in the WQIP, and no modifications are necessary at this time.

On an annual schedule, it is more likely that modifications may be made to strategies and implementation schedules. These are elements that may require updates on a more frequent basis to ensure effective implementation and assessment as the WQIP progresses. The information that may be used to modify these elements of the WQIP through adaptive management is summarized in Table A5-2. While one year of monitoring data have been collected in accordance with the MAP of the WQIP, only a few months of this time period have been under the accepted WQIP and implementation. The Participating Agencies in the WMA began planning and implementing their jurisdictional strategies intended to result in achievement of dry and wet weather interim goals for the term of the current Permit. Sufficient information is not yet available to warrant adaptive management of the water quality strategies and schedules. Collection of additional data will be necessary to supplement this data before the combined data set can be evaluated and adaptive management considered. Proposed minor clarifications to two strategies are shown in the jurisdictional strategy tables in Appendix 2 as markup.

Table A5-2. Information Used to Modify Strategies and Schedules

Evidence	WQIP Sections	2015-2016 Status	Adaptive Management Required after 2015-2016? (Y/N)
Receiving water monitoring results.	Section 3, Appendix 4	No new information pertaining to receiving water exceedances not addressed by the WQIP.	N
Storm drain outfall monitoring results.	Section 3, Appendix 4	NAL and SAL exceedances are consistent with WMA priority constituents.	N
Special studies results.	Section 3, Appendix 4	Data from these studies will be useful for the re-evaluation of the Bacteria TMDL and to facilitate consideration of site-specific water quality criteria for bacteria.	N
New or updated regulations.	Section 5	No new regulatory drivers; adaptive management will be required as new TMDLs are approved and as the Trash Amendments are incorporated into the Permit.	N
Program effectiveness assessments.	Section 5	Additional data will be necessary to supplement 2015-2015 data before program effectiveness can be evaluated.	N
Progress towards achieving numeric goals.	Section 4	Initial results related to program effectiveness indicate that the Participating Agencies have made progress towards achieving each of their dry and wet weather interim goals for the current Permit term.	N

In addition to the strategies and schedules, it is also feasible that updates to the MAP may be necessary more often than priority water quality conditions and numeric goals and schedules. Changes to the MAP may be triggered by several factors including:

- Modifications to other elements of the WQIP, including priority water quality conditions, numeric goals and schedules, and/or strategies and schedules.
- Identification of data gap through the required assessments under Provision D.4.
- Results of special studies.
- Requests/requirements from the Regional Board.

None of these triggers are applicable to the 2015-2016 monitoring year, and adaptive management of the MAP is not required at this time. Modifications have been made to the outfall priorities for dry weather monitoring due to highest priority outfalls becoming dry. The baseline for the wet weather watershed goals for Lower San Luis Rey River WMA was revised to both correct the calculation and refine the methodology. This resulted in a lower baseline from which reductions will be measured, requiring lower monitored loads to demonstrate load reductions. Additional assessments are planned for the ROWD, including evaluation monitoring data and receiving water limitations.

DECLARATION OF SERVICE BY EMAIL

I, the undersigned, declare as follows:

I am a resident of the County of Sacramento and I am over the age of 18 years, and not a party to the within action. My place of employment is 980 Ninth Street, Suite 300, Sacramento, California 95814.

On March 29, 2024, I served the:

- **Current Mailing List dated March 28, 2024**
- **Notice of Waiver of Procedural Requirements, Extension Request Approval, and Postponement of Hearing issued March 29, 2024**
- **Claimants' Comments on the Draft Proposed Decision and Parameters and Guidelines (Volumes 1-14) filed February 20, 2024**

  San Diego Regional Water Quality Control Board Order No. R9-2007-0001, Permit CAS0108758, Parts D.3.a.(3)(b)(iii), D.5.a.(1), D.5.a.(2), D.5.b.(1)(a), D.5.b.(1)(b)(iii-vi), D.5.b.(1)(c), D.5.b.(1)(d), D.5.b.(2), D.5.b.(3), E.2.f., E.2.g., F.1., F.2., F.3., I.1., I.2., I.5., J.3.a.(3)(c)(iv)-(viii), (x)-(xv), the first sentence of L.1. as it applies to the newly mandated activities, and L.1.a.(3)-(6), 07-TC-09-R County of San Diego, Cites of Carlsbad, Del Mar, Imperial Beach, Lemon Grove, Poway, San Marcos, Santee, Solana Beach, Chula Vista, Coronado, Del Mar, El Cajon, Encinitas, Escondido, Imperial Beach, La Mesa, Lemon Grove, National City, Oceanside, San Diego, and Vista, Claimants

by making it available on the Commission's website and providing notice of how to locate it to the email addresses provided on the attached mailing list.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed on March 29, 2024 at Sacramento, California.

Jill Magee

Jill Magee
Commission on State Mandates
980 Ninth Street, Suite 300
Sacramento, CA 95814
(916) 323-3562

COMMISSION ON STATE MANDATES

Mailing List

Last Updated: 3/28/24

Claim Number: 07-TC-09-R

Matter: San Diego Regional Water Quality Control Board Order No. R9-2007-0001 Permit CAS0108758 Parts D.1.d.(7)-(8), D.1.g., D.3.a.(3), D.3.a.(5), D.5, E.2.f, E.2.g, F.1, F.2, F.3, I.1, I.2, I.5, J.3.a.(3)(c)iv-viii & x-xv, and L.

Claimants: City of Carlsbad
City of Chula Vista
City of Del Mar
City of Encinitas
City of Escondido
City of Imperial Beach
City of La Mesa
City of Lemon Grove
City of National City
City of Oceanside
City of Poway
City of San Diego
City of San Marcos
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City of Solana Beach
City of Vista

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Each commission mailing list is continuously updated as requests are received to include or remove any party or person on the mailing list. A current mailing list is provided with commission correspondence, and a copy of the current mailing list is available upon request at any time. Except as provided otherwise by commission rule, when a party or interested party files any written material with the commission concerning a claim, it shall simultaneously serve a copy of the written material on the parties and interested parties to the claim identified on the mailing list provided by the commission. (Cal. Code Regs., tit. 2, § 1181.3.)

Adaoha Agu, *County of San Diego Auditor & Controller Department*
Projects, Revenue and Grants Accounting, 5530 Overland Avenue, Ste. 410 , MS:O-53, San Diego, CA 92123
Phone: (858) 694-2129
Adaoha.Agu@sdcounty.ca.gov

Tiffany Allen, Treasury Manager, *City of Chula Vista*
Claimant Contact
Finance Department, 276 Fourth Avenue, Chula Vista, CA 91910
Phone: (619) 691-5250
tallen@chulavistaca.gov

Rachelle Anema, Division Chief, *County of Los Angeles*
Accounting Division, 500 W. Temple Street, Los Angeles, CA 90012
Phone: (213) 974-8321
RANEMA@auditor.lacounty.gov

Lili Apgar, Specialist, *State Controller's Office*
Local Reimbursements Section, 3301 C Street, Suite 740, Sacramento, CA 95816
Phone: (916) 324-0254
lapgar@sco.ca.gov

Socorro Aquino, *State Controller's Office*
Division of Audits, 3301 C Street, Suite 700, Sacramento, CA 95816
Phone: (916) 322-7522
SAquino@sco.ca.gov

Aaron Avery, Legislative Representative, *California Special Districts Association*
1112 I Street Bridge, Suite 200, Sacramento, CA 95814
Phone: (916) 442-7887
Aarona@csda.net

Ginni Bella Navarre, Deputy Legislative Analyst, *Legislative Analyst's Office*
925 L Street, Suite 1000, Sacramento, CA 95814
Phone: (916) 319-8342
Ginni.Bella@lao.ca.gov

Cindy Black, City Clerk, *City of St. Helena*
1480 Main Street, St. Helena, CA 94574
Phone: (707) 968-2742
ctzafopoulos@cityofsthelena.org

Jonathan Borrego, City Manager, *City of Oceanside*
Claimant Contact
300 North Coast Highway, Oceanside, CA 92054
Phone: (760) 435-3065
citymanager@oceansideca.org

Molly Brennan, Director of Finance, *City of National City*
Claimant Contact
1243 National City Blvd., National City, CA 91950
Phone: (619) 336-4330
finance@nationalcityca.gov

Guy Burdick, Consultant, *MGT Consulting*
2251 Harvard Street, Suite 134, Sacramento, CA 95815
Phone: (916) 833-7775
gburdick@mgtconsulting.com

Allan Burdick,
7525 Myrtle Vista Avenue, Sacramento, CA 95831
Phone: (916) 203-3608
allanburdick@gmail.com

Rica Mae Cabigas, Chief Accountant, *Auditor-Controller*
Accounting Division, 500 West Temple Street, Los Angeles, CA 90012
Phone: (213) 974-8309
rcabigas@auditor.lacounty.gov

Evelyn Calderon-Yee, Bureau Chief, *State Controller's Office*
Local Government Programs and Services Division, Bureau of Payments, 3301 C Street, Suite 740, Sacramento, CA 95816
Phone: (916) 324-5919
ECalderonYee@sco.ca.gov

Sheri Chapman, General Counsel, *League of California Cities*
1400 K Street, Suite 400, Sacramento, CA 95814
Phone: (916) 658-8267
schapman@calcities.org

Annette Chinn, *Cost Recovery Systems, Inc.*
705-2 East Bidwell Street, #294, Folsom, CA 95630
Phone: (916) 939-7901
achinncrs@aol.com

Carolyn Chu, Senior Fiscal and Policy Analyst, *Legislative Analyst's Office*
925 L Street, Suite 1000, Sacramento, CA 95814
Phone: (916) 319-8326
Carolyn.Chu@lao.ca.gov

Michael Coleman, *Coleman Advisory Services*
2217 Isle Royale Lane, Davis, CA 95616
Phone: (530) 758-3952
coleman@muni1.com

Erika Cortez, Administrative Services Director, *City of Imperial Beach*
Claimant Contact
825 Imperial Beach Boulevard, Imperial Beach, CA 91932
Phone: (619) 423-8303
ecortez@imperialbeachca.gov

Eric Dargan, Chief Operating Officer, *City of San Diego*
Claimant Contact
City Hall, 202 C Street, Suite 901A, San Diego, CA 92101
Phone: (858) 236-5587
Edargan@sandiego.gov

Thomas Deak, Senior Deputy, *County of San Diego*
Claimant Representative
Office of County Counsel, 1600 Pacific Highway, Room 355, San Diego, CA 92101
Phone: (619) 531-4810
Thomas.Deak@sdcounty.ca.gov

Kalyn Dean, Senior Legislative Analyst, *California State Association of Counties (CSAC)*
Government Finance and Administration, 1100 K Street, Suite 101, Sacramento, CA 95814
Phone: (916) 327-7500
kdean@counties.org

Margaret Demauro, Finance Director, *Town of Apple Valley*
14955 Dale Evans Parkway, Apple Valley, CA 92307
Phone: (760) 240-7000
mdemauro@applevalley.org

Tracy Drager, Auditor and Controller, *County of San Diego*
Claimant Contact
1600 Pacific Highway, Room 166, San Diego, CA 92101

Phone: (619) 531-5413
tracy.drager@sdcounty.ca.gov

Eric Feller, *Commission on State Mandates*
980 9th Street, Suite 300, Sacramento, CA 95814
Phone: (916) 323-3562
eric.feller@csm.ca.gov

Donna Ferebee, *Department of Finance*
915 L Street, Suite 1280, Sacramento, CA 95814
Phone: (916) 445-8918
donna.ferebee@dof.ca.gov

Tim Flanagan, Office Coordinator, *Solano County*
Register of Voters, 678 Texas Street, Suite 2600, Fairfield, CA 94533
Phone: (707) 784-3359
Elections@solanocounty.com

Jennifer Fordyce, Assistant Chief Counsel, *State Water Resources Control Board*
Office of Chief Counsel, 1001 I Street, 22nd floor, Sacramento, CA 95814
Phone: (916) 324-6682
Jennifer.Fordyce@waterboards.ca.gov

Lisa Fowler, Finance Director, *City of San Marcos*
Claimant Contact
1 Civic Center Drive, San Marcos, CA 92069
Phone: (760) 744-1050
lfowler@san-marcos.net

David Gibson, Executive Officer, *San Diego Regional Water Quality Control Board*
9174 Sky Park Court, Suite 100, San Diego, CA 92123-4340
Phone: (858) 467-2952
dgibson@waterboards.ca.gov

Juliana Gmur, Acting Executive Director, *Commission on State Mandates*
980 9th Street, Suite 300, Sacramento, CA 95814
Phone: (916) 323-3562
juliana.gmur@csm.ca.gov

Mike Gomez, Revenue Manager, *City of Newport Beach*
100 Civic Center Drive, Newport Beach, CA 92660
Phone: (949) 644-3240
mgomez@newportbeachca.gov

Catherine George Hagan, Senior Staff Counsel, *State Water Resources Control Board*
c/o San Diego Regional Water Quality Control Board, 2375 Northside Drive, Suite 100, San Diego, CA 92108
Phone: (619) 521-3012
catherine.hagan@waterboards.ca.gov

Shawn Hagerty, *Best Best & Krieger, LLP*
San Diego Office, 655 West Broadway, 15th Floor, San Diego, CA 92101
Phone: (619) 525-1300
Shawn.Hagerty@bbklaw.com

Heather Halsey, Executive Director, *Commission on State Mandates*
980 9th Street, Suite 300, Sacramento, CA 95814

Phone: (916) 323-3562
heather.halsey@csm.ca.gov

Sunny Han, Acting Chief Financial Officer, *City of Huntington Beach*
2000 Main Street, Huntington Beach, CA 92648
Phone: (714) 536-5630
Sunny.Han@surfcity-hb.org

Chris Hill, Principal Program Budget Analyst, *Department of Finance*
Local Government Unit, 915 L Street, 8th Floor, Sacramento, CA 95814
Phone: (916) 445-3274
Chris.Hill@dof.ca.gov

Tiffany Hoang, Associate Accounting Analyst, *State Controller's Office*
Local Government Programs and Services Division, Bureau of Payments, 3301 C Street, Suite 740, Sacramento, CA 95816
Phone: (916) 323-1127
THoang@sco.ca.gov

Christina Holmes, Director of Finance, *City of Escondido*
Claimant Contact
201 North Broadway, Escondido, CA 92025
Phone: (760) 839-4676
cholmes@escondido.org

Rachel Jacobs, Finance Director/Treasurer, *City of Solana Beach*
Claimant Contact
635 South Highway 101, Solana Beach, CA 92075-2215
Phone: (858) 720-2463
rjacobs@cosb.org

Jason Jennings, Director, *Maximus Consulting*
Financial Services, 808 Moorefield Park Drive, Suite 205, Richmond, VA 23236
Phone: (804) 323-3535
SB90@maximus.com

Heather Jennings, Director of Finance, *City of Santee*
Claimant Contact
10601 Magnolia Avenue, Building #3, Santee, CA 92071
Phone: (619) 258-4100
hjennings@cityofsanteeca.gov

Angelo Joseph, Supervisor, *State Controller's Office*
Local Government Programs and Services Division, Bureau of Payments, 3301 C Street, Suite 740, Sacramento, CA 95816
Phone: (916) 323-0706
AJoseph@sco.ca.gov

Anita Kerezsi, *AK & Company*
2425 Golden Hill Road, Suite 106, Paso Robles, CA 93446
Phone: (805) 239-7994
akcompanysb90@gmail.com

Joanne Kessler, Fiscal Specialist, *City of Newport Beach*
Revenue Division, 100 Civic Center Drive , Newport Beach, CA 90266
Phone: (949) 644-3199
jkessler@newportbeachca.gov

Zach Korach, Finance Director, *City of Carlsbad*
Claimant Contact
1635 Faraday Ave., Carlsbad, CA 92008
Phone: (442) 339-2127
zach.korach@carlsbadca.gov

Kari Krogseng, Chief Counsel, *Department of Finance*
1021 O Street, Suite 3110 , Sacramento, CA 95814
Phone: (916) 322-0971
Kari.Krogseng@dof.ca.gov

Lisa Kurokawa, Bureau Chief for Audits, *State Controller's Office*
Compliance Audits Bureau, 3301 C Street, Suite 700, Sacramento, CA 95816
Phone: (916) 327-3138
lkurokawa@sco.ca.gov

Michael Lauffer, Chief Counsel, *State Water Resources Control Board*
1001 I Street, 22nd Floor, Sacramento, CA 95814-2828
Phone: (916) 341-5183
michael.lauffer@waterboards.ca.gov

Eric Lawyer, Legislative Advocate, *California State Association of Counties (CSAC)*
Government Finance and Administration, 1100 K Street, Suite 101, Sacramento, CA 95814
Phone: (916) 650-8112
elawyer@counties.org

Kim-Anh Le, Deputy Controller, *County of San Mateo*
555 County Center, 4th Floor, Redwood City, CA 94063
Phone: (650) 599-1104
kle@smcgov.org

Fernando Lemus, Principal Accountant - Auditor, *County of Los Angeles*
Auditor-Controller's Office, 500 West Temple Street, Room 603, Los Angeles, CA 90012
Phone: (213) 974-0324
flemus@auditor.lacounty.gov

Erika Li, Chief Deputy Director, *Department of Finance*
915 L Street, 10th Floor, Sacramento, CA 95814
Phone: (916) 445-3274
erika.li@dof.ca.gov

Diego Lopez, Consultant, *Senate Budget and Fiscal Review Committee*
1020 N Street, Room 502, Sacramento, CA 95814
Phone: (916) 651-4103
Diego.Lopez@sen.ca.gov

Everett Luc, Accounting Administrator I, Specialist, *State Controller's Office*
3301 C Street, Suite 740, Sacramento, CA 95816
Phone: (916) 323-0766
ELuc@sco.ca.gov

Jill Magee, Program Analyst, *Commission on State Mandates*
980 9th Street, Suite 300, Sacramento, CA 95814
Phone: (916) 323-3562
Jill.Magee@csm.ca.gov

Darryl Mar, Manager, *State Controller's Office*
3301 C Street, Suite 740, Sacramento, CA 95816

Phone: (916) 323-0706
DMar@sco.ca.gov

Tim McDermott, Director of Finance, *City of Poway*
13325 Civic Center Drive, Poway, CA 92064
Phone: (858) 668-4411
tmcdermott@poway.org

Tina McKendell, *County of Los Angeles*
Auditor-Controller's Office, 500 West Temple Street, Room 603, Los Angeles, CA 90012
Phone: (213) 974-0324
tmckendell@auditor.lacounty.gov

Michelle Mendoza, *MAXIMUS*
17310 Red Hill Avenue, Suite 340, Irvine, CA 95403
Phone: (949) 440-0845
michellemendoza@maximus.com

Monica Molina, Finance Manager/Treasurer, *City of Del Mar*
Claimant Contact
1050 Camino Del Mar, Del Mar, CA 92014
Phone: (858) 755-9354
mmolina@delmar.ca.us

Jill Moya, Financial Services Director, *City of Oceanside*
300 North Coast Highway, Oceanside, CA 92054
Phone: (760) 435-3887
jmoya@oceansideca.org

Marilyn Munoz, Senior Staff Counsel, *Department of Finance*
915 L Street, Sacramento, CA 95814
Phone: (916) 445-8918
Marilyn.Munoz@dof.ca.gov

Tim Nash, Director of Finance, *City of Encinitas*
Claimant Contact
505 S Vulcan Avenue, Encinitas, CA 92054
Phone: N/A
finmail@encinitasca.gov

Kaleb Neufeld, Assistant Controller, *City of Fresno*
2600 Fresno Street, Fresno, CA 93721
Phone: (559) 621-2489
Kaleb.Neufeld@fresno.gov

Andy Nichols, *Nichols Consulting*
1857 44th Street, Sacramento, CA 95819
Phone: (916) 455-3939
andy@nichols-consulting.com

Dale Nielsen, Director of Finance/Treasurer, *City of Vista*
Claimant Contact
Finance Department, 200 Civic Center Drive, Vista, CA 92084
Phone: (760) 726-1340
dnielsen@ci.vista.ca.us

Adriana Nunez, Staff Counsel, *State Water Resources Control Board*
Los Angeles Regional Water Quality Control Board, 1001 I Street, 22nd Floor, Sacramento, CA

95814
Phone: (916) 322-3313
Adriana.Nunez@waterboards.ca.gov

Eric Oppenheimer, Executive Director, *State Water Resources Control Board*
1001 I Street, 22nd Floor, Sacramento, CA 95814-2828
Phone: (916) 341-5615
eric.oppenheimer@waterboards.ca.gov

Frederick Ortlieb, Senior Deputy City Attorney, *City of San Diego*
1200 Third Avenue, 11th Floor, San Diego, CA 92101
Phone: (619) 236-6318
fortlieb@sandiego.gov

Patricia Pacot, Accountant Auditor I, *County of Colusa*
Office of Auditor-Controller, 546 Jay Street, Suite #202 , Colusa, CA 95932
Phone: (530) 458-0424
ppacot@countyofcolusa.org

Arthur Palkowitz, *Law Offices of Arthur M. Palkowitz*
12807 Calle de la Siena, San Diego, CA 92130
Phone: (858) 259-1055
law@artpalk.onmicrosoft.com

Kirsten Pangilinan, Specialist, *State Controller's Office*
Local Reimbursements Section, 3301 C Street, Suite 740, Sacramento, CA 95816
Phone: (916) 322-2446
KPangilinan@sco.ca.gov

Helen Holmes Peak, *Lounsbery Ferguson Altona & Peak, LLP*
960 Canterbury Place, Ste. 300, Escondido, CA 92025
Phone: (760) 743-1201
hhp@lfap.com

Brian Pierik, *Burke,Williams & Sorensen,LLP*
2310 East Ponderosa Drive, Suite 25, Camarillo, CA 93010-4747
Phone: (805) 987-3468
bpierik@bwslaw.com

Johnnie Pina, Legislative Policy Analyst, *League of Cities*
1400 K Street, Suite 400, Sacramento, CA 95814
Phone: (916) 658-8214
jpina@cacities.org

Jai Prasad, *County of San Bernardino*
Office of Auditor-Controller, 222 West Hospitality Lane, 4th Floor, San Bernardino, CA 92415-0018
Phone: (909) 386-8854
jai.prasad@sbcountyatc.gov

Jonathan Quan, Associate Accountant, *County of San Diego*
Projects, Revenue, and Grants Accounting, 5530 Overland Ave, Suite 410, San Diego, CA 92123
Phone: 6198768518
Jonathan.Quan@sdcounty.ca.gov

Roberta Raper, Director of Finance, *City of West Sacramento*
1110 West Capitol Ave, West Sacramento, CA 95691
Phone: (916) 617-4509
robertar@cityofwestsacramento.org

David Rice, *State Water Resources Control Board*
1001 I Street, 22nd Floor, Sacramento, CA 95814
Phone: (916) 341-5161
david.rice@waterboards.ca.gov

Tammi Royales, Director of Finance, *City of La Mesa*
Claimant Contact
8130 Allison Avenue, PO Box 937, La Mesa, CA 91944-0937
Phone: (619) 463-6611
findir@cityoflamesa.us

Jessica Sankus, Senior Legislative Analyst, *California State Association of Counties (CSAC)*
Government Finance and Administration, 1100 K Street, Suite 101, Sacramento, CA 95814
Phone: (916) 327-7500
jsankus@counties.org

Alex Sauerwein, Attorney, *State Water Resources Control Board*
San Diego Regional Water Quality Control Board, 1001 I Street, 22nd Floor, Sacramento, CA 95814
Phone: (916) 327-8581
Alex.Sauerwein@waterboards.ca.gov

Michaela Schunk, Legislative Coordinator, *California State Association of Counties (CSAC)*
1100 K Street, Suite 101, Sacramento, CA 95814
Phone: (916) 327-7500
mschunk@counties.org

Cindy Sconce, Director, *MGT*
Performance Solutions Group, 3600 American River Drive, Suite 150, Sacramento, CA 95864
Phone: (916) 276-8807
csconce@mgtconsulting.com

Carla Shelton, *Commission on State Mandates*
980 9th Street, Suite 300, Sacramento, CA 95814
Phone: (916) 323-3562
carla.shelton@csm.ca.gov

Camille Shelton, Chief Legal Counsel, *Commission on State Mandates*
980 9th Street, Suite 300, Sacramento, CA 95814
Phone: (916) 323-3562
camille.shelton@csm.ca.gov

Wayne Shimabukuro, *County of San Bernardino*
Auditor/Controller-Recorder-Treasurer-Tax Collector, 222 West Hospitality Lane, 4th Floor, San Bernardino, CA 92415-0018
Phone: (909) 386-8850
wayne.shimabukuro@atc.sbcounty.gov

Natalie Sidarous, Chief, *State Controller's Office*
Local Government Programs and Services Division, 3301 C Street, Suite 740, Sacramento, CA 95816
Phone: 916-445-8717
NSidarous@sco.ca.gov

Jolene Tollenaar, *MGT Consulting Group*
2251 Harvard Street, Suite 134, Sacramento, CA 95815
Phone: (916) 243-8913
jolenetollenaar@gmail.com

Brian Uhler, Principal Fiscal & Policy Analyst, *Legislative Analyst's Office*
925 L Street, Suite 1000, Sacramento, CA 95814
Phone: (916) 319-8328
Brian.Uhler@LAO.CA.GOV

Antonio Velasco, Revenue Auditor, *City of Newport Beach*
100 Civic Center Drive, Newport Beach, CA 92660
Phone: (949) 644-3143
avelasco@newportbeachca.gov

Matthew Vespi, Chief Financial Officer, *City of San Diego*
202 C Street, 9th Floor, San Diego, CA 92101
Phone: (619) 236-6218
mvespi@sandiego.gov

Vincent Vu, Attorney, *State Water Resources Control Board*
San Diego Regional Water Quality Control Board, 1001 I Street, 22nd Floor, Sacramento, CA 95814
Phone: (916) 323-5669
Vincent.Vu@waterboards.ca.gov

Emel Wadhwani, Senior Staff Counsel, *State Water Resources Control Board*
Office of Chief Counsel, 1001 I Street, Sacramento, CA 95814
Phone: (916) 322-3622
emel.wadhwani@waterboards.ca.gov

Ada Waelder, Legislative Analyst, Government Finance and Administration, *California State Association of Counties (CSAC)*
1100 K Street, Suite 101, Sacramento, CA 95814
Phone: (916) 327-7500
awaelder@counties.org

Joe Ware, Finance Director, *City of Lemon Grove*
Claimant Contact
3232 Main Street, Lemon Grove, CA 91945
Phone: (619) 825-3803
jware@lemongrove.ca.gov

Renee Wellhouse, *David Wellhouse & Associates, Inc.*
3609 Bradshaw Road, H-382, Sacramento, CA 95927
Phone: (916) 797-4883
dwa-renee@surewest.net

Adam Whelen, Director of Public Works, *City of Anderson*
1887 Howard St., Anderson, CA 96007
Phone: (530) 378-6640
awhelen@ci.anderson.ca.us

Colleen Winchester, Senior Deputy City Attorney, *City of San Jose*
200 East Santa Clara Street, 16th Floor, San Jose, CA 95113
Phone: (408) 535-1987
Colleen.Winchester@sanjoseca.gov

R. Matthew Wise, Supervising Deputy Attorney General, *Department of Justice*
Attorney General's Office, 1300 I Street, Suite 125, PO Box 944255, Sacramento, CA 94244-2550
Phone: (916) 210-6046
Matthew.Wise@doj.ca.gov

Jacqueline Wong-Hernandez, Deputy Executive Director for Legislative Affairs, *California State Association of Counties (CSAC)*
1100 K Street, Sacramento, CA 95814
Phone: (916) 650-8104
jwong-hernandez@counties.org

Elisa Wynne, Staff Director, *Senate Budget & Fiscal Review Committee*
California State Senate, State Capitol Room 5019, Sacramento, CA 95814
Phone: (916) 651-4103
elisa.wynne@sen.ca.gov

Kaily Yap, Budget Analyst, *Department of Finance*
Local Government Unit, 915 L Street, Sacramento, CA 95814
Phone: (916) 445-3274
Kaily.Yap@dof.ca.gov

Helmholst Zinser-Watkins, Associate Governmental Program Analyst, *State Controller's Office*
Local Government Programs and Services Division, Bureau of Payments, 3301 C Street, Suite 700, Sacramento, CA 95816
Phone: (916) 324-7876
HZinser-watkins@sco.ca.gov